UNITED STATES

Aquaculture Atlas

Gulf of Alaska



An Aquaculture Opportunity Area Atlas for the Gulf of Alaska

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About this Document

The mission of the National Oceanic and Atmospheric Administration (NOAA) is to understand and predict changes in the Earth's environment and to conserve and manage coastal and oceanic marine resources and habitat to help meet our Nation's economic, social, and environmental needs. As a component of NOAA, the mission of the National Ocean Service (NOS) is to provide science-based solutions through collaborative partnerships to address evolving economic, environmental, and social pressures on our Great Lakes, ocean, and coasts. NOS is dedicated to advancing safe and efficient transportation and commerce, preparedness and risk reduction, stewardship, recreation, and tourism.

The National Centers for Coastal Ocean Science (NCCOS) is located within NOS and works to help NOAA meet its coastal stewardship and management responsibilities. NOAA's Technical Memorandum NOS NCCOS series works to achieve timely dissemination of scientific and technical information that is of high quality. The contents are of broad scope, including technical workshop proceedings, large data compilations, status reports and reviews, lengthy scientific or statistical monographs, and more. These reports are subjected to peer review and reflect sound, professional work.

This Alaska Atlas includes technical information that may be used to assist agency decision-makers in identifying potential Aquaculture Opportunity Areas (AOAs) as required by Executive Order (E.O.) 13921, Promoting American Seafood Competitiveness and Economic Growth (May 7, 2020), and to advance the goals laid out in E.O. 14276, Restoring American Seafood Competitiveness (April 17, 2025). The scientific results and conclusions, as well as any views or opinions expressed herein, are those of the authors and do not necessarily reflect the views of NOAA or the Department of Commerce. This report does not reflect any agency decision on the location of an AOA or preclude NOAA's ability to evaluate alternate locations. The information within this Atlas will be used as one source of information to assist the agency in identifying AOAs. The decision to identify an AOA will be made only after completion of the National Environmental Policy Act process and consideration of the information presented in a programmatic environmental impact statement (PEIS), as required by E.O. 13921. The PEIS will evaluate the potential impacts of identifying AOAs and siting aquaculture in those locations, as informed by this Atlas and other relevant sources of information. The PEIS will, therefore, evaluate alternatives and provide robust information to support agency decision-making to identify a location as an AOA. The PEIS will be developed with multiple opportunities for public comment and in coordination with interested parties, organizations, and agencies, including federal, state, and local agencies, and tribal governments. This Atlas was developed for the specific purpose of informing identification of locations that might be suitable for locating AOAs and includes limitations specific to that purpose.

This Atlas was developed following the Atlas for the Southern California Bight (Morris et al., 2021) and the Atlas for the Gulf of Mexico (Riley et al., 2021), sharing common methodologies and text. The sequencing and content of many sections are intentionally similar given the relevance and similar marine planning processes that were common in all three regions.

The work presented here is the result of an AOA spatial suitability model developed by NCCOS in coordination with subject matter experts at NCCOS, the National Marine Fisheries Service Alaska Region, and State of Alaska government agencies. This team

provided input during the model construction process, reviewed data layers, assigned weights, and informed the model development and interpretation of results. These parties are referred to herein as the Gulf of Alaska AOA Siting Team ("the Team"). The authors developed all substantive content, data, and conclusions, and take full responsibility for the content of this document.



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Executive Summary

Aquaculture has been among the fastest-growing global food production sectors for decades. Although the U.S. has a substantial coastline, the world's largest exclusive economic zone, a skilled maritime labor force, advanced technology and research, and the second-largest seafood market in the world, U.S. aquaculture production has not kept pace with global trends. For over a century, Alaska has been synonymous with American seafood. While this has primarily been linked to wild-capture fisheries, recent declines in fishing revenue, advances in aquaculture science, technology, and policy, and increasing public and private investment in aquaculture have made Alaska the next frontier for U.S. aquaculture development. However, despite the popular perception of Alaska as a vast open space, the state's coastal waters are some of the nation's busiest, with almost every aspect of life and the economy of coastal Alaska intrinsically tied to the ocean. Strategic expansion of aquaculture requires responsible siting led by innovative spatial modeling to integrate pertinent spatial data into an ecosystem-based approach to aquaculture that promotes socially and environmentally sustainable planning. Such an approach facilitates equitable use of resources, and those environmental considerations are addressed at the onset. Presidential Executive Order (E.O.) 13921, Promoting American Seafood Competitiveness and Economic Growth (May 7, 2020), and E.O. 14276, Restoring American Seafood Competitiveness (April 17, 2025), called for the expansion of sustainable seafood production in the U.S. to ensure food security; provide environmentally safe and sustainable seafood; support American workers; establish coordinated, predictable, and transparent federal action; and remove unnecessary regulatory burdens. Directives under E.O. 13921 require the Secretary of Commerce, in consultation with relevant federal agencies and state and tribal governments to identify Aquaculture Opportunity Areas (AOAs) suitable for commercial offshore aquaculture development.

To support E.O. 13921 requirements to identify AOAs, NCCOS collaborated with the National Marine Fisheries Service (NMFS) and the State of Alaska to initiate a marine spatial planning (MSP) process to identify potential AOA options within state waters of Alaska. This effort is focused on siting shellfish and seaweed aquaculture. Finfish aquaculture is restricted to stock enhancement activities in Alaska so was, therefore, not considered in this analysis. The area of interest (AOI) was delineated based on spatial connectedness to shore-based infrastructure, environmental constraints for aquaculture, state and federal water demarcations, and boundaries associated with state aquaculture policies and regulation of submerged lands. A series of public engagement approaches including a Request for Information published in the Federal Register (88 FR 72046; October 19, 2023) and a Notice of Availability published in the Federal Register (90 FR 17051; April 21, 2025), spatial planning workshops, and numerous one-on-one meetings with partners and local, state, federal, and tribal governments further defined the AOI.

Ten study areas were selected in Alaska state waters centered around the population centers of Juneau, Sitka, Petersburg, Wrangell, Craig, Ketchikan, Seward, Valdez, Cordova, and Kodiak Island. Geospatial analyses for identification of AOA options were based on a categorical framework to ensure relevant, comprehensive data acquisition and characterization for spatial suitability modeling. An authoritative spatial data inventory was developed that included data layers relevant to administrative boundaries, national security (i.e., military), navigation and transportation, energy and industry infrastructure, commercial and

recreational fishing, existing aquaculture operations, natural and cultural resources, and oceanography. A total of 80 data layers were used across these categories in both the suitability analysis and in characterization.

The spatial analysis detailed in this report was designed to meet certain planning goals and criteria within Alaska state waters. The NMFS and Alaska AOA Interagency Working Group selected a planning goal to identify up to 4,000 acres (ac) of suitable subtidal AOA options (up to 2,000 ac for seaweed and up to 2,000 ac for shellfish, or a combination) and up to 100 ac of suitable intertidal AOA options within each study area.

The modeling approach was designed to meet the industry and engineering requirements of depth (no more than 200 ft [61 m]) and distance from coastal population centers (no more than 25 nautical miles), and to ensure options were of sufficient size (50–2,000 ac) to support multiple aquaculture operations while accounting for setbacks (buffers) and potential reductions in size to accommodate vessel fairways or other potential conflicting uses.

The spatial analysis resulted in the identification of 77 final AOA options across all study areas, which cover a total of 13,031 ac across the 10 study areas. Of the 77 AOA options, 66 were subtidal locations covering a total of 12,140 ac across the 10 study areas. The subtidal acreage varied between each study area, ranging from a minimum of two subtidal AOA options (covering 440 ac) in Seward to a maximum of 13 subtidal AOA options (covering 1,947 ac) in Kodiak. Similarly, the results showed variability in available intertidal areas. No intertidal options were identified in Cordova, Seward, or Valdez, largely due to the steep shoreline conditions. In the remaining seven study areas, 11 intertidal AOA options were identified, spanning a total of 893 ac.

The spatial modeling approach used in this analysis was designed to support the identification of discrete areas within Alaska's state waters, ranging from approximately 50 to 2,000 ac, that may be suitable for shellfish and macroalgae aquaculture development. The modeling framework was developed to inform NMFS as part of the broader planning process for AOAs and will contribute to the development of the PEIS. Following completion of the PEIS, one or more areas may be formally identified as AOAs. This analysis supports AOA identification by offering spatial modeling results tailored to Alaska's unique geography and governance. While the Atlas provides valuable insights into early siting considerations, its use should remain focused on AOA planning.

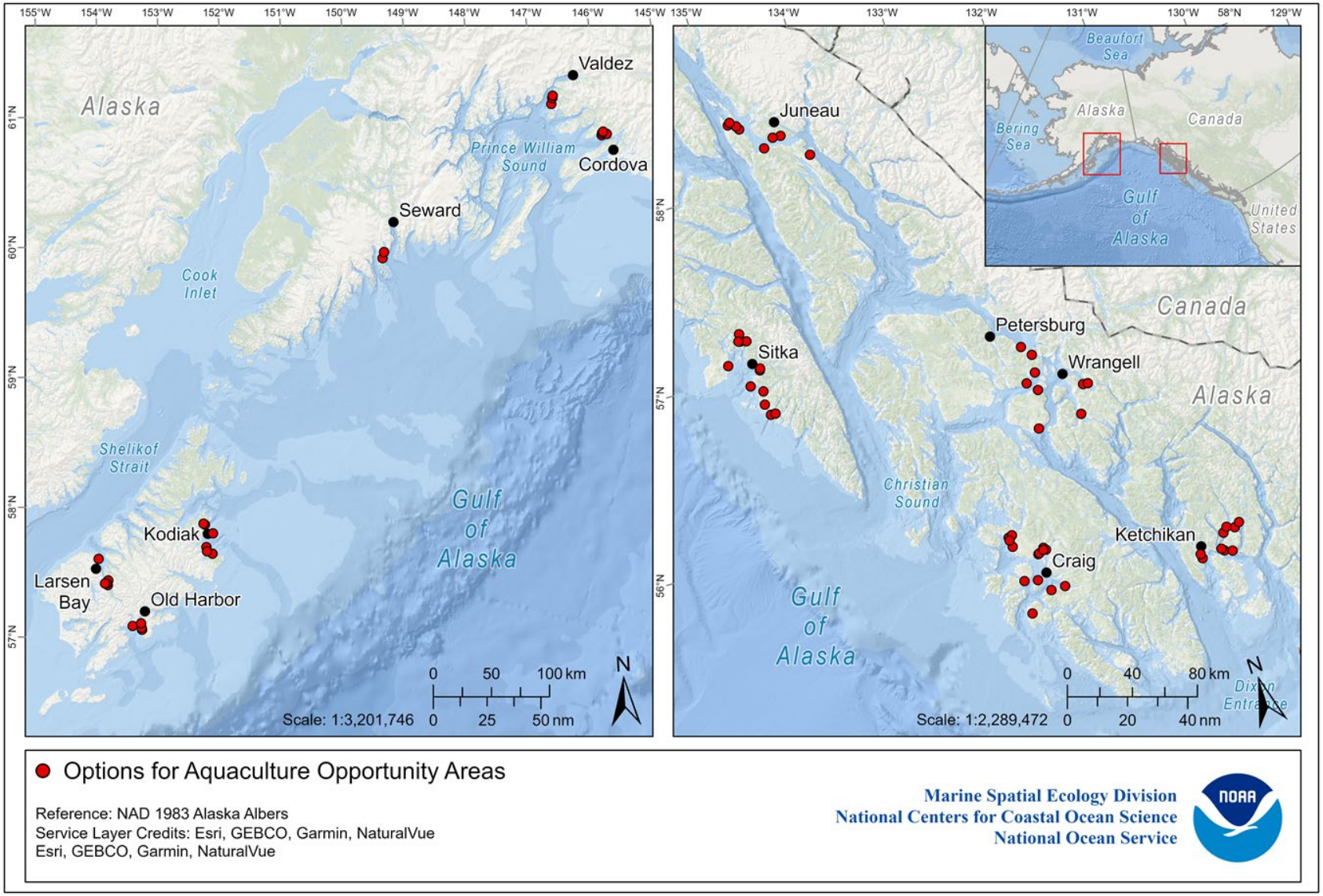
The waters off Alaska are both culturally and economically vital to those who call Alaska home and to the nation. These waters have sustained Indigenous Peoples for over 10,000 years, and the coastline and ocean are deeply tied to their longstanding traditions and identities. Economically, Alaska's waters are a powerhouse for tourism and fishing industries. Commercial and sport fishing support thousands of jobs and generates billions in revenue. Subsistence fishing remains crucial for rural Alaskans who harvest thousands of tons of wild food annually, balancing economic necessity with cultural tradition. The intersection of cultural heritage and economic reliance makes Alaska's waters a focal point for conservation and policy debates, as communities strive to protect their way of life while ensuring sustainable use of marine resources. Due to this complexity, it is expected that many of the important and diverse aspects of the multifaceted cultural, socioeconomic, and environmental landscape of coastal Alaskan waters cannot be fully captured within an MSP framework. However, rigorous MSP science can guide the siting of an informed, forward-looking, and sustainable industry that maximizes efficiencies and minimizes adverse interactions with other users and resources.

The suitability modeling presented here to identify AOA options in Alaska is the first-ever application of MSP in U.S. state waters for the development of aquaculture at this scale. The results of this analysis provide compelling evidence for the opportunities as well as challenges of siting aquaculture in the coastal waters of Alaska.

Advancements in marine planning for aquaculture, prior to embarking on permitting, can support effective permitting processes, avoid space-use conflicts, address public concerns, and support business planning practices. The identification of AOA options is a planning process.

While identifying AOA options can help applicants with site selection and environmental analysis, it is not a preapproval for any location. Applicants for future aquaculture operations will still have to go through the full state and federal permitting and environmental review processes. With that in mind, it is the intent that this work will inform and empower aquaculture proponents and coastal managers to realize the full potential for aquaculture development in Alaska state waters.





(Reprinted from Results, Figure 3.64.). Distribution of final AOA options in Alaska state waters for the Southwest, Southcentral, and Southeast Alaska regions. Red circles represent the locations of the final options but do not reflect the size of the options.

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Acronyms and Abbreviations

ac	acre
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOTPF	Alaska Department of Transportation and Public Facilities
AHRS	Alaska Heritage Resources Survey
AIS	automatic identification system
AK	Alaska
AKR	Alaska Region
AMTF	Alaska Mariculture Task Force
AOA	Aquaculture Opportunity Area
AOI	area of interest
AOOS	Alaska Ocean Observing System
AS	Alaska Statutes
BIA	Biologically Important Area
BOEM	Bureau of Ocean Energy Management
C.F.R.	Code of Federal Regulations
CO-OPS	Center for Operational Oceanographic Products and Services
COR	Cordova
CPP	coastal populated place
CRA	Craig
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
DPS	distinct population segment
EAA	ecosystem approach to aquaculture
EDPS	eastern distinct population segment
EFH	Essential Fish Habitat
ENC	Electronic Navigational Chart
ENP	Eastern North Pacific
E.O.	Executive Order
ESI	Environmental Sensitivity Index
ESA	Endangered Species Act
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EVOS	Exxon Valdez oil spill
FR	Federal Register
FUDS	Formerly Used Defense Sites
GDP	gross domestic product
GHRSST	Group for High Resolution Sea Surface Temperature
GIS	Geographic Information System
GOA	Gulf of Alaska
HAB	harmful algal bloom
IBA	Important Bird Area
JPL	Jet Propulsion Laboratory
JUN	Juneau
Kd	diffuse light attenuation coefficient

KDE	kernel density estimation
KET	Ketchikan
KOD	Kodiak
MAIASC	Military Aviation and Installation Assurance Siting Clearinghouse
MHW	mean high water
MHHW	mean high-high water
mi	statute mile
MLLW	mean low-low water
MMPA	Marine Mammal Protection Act
MSP	Marine Spatial Plan/Planning
NAA	National Aquaculture Act
NADP	National Aquaculture Development Plan
NCCOS	National Centers for Coastal Ocean Science
NMFS	National Marine Fisheries Service
nm	nautical mile
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NREL	National Renewable Energy Laboratory
NWI	National Wetlands Inventory
OCM	Office for Coastal Management
OLCI	Ocean and Land Colour Instrument
PEIS	programmatic environmental impact statement
PET	Petersburg
RFI	Request for Information
SARDFA	Southeast Alaska Regional Dive Fisheries Association
SCA	Joint Subcommittee on Aquaculture
SEAFAC	Southeast Alaska Acoustic Measurement Facility
SEAFA	Southeast Alaska Fishermen's Alliance
SEAK	Southeast Alaska
SEW	Seward
SIT	Sitka
SMA	Special Management Area
TMAA	Temporary Maritime Activities Area
TOPSIS	Technique for Order of Preference by Similarity to Ideal Solution
TRMZ	Tideland Resource Management Zone
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USACE – AD	U.S. Army Corps of Engineers Alaska District
U.S.C.	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VAL	Valdez
WDPS	western distinct population segment
WNP	Western North Pacific
WPTO	Water Power Technology Office
WRA	Wrangell
WTK-LED	WIND Toolkit Long-Term Ensemble Dataset
Y-SEAK	Yakutat-Southeast Alaska

Species List

Common name	*Scientific name*
Alaska plaice	*Pleuronectes quadrituberculatus*
Alaska (walleye) pollock	*Gadus chalcogrammus*
Alaska red ribbon kelp	*Palmaria palmata*
Alaska skate	*Arctoraja parmifera*
Aleutian skate	*Bathyraja aleutica*
arrowtooth flounder	*Atheresthes stomias*
Atka mackerel	*Pleurogrammus monopterygius*
black seaweed	*Pyropia abbottiae*
bull kelp	*Nereocystis luetkeana*
California sea cucumber	*Apostichopus californicus*
chinook salmon	*Oncorhynchus tshawytscha*
chum salmon	*Oncorhynchus keta*
cockles	*Cardium* spp.
coho salmon	*Oncorhynchus kisutch*
Dall's porpoise	*Phocoenoides dalli*
dragon kelp	*Eualaria fistulosa*
English sole	*Parophrys vetulus*
fin whale	*Balaenoptera physalus*
five-ribbed kelp	*Costaria costata*
flathead sole	*Hippoglossoides elassodon*
giant kelp	*Macrocystis pyrifera*
gray whale	*Eschrichtius robustus*
Greenland turbot	*Reinhardtius hippoglossoides*
harbor porpoise	*Phocoena phocoena*
harbor seal	*Phoca vitulina*
harlequin rockfish	*Sebastes variegatus*
humpback whale	*Megaptera novaeangliae*
Kamchatka flounder	*Atheresthes evermanni*
killer whale	*Orcinus orca*
longspine thornyhead rockfish	*Sebastolobus altivelis*
minke whale	*Balaenoptera acutorostrata*
North Pacific right whale	*Eubalaena japonica*

Common name	*Scientific name*
northern rockfish	*Sebastes polyspinis*
Pacific blue mussel	*Mytilus* trossulus
Pacific cod	*Gadus macrocephalus*
Pacific Dover sole	*Microstomus pacificus*
Pacific geoduck	*Panopea generosa*
Pacific herring	*Clupea pallasii*
Pacific ocean perch	*Sebastes alutus*
Pacific oyster	*Crassostrea gigas*





Common name	*Scientific name*
pink salmon	*Oncorhynchus gorbuscha*
red ribbon seaweed	*Devaleraea mollis*
red sea urchin	*Mesocentrotus franciscanus*
redbanded rockfish	*Sebastes babcocki*
rex sole	*Glyptocephalus zachirus*
ribbon kelp	*Alaria marginata*
rock sole	*Lepidopsetta bilineata*
rockfish	*Sebastes* spp.
rougheye rockfish	*Sebastes aleutianus*
sablefish	*Anoplopoma fimbria*
sea otter	*Enhydra lutris*
sharpchin rockfish	*Sebastes zacentrus*
shortraker rockfish	*Sebastes borealis*
shortspine thornyhead rockfish	*Sebastolobus alascanus*
sieve kelp	*Agarum clathratum*
sockeye salmon	*Oncorhynchus nerka*
sperm whale	*Physeter macrocephalus*
starry flounder	*Platichthys stellatus*
Steller sea lion	*Eumetopias jubatus*
Steller's eider	*Polysticta stelleri*
sugar kelp	*Saccharina latissima*
sunflower sea star	*Pycnopodia helianthoides*
Tanner crab	*Chionoecetes bairdi*
three-ribbed kelp	*Cymathaere triplicata*
yelloweye rockfish	*Sebastes ruberrimus*
yellowfin sole	*Limanda aspera*

Unit Conversions

Common units of measure utilized within this publication. Units are listed as imperial units with the metric equivalent. In the Atlas units are reported in imperial or in the format of the original data, regulation, or policy, when relevant, with imperial equivalents added.

Length	
Imperial	*Metric*
1.00 inch	2.54 centimeters
1.00 foot	30.48 centimeters
1.00 statute mile	1.61 kilometers
1.00 nautical mile	1.85 kilometers
Volume	
1.00 gallon	3.78 liters
1.00 cubic foot	0.03 cubic meters
1.00 barrel	158.99 liters
Temperature	
32° Fahrenheit	0° Celsius

Area	
Imperial	*Metric*
1.00 square nautical mile	3.43 square kilometers
1.00 acre	0.40 hectare
Mass	
1.00 pound	0.45 kilograms
2,205.00 pounds	1.00 metric ton







INTRODUCTION

Background

The world's population is an estimated 8.1 billion and is expected to reach 10.2 billion by 2030 (United Nations 2024). Seafood accounts for 15% to 17% of the animal protein consumed worldwide and is an essential source of nutrition, especially in developing nations and growing middle-class areas (FAO 2024). Scientists have long recognized that eating seafood has many health benefits, helping people stay healthy and well nourished (Bang and Dyerberg 1980, Kromhout et al. 1985, Mozaffarian and Rimm 2006, Costello et al. 2020). Because of these benefits, demand for sustainable seafood has increased, making fish and shellfish the most traded food products in the world (Gephart et al. 2017, Guillen et al. 2019, Costello et al. 2020). In 2022, global fisheries and aquaculture production reached a record 223.2 million metric tons, valued at $472 billion. While wild fish catches have remained about the same for decades, aquaculture has grown by 6.6% since 2020 and now provides over 57% of the seafood people eat globally (FAO 2024). Global aquaculture is worth about $313 billion a year, but the U.S. produces only a small share—around 0.5%, valued at $1.7 billion in 2022 (NOAA NMFS 2024a). With ocean ecosystems under stress, there is growing awareness of the need to manage fisheries and aquaculture responsibly to meet the rising demand for sustainable seafood.

Global Aquaculture Development

Aquaculture has been one of the fastest growing food production sectors worldwide for many years. In 2022, the industry reached a significant milestone when aquatic animal farming surpassed wild fish catch (capture fisheries) for the first time (FAO 2024). Today, aquaculture produces over 130 million metric tons of seafood each



year, valued at more than $300 billion. Most of this growth has predominantly come from land-based freshwater systems, but coastal and marine aquaculture is also expanding. In 2022, marine and coastal aquaculture reached 71.1 million metric tons worldwide. This growth has come from farmed finfish, but production of mollusks also grew by one million tons between 2020 and 2022, a 15.6% increase. Seaweed farming has grown even more dramatically, with production in marine and coastal systems tripling between 2000 and 2022 to reach 36.4 million metric tons (wet weight), worth more than $17 billion (FAO 2024). With new markets continuing to develop, the value of seaweed farming is expected to increase by another $11.8 billion by 2030 (The World Bank 2023).

As the global human population grows, aquaculture production is expected to keep rising to help meet the need for more food. With this expansion, there has been more pressure to improve sustainability, particularly over the last 20 years. This pressure has led to better technology, governance, planning, and the use of advanced mapping tools to choose suitable locations for farms (Naylor et al. 2021). One significant improvement has been in the design and engineering of aquaculture systems, which are now better able to handle strong waves and currents in offshore and coastal waters (Fredriksson et al. 2003, Fredheim and Langan 2009, Goudey 2009, Lekang 2013, Holm et al. 2017). These advances help increase seafood production while also reducing environmental risks and avoiding conflicts with other coastal activities (Kapetsky et al. 2013, Froehlich et al. 2021).



U.S. Aquaculture Policies

The National Aquaculture Act of 1980

In 1980, Congress passed the National Aquaculture Act (NAA) (16 U.S. Code [U.S.C.] § 2801 et seq.) to create a national policy for aquaculture. This law recognized the importance of reducing the U.S. seafood trade deficit, supporting both commercial and recreational fisheries, and producing renewable food resources to meet future needs in the U.S. and around the world. The act gave the Secretary of Agriculture the role of leading a special group called the Joint Subcommittee on Aquaculture (SCA). This subcommittee was initially created in 1978 by Executive Order (E.O.) 12039, Science and Technology Policy Functions (February 23, 1978), and works within the Office of Science and Technology Policy. The SCA was responsible for creating a National Aquaculture Development Plan (NADP).



In 2024, the SCA updated the NADP by creating three strategic plans focused on: (1) aquaculture research, (2) economic development, and (3) regulatory efficiency. These plans were developed with input from federal and state agencies, tribes and indigenous communities, universities, aquaculture producers, and other ocean users. The goal is to support and guide the responsible, coordinated growth of aquaculture in the U.S.

U.S. Department of Commerce and NOAA Aquaculture Policies

After the NAA was passed in 1980, the U.S. government launched several initiatives. It produced major reports to support the growth of nearshore and offshore aquaculture and to improve marine spatial planning (MSP) in U.S. waters. Despite these efforts, aquaculture in the U.S. still faces challenges related to science, economics, laws, and production (Cicin-Sain et al. 2005, Lester et al. 2018, Rubino 2022).

To help speed up aquaculture development, two significant federal policies were created. In line with the NAA, the U.S. Department of Commerce (DOC) released its Aquaculture Policy in 2011, which outlined goals and priorities for all DOC agencies, including NOAA. This policy focuses on promoting jobs, economic growth, innovation, and international competitiveness. It was developed in partnership with the U.S. Department of Agriculture, Food and Drug Administration, Department of the Interior, and the SCA. The policy aims to make the U.S. a global leader in sustainable, innovative aquaculture and to encourage sustainable aquaculture practices worldwide.

Building on the DOC Aquaculture Policy, NOAA released its Marine Aquaculture Policy in 2011, which reinforced the importance of

aquaculture within NOAA's mission to protect the ocean and support healthy coastal communities and economies. Under federal law, NOAA NMFS is also responsible for protecting ocean habitats, endangered species, and sustainable fisheries. That means NMFS must also review and manage the environmental impacts of proposed and current marine aquaculture operations to make sure they are safe and sustainable.

Executive Order 13921

Presidential E.O. 13921, Promoting American Seafood Competitiveness and Economic Growth (May 7, 2020), called for the expansion of sustainable seafood production in the U.S. to ensure food security; provide environmentally safe and sustainable seafood; support American workers; ensure coordinated, predictable, and transparent federal actions; and remove unnecessary regulatory burdens. Section 7 of the E.O. directs the Secretary of Commerce to identify Aquaculture Opportunity Areas (AOAs) in consultation with the Secretary of Defense, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Homeland Security, the Administrator of the Environmental Protection Agency, other appropriate federal officials, appropriate Regional Fishery Management Councils, and in coordination with applicable state and tribal governments. The E.O. directs NOAA to 1) identify geographic areas containing locations suitable for commercial aquaculture and 2) complete a programmatic environmental impact statement (PEIS) for each region to assess the impact of siting aquaculture facilities there. This Atlas details an MSP process to assist agency decision-makers in identifying geographic areas that may be suitable for locating AOAs as required by E.O. 13921. The AOA options identified here serve as one source of information to be used by NMFS to inform the development of the PEIS.

Executive Order 14276

Presidential E.O. 14276, Restoring American Seafood Competitiveness (April 17, 2025), reinforces and builds on the efforts of E.O. 13921 through the streamlining and unburdening of regulations and the promotion of domestic seafood products. Section 4(a) calls for the review of seafood production regulations with the goal of suspending, revising, or rescinding any that overburden seafood production. Section 4(d) further directs the Secretary of Commerce, in consultation with the Secretary of Agriculture, to develop and implement an America First Seafood Strategy to promote U.S. seafood products. This section of the E.O. also calls for efforts to educate American consumers about the health benefits of seafood and to increase inclusion of seafood in nutrition programs. The E.O. further calls for improvements in fishery assessments and monitoring, as well as additional evaluations of trade efficiencies and imbalances.



State of U.S. Aquaculture

U.S. Aquaculture Opportunity

The U.S. has long coastlines with ideal ocean depths, current speeds, and water temperature, plus the right technology, accessible ports, skilled workers, and a strong seafood market for growing U.S. marine aquaculture (Nash 2004, Kapetsky et al. 2013, Kite-Powell et al. 2013, Knapp and Rubino 2016, Lester et al. 2018, Rubino 2022). For example, the market for half-shell oysters is expanding, and demand for clams and other shellfish remains high (Lima 2025). In 2022, marine aquaculture in the U.S. was worth $441 million and produced over 36,000 metric tons of seafood. Of this, shellfish (oysters, clams, and mussels) made up 72% of the total value, followed by salmon, which made up 26% of the value of marine aquaculture in the U.S. (NOAA NMFS 2024a).

Regionally, the Atlantic coast accounted for 36% of production and 43% of value. The Gulf of America made up 39% of production and 21% of value, while the Pacific coast represented 25% of production and 36% of value. Seaweed farming is also growing quickly in the U.S., with many farms in New England, the Pacific Northwest, and Alaska (NOAA NMFS 2024a). In 2022, U.S. seaweed farms produced over 1,000 metric tons (NOAA NMFS 2024a), but the country still imports 10,000 metric tons each year for food and industry use (Kim et al. 2019).

Despite this vast potential and recent growth, the U.S. is still a minor player in global seafood production, contributing only 9.6% of total worldwide capture and aquaculture combined (FAO 2024). U.S. aquaculture makes up less than 1% of global farmed seafood and ranks 19th in the world (NOAA NMFS 2024a). Between 70% to 90% of the seafood Americans eat comes from other countries, and over half of that is farm raised (NOAA NMFS 2024a). In 2023, the U.S. seafood trade deficit hit $20.3 billion (U.S. Department of Agriculture 2024). Much of the imported seafood is either farmed overseas or caught by U.S. fishermen, sent abroad for processing, and then re-imported (NOAA NMFS 2021a). Due to its large population, the U.S. is the second-largest consumer of seafood in the world after China, but per capita consumption is much lower in the U.S. at ~20 lb/year (NOAA NMFS 2024a), with the U.S. ranking outside of the top 20 countries (FAO 2024). For years, the U.S. has relied on seafood imports from Asia, Central America, and South America to meet demand. While aquaculture is growing fast around the world, especially overseas, U.S. companies and investors are often helping fund and develop that growth abroad (Knapp and Rubino 2016, Lester et al. 2018, Rubino 2022).

There are ongoing debates in the U.S. about food safety, sustainability, and ethical concerns tied to seafood imports. Meanwhile, there are also considerable human rights issues connected to seafood production abroad and therefore entwined in the global seafood trade (Teh et al. 2019). Thus, marine aquaculture can play a significant role in producing ethically responsible and sustainable seafood in the U.S. and contribute to improving the stability and diversity of the country's seafood supply, especially as we face climate and economic uncertainties. Growing more seafood at home, where there are strong environmental rules, safety standards, and advanced technologies, can protect ocean resources, create jobs, and strengthen the U.S. blue economy. Owing to high standards and skilled scientists and engineers, the U.S. is seen as a global leader in sustainable seafood production.

History and Current Status of Aquaculture in Alaska

Alaska has a long history with aquaculture, with evidence of clam gardens dating back to the late Holocene (Baird et al. 2022, Gillispie 2018). Modern aquaculture in Alaska dates back to the late 1970s, with a handful of farms in Southeast Alaska focused on Pacific oyster culture. The state experienced modest growth until the development of a formal regulatory framework under the Alaska Aquatic Farm Act (Alaska Statutes [AS] 16.40.100–199) in 1988. The Aquatic Farm Act authorized the Commissioner of the Alaska Department of Fish and Game (ADFG) to issue permits for the construction or operation of aquatic farms and hatcheries to supply aquatic plants or shellfish to aquatic farms. The law limited aquatic farming within state waters to shellfish and aquatic plants, and in 1990, Alaska House Bill 432 became law, prohibiting the farming of finfish in the state. The same statute also authorizes the Alaska Department of Natural Resources (ADNR) to issue leases for aquatic farming (AS 38.05.083). The Alaska Department of Environmental Conservation (ADEC) is charged under AS 17.20. to regulate food safety. The three agencies (ADFG, ADNR, and ADEC) jointly administer the statewide aquatic farm program, each with its specific role in authorizing and managing aquatic farm activities within Alaska. The term “mariculture” was popularly adopted by the state and industry to describe invertebrate and seaweed aquaculture. Mariculture was defined as “the farming of shellfish and aquatic plants as defined in AS 16.40.199.” in the Alaska statute in 2024 under AS 16.10.890–16.10.945. The terms aquaculture or aquatic farming are generally interchangeable with mariculture, and both terms are used in this Atlas.

In 2014, the Alaska Fisheries Development Foundation received a grant from NOAA for the Alaska Mariculture Initiative, an effort to accelerate the development of mariculture in Alaska with the vision to grow a $100 million industry in 20 years. As a result of the initiative, former Governor William Walker established the Alaska Mariculture Task Force (AMTF) in 2016 by Administrative Order No. 280. The AMTF was directed to create a comprehensive plan to boost the mariculture industry, which includes aquatic farming and enhancement of wild fisheries in Alaska. The recommendations developed by the AMTF include details on public and private investments, regulatory issues, research and development needs, environmental changes, public education, and workforce development. The AMTF published the Alaska Mariculture Development Plan, which sought to grow mariculture into a $100 million annual industry within 20 years. The plan focused on expanding hatchery capacity, streamlining regulations, attracting investment, and boosting market demand for shellfish and seaweed. Workforce development, tribal participation, and research innovation were central pillars of this work. The work being done by the AMTF transitioned to the private non-profit organization Alaska Mariculture Alliance, in 2021.

The U.S. Economic Development Administration awarded the Alaska Southeast Economic Development Conference a $49 million Build Back Better Regional Challenge grant to catalyze a sustainable mariculture industry for the long-term benefit of Alaska's economy, environment, and communities. These funds were further bolstered by a 20% match from the State of Alaska and led to the development of the coalition Alaska Mariculture Cluster, with initiatives focused on mariculture innovation, workforce development, infrastructure, and equity-focused growth in Alaska’s coastal communities. Key efforts include joint innovation projects managed by the Alaska Fisheries Development Foundation, which are improving kelp and shellfish farming techniques, developing new mooring technologies and advancing gear engineering, and

enhancing product quality. Workforce development is underway through the University of Alaska Fairbanks and the Alaska Mariculture Research and Training Center. Infrastructure support includes $2.3 million in equipment funding for nine Alaskan entities, including three Alaska Native organizations, to address hatchery and processing bottlenecks. The initiative emphasizes tribal and community engagement, with half of the funding directed to underserved communities and 25% specifically allocated to Alaska Native communities. Partnering with Sealaska, the Cluster integrates cultural and economic priorities of Tlingit, Haida, and Tsimshian shareholders.

In 2022, the EVOS Trustee Council awarded the Alaska Mariculture Research and Restoration Consortium $32 million over a 10-year period. This consortium is a partnership between scientists and Alaska seaweed and shellfish farmers in the spill-affected area from Prince William Sound, Kachemak Bay, to Kodiak, Alaska. Project components include: restoration, looking at the ecological effects of mariculture industry in the spill area, farm and business development in the spill area, and coordinated outreach and education activities to make scientific information publicly available. NMFS Alaska Fisheries Science Center is working under the consortium to understand regional variation and oceanographic influences on oyster and kelp production, developing oyster hatchery methods suitable to Alaska, enhancing selective breeding efforts to optimize oysters for Alaska farming conditions, and monitoring the influence of farms on fish and invertebrate occupancy.

In 2024, the Alaska Legislature awarded $7 million to the University of Alaska for aquaculture training and development. As of 2024, Alaska had 91 aquatic farms authorized under operation permits, covering approximately 1,644 acres (ac) of state tidelands. These farms are concentrated in the Southeast and Southcentral regions, as well as Kodiak Island. The primary species cultured are Pacific oysters (*Crassostrea gigas*) and several kelp varieties, including sugar kelp (*Saccharina latissima*), ribbon kelp (*Alaria marginata*), and bull kelp (*Nereocystis luetkeana*). Additional species permitted for culture include Pacific blue mussels (*Mytilus trossulus*), Pacific geoduck (*Panopea generosa*), Alaska red ribbon kelp (*Palmaria palmata*), giant kelp (*Macrocystis pyrifera*), dragon kelp (*Eualaria fistulosa*), black seaweed (*Pyropia* spp.), three-ribbed kelp (*Cymathaere triplicata*), and five-ribbed kelp (*Costaria costata*). In total, 42 algal and invertebrate species have been approved for hatcheries and aquatic farms in Alaska, among them scallops, Kumamoto oysters, cockles, sea lettuce, and sea urchins.

In terms of production, aquatic farming sales in Alaska reached just below $1.6 million in 2024, with shellfish accounting for nearly $1.5 million and seaweed contributing about $50,000. Growers reported harvesting 2.4 million market oysters, representing an 80% increase compared to 2023, along with 8.4 million in oyster seed sales. Seaweed harvests totaled 156,000 wet pounds in 2024, marking an 82% decline relative to 2022 production levels.



Marine Spatial Planning

MSP arose out of the necessity to develop planning resources to better understand and manage space in the world's oceans (Douvere 2008). At a basic level, the MSP process is applied to minimize conflicts in ocean space as well as mitigate interactions with other users and minimize adverse interactions with the environment (Ehler 2018). MSP has been applied to manage a wide range of renewable and non-renewable ocean resources (Ehler and Douvere 2009) as well as coastal and ocean conservation efforts. In U.S. waters, MSP has been applied in the planning of marine protected areas, navigation and transportation management, and energy development.

Planning for Aquaculture Development

Effective planning and siting of marine aquaculture operations require the integration and analysis of diverse environmental and spatial datasets, as well as the identification of potential ocean use conflicts (Kapetsky et al. 2013). Geographic information systems (GIS) are essential tools for this process, enabling the synthesis of geospatial information to conduct detailed analyses and generate map-based outputs. These outputs can inform policy decisions and permitting processes, helping determine when and where aquaculture operations can be appropriately located within a specific area of interest (AOI).

Central to this effort is the application of MSP, a core component of the ecosystem approach to aquaculture (EAA) (Morris et al. 2025). EAA promotes the integration of aquaculture into broader marine ecosystems while advancing sustainability, social equity, and system resilience (Stelzenmüller et al. 2017, Brugere et al. 2019). Long-term sustainable development of aquaculture depends on stable environmental conditions and harmonious coexistence with other marine users and natural resources. Spatial and temporal planning efforts must weigh environmental, social, economic, cultural, and managerial trade-offs to determine the most suitable aquaculture practices and locations (Couture et al. 2021).

Incorporating spatiotemporal strategies into aquaculture planning improves the ability to assess site compatibility and enhances coordination across permitting agencies and stakeholders. Regardless of the size or complexity of a proposed aquaculture venture, sustainable siting demands spatially explicit data on both environmental suitability and existing human uses (Kelly et al. 2014, Wever et al. 2015). A typical spatial planning workflow includes: (1) defining the planning objective, (2) compiling relevant spatial data, (3) conducting geospatial analyses, (4) interpreting results, and (5) delivering actionable map products and reports to resource managers and decision-makers. This structured approach supports site-specific aquaculture infrastructure development, strengthens coastal community resilience, and minimizes negative ecological impacts. Spatial planning tools enable the identification of environmental or operational constraints such as sensitive habitats, protected species areas, commercial fishing zones, and navigation routes that could limit aquaculture development in U.S. federal waters.

Multi-criteria decision analysis is often employed in MSP to evaluate and compare different spatial data layers, providing a relative assessment of aquaculture suitability across various sites (Longdill et al. 2008). These analyses include critical variables such as oceanographic conditions, biophysical features, fisheries management zones, and the presence of protected resources. Ultimately, spatial planning contributes to informed, transparent, and sustainable marine aquaculture development by balancing

ecological integrity with economic and social goals, but should be accompanied by robust engagement and acknowledgment of the limitations of the spatial data used in a given study.

AOA Identification and Marine Spatial Planning

E.O. 13921 directed the identification of AOAs, which are defined geographic areas that NOAA has evaluated, through both spatial analysis and the programmatic National Environmental Policy Act process, and that may be environmentally, socially, and economically appropriate to support multiple commercial aquaculture operations. The AOA identification process includes the application of the best available science to promote aquaculture development in ways that are environmentally responsible, economically viable, and socially acceptable. As the U.S. advances its efforts to identify AOAs, MSP is gaining recognition in its ability to inform siting decisions, offering a data-driven approach that enhances sustainability, maximizes production efficiency, and minimizes user conflicts and environmental impacts (Lester et al. 2018).

A well-executed and comprehensive spatial planning framework can significantly boost investor and industry confidence by reducing operational uncertainties and regulatory risks (Aguilar-Manjarrez et al. 2018, Lester et al. 2018, Froehlich et al. 2021). Critically, MSP-informed site selection is foundational to avoiding or mitigating negative interactions with the environment, existing marine users, and coastal communities (Kapetsky et al. 2013, Froehlich et al. 2021). In support of AOA identification, NOAA's NCCOS, in collaboration with NOAA's NMFS, initiated an MSP study focused on shellfish and seaweed aquaculture in the Gulf of Alaska (herein also referred to as "the Gulf"). Using the best available environmental, economic, social, and cultural spatial data, NCCOS evaluated potential areas for aquaculture development that would be both sustainable and technically feasible. The planning process was informed by extensive stakeholder and tribal engagement, including input from federal and state agencies, tribal governments, coastal communities, industry representatives, and the general public. The findings of this analysis are presented in this Atlas, which documents the underlying science and spatial outputs. These results are intended to inform NMFS and the State of Alaska in developing alternatives for consideration in a PEIS.

Through spatial modeling, NOAA aims to identify areas that may be suitable for multiple commercial-scale aquaculture operations. The size and configuration of each AOA option will depend on regional oceanographic conditions, existing ocean uses (e.g., navigation routes), and potential impacts to cultural resources, protected



species, and Essential Fish Habitat (EFH), among other considerations. Although AOA options will be identified for their overall suitability, not all areas within an AOA option will necessarily be appropriate for every type of aquaculture.

The spatial modeling approach used in this analysis was designed to support the identification of discrete areas within Alaska's state waters, ranging from approximately 50 to 2,000 ac, that may be suitable for shellfish and macroalgae aquaculture development. The modeling framework was developed to inform NMFS as part of the broader planning process for AOAs and will contribute to the development of a PEIS for each proposed AOA. Following completion of the PEIS, one or more areas may be formally identified as AOAs. This analysis supports AOA identification by offering spatial modeling results tailored to Alaska's unique geography and governance. While the Atlas provides valuable insights into early siting considerations, its use should remain focused on AOA planning.

Gulf of Alaska Area of Interest

At the beginning of any marine spatial modeling effort, it is essential to define an AOI to establish the geographic scope of the project. Once this broad area is characterized, the AOI can be refined by accounting for regulatory constraints and user-defined needs, leading to the delineation of more focused study areas. The state waters of Alaska were selected for AOA evaluation following a series of public engagement approaches, including a Request for Information (RFI) published in the Federal Register (85 FR 67519; October 23, 2020). NOAA received broad public support for the identification of AOAs in Alaska state waters from Alaska Native organizations, the ADFG, Alaska Governor Mike Dunleavy, members of Alaska's legislature, as well as industry and research institutions in response to the RFI.

Alaska has over 30,000 mi of coastline, necessitating narrowing down the Alaska AOA AOI using a combination of spatial mapping approaches, scientific review, and public input. The AOI was initially refined by limiting the analysis to Alaska state waters, specifically the area between the mean high tide line and 3 nautical miles (nm) (5.6 km) offshore. This boundary is consistent with state jurisdiction as outlined in the Submerged Lands Act of 1953.[1] Feedback from industry representatives emphasized several key limitations that supported further refinement. First, they noted that sites located more than 25 nm (46.3 km) from major population centers would present significant challenges in terms of access and increased transportation and operational costs. Second, areas regularly impacted by sea ice were identified as posing a high risk of gear damage or loss, making these locations unsuitable for aquaculture development. In response to these concerns, the AOI was further restricted to state waters within 25 nm of coastal communities with at least 1,000 residents, based on the Coastal Populated Places dataset generated by NOAA Office for Coastal Management (OCM) using 2010 U.S. Census data (NOAA OCM 2024). The 2010 Census data were used due to their completeness at the early stages of AOA spatial planning. In addition, regions that experience sea ice, based on the 10-year aggregate maximum sea ice extent reported by the U.S. National Ice Center, were excluded from consideration. These criteria limited the AOI to 16 distinct areas within state waters of the Gulf of Alaska situated along the coasts of Southeast, Southcentral, and Southwestern Alaska. These areas were centered around the communities of Unalaska, Akutan,

[1] https://www.boem.gov/sites/default/files/documents/The%20Submerged%20Lands%20Act.pdf

Kodiak, Anchor Point, Homer, Seward, Valdez, Cordova, Haines, Juneau, Sitka, Petersburg, Wrangell, Craig, Ketchikan, and Metlakatla.

Physical Description and Scale

The Gulf of Alaska is characterized by a short continental shelf that plunges deep into the Gulf offshore, promoting upwelling that brings nutrient-rich waters to the coast, which support a diverse ecosystem. State waters remain shallow throughout the Gulf, generally ranging from 0–328 ft (0–100 m) but reaching up to 2,461 ft (750 m) in Prince William Sound (Halverson et al. 2013) in the northern Gulf of Alaska, and 656 ft (200 m) in Cook Inlet and some Aleutian Islands.[2] The Gulf of Alaska experiences strong currents brought in by the Alaska Coastal Current that moves east to west along the Gulf of Alaska (Stabeno et al. 2004). The Gulf also hosts two large archipelagos at each end. The Alexander archipelago in Southeast Alaska is made up of over 1,000 islands, and the Aleutian volcanic islands on the western end of the Gulf stretch over 1,080 nm (2,000 km) and are made up of over 200 islands.[3]

Marine Ecoregion and Habitat

The Gulf of Alaska AOI is within the Alaskan/Fjordland Pacific ecoregion, which runs along the southern edge of the Aleutian Archipelago through the Gulf of Alaska to Vancouver Island in Canada. This region is fed by the counterclockwise Alaska Current that drives upwelling and nutrients up onto the continental shelf (Wilkinson et al. 2009). Productivity throughout the year is fueled by the Alaska Coastal Current, which runs inshore to the larger Alaskan Current and is driven by alongshore winds and tidal currents that mix with terrestrial nutrient inputs from abundant freshwater sources (Stabeno et al. 2016). These high nutrient levels and productivity support diverse ecosystems. Salt marshes, mudflats, and eelgrass beds dominate nearshore ecosystems (NOAA NMFS 2025a). At the same time, subtidal rocky reefs and kelp forests support economically and ecologically significant fish and invertebrate species. The ecoregion comprises several islands and fjordlands with freshwater inputs bringing nutrients and sediment from terrestrial systems. Prince William Sound is a large semi-enclosed bay in the northern Gulf of Alaska that is characterized by various inlets and fjords, coastal wetlands, and glaciers. Cook Inlet, to the west of Prince William Sound, is a long bay that regularly experiences drastic tidal fluctuation, leaving bare mudflats that are heavily inundated throughout the year. The region also supports large populations of seabirds and marine mammals, including major concentrations of adult sea otters (Wilkinson et al. 2009).

In recent history, there has been ecological misfortune in the region. The 1989 EVOS in Prince William Sound resulted in the release of over 10 million gallons of crude oil into Prince William Sound, oiling sensitive coastal habitats and resulting in significant ecosystem disruption.[4] An intense warming event hit the Gulf of Alaska in 2015–2016, pushing temperatures 4°F–19°F above normal temperatures and causing widespread die-offs in the region.[5] The

[2] https://portal.aoos.org/#map
[3] https://www.usgs.gov/centers/alaska-science-center/science/aleutian-islands-ecosystem-recovery-studies
[4] https://evostc.state.ak.us/oil-spill-facts/details-about-the-accident/
[5] https://www.fisheries.noaa.gov/feature-story/looking-back-blob-record-warming-drives-unprecedented-ocean-change

region is also prone to major natural hazards such as earthquakes, tsunamis, volcanoes, and flooding.[6] While such incidents are relatively infrequent, their ecological and economic consequences can be profound. These considerations were outside the scope of this Atlas, but should be carefully considered in site selection and management.

Cultural Heritage and Archaeological Resources

Alaska is home to over 45,000 documented cultural and historic sites that can provide a scientific or humanistic understanding of past human behavior or cultural adaptation. This includes both terrestrial (e.g., petroglyphs, burial sites, traditional cultural places, and other places of cultural importance) and submerged (e.g., shipwrecks, downed aircraft, submerged coastal pre-contact sites, etc.) resources (BOEM 2024, AK DNR 2024), including over 4,000 documented shipwrecks, with many more likely to exist (AK DNR 2024, BOEM 2011). These sites offer invaluable insight into thousands of years of human occupation across the study areas. They are central to Alaska's cultural identity, particularly for Alaska Native communities whose connections to land and sea remain deeply rooted.

Evidence of humans in Alaska dates to the late Pleistocene (15,000–12,000 years ago) when the glacial extent resulted in sea levels over 425 ft (120 m) lower than they are currently, exposing a land bridge between Alaska and Siberia (Gillispie 2018). There is extensive evidence of maritime activities and marine resource use by Alaska Natives throughout the state dating back to the early Holocene (> 11,000 years ago). Archeological sites have been found in Southeast Alaska, Aleutian Islands, and Northern Alaska, dating back 10,500–7,700 years ago, including near the current tide lines with evidence of marine resource use (BOEM 2024). More established settlements with evidence of greater dependence on intertidal resources, including shell middens and clam gardens, date back to the late Holocene (Gillispie 2018, Baird et al. 2022).



Subsistence take of wild resources is defined as those that are noncommercial, traditional, or customary for a variety of uses, and in Alaska, make up a large part of the food consumed in rural communities (DOI FSMP 2025). Reliance on wild foods is greatest in Alaska compared to the rest of the U.S. Despite not being included in the formal economy, subsistence fishing includes resources used for personal, trade, barter, and sharing (AS 16.05.940[32]), and, in this way, provides important contributions to the cultural, social, and economic well-being of Alaska communities (ADFG 2024b).

[6] https://www.usgs.gov/centers/alaska-science-center/science/hazards-alaska

Maritime Economy

Alaska's maritime economy is a foundation of the state's identity, culture, and livelihood. In Alaskan coastal communities, nearly every element of the economy is connected to the ocean. The maritime economy encompasses commercial and sport fishing, seafood processing, marine transportation, shipbuilding, tourism, offshore mineral resources, and port infrastructure. These sectors employ over 38,000 people, the majority of whom are in the tourism industry, followed closely by capture fisheries. In 2021, the ocean economy was valued at $8.9 billion, with offshore mineral resources contributing 71% of the total gross domestic product (GDP) derived from the state's marine economy (NOAA OCM 2024). Alaska fisheries contribute the most significant yields to U.S. production, by volume and value compared to other states and territories, producing over 35% of the total value and over 60% of the total volume of domestic commercial catch (NOAA NMFS 2024a). The seafood industry is also a major private sector employer in Alaska, accounting for one in five jobs. Aquaculture is a small but growing segment of Alaska's maritime economy.





Despite growth in wages and the total number of marine businesses, the value of Alaska's marine economy decreased by 32% over the past decade. The Alaska seafood industry suffered a $1.8 billion loss between 2022 and 2023, and a 50% decline in profitability between 2021 and 2023 (NOAA OCM 2024, NOAA NMFS 2024b). These declines are primarily linked to increasing costs of production (including wages) and decreasing sale prices for all major species (NOAA NMFS 2024b). While these issues could similarly affect the viability and growth potential of aquaculture in Alaska, cultured products and wild capture products are largely dissimilar, so aquaculture expansion should act to diversify seafood production in Alaska, rather than compete with existing industries. Losses in the fishing and other marine industries, coupled with the reliance of coastal Alaskan communities on fishing as a primary source of income and employment, further incentivize the development of aquaculture in Alaska.

Study Areas

NMFS published an RFI in the Federal Register (88 FR 72046; October 19, 2023) seeking public input on the identification of final study areas, data, and analyses relevant to identifying AOAs in Alaska state waters via a 60-day comment period. In addition to defining AOA study areas in Alaska, NMFS also sought feedback from Alaska Native entities, other partners, industry, and the public regarding the location and size of specific areas they wished to be included in (or excluded from) future AOA identification, along with other planning and siting considerations.

Following publication of the RFI, NMFS held three virtual listening sessions to collect oral comments. NMFS received 24 comments during the RFI (six oral comments, 17 electronic comments, and one letter). Comments included recommendations of specific areas to avoid or be considered, tribal resource considerations, fishing data to utilize in spatial modeling, and datasets representing protected species, among others. Electronic written comments are available online,[7] and oral comments are available in listening session transcripts.[8]

Based on feedback received through the RFI and the use of best available information, 10 final study areas were selected for the Alaska AOA spatial model. The final Alaska study areas included one expanded area in Southwest Alaska, three in Southcentral Alaska, and six areas located in Southeast Alaska (Figure 1.1). The study areas consisted of Alaska state waters within proximity to the communities of Juneau, Sitka, Petersburg, Wrangell, Craig, Ketchikan, Seward, Valdez, and Cordova. In response to public and agency comments, the Kodiak Island Study Area was expanded to include areas within 25 nm of Old Harbor and Larsen Bay, and the communities of Haines, Homer, Anchor Point, Unalaska, and Akutan were not selected for inclusion in the spatial study. Annette Island and the surrounding tribal waters are the only Indian Reservation in all of Alaska. tribal leadership in Metlakatla requested that this area not be included in the AOA study areas but wished to pursue additional spatial analysis for aquaculture and other activities with NOAA outside of this process. In addition, the original study area boundary of 25-nm linear distance from population centers was constrained to a 25-nm transit distance boundary. With few exceptions, all existing aquaculture operations and proposed projects in the queue for leasing and permitting occur within the selected study area boundaries, further supporting the selection of the 10 study areas.

Southwest Study Area

The Southwest study area includes the communities of the city of Kodiak, Old Harbor, and Larsen Bay, on Kodiak Island, a large island separated from the Alaska mainland by the Shelikof Strait. Situated within the nutrient-rich waters of the western Gulf of Alaska, the area benefits from a combination of favorable oceanographic conditions, existing maritime infrastructure, and a deep-rooted fishing culture. These attributes position Kodiak Island as a strategic location for mariculture expansion, particularly in the cultivation of shellfish and macroalgae, while its relative remoteness can pose challenges (AMTF 2021). The nearshore marine environment surrounding Kodiak Island is characterized by high biological productivity driven by seasonal upwelling, freshwater inputs from snowmelt and precipitation, and strong tidal

[7] https://www.regulations.gov/document/NOAA-NMFS-2023-0113-0001/comment
[8] https://www.fisheries.noaa.gov/alaska/aquaculture/identifying-aquaculture-opportunity-areas-alaska

mixing (Stabeno et al. 2004, Ladd et al. 2005). Kodiak supports robust commercial fisheries for salmon, halibut, crab, cod, and pollock, alongside sport fishing for halibut and salmon. The city of Kodiak is distinctly different from the remote communities of Old Harbor and Larsen Bay. As the regional hub, the city of Kodiak offers year-round transportation access, a diversified economy, and extensive infrastructure supporting commercial fishing and community services. In contrast, Old Harbor and Larsen Bay are smaller, more isolated communities with limited transportation links, seasonal economic activity, and greater reliance on subsistence and personal-use fishing. Kodiak Island's cultural heritage is deeply shaped by the Alutiiq (Sugpiaq) people, whose traditions of subsistence harvesting of salmon, halibut, crab, and shellfish, marine stewardship, and village life span over 7,500 years (ADFG 2024a, Sun'aq Tribe of Kodiak 2024).

Southcentral Study Areas

The Southcentral study areas, encompassing the waters around Cordova, Valdez, and Seward, host rich oceanographic dynamics, diverse marine habitats, and existing maritime infrastructure. This region is defined by glacially carved fjords, steep bathymetry, and the confluence of freshwater inputs from tidewater glaciers and the Copper River system with cold, nutrient-rich waters from the Gulf of Alaska (Stabeno et al. 2004, Whitney et al. 2005). These interactions drive seasonal stratification and mixing, enhancing primary productivity through mechanisms such as upwelling and tidal exchange, which in turn support robust plankton communities and complex food webs (Stabeno et al. 2004). The region has a well-established maritime economy with a focus on fishing, tourism, and petroleum. Commercial, recreational, and charter fleets target salmon, halibut, rockfish, and other species (ADFG 2020). The Southcentral Alaska region has a deep-rooted history of fishing and marine stewardship, dating back thousands of years of Alaska Native communities such as the Dena'ina, Alutiiq (Sugpiaq), and Eyak. Their cultural and subsistence ties to marine resources span thousands of years.

Southeast Study Areas

The Southeast Alaska study areas include the communities of Juneau, Petersburg, Wrangell, Ketchikan, Craig, and Sitka, and encompass an intricate network of fjords, islands, and coastal passages (Weingartner et al. 2005). This region is characterized by cold, nutrient-rich waters from the Gulf of Alaska that mix with freshwater inputs from glacial runoff and high precipitation, creating a highly productive and biodiverse marine environment (Whitney et al. 2005). Tidal mixing further enhances nutrient availability, supporting ideal conditions for aquaculture (Stabeno et al. 2004). Southeast Alaska's key fisheries include salmon, halibut, sablefish, crab, shrimp, herring, and shellfish, which support commercial harvests, sport fishing, and subsistence use by Alaska Native and rural communities (ADFG 2024b, SEAKFHP 2024). The region has a deep-rooted history of fishing and reliance on marine resources, dating back thousands of years of the Alaska Native communities, including the Tlingit, Haida, and Tsimshian Nations. Archaeological evidence, such as shell middens and clam gardens, reflects a long-standing connection to marine resources and a tradition of human-mediated ecosystem management (Jackley et al. 2016). The ecological richness, cultural heritage, and existing maritime infrastructure of Southeast Alaska make it a region of strategic interest for aquaculture development (Alaska Mariculture Cluster 2024).

Planning Goals

The planning goals for the Alaska AOA spatial planning process consist of finding appropriate areas (options), each sized between 50–2,000 ac to allow for multiple aquaculture operations with space between them for navigation, buffering, and other conflicting issues. The planning goals sought up to 4,000 ac of suitable subtidal AOA options for submerged seaweed and shellfish cultivation per study area and up to 100 ac of suitable intertidal AOA options for shellfish bottom culture per study area. These values were derived from an estimate of acreage needed to meet the AMTF goal of growing to a $100 million industry by 2030, and subsequent AMA objectives (AMTF 2018). Additional project requirements based on water depth were also established, grounded on industry input and a review of existing permitted farm placements. The study areas were restricted to depths shallower than 200 ft. Areas that fell outside of the established water depth, distance from population center, or minimal sea ice planning goals were constrained and excluded from spatial modeling (Table 1.1).

Table 1.1. AOA option spatial planning and siting boundary requirements.

AOA Boundary Requirements	Description
Depth Range	Shallower than 200 ft
Size Range	Minimum 50 acres
Maximum Distance from Coastal Populated Places/Harbor	25-mi travel distance from a coastal populated place; in Kodiak, distance also calculated from noted harbors
Sea Ice Overlap	No overlap with maximum sea ice extent



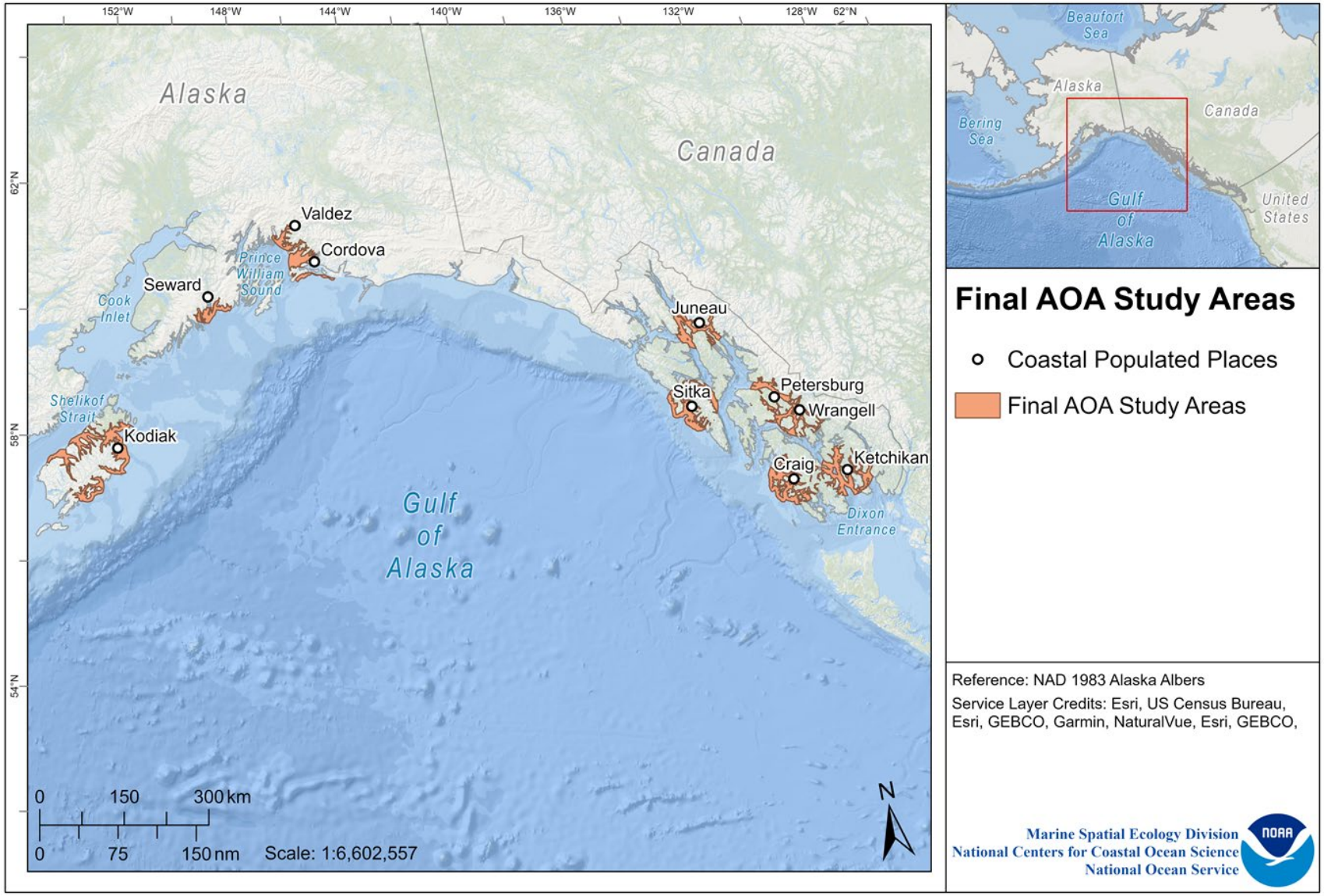


Figure 1.1. Study areas for identification of AOA options include Kodiak, Seward, Valdez, Cordova, Juneau, Sitka, Petersburg, Wrangell, Craig, and Ketchikan.

METHODS

Spatial Planning: Step-by-Step Approach

Spatial planning and analysis for a potential AOA requires a deep understanding of the relationship between different elements of the environment and coastal and ocean use as well as practical requirements for aquaculture development. By any measure, developing an atlas for an expansive ocean region requires compilation and analysis of best available data for marine spatial analysis and planning. A step-by-step approach (Riley et al. 2021, Morris et al. 2021) developed for spatial planning using a logical workflow (Figure 2.1) began with defining the project requirements, followed by data acquisition, categorization, scoring, and processing, then continued with spatial suitability modeling, identifying potential AOA options using a unique precision siting modeling strategy, further characterization of options, and finally, interpretation of results.

Geospatial Overlay

Grids are commonly applied for spatial analysis, scientific observations, experiments and simulations; when used in arrays, they are the most efficient means for mapping spatial variation and establishing a common framework for spatial models (Olea 1984, Dale 1998, Birch et al. 2007). In spatial science, grids are regular polygons that can be repeated over a surface to cover any space without overlaps or gaps. All spatial modeling using a gridded overlay was conducted using ArcGIS Pro (v. 2.8.0) and R programming language (Esri 2021a, R Core Team 2024). The grid cell size was determined by a number of factors, including the extent of the analysis, minimum AOA size, processing time, and spatial resolution of data within the model (Hengl 2006). Grid resolution must strike a balance between coarse (e.g., bathymetry, oceanographic) and fine data (vector data with associated precision and accuracy errors) in the model. Hengl (2006) and Liang et al. (2004) both acknowledge that grid cell size selection can be optimized, but at a certain point, increased resolution provides only minor improvements. Moreover, there is no ideal grid cell or pixel size, but it is recommended to avoid using resolutions that do not comply with the inherent properties of input datasets (Hengl 2006). Given these considerations and the aim to identify areas ranging from 50–2,000 ac, a gridded overlay with 5-ac grid cell size was used for each study area (Figure 2.2). The North American Datum 1983 Alaska Albers geographic coordinate system was used throughout the spatial analysis.

A hexagonal tessellation was used as hexagonal grids fit natural curves and organic shapes better than square grids, which is an important consideration when determining a relative comparison of complex ocean areas (Tsatcha et al. 2014). Groups of hexagons tend to form less rectilinear shapes because of the hexagonal grid's three non-orthogonal axes (Birch et al. 2007). Hexagons were also of interest for use in this model because they are the closest tessellating shape to a circle, which has the smallest perimeter-to-area ratio, thereby reducing bias and edge effects and providing optimal sampling within a cell (Birch et al. 2007) (Figure 2.2).

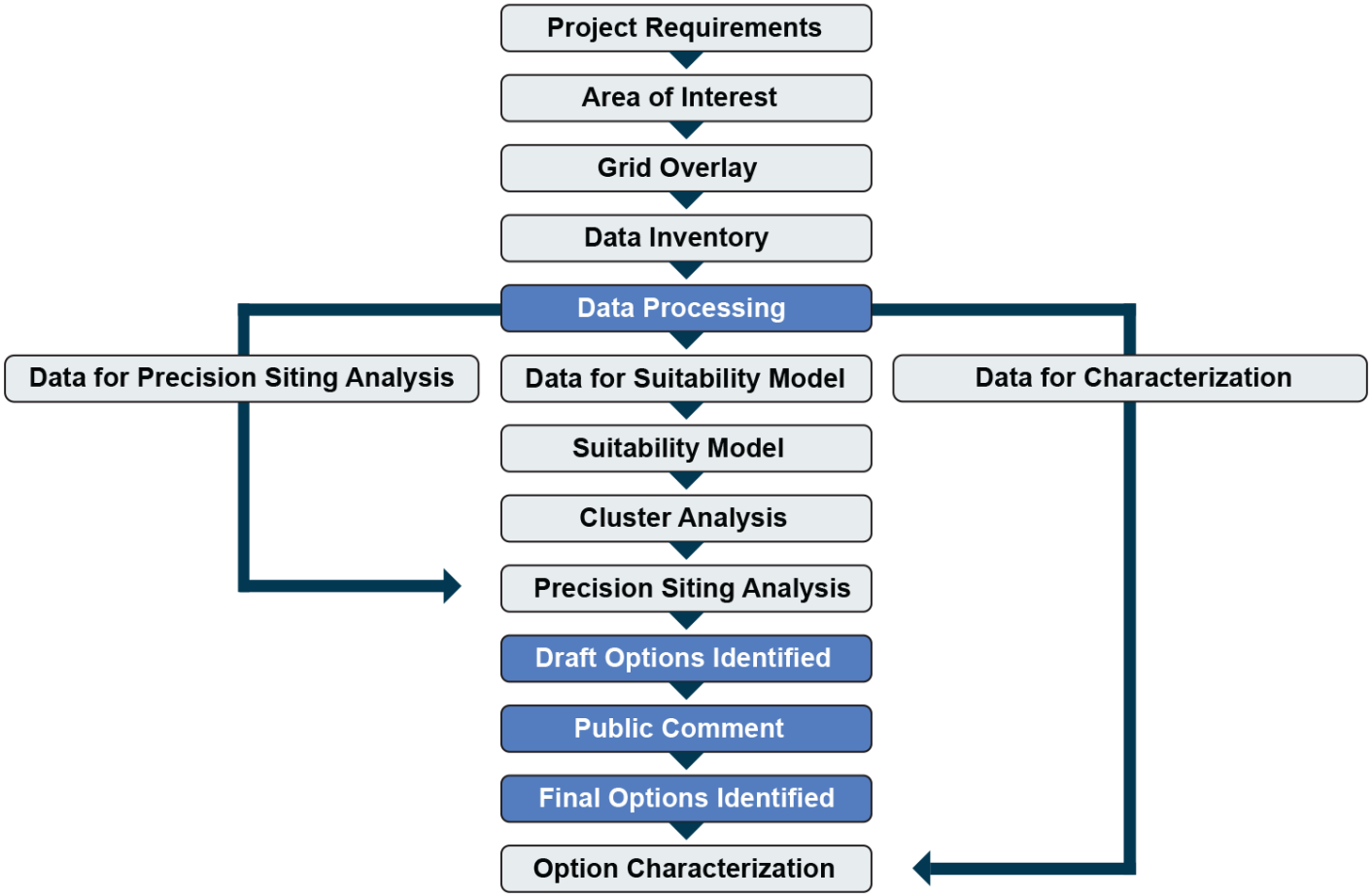


Figure 2.1. Workflow overview for the Aquaculture Opportunity Areas site suitability analysis within the Gulf of Alaska.

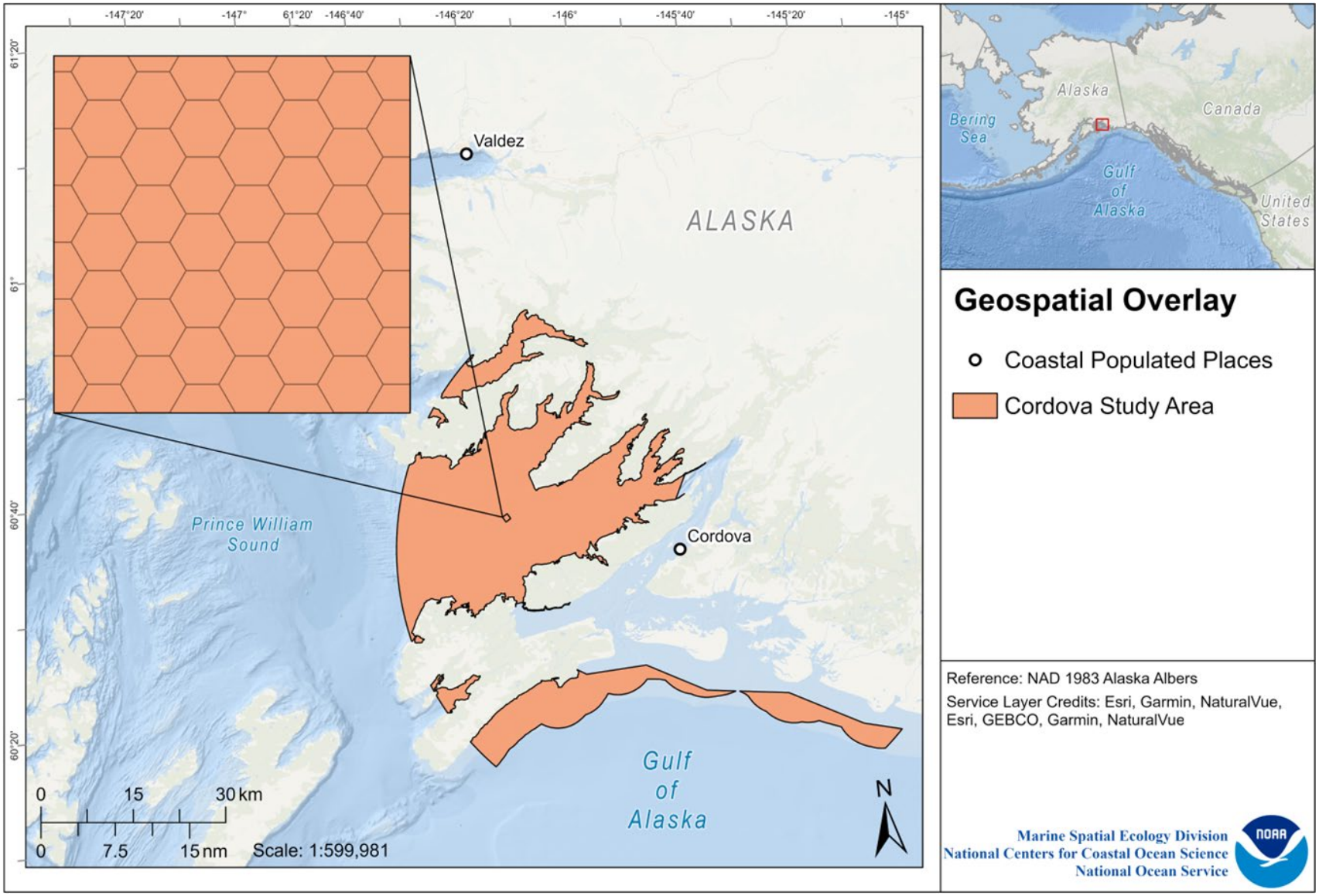


Figure 2.2. An example of the grid cells formulated for each study area. Each cell is a 5-ac hexagon.

Data Acquisition

In the Alaska AOA spatial modeling process, identifying potential AOA options requires understanding the relationships among environmental and ocean factors, as well as the practical requirements for developing aquaculture in Alaska state waters. Spatial suitability modeling is a type of Multi-Criteria Decision Analysis that enables the calculation of a relative suitability score for each grid cell in an area. Data categorization was based on a schema provided in Lightsom et al. (2015) because the intent of the categorical structure is for ocean planning. The structure intends to bring transparency and a consistent framework for organizing complex and dynamic ocean systems (Lightsom et al. 2015). The categorical framework included herein ensures all necessary data needed for marine aquaculture site suitability analysis, a specific type of ocean planning, were included.



Acquisition of spatial data is a key factor in model success because it is the basis for further calculations and analysis (Molina et al. 2013). An initial literature review was completed to determine the broad suite of data and categories needed to support this analysis properly. A comprehensive, authoritative spatial data inventory was developed, including data layers relevant to administrative boundaries, national security (i.e., military), navigation and transportation, energy and industry infrastructure, commercial and recreational fishing, natural and cultural resources, and oceanography (see Appendix A). Data holdings were developed through engagement with U.S. federal and state agencies and tribal governments, and a diverse array of other ocean users. Many datasets were leveraged through the Marine Cadastre (NOAA OCM 2025) and Alaska Ocean Observing System (AOOS 2025). NOAA used a categorical framework to ensure relevant data were comprehensively acquired and considered for modeling. Evaluation of all spatial data layers was conducted prior to their integration into the modeling framework. This vetting process included, at a minimum, a review of layer-level metadata and primary source documentation; coordination with the Project Team to verify that each dataset reflected the most current and authoritative information available for regulatory review and permitting; and an assessment of spatial extent and completeness to ensure that gaps within study-area geospatial grids did not introduce analytical bias. Dataset-specific constraints, along with the methods used to address them, are documented in the data processing workflow, the general data limitations section, and the metadata records associated with each layer.

In addition, NMFS, in coordination with NCCOS and the State of Alaska, held two AOA spatial planning workshops with funding support from the NMFS Office of Aquaculture. The workshops provided attendees with an opportunity to learn about the AOA

spatial planning approach, discuss available spatial data within Alaska AOA study areas, identify data gaps, and establish points of contact for accessing additional spatial data. The first workshop took place on February 26, 2024, in Anchorage, and the second on March 26 and 27, 2024, in Juneau. The Juneau workshop included a tribal panel discussion with representatives from several Southeast Alaska Native Organizations. Over 130 individuals attended the workshops. Participants across both events included Alaska Native community members and tribal government representatives, fishermen, aquaculture industry representatives, environmental organizations, scientists, subject matter experts, and state and federal agency personnel. A workshop summary report is available online.[9] NMFS and NCCOS also held over 100 engagement meetings to gather feedback to develop datasets, support data processing methods, and refine the spatial modeling methodology to inform the identification of draft AOA options for further public comment before finalization. These included in-person and virtual meetings with federal, tribal, and state government agencies, as well as in-person and virtual meetings with various coastal and ocean user groups throughout the Alaska study areas.

Data Categorization

Spatial data layers used in suitability analysis identify space-use conflicts and environmental constraints, including active national security areas, maritime navigation, ocean industries, recreation sites, subsistence use areas, and natural resource management. A submodel structure was used to categorize ocean use and conservation concerns, including national security; natural resources; cultural resources; industry, navigation, and transportation; and fisheries and aquaculture. Data layers with no compatibility with aquaculture development (e.g., shipping fairways) were captured in the Constraints Model and given a score of 0 (Figure 2.3). The model structure ensures that each submodel is given equal representation in the final suitability model, regardless of how many data layers are present in each submodel.

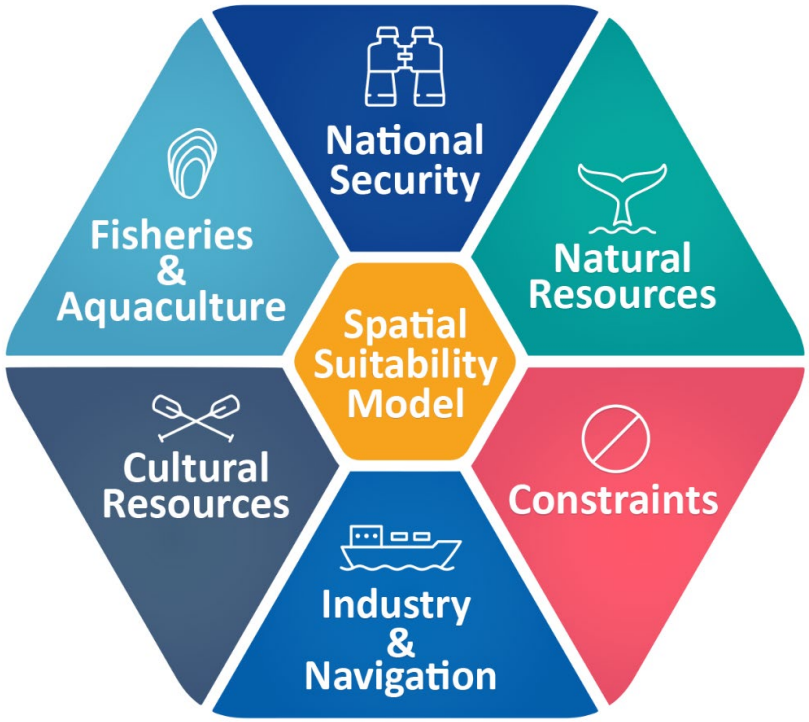


Figure 2.3. Overview of relative suitability model design and the model components. The Constraints Model includes all data layers with a score of 0; these data layers were removed before the remaining submodel scores were calculated.

[9] https://www.fisheries.noaa.gov/s3//2024-08/Alaska-AOA-Spatial-Planning-Workshops-Report.pdf

Scoring Categorical Data

Categorical datasets (i.e., in which data are distinct and separate groups) were evaluated to determine if a limiting feature was present or absent in each grid cell. If such a feature was absent, a score of 1 was given; otherwise, a constant value between 0 and 1 was assigned (0 = constraint, unsuitable for aquaculture). The value assigned as a score for each individual layer was determined by the feature's relative certainty of compatibility with aquaculture. For layers that were classified as potentially challenging for aquaculture development, a score of 0.5 was used as a model standard. For example, a regulated shipping lane that experiences regular traffic would be deemed unsuitable for aquaculture and thus was included in the Constraints Model and received a score of 0. On the other hand, within certain military operating areas or cultural resource areas, uncertainty exists, and even if a suitable location is found, additional communications and resources may be required; thus, a score of 0.5 would be given. Throughout this document, "down-scoring" is used to mean the lowering of the relative suitability for a given space that results from the low suitability score assigned to that space, in contrast to a default value of 1.

Some data layers require additional setbacks from the discrete/categorical layer, either by agency action or for safety and security reasons. If a setback was established by a permitting authority as a no-go area, a score of 0 was applied to the setback (e.g., a fish haven and a 500-ft setback from the outer boundary all scored as 0). Setbacks were also established based on governance, policy, and regulations, in which case the most conservative setback distance is used to avoid interactions with other ocean activities or resources. In the case of uncertainty in how aquaculture will interact with the activity, such as a potential for interaction with a transient resource, a score of 0.5 was assigned. See Tables 2.1–2.5 for categorical data scores and setbacks, and Appendix A for a detailed list and rationale for each score.

Scoring Numerical Data

Numerical data (i.e., data that can represent any value within a given range) were rescaled using a linear function, binning, or fuzzy logic membership function (Vincenzi et al. 2006, Vafaie et al. 2015, Landuci et al. 2020, Olivier AVDS 2020). Fuzzy logic membership functions are similar to a linear or nonlinear functional approach; however, the use of fuzzy logic membership functions accounts for additional uncertainty when assigning scores to the data (Kapetsky and Aguilar-Manjarrez 2013). The function used for each numerical dataset was chosen to reflect that dataset's known association or compatibility with aquaculture. The ranges of the numerical dataset (i.e., the minimum and maximum values) were used as the inputs for creating the function. They were modified to ensure no output value would equal 0. No zero values were allowed because no observed value in any numerical dataset used was known to be completely unsuitable for aquaculture.

The distance to shore parameter is the only dataset in the suitability analysis where a standard linear function was used, due to the high certainty that the closer it is to shore, the more suitable an aquaculture operation is regarding logistics and cost (Gentry et al. 2017). All other numerical datasets were reclassified using the Z-shaped membership function from the Scikit-Fuzzy (Version 0.4.2) Python library, where the higher the observed value (vessel traffic, fishing effort), the lower the compatibility with aquaculture, and thus, the lower the suitability score (Warner et al. 2019) (Equation 2.1; Figure 2.4). See Tables 2.1–2.5 for continuous data used in the suitability analysis, and Appendix A for a detailed list and rationale for each score.

Equation 2.1. Equation of the Z-shaped membership function used, based on the MathWorks documentation example (MathWorks, 2021).

$$zmf(x;a,b) = \begin{cases} 1, & x \le a \\ 1 - 2\left(\frac{x-a}{b-a}\right)^2, & a \le x \le \frac{a+b}{2} \\ 2\left(\frac{x-b}{b-a}\right)^2, & \frac{a+b}{2} \le x \le b \\ 0, & x \ge b \end{cases}$$

x = *Input value to be rescaled*

a = *Function begins falling from 1 (Minimum value of dataset)*

b = *Function attains 0 (Maximum value of dataset +1 to ensure no 0 values in output)*

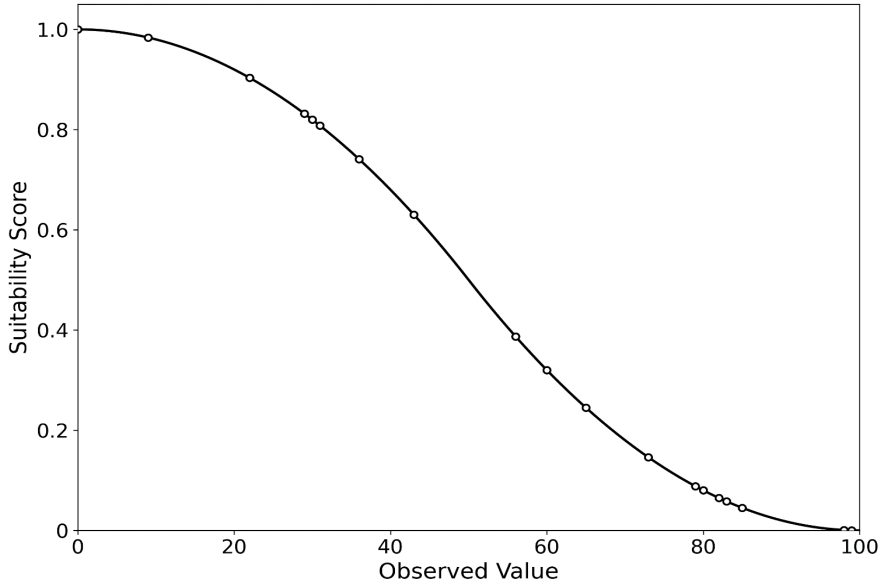


Figure 2.4. Example of a hypothetical Z-shaped membership function, with the minimum observed value being 0 and the maximum observed value being 99. However, the total range of the function goes to 100, as 1 was added to 99 when creating the function to ensure no observed values would be rescaled to 0. For example, the points on the line indicate the intersection of an observed value (e.g., vessel traffic) and the corresponding score to which it would be rescaled from the function.

Table 2.1. National security considerations included in the relative suitability analysis and the score assigned to each dataset. Each dataset is listed with an "x" if it occurred within a study area. The study areas include Kodiak (KOD), Seward (SEW), Valdez (VAL), Cordova (COR), Juneau (JUN), Sitka (SIT), Petersburg (PET), Wrangell (WRA), Craig (CRA), and Ketchikan (KET). A "-" dash indicates that the data layer did not overlap the study area. All zero score values were included in the Constraints Model. Continuous data are denoted in the table as "cont." Combined datasets are denoted in the table as "comb."

National Security Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Danger Zones and Restricted Areas	0	-	-	-	-	-	-	-	-	-	x
Munitions and Explosives of Concern	0.5	x	-	-	-	-	-	-	-	-	-
Navy Undersea Cables (500-m setback)	0	x	x	x	x	x	x	x	x	x	x

Table 2.2. Natural resources considerations included in the relative suitability analysis and the score assigned to each dataset. Symbols and abbreviations are as in Table 2.1.

Natural Resources Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Alaska National Parks, Preserves, Monuments	0.5	-	x	-	-	x	-	-	-	-	x
Alaska State Game Refuges, Critical Habitat, Sanctuaries	0	-	-	-	-	x	-	-	-	-	-
Anadromous Waters Catalog – Streams (91.5-m setback)	0	x	x	x	x	x	x	x	x	x	x
Deep Sea Coral and Sponge Occurrences (1,000-m setback)	0	x	x	x	x	-	x	-	x	x	x
Essential Fish Habitat Combined	Comb.†	x	x	x	x	x	x	-	-	x	-
Herring Spawn Occurrences per Year	Cont.*	-	-	x	x	x	x	x	-	x	x
Key Harbor Seal Haulout Locations (500-m setback)	0	x	-	x	x	x	x	x	x	x	x
National Wetlands Inventory	0	x	x	x	x	x	x	x	x	x	x
North Pacific Seabird Data	0.8	x	x	x	-	-	x	x	x	x	-
Northern Sea Otter Abundance and Distribution, Southeast Alaska	Cont.*	-	-	-	-	x	x	x	x	x	x
Pacific Herring Spawning Areas, Kodiak and Seward	0.5	x	x	-	-	-	-	-	-	-	-

Natural Resources Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Protected Species Combined	Comb.†	x	-	-	-	-	x	-	-	-	-
Sea Otter Relative Population Density Estimate	Cont.*	x	x	x	x	-	-	-	-	-	-
ShoreZone Coastal Mapping – Eelgrass Bioband	0.2	x	-	x	x	x	x	x	x	x	x
Steller Sea Lion Haulout and Rookery Locations	Cont.*	x	x	-	-	x	x	x	x	x	x
Steller Sea Lion Major Haulout and Rookery Locations (500-m setback)	0	x	x	x	-	x	x	x	x	x	x
Steller's Eider Abundance and Distribution, Kodiak	0.5	x	-	-	-	-	-	-	-	-	-
Taku Glacier Boundary	0	-	-	-	-	x	-	-	-	-	-

* Data layers represent continuous data scored between 0.5–1.
† Data layers were individually scored and then combined using the product method.

Table 2.3. Industry, navigation, and transportation considerations included in the relative suitability analysis and the score assigned to each dataset. Symbols and abbreviations are as in Table 2.1. AIS = automatic identification system; DEC = Department of Environmental Conservation; DNR = Department of Natural Resources; AOOS = Alaska Ocean Observing System; USACE – AD = U.S. Army Corps of Engineers Alaska District; USFS = U.S. Forest Service.

Industry, Navigation, and Transportation Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Aids to Navigation (500-m setback)	0	x	x	x	x	x	x	x	x	x	x
AIS Combined	Comb. ‡	x	x	x	x	x	x	x	x	x	x
Alaska Area Plans (Anchorages)	0.5	-	x	x	x	x	-	x	x	x	x
Alaska Area Plans (Aquaculture Exclusion Areas)	0	-	-	-	-	-	-	-	x	x	x
Alaska Area Plans (Species Management)	0.5	-	x	-	-	-	-	-	x	x	-
Alaska DEC Water Quality Monitoring Locations	0	x	x	x	x	x	x	x	x	x	x
Alaska Marine Highways (500-m setback)	0	x	x	x	x	x	x	x	-	-	x
Alaska DNR Land Permit or Lease	0.5	x	x	x	-	x	x	x	-	x	x

Industry, Navigation, and Transportation Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Anchorages	0	-	-	-	x	-	-	-	x	-	x
AOOS Sensor locations	0	x	x	x	x	x	x	x	x	x	x
Coastal Maintained Channels	0	x	-	x	-	-	x	x	-	x	x
Depths Over 200 ft	0	x	x	x	x	x	x	x	x	x	x
Environmental Sensors and Buoys (500-m setback)	0	x	x	x	-	x	x	x	x	x	x
Ferry Routes (500-m setback)	0	x	x	x	x	x	x	x	x	x	x
Ferry Terminals (350-m setback)	0	x	-	x	-	x	x	x	x	x	x
Fiberoptic Cable (200-m setback)	0	x	x	-	-	-	-	-	x	-	-
Harbors (500-m setback)	0.5	x	-	-	-	x	-	x	x	x	x
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities (500-m setback)	0.3	-	-	-	-	-	x	x	x	x	x
Islands	0	x	x	x	x	x	x	x	x	x	x
Land Status within the National Wildlife Refuges of Alaska – Afognak and Womens Bay Submerged Lands	0	x	-	-	-	-	-	-	-	-	-
Ocean Disposal Sites	0	x	-	-	-	x	-	x	x	x	x
Offshore Seafood Processors Permitted Vessels	0	x	-	x	x	x	x	-	-	x	x
Permitted Log Transfer Facility (500-m setback)	0.2	-	-	-	-	-	x	x	x	x	x
Pipelines (500-m setback)	0	-	-	x	-	-	x	-	x	-	-
Seafood Processing Discharge Locations	0	x	-	x	-	x	x	x	x	x	x
Seafood Processing Facility Locations	0	x	-	x	-	x	x	x	x	x	x
Seafood Processing Permitted Carcass Disposal Sites	0	x	-	x	-	x	x	x	x	x	-
Seafood Processing Permitted Net Pens	0	x	-	x	-	x	x	x	x	x	x
Seafood Processing Permitted Outfalls (350-m setback)	0	x	-	x	-	x	x	x	x	x	x
Shipping Fairways, Lanes, and Zones (500-m setback)	0	-	-	x	-	-	-	-	x	-	-

Industry, Navigation, and Transportation Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
ShoreZone Coastal Mapping – Wave Exposure	0.2, 0.4, 0.6	x	x	-	-	x	x	x	x	x	x
Significant Wave Height	0.2, 0.4, 0.6	x	x	-	-	-	x	-	-	x	-
Submarine Cables (200-m setback)	0	x	x	x	x	x	x	x	-	-	x
Submarine Cable Areas (200-m setback)	0	x	x	x	x	x	x	x	x	x	x
Tongass National Forest Mooring Buoys (500-m setback)	0.3	-	-	-	-	-	x	-	x	-	x
Travel Distance (25-mi boundary)	0	x	x	x	x	x	x	x	x	x	x
USACE – AD Erosion Protection and Flood Mitigation Projects (500-m setback)	0	-	-	-	-	x	-	-	x	-	-
USACE – AD Navigation Projects (500-m setback)	0	x	-	x	-	x	x	x	x	x	x
USFS Recreation Opportunities – Cabin Rentals (500-m setback)	0.3	-	-	-	-	-	x	x	-	-	x
Wastewater Outfalls (500-m setback)	0	-	-	x	x	x	x	x	x	x	-
Wrecks and Obstructions (152.5-m setback)	0	x	x	x	x	x	x	x	x	x	x

§ Data layers were scored and then combined using the geometric mean.
‡ Data were scored using a quantile membership function.

Table 2.4. Cultural resources considerations included in the relative suitability analysis and the score assigned to each dataset. Symbols and abbreviations are as in Table 2.1.

Cultural Resources Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Alaska Area Plans (Community Harvest)	0.5	x	x	x	x	x	x	x	x	x	x
Alaska Area Plans (Heritage Sites)	0.5	x	x	-	-	x	x	x	x	x	x
Alaska Heritage Resources Survey Sites (500-m setback)	0.2	x	x	x	x	x	x	x	x	x	x
Herring Spawn Occurrences per Year	0.5	-	-	x	x	x	x	x	-	x	x
Historic Lighthouses (500-m setback)	0.5	-	-	-	-	x	x	-	-	-	x

Cultural Resources Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Northern Sea Otter Abundance and Distribution, Southeast Alaska	0.5	-	-	-	-	x	x	x	x	x	x
Pacific Herring Spawning Areas, Kodiak and Seward	0.5	x	x	-	-	-	-	-	-	-	-
Sea Otter Relative Population Density Estimate	0.5	x	x	x	x	-	-	-	-	-	-
State Park Boundary (100-m setback)	0	x	x	x	x	x	x	x	x	-	x

Table 2.5. Aquaculture and fisheries considerations included in the relative suitability analysis and the score assigned to each dataset. Symbols and abbreviations are as in Table 2.1. DNR = Department of Natural Resources.

Aquaculture and Fisheries Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Active Aquatic Farming Operation Areas	0	x	x	-	x	x	x	-	-	x	x
Alaska Area Plans (Sport Fishing)	0.5	x	x	x	x	x	x	-	x	x	x
Alaska DNR Shore Fishery Lease	0.5	x	-	-	-	-	-	-	-	-	-
Aquatic Farm Permit or Lease (50-m setback)	0	x	x	x	x	x	x	-	x	x	x
Fisheries Landings Combined	Comb.	x	x	x	x	x	x	x	x	x	x
Geoduck Bed Surveys	0.3	-	-	-	-	-	-	-	-	x	x
Hatchery Release Sites (500-m setback)	0.5	x	-	x	-	x	x	x	x	x	x
Data layers were individually scored and then combined by taking the minimum value over all layers.											



Data Processing

Many datasets require processing before use in spatial analysis. For example, long-term aerial herring spawning survey data collected by the ADFG were available in several study areas. It was necessary to process these data in a manner that would provide an understanding and scoring approach of both spawning occurrence and historic frequency at the 5-ac grid cell level. Summary methods are provided below for all data that required processing; many datasets were received in a ready-to-use format, and processing notes can be found in the metadata provided by the data originator. Data layers representing areas or features where aquaculture cannot occur are identified as constraints, and overlapping areas are removed from the analysis. The remaining data layers are assigned scores between 0.1 and 1 to reflect the relative suitability of the associated features for aquaculture. Setback (buffer) distances from data features were applied when required by governance, policy, and/or regulations. When an established setback requirement was unavailable from an authoritative source, conservative professional judgment was used to assign a distance. In the context of spatial planning in Alaska, some datasets have relevance to multiple data categories, such as the importance of herring to both ecological functions and subsistence and commercial harvest. This is also true for sea otters, which are also important traditional subsistence resources. In the case of both examples, the data were included in both the Cultural and Natural Resources Submodels but scored in the model differently to fit the specific context of their use under the respective submodel (submodel is defined in the Suitability Analysis section below; also see Figure 2.3 above).

NMFS Protected Resources

To holistically consider NMFS protected species in the region, a novel combined data layer providing the overall score for selected species was developed through collaboration with the NMFS Alaska Region and the NMFS Office of Protected Resources (Appendix B). A scoring system (Table 2.6) was developed to assign relative suitability scores to protected species data based on species status, population size, and trajectory. Protected species include those listed under the Endangered Species Act (ESA) and/or protected under the Marine Mammal Protection Act (MMPA). This approach was preferred because the spatial planning process does not account for gear-specific aquaculture or secondary interactions with protected species, and a more generalized approach is transferable across regions. This dataset contains only highly vulnerable protected species (Table 2.7); consequently, a number of protected species, especially marine mammals, were excluded from this analysis (Appendix B; Table 2.8). Those species will need to be considered during the PEIS stage to determine the overall suitability of potential AOA options. The scores provided in Tables 2.7 and 2.8 for MMPA- and ESA-listed species range from 0.1 (most vulnerable species, based on their biological status) to 0.8 (least vulnerable species) using best-available data for each region. These scores were developed for each species/stock using factors that are more or less likely to affect their ability to withstand mortality, serious injury, or other impacts that could affect the species' ability to survive and recover.

Table 2.6. AOA option model scoring system for NMFS ESA and MMPA species data layers (reproduced from NMFS 2021b). NMFS = National Marine Fisheries Service; ESA = Endangered Species Act; MMPA = Marine Mammal Protection Act.

Status	Trend	Converted scores for model
Endangered	Declining, small population,* or both	0.10
Endangered	Stable or unknown	0.20
Endangered	Increasing	0.30
Threatened	Declining or unknown	0.40
Threatened	Stable or increasing	0.50
MMPA Strategic	Declining or unknown	0.60
MMPA listed	Small population	0.70
MMPA listed	Large population	0.80
*Small population equates to populations of 500 individuals or less (Franklin 1980)		

A data layer for Steller sea lions (rookeries and major and minor haulouts) and three separate Cetacean Biologically Important Area II (BIA) layers (North Pacific right whale, gray whale, and fin whale feeding areas) were included in the combined protected species layer (Wild et al. 2023). North Pacific right whale, gray whale, and fin whale feeding BIAs co-occur in the Kodiak Study Area. Gray whale feeding areas also occur in the Sitka Study Area. All three of the BIA cetacean data layers included in this modeling effort overlap with the Steller sea lion data layer within the Sitka and Kodiak Study Areas. Table 2.7 provides the species, status, trend, and score. Justification for scores used in suitability modeling can be found in Appendix B. Data layers provided for these species provide resolution and contrast that will influence the cell score within the study areas. Because the only overlap with NMFS protected species layers occurred in the Kodiak and Sitka Study Areas, the combined layer was used only for modeling in those areas. Steller sea lion rookeries and major and minor haulouts were individually down-scored in other study areas. In addition to their inclusion within the suitability model, the Steller sea lion data were also used within the Constraints Model to remove any areas that were within 500 m of a western distinct population segment (WDPS) rookery or major haulout.



Harbor seal haulout location data were used both in modeling and in characterization. Only key haulout locations were included in the suitability model, with any location within 500 m of a site classified as a key haulout added to the Constraints Model. Key and non-key haulouts were considered in characterization for the final AOA options. A 500-m buffer was used for both key and non-key haulouts within characterization. Table 2.8 lists species (including their population status and trend and recommended suitability score) that are too widely distributed to influence relative suitability modeling within the study area and are not included in the modeling. This list is provided to inform characterization and should be considered for early awareness regarding the potential presence of species of lower or higher concern for protected species interaction at the regional scale or within specific AOA options. NMFS used the product method to combine these data layers, which assumes that a lower suitability score for one variable cannot be compensated for by a higher-scoring variable (Equation 2.2).





Equation 2.2. Equation for the product method used to determine scoring values.

$$p = x_1 \cdot x_2 \cdot \ldots \cdot x_i$$

$x_1 =$ *variable 1*
$x_2 =$ *variable 2*
$x_i =$ *additional variables*

Table 2.7. ESA/MMPA species that occur within the AOA study regions for Alaska state waters and their recommended suitability scores, as determined by species status and trend, for use in the suitability model (Appendix B). ESA = Endangered Species Act; MMPA = Marine Mammal Protection Act; AOA = aquaculture opportunity area; ENP = Eastern North Pacific; EDPS = eastern distinct population segment; WDPS = western distinct population segment.

Species	Status and Trend	Score
Fin Whale	Endangered; unknown or increasing	0.2
Gray Whale (ENP)	MMPA; large population	0.8
North Pacific Right Whale	Endangered; unknown trend, small population	0.1
Steller Sea Lion (EDPS)	MMPA; large population	0.8
Steller Sea Lion (WDPS)	Endangered; increasing	0.3

Table 2.8. NMFS ESA/MMPA species that overlap with study areas but were not included in the suitability model. Scores, as determined by species status and trend (as of May 2025), are provided for informational purposes for consideration in site characterization descriptions. WNP = Western North Pacific; GOA = Gulf of Alaska; NSEAK = Northern Southeast Alaska; SSEAK = Southern Southeast Alaska; Y-SEAK = Yakutat-Southeast Alaska; ENP = Eastern North Pacific; MMPA = Marine Mammal Protection Act; ESA = Endangered Species Act.

Species	Status and Trend	Score
Dall's Porpoise	MMPA; unknown trend, large population	0.8
Gray Whale (WNP)	Endangered; unknown trend, small population	0.1
Harbor Porpoise (GOA)	MMPA; unknown trend, large population	0.8
Harbor Porpoise (NSEAK inland)	MMPA; unknown trend, large population	0.8
Harbor Porpoise (SSEAK inland)	MMPA; unknown trend, large population	0.8
Harbor Porpoise (Y-SEAK offshore)	MMPA; unknown trend, unknown population	0.6
Harbor Seal (Clarence Strait stock)	MMPA; large population	0.8
Harbor Seal (Dixon/Cape Decision stock)	MMPA; large population	0.8
Harbor Seal (Lynn Canal/Stephens Passage stock)	MMPA; declining population	0.6
Harbor Seal (N. Kodiak stock)	MMPA; large population	0.8
Harbor Seal (Prince William Sound stock)	MMPA; declining population	0.6
Harbor Seal (S. Kodiak stock)	MMPA; large population	0.8
Harbor Seal (Sitka/Chatham stock)	MMPA; unknown trend	0.6
Humpback Whale (Hawaii)	MMPA; large population	0.8

Species	Status and Trend	Score
Humpback Whale (Mexico)	Threatened; unknown trend	0.4
Humpback Whale (WNP)	Endangered; unknown trend	0.2
Killer Whale (AT1 transient)	MMPA Strategic; declining population	0.6
Killer Whale (ENP Alaska resident)	MMPA; large population	0.8
Killer Whale (ENP Northern resident, offshore)	MMPA; stable, small population	0.7
Killer Whale (ENP transient)	MMPA; unknown trend, small population	0.7
Killer Whale (West Coast transient)	MMPA; small population	0.7
Minke Whale	MMPA; stable, large population	0.8
Sperm Whale	Endangered; unknown trend	0.2
Sunflower Sea Star	Proposed ESA-Listed Threatened; unknown trend	0.4



Essential Fish Habitat Combined Data Layer

Similar to NMFS protected resources, a novel combined data layer providing the overall score for selected Essential Fish Habitat (EFH) data layers was developed in collaboration with NMFS Alaska Regional Office. EFH for the following species was defined by NMFS at the early juvenile stage: Pacific cod, pollock, Pacific ocean perch, rock sole, sablefish, starry flounder, and yellowfin sole. A final combined EFH data layer was generated within the Natural Resources Submodel using the product approach. Each species is categorized using four percentiles representing probability of occurrence, and scores within the model were mapped to these values by determining which value each grid cell intersects. The 95th percentile represents the legal/technical definition of an EFH and is given a score of 0.6; the 75th percentile represents a principal EFH and is given a score of 0.7, the 50th percentile represents a core EFH and is given a score of 0.8; the 25th percentile represents a hotspot and is given a score of 0.9. Once it was determined for each grid cell which EFH classification is assigned for each species, the combined dataset was produced by taking the product over all of the values for all of the species for each grid cell within the study area (Equation 2.2).





Northern Sea Otters

The Team worked with U.S. Fish and Wildlife Service (USFWS) experts to prioritize USFWS ESA listed species and other species of concern, including northern sea otters. While negative impacts to northern sea otters from aquaculture have not been directly documented to date, sea otters have been recorded entering aquaculture areas and using the space similar to natural habitats, an occurrence that is expected to increase if sea otter resources become scarce (Reynolds et al. 2025) Still, the importance of sea otters to natural and cultural resources in Alaska necessitates its inclusion in aquaculture suitability. The estimated population density of sea otters (*Enhydra lutris*) for the Southcentral and Southwest regions was represented using kernel density estimation (KDE) models created from aerial survey transect counts of adults and pups from reports (Cobb 2018, Esslinger et al. 2021). Sea Otter Relative Population Density Estimate datasets were generated as part of this project in order to extrapolate these discrete survey observations throughout the surrounding area, as these populations inhabit a wider area than the specific location observed

on a single day. Through coordination with subject matter experts, a 15-km travel distance was agreed upon for modeling sea otter travel ranges, chosen from the upper range of estimations to more conservatively avoid otter populations. Study area extents were set back by this 15-km travel distance to include influence from survey observations outside the study areas. KDE was run in these buffered areas using the total population count from each survey line as input with a grid cell size of 100 m, a search radius of 15 km, and using the Alaska coastline as a barrier feature.

For the Southeast Alaska region, a statistical forecast of sea otter abundance and distribution from the USFWS (Schuette et al. 2023) was used as an authoritative estimate of sea otter density in the region. KDE estimates were used for the Southcentral and Southwest regions due to a lack of such authoritative forecast modeling in these regions. The Sea Otter Relative Population Density Estimate KDE raster grids effectively capture the areas of high activity for suitability modeling, although without further refinement, they should not be used for direct population estimates in their current form.

In the suitability model, both the Southeast Alaska Abundance and Distribution data and the Sea Otter Relative Population Density Estimate data were included in both the Natural Resources and Cultural Resources Submodels, but different scoring methods were used within each submodel to reflect the unique interactions with the two resource types. For the Natural Resources Submodel, both datasets were linearly rescaled between 0.5 and 1.0, with areas of highest relative density receiving the lowest score of 0.5. This approach ensures that scoring directly reflects areas with increased sea otter presence and importance from a species distribution perspective, thereby down-scoring locations with higher ecological significance for otters. Down-scoring areas with high otter densities is also reflective of concerns related to sea otter interactions with aquaculture. For the Cultural Resources Submodel, following discussions with regional partners, the data were scored specifically to differentiate areas of cultural significance. The top quartile (values above the 75th percentile) of the otter density data were assigned a score of 0.5, categorizing major sea otter areas as an important cultural resource. This represents that, from a cultural perspective, human interaction with sea otters primarily takes the form of recognizing distinct high-activity zones as culturally important areas defined by the known presence of otters.



Marine Birds

Alaska is home to some of the largest seabird colonies in the Northern Hemisphere. Seabirds link marine ecosystems to human communities through their role in food webs, biodiversity, and as a cultural and subsistence resource. The two datasets used in the

model were the North Pacific Seabird Data and the Steller's Eider Abundance and Distribution data. Due to the high number of seabird colonies across study areas, and differential concerns related to disturbance of specific species of seabirds, the Team worked with USFWS experts to prioritize ESA listed and other species of increased concern and specific colony types to be down-scored. To address potential impacts on water quality from congregations of seabirds and to further provide a conservation benefit, a 500-m buffer around down-scored colony locations was established. Steller's eider is the only ESA-listed bird species included and is regularly found within portions of the Kodiak Study Area. Areas with larger eider groups (126–1,000 individuals) within the Kodiak Study Area were down-scored to 0.5. The North Pacific Seabird Dataset was used to down-score all colonies that overlapped with the study areas and had greater than 500 individuals. A lower threshold was used for specific species prone to disturbance, including colonies with ≥ 20 black oystercatchers, ≥ 50 Arctic terns, and ≥ 100 individual gulls on offshore islands. For colonies that USFWS identifies as including Birds of Conservation Concern, a buffer and down-score were applied regardless of colony size.

Pacific Herring Spawning

Pacific herring holds deep cultural, ecological, and subsistence significance in the Gulf of Alaska as a key prey species that supports salmon, marine mammals, seabirds, and fish and roe, and has long been central to Alaska Native diets and traditions (Moss et al. 2016). Pacific herring spawning data were included in the suitability modeling to identify areas with regular, repeated spawning events. These spawning events are visually recognized by the discoloration of water from herring milt during ADFG aerial surveys and digitized as line features. The final dataset represents the occurrence of spawning activity over a range of years, with some survey data dating back as far as 1976. Herring spawning survey data were available for the southeastern extent and within Prince William Sound. The available herring data for Seward and Kodiak are labeled Pacific Herring Spawning Areas and show the general extent of herring spawning. For both study areas, there were data only for a single year, so occurrences per year could not



be calculated. These data did not require any further processing, and areas overlapping a Pacific Herring Spawning Areas location were given a score of 0.5. This resulted in a data limitation for Kodiak and Seward, where the model could use the data only as presence-absence data and had no information on frequency.

For the suitability modeling in the Southeast and Prince William Sound areas, a relative occurrence value was calculated to represent the frequency of spawning events. This process involved counting the number of intersections between the model grid cells and the mapped spawn location lines from the most recent 10 years. These totals were then divided by the total number of years of data present based on the regional location (as some areas do not have surveys for all 10 years). The final occurrence per year number was used in the suitability model, allowing areas where regular, repeated spawning events occur to be increasingly down-scored versus those with occasional or infrequent spawning events.

In the suitability model, the herring spawning occurrence data were included in both the Natural Resources and Cultural Resources Submodels but were scored differently to reflect how herring spawning interacts with each resource type. For the Natural Resources Submodel, the herring spawning occurrence values (occurrences per year) were linearly rescaled between 0.5 and 1.0, with areas of most frequent occurrence receiving the lowest score of 0.5. This scoring directly reflects the importance of spawning frequency from a natural resource perspective, increasingly down-scoring areas with more significant biological activity for herring. For the Cultural Resources Submodel, following discussions with regional partners, the data were scored specifically to differentiate areas of cultural significance, identified as major spawning areas. Areas with greater than 0.5 occurrences per year (spawning is observed more frequently than every other year) were categorized as major herring spawning areas and assigned a score of 0.5. This approach was chosen to represent the cultural perspective of herring spawn, which primarily takes the form of a connection with specific locations that are known to regularly host spawning activity.

Bathymetry

Bathymetry data were used from two different sources: the Southeast Alaska 8/3 arc-second Mean High-High Water (MHHW) Coastal Digital Elevation Model (NOAA National Geophysical Data Center 2010) and the AFSC/RACE/GAP/Zimmermann: Central Gulf of Alaska 100-m Grid (Alaska Fisheries Science Center 2025). These were selected because each study area occurs fully within the extent of either dataset, providing consistent values across each suitability model domain while still having sufficient resolution, finer than the ~150-m of the model grid. For analysis, these two bathymetric grids were mosaicked together, with priority in overlapping areas given to the Southeast Alaska dataset due to its finer (~58-m) resolution. The Gulf of Alaska dataset was resampled to match this resolution using bilinear interpolation. When slope was used in the precision siting and characterization of potential AOA sites, the slope values were calculated from this 58-m resolution bathymetry mosaic using a 3 × 3 grid cell steepness calculation.

The ability to shift the grids to different vertical tidal datums was necessary because the source datasets were generated relative to different datums [MHHW] and mean low-low water [MLLW], respectively, for the NOAA National Geophysical Data Center 2010 and Alaska Fisheries Science Center 2025 grids). Before mosaicking onto a single grid, each dataset was shifted to the same datum for better agreement with each other. Furthermore, having depth ranges relative to multiple datums is also critical for AOA suitability modeling in coastal Alaskan waters, as tidal ranges can

exceed 9 m, and analysis of suitable depths must account for this context. For example, when the AOA options were characterized, depth ranges at MLLW and mean high water (MHW) were reported to give complete context for the observed ranges of water depth. These datums were chosen because MHW is standardly used to define land boundaries and the high tide line and MLLW is standardly used for assessment of navigational risks. To accomplish these datum shifts, grids were created with values equal to the difference between the current and desired tidal datums, based on the VDatum methodology (NOAA National Geodetic Survey 2025). The difference values for each grid cell in the datum shift rasters were calculated using a weighted mean of values from 21 NOAA tide stations, with weights proportional to the inverse square of the distance to each station.

Inverse square distance weighting is a standard method for interpolation between spatial data points (Babak and Deutsch 2009, Lu and Wong 2008) and was chosen as a straightforward method to approximate tidal ranges between the available tide stations. More sophisticated methods of modeling tide propagation between discrete samples have been developed (e.g., Hess et al. 1999), but more reliable tidal datum shift information across the Alaska region was not available at the time of this project. Producing that information is a major undertaking outside the scope of this project and is an ongoing area of work for the NOAA VDatum program. The inherent uncertainty of not only the underlying bathymetric data but also in the tidal shift values influenced both our decision to report the full observed depth ranges at multiple datums during characterization and to look to other datasets, namely the National Wetlands Inventory, to define the difference between intertidal and subtidal areas in this study. In many areas, more accurate depth data than is used here exist at a local scale. Because the suitability model used 5-ac grid cells, localized high-resolution data do not add much benefit and would be much less consistent across the study areas for the general use of bathymetric data in this study. As an additional note, combining the data in the mosaic grid created a seam between the two datasets. Since the seam does not overlap any study area, any artifacts introduced there were not a concern in this analysis. However, for all of these reasons, future work on siting individual farms or general use in areas outside these study areas should look to other depth datasets that may provide better accuracy and resolution in local areas.



National Wetlands Inventory

Differentiating areas by habitat type and, specifically, understanding tidal conditions and freshwater influence were core

requirements of this study. The National Wetlands Inventory (NWI), produced and distributed by the USFWS, provides current, geospatially referenced information on the extent and characteristics of wetlands and related aquatic habitats (USFWS 2019). Wetlands are systematically categorized (USFWS 2013) in the NWI by trained analysts using high-altitude imagery in conjunction with collateral data sources and field work. For the AOA suitability modeling, the NWI was used to remove areas likely unfit for the planning goals due to significant freshwater influence or tidal range. Wetland areas categorized as non-estuarine or non-marine systems, defined in the classification standard where ocean-derived salts measure less than 0.5 parts per thousand, were fully constrained in the suitability model and removed from consideration. Furthermore, this project required separating the siting process into intertidal and subtidal labels to provide options for different farm types. This was done using the NWI subsystem categories, where areas labeled as intertidal were separated from other habitat types and analyzed specifically to identify intertidal AOA options. The NWI classification was chosen for these differentiations because it provided complete coverage of the coastal areas within the study areas, which is necessary for comparison, as well as high spatial accuracy and well-defined data standards and providing for the systematic removal of areas dominated by freshwater inputs and sediments where accurate salinity data are not available.

Small Island Boundaries

The available Alaska coastline polygon datasets do not identify many small coastal islands as land. To ensure model grid cells that predominantly overlap islands were not considered in the suitability analysis, a dataset of island polygons was developed. The NOAA Office of Coast Survey distributes geospatially referenced coastlines at nested spatial resolutions for Electronic Navigational Charts (NOAA Office of Coast Survey 2001), including what they define as Harbor (scales: 1:12,00 and 1:22,000) and Approach (scales: 1:45,000 and 1:90,000) usage bands, which were used for this analysis. These coastline vector line features were extracted for the study areas and then joined at their intersections. When these intersections formed closed loops, a polygon feature around small islands was created. These were extensively refined by manually inspecting the output and editing the results against satellite imagery, as well as applying several filtering algorithms to retain only features with a high confidence of representing islands. Grid cells that were > 80% covered by areas identified as land were then constrained and excluded from the suitability analysis.

Vessel Traffic

Automatic identification system (AIS) vessel traffic data are collected by the Marine Exchange of Alaska, which monitors real-time vessel information to improve navigation safety and support homeland security. AIS transponders are carried on most self-propelled vessels of 1,600 or more gross tons and on many commercial vessels of smaller size. Transponders are required on vessels of 19.8 m (65 ft) or more in length and engaged in commercial service; towing vessels of 7.9 m (26 ft) or more in length and with more than 600 horsepower; vessels certified to carry more than 150 passengers; vessels supporting dredging operations; and vessels transporting specific dangerous, flammable, or combustible cargo (U.S. Coast Guard 2025). Additionally, fishing industry vessels of various sizes and tonnage are required to carry AIS transponders to support commercial fishing. The data, which include ship name, purpose, course, and speed, are continuously acquired from vessels through transmissions to 79 fixed stations.



Raw vessel traffic data from 2012 to 2024 were processed for the AOI. Years 2020 and 2021 were not included as the data are not representative of expected trends due to the disruptions from covid-19. Vessel activities were interpreted from the received data format of short line segments for single data logs within vessel trips. These segments were merged into continuous lines if they were from the same ship ID and had consecutive times to create continuous vessel tracks for spatial analysis and quantification. These combined lines were then converted into raster (100-m resolution) grids for each study area to standardize the spatial units for analysis. For each month over the 10 years, the total intersections of transects with each grid cell were counted. This process was repeated for each vessel type: cargo, tanker, tug and tow, pleasure and sailing, passenger, fishing, military, and other. These categories are provided by the monitoring database, including the “other” category, which contains vessels that either do not fit into another category or fail to report their description. The mean of these monthly totals was calculated over the 10-year time series, resulting in a single raster of average transects per month for each ship type, which was then used in suitability modeling.

Vessel traffic is displayed on maps using categories created with quantiles to maximize contrast and ease the interpretation of high- and low-traffic areas. A key limitation of these data is that not all vessel traffic is represented, as certain smaller recreational and commercial vessels are not required by regulations to carry AIS transponders. The “other” category contains numerous different types of vessel activity, for example, diving or dredging operations among many others. The AIS transects per month were first scored for each vessel type and study area using a Z-shaped membership to values ranging from 0.01 to 1. Then, a combined AIS scored layer was created and used in the suitability model by taking a geometric mean of those eight individually scored layers.

Oceanographic Conditions and Water Quality

In oceanographic analyses, regional-scale models such as the Regional Ocean Modeling System for current speed, direction, temperature, and salinity, and the Simulating WAves Nearshore model for wave characteristics, are commonly employed to characterize marine conditions. However, due to Alaska's complex coastline, characterized by extensive islands, inlets, and fjords, the AOA study areas are not adequately resolved by the spatial resolution of any regional ocean models, especially because the project goals specifically target highly dynamic nearshore areas. Furthermore, because these goals center on comparing areas to each other over the entire study area, the best available data for suitability modeling need to strike a balance between the accuracy of the spatial resolution and sufficient coverage for reasonable comparison without bias of data presence. Even though there are monitoring stations, in situ measurements, and some small-scale high-resolution oceanographic models across Alaskan waters, there are no consistent sources of salinity, water temperature, current speed, or water quality data that resolve across the study

areas at a resolution or accuracy that would be appropriate to include as input for the suitability model. Satellite remote sensing products do provide water temperature and quality estimates across the study area but are often considered inconsistent and inaccurate in nearshore environments. Since oceanographic conditions are critical to the logistical and financial viability of a mariculture operation, any future planning within individual AOA options should consult local partners for more detailed information and data in the area. One particular data gap in this analysis that may be filled by local sources on a case-by-case basis is the lack of information on current speed. Every effort was made to account for these oceanographic conditions where possible, particularly in the case of potential wave exposure.

Despite the data limitations described above, feedback from the public and industry partners emphasized the need to account for potential wave exposure in site feasibility. Therefore, multiple datasets were utilized for site characterization. Where the Department of Energy's Water Power Technology Office's (WPTO) US Wave dataset (DOE WPTO 2025) was available, primarily on the outer parts of the study areas connected to the Gulf of Alaska, the average significant wave height was extracted from the time series model data (2000–2010). For inshore areas where the model domain did not reach, the NOAA Fisheries Alaska ShoreZone dataset (NOAA NMFS 2025b) was used. "Biological wave exposure" categories were used as a proxy for potential exposure to wave energy. In these areas where model grid cells did not directly overlap the Alaska ShoreZone mapped coastlines, the exposure category was interpolated from the nearest coastline. Each data layer was scored categorically, with higher exposure categories and significant wave heights representing increased difficulty in constructing aquaculture infrastructure for higher wave energy areas. Down-scored model values of 0.6, 0.4, and 0.2 were assigned to areas with average significant wave heights of 1–1.5 m, 1.5–2 m, and > 2m, respectively. These same down-scored values were also assigned to ShoreZone wave exposure categories of "semi-exposed," "exposed," and "very exposed," respectively. Wind model data were included in the characterization of AOA options to provide additional context on potential weather conditions and annual trends, with wind speed at 10-m altitude extracted from the National Renewable Energy Laboratory (NREL) WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) (Wang et al. 2024) and presented as a summarized climatology. As discussed above, water quality was assessed during the characterization stage using satellite time series data to provide some insight on the seasonal fluctuations and ranges. Sea surface temperatures indicate the thermal conditions of the water, which are relevant for marine species distribution and physiological processes. Surface chlorophyll *a* serves as a proxy for phytoplankton biomass, indicating primary productivity and overall ecosystem health. Light attenuation (Kd) is a measure of water clarity, affecting light penetration crucial for photosynthesis and visual foraging. Total suspended solids (TSS) indicate turbidity, which can impact light penetration and affect filter-feeding organisms, positively or negatively (Dutertre et al. 2009). Sea surface temperature data were derived from the Jet Propulsion Laboratory (JPL) Multi-scale Ultrahigh Resolution Level 4 dataset (JPL 2015). Data from 2019 to 2023 were used, with a daily mean temperature calculated at a 0.01° resolution. Chlorophyll *a*, Kd, and TSS were sourced from the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) Sentinel-3A Ocean and Land Colour Instrument (OLCI) Ocean Colour Geophysical dataset at a 300-m resolution (EUMETSAT 2025) and summarized into a monthly climatology.

While satellite data provide the best available information for characterizing general trends and climatology across large areas, it has limitations, particularly in complex coastal waters. There are also other potential remote sensing sources for these parameters, such as from Sentinel-2 or Landsat; however, EUMETSAT provides a processed, derived product from the OLCI that uses a neural network for correction over complex coastal waters. This served as the best available satellite remote sensing product for Chlorophyll *a*, Kd, and TSS in the context of this work. OLCI satellite data are still susceptible to measurement errors caused by sun glint, clouds, snow, sea ice, and unresolved shorelines. As a result, individual extreme values are unlikely to be accurate, and the data are most useful for quantifying and visualizing general trends over time and between locations rather than for single accurate measurements. Therefore, while these data provide valuable context for the AOA options, they were included only in the characterization stage, and incorporating data sampling and local knowledge will be valuable in subsequent efforts that are more localized, especially given the known challenges of satellite data in very nearshore coastal environments.



Commercial Fishing Data

Commercial fishing is an important economic driver for Alaska (McKinley Research Group 2024, NOAA OCM 2024), and understanding use patterns is essential for MSP and minimizing conflicts within this established and socio-economically important industry. Commercial fisheries data were received from the ADFG and were predominantly annual landings (pounds and dollar values) by species and gear code for specific statistical reporting units. Fishing data are considered Controlled Unclassified Information, which requires specific measures for handling, safeguarding, and controlled dissemination. Under the Magnuson-Stevens Fishery Conservation and Management Act, section 402(b)(3), NMFS may publicly release confidential information only in an aggregate or summary form that does not directly or indirectly disclose the identity or business of any person. The aggregation rule applied in the NMFS Alaska Regional Office is that a minimum of three or more submitters in each stratum is considered suitable for public display. Data not meeting these criteria were removed from map visualizations but were used in the analysis. To further maintain confidentiality, maps containing fishing data were categorized by quantiles into descriptive categories such as “Low,” “Moderately Low,” “Moderate,” “Moderately High,” or “High” fishing effort.

ADFG provided the most recent 10 years of landings data for three primary reporting classes (salmon, groundfish, and shellfish/other) from their fish ticket database. Fish tickets serve as a bill of sale, indicating the amount of each species delivered by a vessel to a processor, along with other information such as gear type and statistical management area. Because the smallest spatial resolution of a landing is a state statistical area, a value for the average landings in pounds per acre per year (lb/ac/yr) was

assigned to grid cells across each statistical area by dividing the total landings by the size of the statistical area and number of years recorded. This was necessary to compare landings between statistical areas. NCCOS collected feedback on means to further refine these data for specific fisheries with habitat-focused locations, highlighting that certain fisheries primarily operate within a maximum depth range. As a result, average landings values for gear codes associated with diving and pot fisheries were distributed to portions of the statistical areas within their respective identified depth ranges (shallower than 25 m for geoduck and sea cucumber dive fisheries, and shallower than 100 m for most crab pot fisheries), as opposed to the statistical area as a whole.



Effectively scoring the landings data in the suitability model required careful consideration due to statistical outliers in lb/ac/yr values caused by the existence of small statistical areas around salmon hatcheries. The small areas with large recorded landings produced values up to two orders of magnitude higher than those from the rest of the statistical units. To account for this skew, a 90th percentile landings value was identified that represents a reasonable upper bound expected for most of the data excluding these large outliers. The lb/ac/yr values for each of the three species were first scored independently by identifying any values above this 90th percentile threshold and down-scoring to 0.2, categorizing these extreme landings locations as very unfit for mariculture. Remaining values were then linearly rescaled between 0.5–1, with areas having the lowest fishing effort receiving the highest suitability scores. A combined fisheries landings layer was created per study area by taking the minimum score between the three species categories, chosen so that areas with increased fishing effort in any of the three categories receive that lower relative suitability score.

Alaska Area Plans

ADNR divides the state into 16 planning regions, each guided by an Area Plan that outlines goals, management priorities, and land and water use guidelines. These plans allocate the use of state land and water through designations. Designations include critical information considered during the adjudication of aquatic farm leases by ADNR. Alaska Area Plans are treated as a primary source of information for the AOA suitability model project because of ADNR requirements to adhere to these plans through the aquatic farm lease determination process. The data processing included the identification of subunits within the seven Area Plans (Kenai, Central Southeast/Southern, Prince of Wales, Northern Southeast, Juneau, Prince William Sound, and Kodiak) that overlapped with the AOA study areas. Area plan unit and subunit boundaries were downloaded from the Alaska mapper. In some cases, shapefiles for Area Plan subunits that overlapped with the AOA study area were required to be created using text descriptions of subunit boundaries within the Area Plan document. For each of the overlapping area plans, relevant text attributes for all subunits were copied into a

spreadsheet. References to subsistence harvest, personal-use fishing, intertidal gathering, and community harvest were coded to create an attribute field labeled "community harvest." Text references to sport fishing were coded into a "sport fishing" attribute field. Text references to "heritage sites" and "anchorages" were similarly coded into separate attribute fields. In addition, two separate attribute fields were created for text related to aquaculture policy constraints. One was associated with explicit prohibitions on the issuance of aquatic farm leases within a subunit or a portion of a subunit; the other was related to units or subunits with special management plans that require authorization from multiple entities or similar requirements before the issuance of an aquatic lease. This process was repeated for all the subunits in each plan, except for the amended SW units of the Prince of Wales Area Plan. For this plan, only the units that overlap with the AOA study areas were extracted due to time constraints. Each attribute field was used to generate individual spatial data layers, which were then sorted into the appropriate submodel for use in the suitability model.

Suitability Analysis

A gridded relative suitability analysis, commonly used in a multi-criteria decision analysis, was performed at the individual study area level to identify the grid cells with the highest suitability for aquaculture based on the study planning goals (Longdill et al. 2008, Radiarta et al. 2008, Gimpel et al. 2015, Bwadi et al. 2019). Final suitability scores are presented in maps as categories ("Unsuitable," "Low," "Moderate," "High") grouped by quantiles of the final scores, with all scores of 0 being in the "Unsuitable" category and represented by the color red. Standardized colors were used in the maps to depict suitability categories, with orange representing "Low," yellow representing "Moderate," and blue representing "High" suitability and coinciding with each quantile. With all suitability maps, the categories still represent values ranging from 0.1 to 1, with the "Low" category representing the lowest quantile of the data, "Moderate" representing the middle quantile, and "High" representing the upper quantile. Presenting categories rather than actual suitability scores simplifies the interpretation of results and provides optimal contrast among categories. Further, the distribution of scores varies among the suitability submodels (e.g., number of data layers, score range of data distribution depicted); for example, in one submodel, a score of 0.5 could be classified as "High," while in another submodel or region, a score of 0.5 could be "Low" because the scores are relative. Thus, suitability scores among the different study areas and different submodels cannot be directly compared, as the score is unique to each study area and submodel. While suitability models are split up by study area to account for relative scoring among study areas, comparisons between study areas are not possible, and suitability models for each study are not run separately between intertidal and subtidal scenarios at this stage of the modeling workflow.

Calculation of Suitability Scores

After combining all of the constraint layers (suitability score of 0) to remove any areas deemed unsuitable for aquaculture (or, in the case where existing aquatic farm leases are present, occupied), all the other data layers within the remaining area for each study area were extracted onto the hexagonal grid cells and the suitability score applied to the modeling process. As discussed previously, many data layers represent locations or areas with single or discrete suitability scores applied, while others have a continuous range of input values that are rescaled to a range of suitability scores using a membership function. Applying the constraints first ensures the relative scoring of these continuous layers is scaled to

the appropriate range and not redundant with the areas already removed by the constraints. The suitability score for each of the five submodels (Figure 2.5) was calculated using the geometric mean from all scored data layers in the respective submodel. The final suitability score for each grid cell was then calculated as the geometric mean of the five submodel scores (Equation 2.3). The geometric mean (Equation 2.3) was chosen as the most representative scoring statistic for the analysis (Bovee 1986, Longdill et al. 2008, Silva et al. 2011, Muñoz-Mas et al. 2012), and equal weights in that geometric mean were applied to data layers and to submodels.

Equation 2.3. Geometric mean equation implemented for final suitability model scoring, after 0 values (Constraints Model) were removed.

$$\textit{geometric mean AOA suitability model} = \sqrt[4]{x_1 \cdot x_2 \cdot x_3 \cdot x_4}$$

$x_1 =$ *national security submodel*
$x_2 =$ *natural and cultural resources submodel*
$x_3 =$ *industry, navigation, and transportation submodel*
$x_4 =$ *fishing and aquaculture submodel*

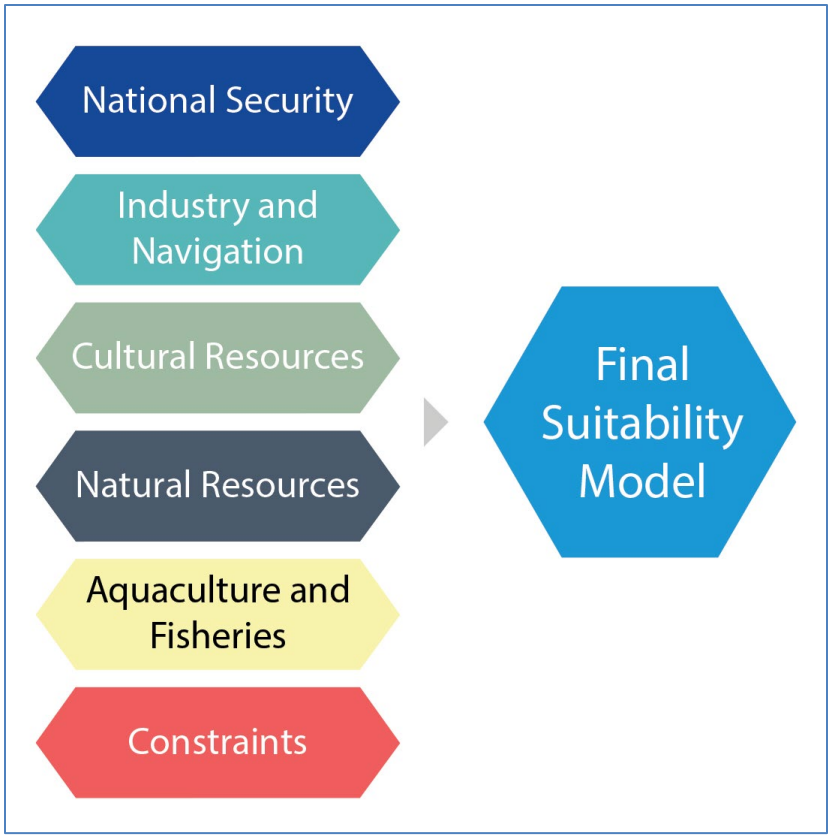


Figure 2.5. A generalized approach to a multi-criteria decision analysis suitability model. The study area is first constrained by the data layers that are unsuitable for the planning goals (score = 0). The other data layers within each submodel are scored (0.1–1), and any rescaling is done on the remaining space after constraints are applied. These constrained and scored data layers are combined into a single value for each submodel. Final submodel values are then combined into the final suitability score using an equally weighted geometric mean.

Local Index of Spatial Association

A local indicators of spatial association analysis (hereafter, "cluster analysis") was used to identify statistically significant clusters in the final relative suitability modeling results for each study area. It was performed for both intertidal and subtidal scenarios (Anselin 1995). All grid cells assigned a score of 0 within the Constraints Model were excluded from the cluster analysis, as these areas are unsuitable for aquaculture and were not considered further (Figure 2.5). The "rgeoda package" (Version 0.0.10-4) in R was used to implement the Local Moran's *I* approach, comparing the standardized z-values of the suitability score at each grid cell location to neighbors within a fixed distance. The function inputs were a 250-m search distance, to consider the six adjacent grid cells as neighbors for each location, and 9,999 permutations, which are used for statistical analysis (calculating p-values) of whether the clustering observed in different locations is likely indicative of an actual pattern and not just present from random chance (Esri 2021b). Statistically significant clusters ($p < 0.05$) of grid cells with relatively high suitability scores (i.e., high suitability clusters) were identified at a 95% confidence threshold. The cluster analysis identified a total of 3,341,873 ac (13524.1 km^2) of such statistically significant high suitability clusters.

Data Not Included in the Suitability Model and Cluster Analysis

Some data layers were not appropriate to include in the suitability and subsequent cluster analysis. Certain data layers lacked the quality, validation, temporal scale, or spatial resolution necessary for inclusion in the model. Additionally, some layers were shared at a resolution unsuitable for inclusion in the suitability model without a downscaling algorithm being applied, which can lead to several issues, including influencing the accuracy, output resolution, and robustness of the data (Ramírez Villegas and Jarvis 2010, Porporato et al. 2020). Lastly, some layers were considered but did not overlap or intersect the study area. Table 2.9 lists some examples of data layers that were reviewed but were not included in the suitability model. A number of layers that did not meet specifications for modeling were, however, included in the characterization of individual AOA options to provide supplemental information that may be useful in individual project planning and review.



Table 2.9. Examples of data layers considered for inclusion in the Alaska Aquaculture Opportunity Area suitability model but excluded because they had no or uncertain interactions with the study areas. Although these variables were not used, they were considered in the characterization of Aquaculture Opportunity Area options. DOD = (U.S.) Department of Defense; CDP = census-designated place.

National Security Datasets	
DOD Assessment Planning Area	Formerly Used Defense Sites (FUDs)
Natural and Cultural Resources Datasets	
Salt Marsh Vegetation Biobands	Urchin, Mussel, and Barnacle Biobands
Cultural Resources	
Communities – Incorporated and Unincorporated Cities, Boroughs, CDPs, Localities	Community Culture and History
Industry, Navigation, and Transportation Datasets	
Airport in Community	Solid Waste Sites
Coastal Energy Facilities – Power Plants	Power Plants and Neighboring Communities
Aquaculture and Fisheries Datasets	
Wild Resource Harvest and Use by Bering Sea Communities	Salmon Radio Telemetry, Copper River, Alaska

Precision Siting Model

A precision siting model adapted from Riley et al. (2021) was developed using custom rules and an adapted version of the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) to identify the most suitable draft AOA options in each study area for both intertidal and subtidal scenarios. The first step in the precision siting model evaluated the high suitability clusters. Industry feedback identified a preference for areas with limited seafloor slope, shallower operationally appropriate depths, and a shorter distance to port. This preference is due to logistical challenges and costs associated with deploying mooring systems in high seafloor relief areas and at greater depths, as well as potential economic impacts related to travel distance. In addition, industry feedback suggested a preference for sites with moderate to low wind and wave exposure to support engineering thresholds and access across weather conditions. Additional input from the U.S. Coast Guard, fisheries managers, and the fishing industry also supported an approach where siting proximate to shore would support minimizing vessel traffic and some fishing activity due to a tendency for both sectors to avoid certain shoreline features, which can present hazards to navigation and fishing gear.

Using a TOPSIS approach to rank potential AOA options first required calculating metrics to characterize each location based on this feedback from industry and management partners. Normalized values between 0 and 1 were produced from four different input metrics: travel distance to coastal population center, distance to

shore, depth, and slope, with values closer to 1 representing better conditions for draft AOA options. Selected datasets and data rescaling functions are presented in Table 2.10. This normalization procedure was needed to bring the different criteria into a consistent range. It prioritizes areas with shorter distances to coastal population centers, higher proximity to the shoreline, and shallower and flatter seafloor. This normalization was applied every time TOPSIS was run for each study area and scenario, since ranking is relative to the alternatives being compared. These normalized metric values are treated as theoretical coordinates, giving a 4-dimensional point in this theoretical space for each real location that corresponds to its overall performance across all four criteria. Using a simple Euclidean (i.e., straight-line) distance, TOPSIS calculates how close this 4-dimensional coordinate is to the ideal scenario point of all 1-values, providing that "similarity to ideal solution" that gives TOPSIS its name. Each location can then be ranked based on this distance value, where smaller values (more similar to ideal) are considered better. This analysis was conducted both for different areas within large high suitability clusters (greater than 500 ac) and then among different high suitability clusters.

All grid cells within the high suitability clusters that were larger than 500 ac were ranked using the TOPSIS method described above, identifying the highest suitable groupings of cells within each cluster. This step was conducted to restrict the large high suitability cluster areas down to the optimal locations within them at sizes closer to the planning goals, which could then be compared against each other later using an among-cluster model. The slope, distance to population center, distance to shore, and depth data were extracted for each grid cell and normalized separately within each individual cluster. Then, either the highest ranking 500 ac from the within-cluster TOPSIS ranking or the highest-ranking 10% of the cluster area (whichever is larger) was kept and dissolved into new continuous polygon regions passed forward to the among-cluster TOPSIS. For clusters less than or equal to 500 ac in area, the entire cluster was dissolved into a single polygon and analyzed against other potential site locations.

These candidate polygons returned from the within-cluster siting model were then assessed against each other using the TOPSIS approach to compare potential AOA option locations across each study area. Means of each of the four-ranking metrics (slope, distance to population center, distance to shore, and depth) were calculated for each dissolved polygon before being normalized to provide a single value for each. This normalization was applied separately across each study area and for each planning scenario (subtidal and intertidal). Before this extraction and ranking was run, a "simplify geometry" tool was run using R terra to reduce the jaggedness of the polygon edges caused by the hexagonal grid pattern and produce smoother results. The TOPSIS ranking metric was then produced for each of these potential AOA options, which informed the final step of this process: manual inspection and optimal site selection.

Table 2.10. Precision siting model parameters, with the function used to rescale each parameter before inclusion within the model.

Data Layer	Rescale Function
Seafloor slope	Linear
Depth	Linear
Travel distance to coastal population center	Linear
Distance to shore	Linear

General Data Limitations Disclaimers

It is important to address the limitations of the data used within the spatial analysis. The following sections aim to provide general context regarding recurring limitations in the data used throughout the spatial planning process. Additional data-specific limitations are identified in the data processing steps section. More information on individual data layers and potential limitations can be found in their respective metadata. Links to the metadata for layers used in the analysis and characterization are provided in Appendix A.

Data Gaps

Across individual study areas, there is significant variability in the species and/or habitats present, resources of concern, and the extent of past and current sampling efforts. To address these differences in data and priorities for aquaculture planning, separate suitability models were developed for each study area. Although this approach limited direct comparisons between study areas, it enabled the use of higher-resolution, localized datasets that reflect specific development concerns in the study area and prevented unequal data coverage from biasing the modeling results. Despite this, individual study areas still encompassed large spatial extents. To the extent possible, data gaps or limitations of included datasets were identified in the analysis. However, the absence of data in a given study area may reflect gaps in data coverage and not the true absence of a given resource. Conversely, many localized datasets with finer resolution than those incorporated into the models were identified. However, because these datasets did not provide complete coverage of a given study area, they were unsuitable for inclusion in the suitability modeling.

Dataset Updates and Removal

Over the course of the two-year spatial modeling and report development process, several data layers incorporated into the analysis were subsequently updated or removed from public servers. Where feasible, updated datasets were integrated into the final model runs; however, datasets revised after the completion of the modeling process were not included. For instance, the Aquatic Farm Permit and Lease dataset and the Navy Undersea Cables dataset have been updated since the modeling concluded. Conversely, datasets such as Historic Lighthouses and USACE AD Navigation Projects have been removed from public servers following their initial acquisition. Sea otter and herring stocks are subject to relatively frequent survey efforts. Accordingly, these datasets should be systematically monitored for updates, both through publicly available survey results and via direct engagement with the agencies responsible for conducting the surveys.

Partial Use of Data Layers

Several data layers include information on multiple species or habitat types, but only specific layer features have relevance to aquaculture suitability modeling. In these cases, the Team relied on expert guidance to identify which features in a specific data layer should be included and which should be excluded from the analysis. This means that while the entire dataset is listed and cited within this Atlas, in some cases, only a single or select features were included in the analysis. Examples of this include the Southeast Alaska Closed Waters Salmon Net Fisheries, Harbor Seal Haulouts, Steller's Eider Abundance and Distribution, ShoreZone Mapping Data, and Steller sea lion data, which all have conditions that require filtering of the data within the model.

AOA Option Selection

The highest-ranking potential AOA options within each study area were selected based on a combination of precision siting scores and manual inspection of geometry. Any clusters smaller than 50 ac were excluded from further consideration, as this was the minimum AOA target size. High-scoring potential options with shapes incompatible with the planning goal (e.g., clusters primarily consisting of a width of 1–3 adjacent grid cells or other irregular geometry) were removed, as they could not support multiple aquaculture operations. The remaining high scoring potential AOA options within each study area were subjected to review by the Team to address possible permitting, leasing, navigation, or other constraints not included within the suitability model structure (e.g., changes in upland ownership and/or lease status since model initiation, major navigation conflicts, significant natural or cultural resource conflicts, etc.). U.S. Coast Guard review of potential options yielded several concerns related to traditional unmarked vessel fairways and unmarked anchorage areas. In addition, options frequently subject to large debris from upland washouts and areas with freshwater sources that result in winter ice development, which can shear flotation buoys from suspended culture systems, were identified.

AOA options with identified production constraints or major navigation safety concerns were removed or modified (e.g., constrained/conflicted portions removed). The remaining top-ranking options were identified as the final draft AOA options within each study area. Where necessary, boundaries of the final draft AOA options were further simplified to reduce the number of corners and/or adjusted to address deviations in shoreline and bathymetric boundaries and the grid structure (e.g., the landward edges of grid cells with portions that extended into upland areas



were clipped to the shoreline). Previous work conducted by Morris et al. (2021) and Riley et al. (2021) sought to identify rectangular options for ease in computation, for boundary establishment, and to maintain position to the cardinal directions. This approach is ideal in open ocean areas where the coastline does not as heavily influence bathymetry and exposure as in coastal waters. In the study areas, the coastal geology often includes deep channels and bays with narrow shoreline-adjacent depth contours suitable for coastal aquaculture operations (less than 200 ft [60.96 m] in this study). In addition, proximity to shoreline features was often correlated with reduced wave and wind exposure within study areas. As a result, identifying options with boundaries that follow the coastline and bathymetric contours, as opposed to rectangles, was required to focus on areas with operationally ideal conditions and stay within planning goals, such as identifying AOA options suitable for multiple operations. Ultimately, individual operation siting may allow for sites with simplified geometry within the identified larger irregularly shaped options.

Revision of Draft AOA Options After Public Notice

NMFS published a Notice of Availability in the Federal Register with a 30-day public comment opportunity (90 FR 17051; April 3, 2025) seeking input on the draft AOA options. The initial report, which includes the draft AOA options, can be found online.[10] Comments received for the Notice of Availability included information that supported improvements in scoring or data processing to existing model layers as well as new authoritative spatial data sources not initially included in previous model runs. An example of an option boundary modification from updated model features suggested during public comment can be seen in Figure 2.6. Based on review of these comments and best available information, by NMFS and the State of Alaska, changes were made to the model and the suitability and cluster analysis were then rerun.

This revised model run was used solely to modify the footprint of the draft AOA options presented for public comment, due to concerns from the Team that new options or expansions to the draft options would not have benefited from public review and comment. The updated model suitability results were analyzed using the same clustering parameters and algorithms as before to determine whether grid cells within the footprint of draft AOA options remained part of high suitability clusters following the revised modeling run. Portions of the draft AOA options that were no longer within high suitability clusters were removed, and the boundaries were modified to produce the final AOA options presented in the results. If less than 50 ac of area remained following boundary modification, the draft option was removed entirely due to falling below the minimum size established in the study planning goals. In addition, several draft options below 50 ac that were included in error during the draft site selection process were also removed. Because this updated suitability model was used only to revise the draft options, it was unnecessary to rerun the precision siting that initially resulted in the selection of draft AOA options.

Not all public comments resulted in modeling changes. Comments that did not result in modeling changes are summarized in the characterization section for the respective study area(s) to provide context to proponents and agencies on potential use conflicts and other factors that may need to be considered during the design, review, and permitting of aquatic farm leases.



[10] https://cdn.coastalscience.noaa.gov/page-attachments/MSP/Report-for-Notice-for-Comment-for-Alaska-Draft-Final.pdf

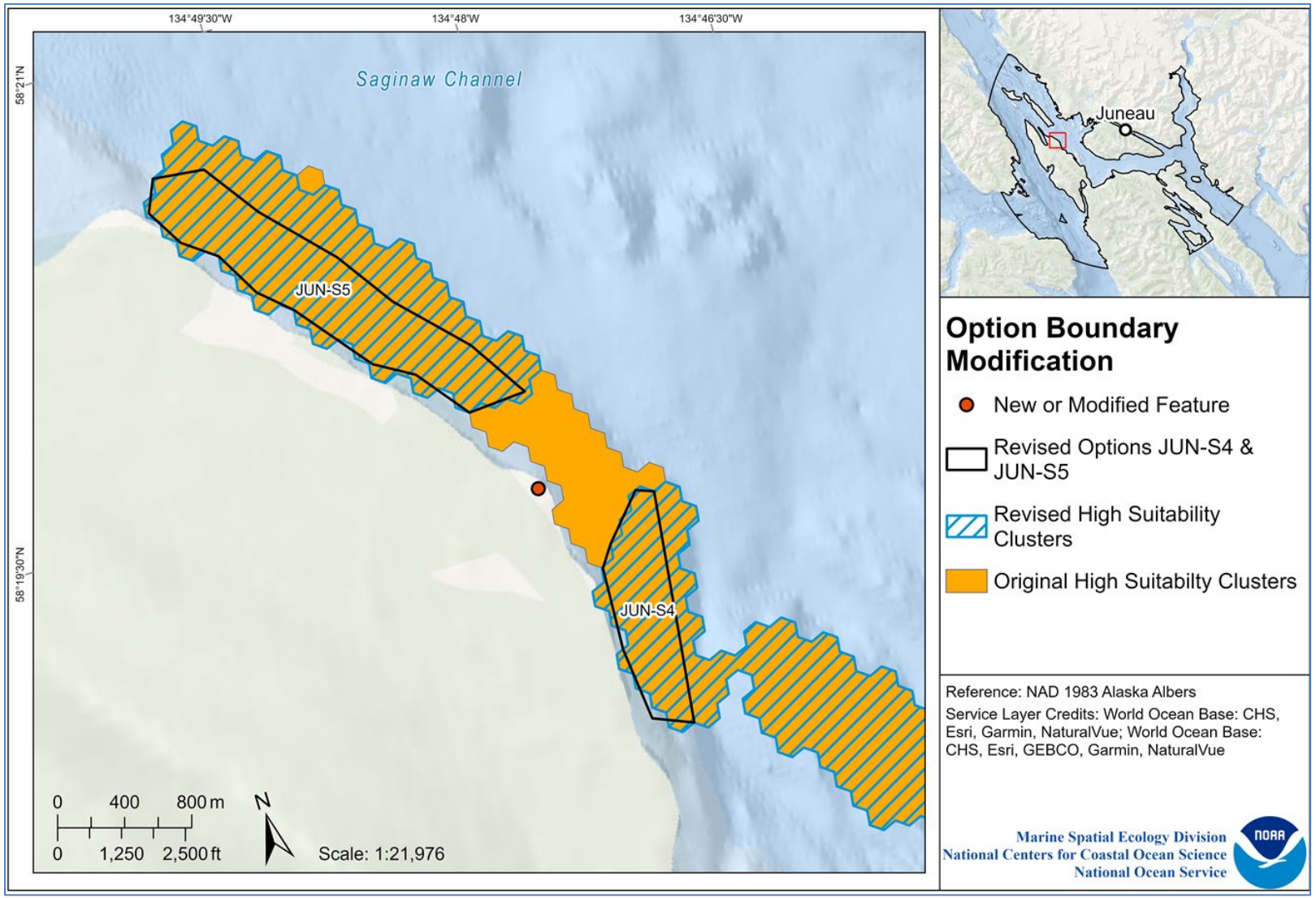


Figure 2.6. (Reprinted from Results Figure 3.62) Example of an option boundary modification from updated model features. The black line depicts the newly revised boundary for options JUN-S4 and JUN-S5. The original high suitability clusters (orange polygon) were revised due to new or modified model features (red points) resulting in revised high suitability clusters (blue hatched polygons).

Characterization of AOA Options

Following the selection of the AOA options, a detailed characterization of each option was conducted. This characterization includes summarizing information, generally related to the distance or overlap of each AOA option with data layers critical to aquaculture planning and permitting. Data layers used in characterization include both data used in modeling and data deemed not compatible for modeling but important in the aquaculture planning and permitting process.

Final Considerations

Models are valuable tools in optimizing planning choices and enhancing decision-making by offering more objective results and minimizing common biases. However, any modeling framework inherently involves certain assumptions. For instance, this modeling approach assumes that multiple overlapping activities within the same spatial area led to increased conflict, thus deeming such areas less suitable for aquaculture. This may not always be the case, depending on the specific activities involved.

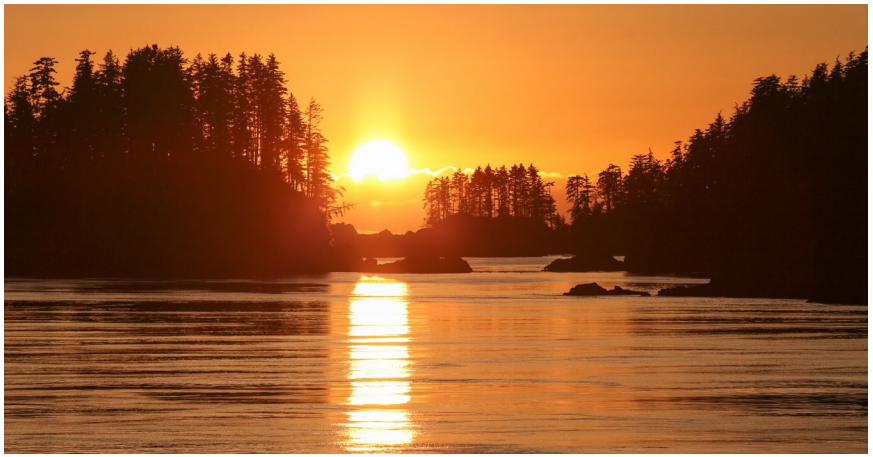
Spatial data were systematically integrated within a GIS framework as many independent model variables and incorporated through a series of interconnected workflow steps (Figure 2.1) (Stelzenmüller et al. 2012, 2017) to compare how those different criteria interact across locations. This relative suitability model for aquaculture in coastal ocean environments aims to identify the least conflicted areas with the best locations for the planning objectives, including productivity and long-term sustainability (Perez et al. 2003, Cho et al. 2012, Pınarbaşı et al. 2017, 2019, Stelzenmüller et al. 2017). To minimize bias between different sectors (e.g., fishing, aquaculture industry considerations, natural resources) and between any individual input layers, equally weighted submodels were created for each sector to calculate the final average suitability score. Layers within the submodels are also equally weighted. Environmental threshold values, suitability scores, and the inclusion or exclusion of individual layers were informed by extensive engagement, a key factor in accurate aquaculture planning (Vincenzi et al., 2006). When selecting the final modeling approach for identifying AOA options, careful consideration was given to the dynamic marine environment, distinguishing it from modeling approaches traditionally used for terrestrial environments (Sears 1940, Duck 2012, Maxwell et al. 2015). A favorable aspect of this planning process was the consistent use of NOAA and State of Alaska data, which helped to capture many of the social, cultural (e.g., commercial fishing), and economic (e.g., value) characteristics of the Gulf of Alaska region.

Like all models, this approach has inherent limitations. These include statistical considerations, reliance on the best available data, and the specific choices made in the modeling methodology. For example, in the spatial modeling workflow, many decisions are made that would likely lead to different results if approached differently, including: the selection and scoring of datasets, the decision to include or exclude specific datasets, methods for how data are summarized or averaged, the chosen p-value for cluster analysis and outlier analysis, and considerations of model error or weighting, among others. Specific examples of data limitations include the spatial and temporal resolution of the model data, the accuracy and precision of the data itself, and the availability of types of data (e.g., not having key primary socio-economic data or current speed models for this project). Additionally, there is a recognized scarcity of comprehensive spatial data regarding subsistence, sport, personal-use, and commercial fishing locations. Given the

significance of these variables in the aquatic lease determination process, the lack of robust spatial data introduces uncertainty regarding the ultimate suitability of specific activities at specific locations. The available shoreline datasets are an example of specific data accuracy limitations, as they did not consistently follow the precise contour of the coastline visible on high-resolution satellite imagery and frequently failed to encompass islands, occasionally leading to grid overlap with land areas.

The determination of aquaculture site suitability can be approached in several ways, depending on the specific planning objectives, and the modeling choices made in the overall framework can significantly influence the outcomes. This analysis applied suitability functions individually to each parameter (Vincenzi et al. 2006, Longdill et al. 2008, Cho et al. 2012). It is understood that alternative methods, such as those that apply varying levels of influence (often called "weighted approaches"), or have scoring for a layer conditional on values in another, can capture more complex relationships but may also introduce inconsistencies and biases. Research has also shown that even aquaculture experts with similar backgrounds may not be consistent in how they assign importance or score different factors (Manjarrez et al. 1996, Silva et al. 2011), which can lead to a range of potential results (Levings et al. 1995, Nath et al. 2000, Longdill et al. 2008).

Ongoing areas of development in this field often explore using more sophisticated scoring methods to account for the many complexities in the spatial suitability modeling process, such as the use of dynamic conditions to manage the overlap of potentially redundant elements or to incorporate different levels of importance for various data layers. For this particular project, however, a primary goal was to keep the modeling process as accessible as possible. The suitability modeling approach used allows for easier tracking of results back to inputs and decisions, maintaining high levels of transparency in how decisions are made. No obvious instances were identified wherein forcing more complex methods would significantly benefit results, especially considering the increased complexity and processing cost these methods would introduce. It is important to note that for other future projects with different objectives, such methods could prove highly beneficial. An example of a more sophisticated approach would be considering other factors such as proximity to shore or port, and oceanographic forces like current speed and significant wave height, as conditions for how to handle the presence or absence of other datasets (Brown 1986, Kapetsky et al. 2013, Porporato et al. 2020). This would mean that the presence or absence of a variable would only have influence if the conditions existed where that variable has a reasonable expectation to occur. In this model, this approach was used a single time, when applying fisheries landings data only to the areas within relevant depth ranges. Ultimately, the chosen suitability modeling approach strikes a balance between effectively identifying fitter aquaculture sites and maintaining a transparent, easily traceable process.



RESULTS

Constraints Model

Siting restrictions for aquaculture in state and federal statutes, regulations, and policies, and industry-based siting limitations were assessed for inclusion in the Constraints Model (Figures 3.1 and 3.2). The Alaska aquaculture leasing and permitting framework is designed to ensure that shellfish and seaweed farming can expand sustainably while protecting Alaska's coastal ecosystems and traditional resource uses. In some cases, state and federal agencies have established restrictions on locations where aquaculture can be sited. These include restrictions on siting in proximity to specific sensitive natural resources, such as within 91.5 m of anadromous streams or within 1,000 m of deep-sea coral and sponge observations, and in particular areas, such as danger zones and restricted areas, marine highways, existing aquatic farm lease sites, and Alaska Area Plan subunits with specific prohibitions on aquatic farm leasing. In addition, input was gathered to identify practical siting limitations for aquaculture, such as avoiding areas with sea ice, freshwater-dominated areas, and locations with depths that pose significant challenges for deploying gear. These areas were considered "unsuitable" for aquaculture within the suitability model and removed from analysis. It should be noted that some areas constrained by existing uses, such as existing aquatic farm leases, are not unsuitable for aquaculture in general; however, they represent a constraint because space is occupied and functionally restricted from new development. Further, some areas were included in the Constraints Model by the Team that do not have explicit legal restrictions on aquaculture siting but would require additional authorizations and lengthy steps in the process that made them functionally unsuitable for the intent of this siting analysis, such as the Afognak and Womens Bay submerged lands within the Alaska Maritime National Wildlife Refuge on Kodiak Island, where Refuge permits would be required for aquatic farming. Constraints model layers were categorized into the related submodel (e.g., National Security, Natural Resources, etc.) and included in the respective submodel Figures 3.3–3.48.

All Constraints Model layers have a score of 0 but may impact study areas differently due to the varying degree of overlap those layers have with each study area (i.e., study areas with higher levels of overlap with constraint layers have less space for AOA suitability modeling) (Table 3.1). It is important to note that many constraints overlap, and the total area removed may not sum to 100% due to overlapping constraints.

The Constraints Model differentially impacted the available space for suitability modeling across study areas, with 96.4% of the area removed in the Valdez Study Area, 95.4% in the Seward Study Area, and 87.3% of the Cordova Study Area removed due to constraints. In the Southeast, the Juneau Study Area saw the most significant reduction with 90.1% removed, followed by 88.6% in the Ketchikan Study Area, 76.8% in the Sitka Study Area, 76% in the Wrangell Study Area, 75.4% in the Petersburg Study Area, and 70.1% in the Craig Study Area. The Kodiak Study Area had 73.5% of the area removed due to constraints. In all cases, the 200-ft depth restriction removed the most significant amount of area. Ferry routes, marine highways, submarine cable areas, and Navy undersea cables layers also resulted in a substantial amount of constrained area across study areas with limited exceptions (Table 3.1).

Table 3.1. Data layers included in the Constraints Model for the Kodiak (KOD), Seward (SEW), Valdez (VAL), Cordova (COR), Juneau (JUN), Sitka (SIT), Petersburg (PET), Wrangell (WRA), Craig (CRA), and Ketchikan (KET) study areas. All datasets included in the Constraints Model were given a score of zero. Each dataset is listed with the percentage value (%) of total down-scored grid cells in each study area, as well as its assigned submodel classification – Industry, Navigation, Transportation (INT), Cultural Resources (CR), Aquaculture and Fisheries (AF), Natural Resources (NR), and National Security (NS). Continuous data are denoted in the table as "cont." Combined datasets are denoted in the table as "comb." A "-" dash indicates that the data layer did not overlap the study area. DEC = Department of Environmental Conservation; AOOS = Alaska Ocean Observing System; USACE – AD = U.S. Army Corps of Engineers Alaska District.

Constraints Layer Name	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Active Aquatic Farming Operation Areas	AF	0.08	0.02	-	0.15	0.02	0.06	-	0.01	0.08	0.05
Aids to Navigation (500-m setback)	INT	1.64	0.22	3.32	0.59	3.3	2.33	3.38	4.2	2.53	2.29
Alaska Area Plans (Aquaculture Exclusion Areas)	INT	-	-	-	-	-	-	-	-	1.92	0.93
Alaska DEC water quality monitoring locations	INT	0	0	0	0	0.06	0	0.01	0.01	0	0.01
Alaska Marine highways (500-m setback)	INT	5.18	5.41	7.63	6.74	12.3	4.16	6.3	5.47	-	4.26
Alaska State Game Refuges, Critical Habitat, and Sanctuaries	NR	-	-	-	-	0.97	-	-	-	-	-
Anadromous Waters Catalog – Streams (91.5-m setback)	NR	0.72	0.32	1.25	1.31	1.31	0.99	1.77	1.67	1.18	0.76
Anchorages	INT	-	-	-	1.92	-	-	-	-	-	0.05
AOOS Sensor locations	INT	0.01	0.01	0.03	0.01	0.03	0.01	0.01	0.02	0.02	0.02
Aquatic Farm Permit or Lease (50-m setback)	AF	0.2	0.03	0.14	0.25	0.04	0.09	-	0.02	0.24	0.11
Coastal Maintained channels	INT	0.01	-	0.03	-	-	0.03	0.27	0.18	0	0.01
Danger Zones and Restricted Areas	NS	-	-	-	-	-	-	-	-	-	6.09
Deep Sea Coral and Sponge Occurrences	NR	4.49	3.02	1.72	3.24	-	0.64	-	0.21	0.28	0.26
Depths over 200 ft	INT	39.14	74.98	68.38	42.27	60.19	45.51	42.03	44.29	36.4	64.76
Environmental Sensors and Buoys (500-m setback)	INT	0.07	0.12	0.49	-	0.88	0.11	0.01	0.05	0.02	0.3
Ferry routes (500-m setback)	INT	7.76	7.14	19.26	11.59	22.21	8.27	9.95	9.72	0.63	6.42
Ferry terminals (350-m setback)	INT	0.04	-	0.11	-	0.03	0.02	0.05	0.05	0.02	0.02
Fiberoptic Cable (200-m setback)	INT	0.34	1.85	-	-	-	-	-	-	-	-
Islands	INT	0.56	0.27	0.49	0.58	0.73	1.46	1.48	1.97	2.48	0.94

Constraints Layer Name	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Key Harbor Seal Haulout Locations (500-m setback)	NR	1.03	-	0.12	1.11	1.49	0.87	0.51	1.35	1.04	0.96
Land Status within the National Wildlife Refuges of Alaska – Afognak and Womens Bay Submerged Lands	INT	11.16	-	-	-	-	-	-	-	-	-
National Wetlands Inventory	NR	0.72	1.35	4.6	3.59	2.44	3.34	6.1	6.12	4.11	5.17
Navy Undersea Cables (500-m setback)	NS	6.09	10.24	29	8.05	24.29	10.78	16	19.26	2.25	10.9
Ocean disposal sites	INT	0.17	-	-	-	0.01	-	0.08	0.03	0	0.02
Offshore Seafood Processors Permitted Vessels	INT	0.01	-	0.02	0.02	0.01	0.01	-	0	0.01	0.01
Pipelines (500-m setback)	INT	-	-	0.22	-	-	0.03	-	-	-	-
Seafood Processing Discharge Locations	INT	0.01	-	0.01	-	0	0	0.01	0	0	0
Seafood Processing Facility Locations	INT	0	-	0.01	-	0	0	0	0	0	0
Seafood Processing Permitted Carcass Disposal	INT	0	-	0.01	-	0	0.01	0	0	0	-
Seafood Processing Permitted Net Pens	INT	0	-	0	-	0.01	0.01	0	0	0	0
Seafood Processing Permitted Outfalls (350-m setback)	INT	0.01	-	0.09	-	0.03	0.11	0.02	0.05	0.02	0.01
Shipping Fairways, Lanes, and Zones (500-m setback)	INT	-	-	11.49	-	-	-	-	-	-	-
State Park Boundary (100-m setback)	CR	0.14	1.45	3.13	0.45	2.48	0.99	0.3	0.65	-	0.51
Steller Sea Lion Major Haulout and Rookery Locations (500-m setback)	NR	0.09	0.78	0.14	-	0.19	0.1	0.09	0.11	0.08	0.04
Submarine Cables (200-m setback)	INT	0.35	4.98	9.66	1.72	7.22	1.75	0.79	1.31	-	2.65
Submarine Cable Areas (200-m setback)	INT	4.11	3.89	9.02	3.7	19.13	2.79	21.06	22.69	3.69	7.9
Taku Glacier Boundary	NR	-	-	-	-	3.87	-	-	-	-	-
Travel Distance (25-nm boundary)	INT	38.41	56.21	60.63	54.17	54.96	49.78	23.72	23.5	43.55	36.99
USACE – AD Erosion Protection and Flood Mitigation Projects (500-m setback)	INT	-	-	-	-	0.01	-	-	-	-	-
USACE – AD navigation projects (500-m setback)	INT	0.09	-	0.24	-	0.17	0.19	0.11	0.14	0.04	0.09
Wastewater Outfalls (500-m setback)	INT	-	-	0.4	-	0.07	0.12	0.07	0.08	0.06	-
Wrecks and Obstructions (152.5-m setback)	INT	0.28	0.12	0.53	0.45	0.43	0.65	0.61	0.71	0.23	0.24

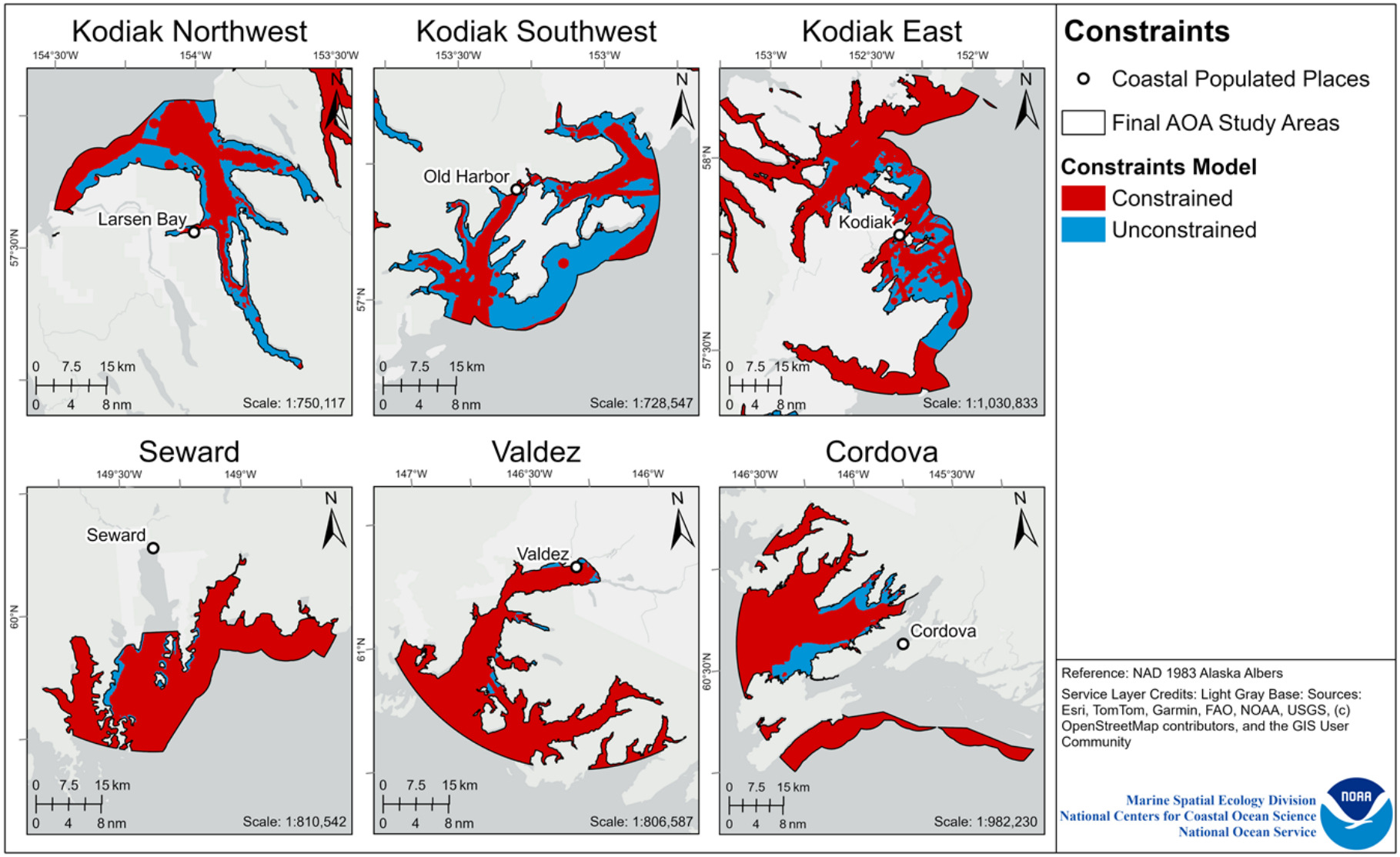


Figure 3.1. Constraints Model for Southwest and Southcentral Alaska Study Areas.

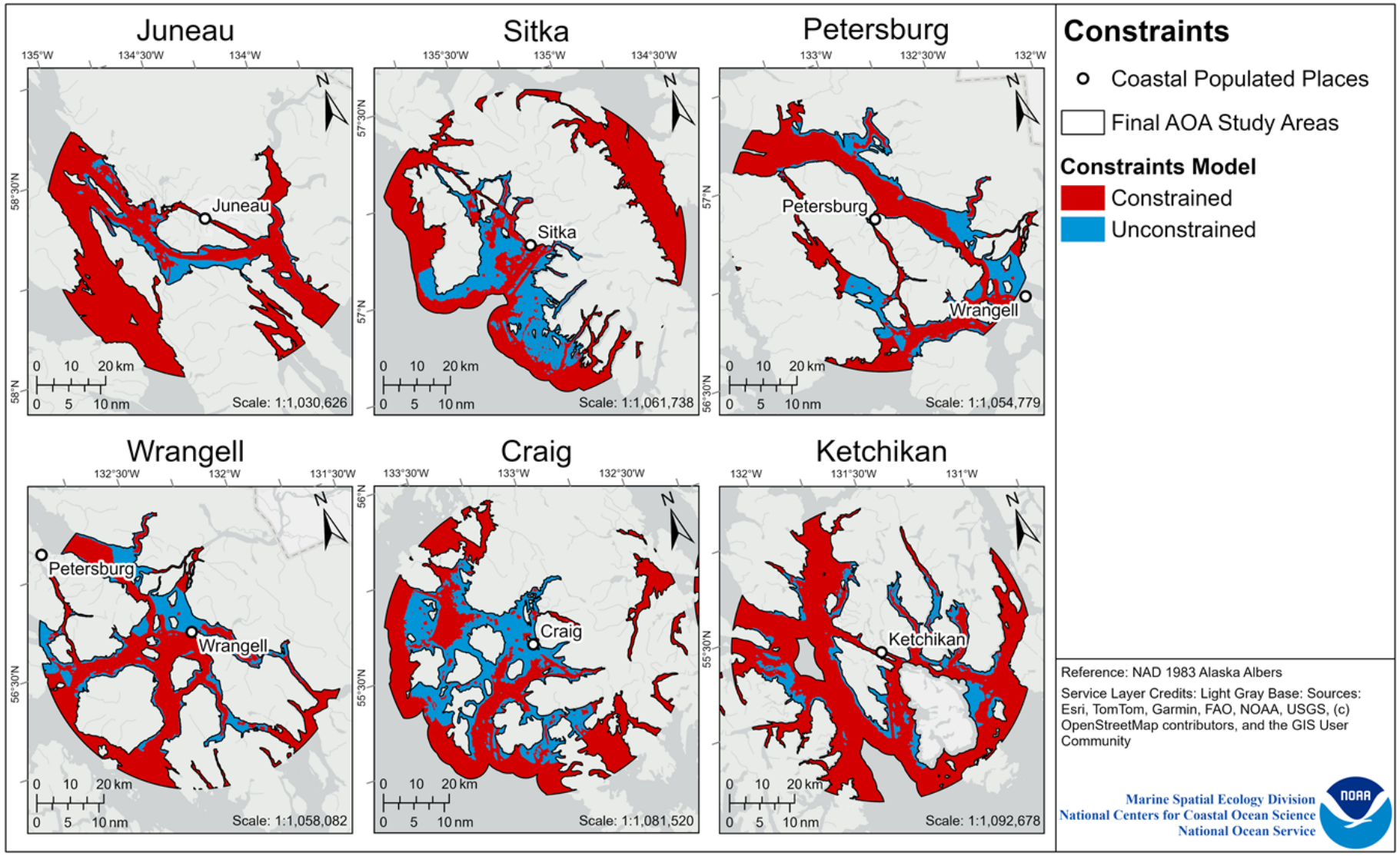


Figure 3.2. Constraints Model results for Southeast Alaska Study Areas.

AOA Study Area Submodels

Figures 3.3–3.48 depict individual layers included in each submodel, and submodel relative suitability results. To generate submodel relative suitability maps, the remaining portion of the study area after applying the Constraints Model was divided equally into five quantile-based categories, except for National Security, due to the limited number of datasets within the submodel (Table 3.2). The maps present the quantile categories as “Low,” “Moderately Low,” “Moderate,” “Moderately High,” and “High” based on the final scores, which range from 0.1 to 1. The maps use standardized colors to depict scores: orange for the lowest scores (areas with higher potential conflict) and blue for the highest scores (areas with minimal conflict). This categorical approach simplifies interpretation and enhances visual contrast. Because suitability scores are unique to each submodel, they should be interpreted as relative rankings rather than absolute values. Importantly, score distributions vary across submodels. For instance, a score of 0.5 may fall into the “High” category in one submodel but “Low” in another, depending on the relative distribution. As a result, scores cannot be directly compared across study areas or submodels, since each reflects its own relative scale.

National Security Submodel

National security operational areas and areas of national security interest were reviewed in and around the AOA study areas (Figures 3.3–3.6). The waters of the Gulf of Alaska are of strategic importance to military readiness, research, development, and testing and evaluation (10 U.S.C. § 5062). The Ketchikan Study Area is within portions of the Carderock’s Southeast Alaska Acoustic Measurement Facility (SEAFAC). SEAFAC is a small area, covering 164 km^2 (48 nm^2) in the Western Behm Canal near the city of Ketchikan, Alaska, and serves as the Navy's primary acoustic engineering measurement facility in the Pacific. This area is under Navy-controlled restricted use, and no other federal activities are expected to occur in this area. The Navy can restrict public access to SEAFAC areas with notification per 33 Code of Federal Regulations 334.1275. The Seward Study Area is near Warning Area 612 (W-612), which is a designated Special Use Airspace that spans approximately 2,256 nm^2 and extends from the ocean surface up to flight level 290. W-612 is used primarily by the U.S. Air Force for anti-air warfare training and by the U.S. Coast Guard for various exercises. When active, aircraft operating under Instrument Flight Rules are restricted from entering, though visual flight rules flights, such as fish spotters and whale watchers, may still transit the area. The Seward Study Area also overlaps with the Temporary Maritime Activities Area (TMAA). The TMAA encompasses 42,146 nm^2 of surface, subsurface, and airspace training zones. Located roughly southeast of Kodiak Island and south of Prince William Sound, the TMAA stretches about 300 nm long by 150 nm wide and reaches up to flight level 600. It includes most of W-612 and serves as a venue for joint military exercises involving the Navy, Air Force, and Coast Guard. FUDS are managed by the Military Munitions Response Program that addresses munitions and explosives of concern at former Department of Defense (DOD) sites.[11] FUDS overlap sections of all study areas.

National security interactions with the suitability of AOA options were determined through communications with the DOD Military Aviation and Installation Assurance Siting Clearinghouse (MAIASC)

[11] https://www.usace.army.mil/Media/Fact-Sheets/Fact-Sheets-View/Article/1910599/formerly-used-defense-sites-program-fact-sheet/

and the U.S. Coast Guard.[12] A single area marked as a danger zone and restricted area representing SEAFAC in the Ketchikan Study Areas was removed as a constraint. Munitions and explosives of concern areas overlap with only the Kodiak Study Area and were identified for modeling and down-scored to 0.5 (Table 3.2)

Table 3.2. National security considerations included in the relative suitability analysis and the score assigned to each dataset. Each dataset is listed with the percentage value (%) of total down-scored grid cells in each study area after all constrained areas were removed. Symbols, units, and abbreviations are as in Table 3.1.

National Security Dataset	Score	Southcentral and Southwest AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Munitions and Explosives of Concern	0.5	10.50	-	-	-	-	-	-	-	-	-



[12] https://www.dodclearinghouse.osd.mil/

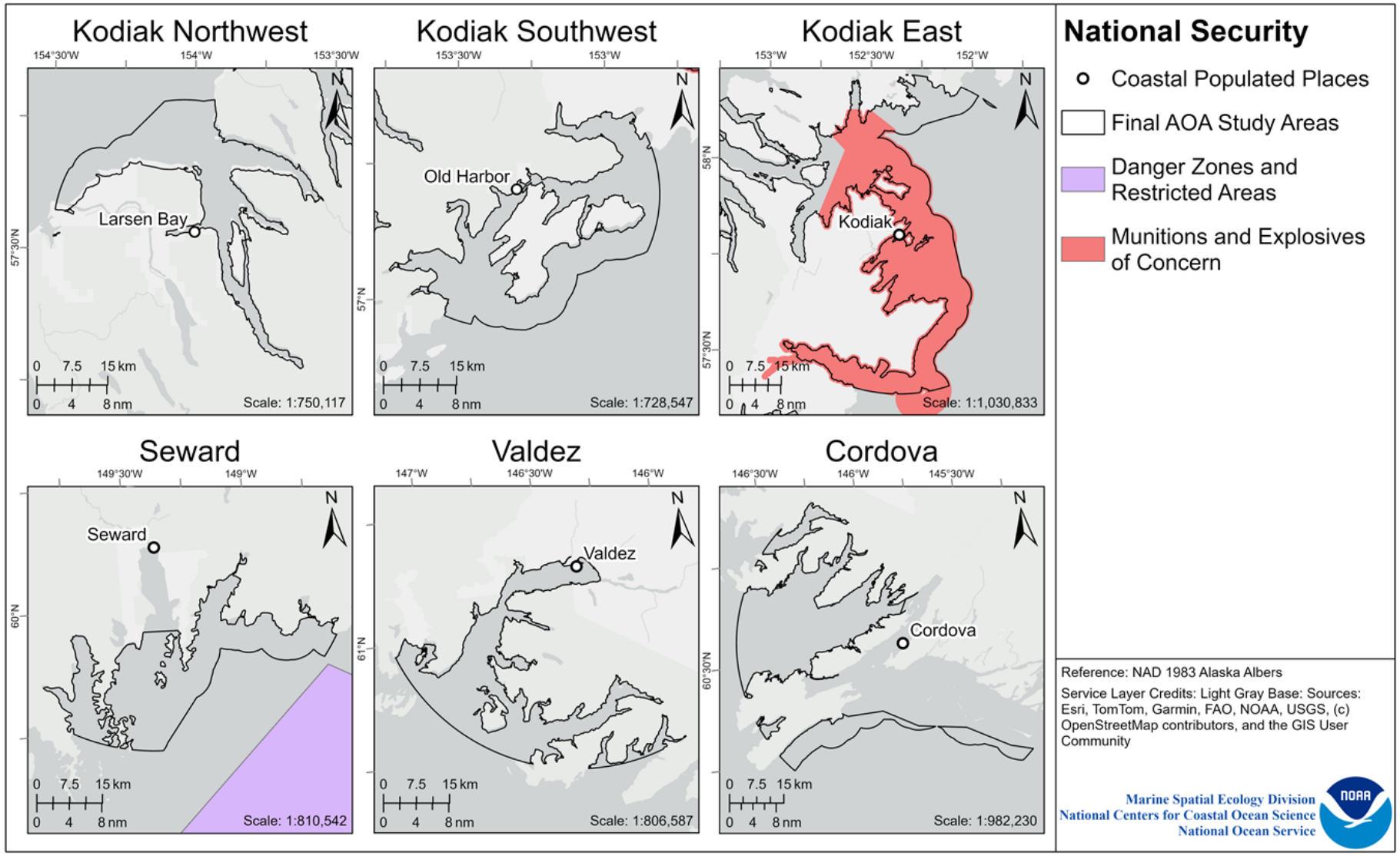


Figure 3.3. National security considerations for the Southwest and Southcentral Study Areas. Considerations include danger zones and restricted areas, munitions and explosives of concern. No overlap between national security areas and Kodiak Northwest, Kodiak Southwest, Seward, Valdez, and Cordova Study Areas.

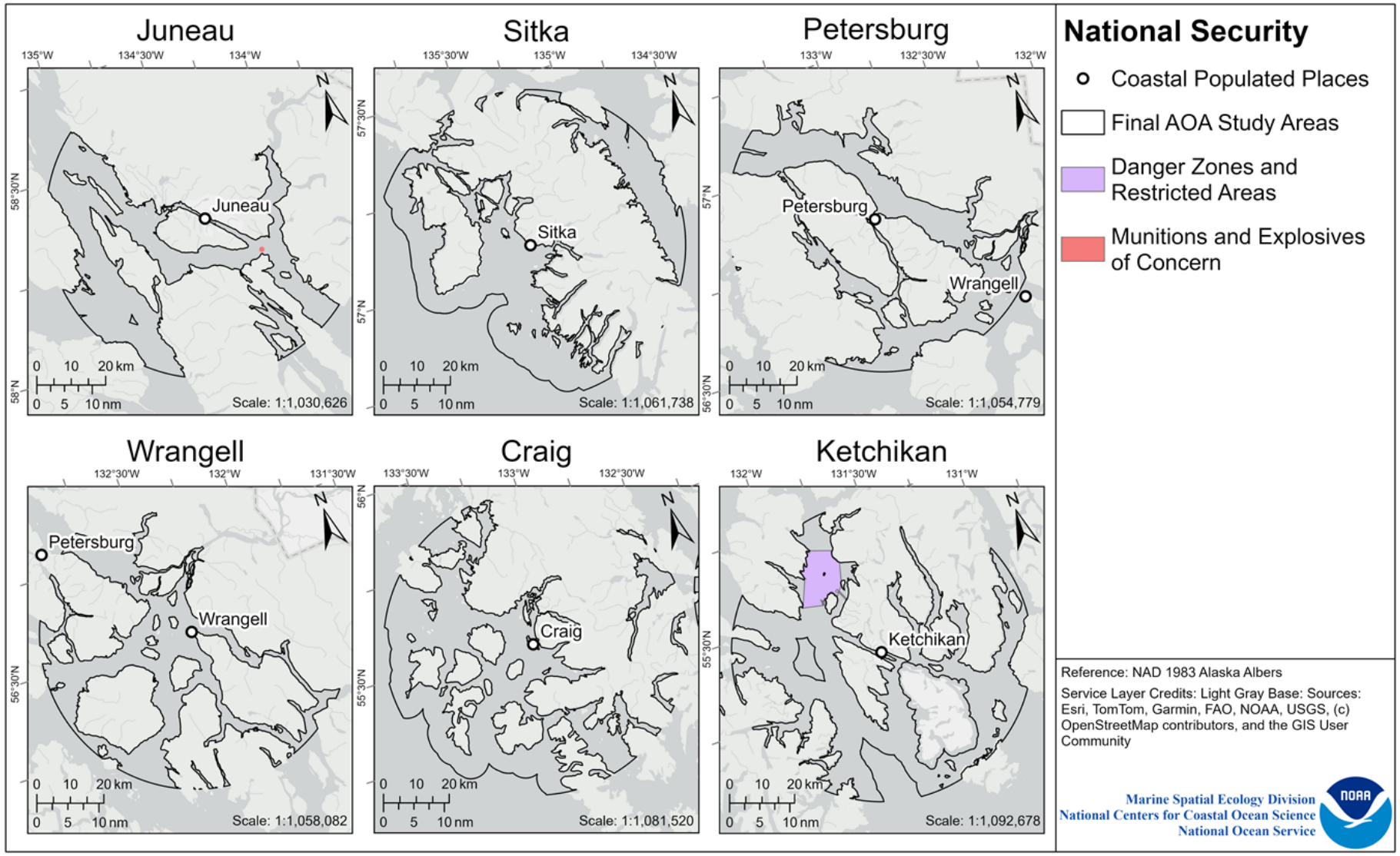


Figure 3.4. National security considerations for the Southeast Alaska Study Areas. Considerations include danger zones and restricted areas, munitions and explosives of concern. No overlap between national security areas and Sitka, Petersburg, Wrangell, and Craig Study Areas.

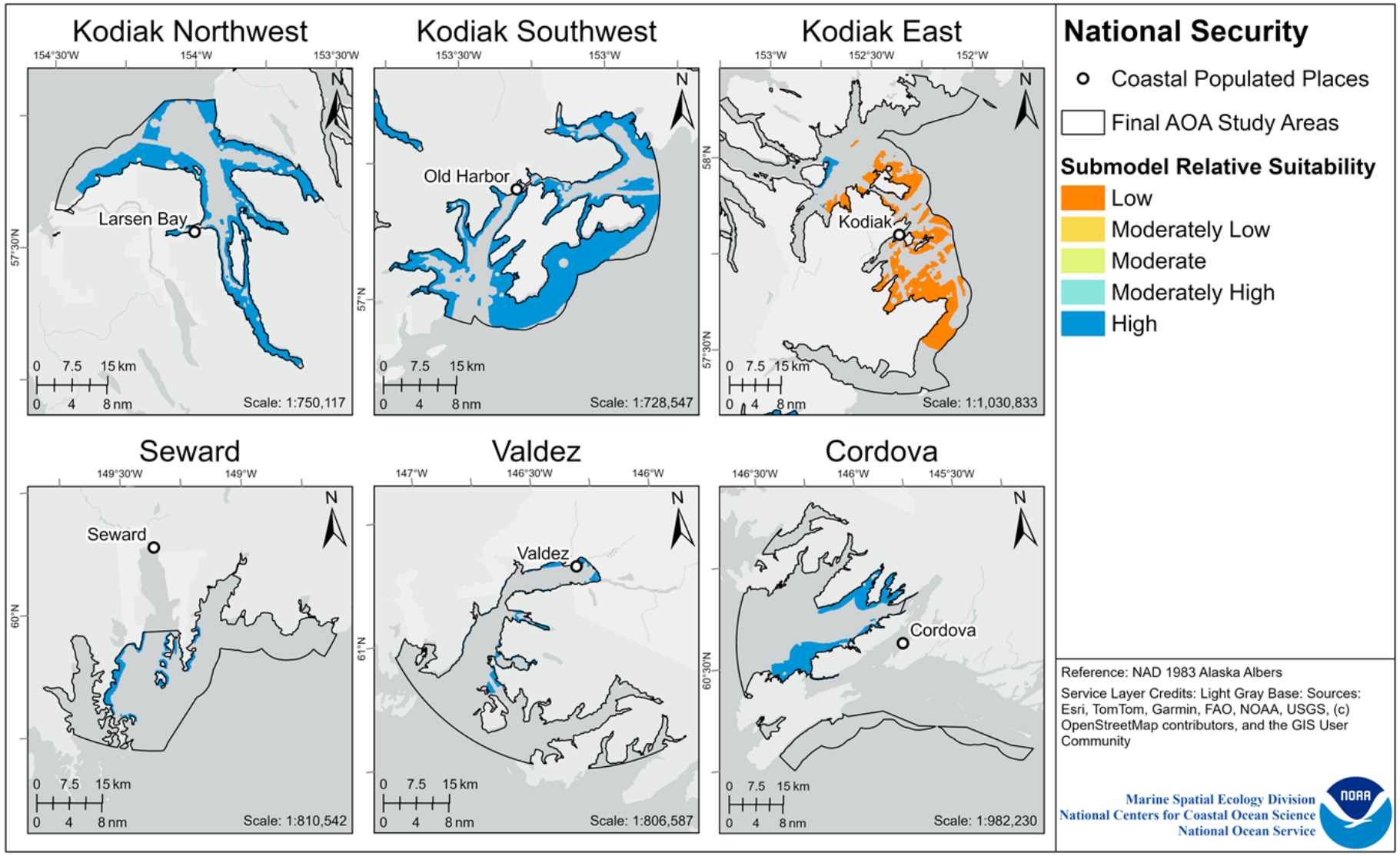


Figure 3.5. Final National Security Submodel results utilized in the suitability model for the Southwest and Southcentral Study Areas. Only high suitability areas were identified in the Southcentral Study Areas, and only high and low suitability areas were identified in the of the Southwest Study Areas.

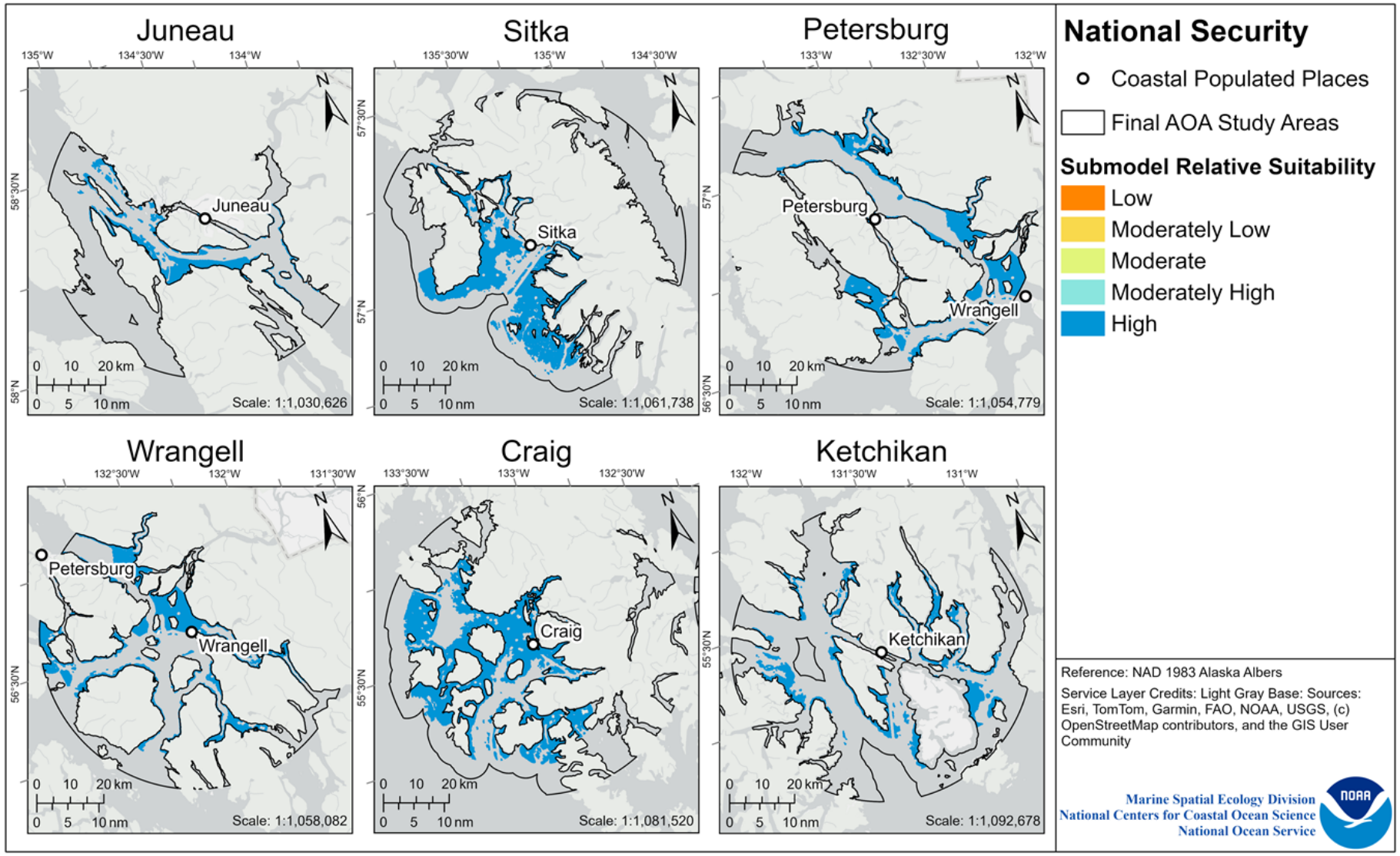


Figure 3.6. Final National Security Submodel results utilized in the suitability model for the Southeast Alaska Study Areas. Only high suitability areas were identified in the Southeast Study Areas.

Natural Resources Submodel

Alaska's coastal natural resources support unparalleled ecosystems and distinct cultural identities, and drive key industries like tourism and fisheries that power local economies, making thoughtful stewardship and planning essential for resilience and community well-being. Natural resource data layers were assessed to determine biologically important and sensitive habitats and designated protected areas in and around the AOA study areas. Many layers in this Submodel were moved to the Constraints Model due to their ecological importance and need for avoidance as outlined in the numerous resource-related restrictions across ADNR and ADFG regulations and policies. Natural resources data layers that received a score of 0 included: ADEC sensitive areas, anadromous streams with a 91.5-m setback, deep-sea coral and sponge observations with a 1,000-m setback, key harbor seal haulouts (> 50 animals) with a 500-m setback, and Steller sea lion major haulouts and rookeries with a 500-m setback.



Considerations included the combined data layer of early life history stage EFH for Pacific cod, Pacific herring, Pacific ocean perch, pollock, rock sole, sablefish, yellowfin sole, starry flounder, the combined data layers of Cetacean BIAs and Steller sea lion western and eastern distinct population segment (DPS) haulouts and rookeries, eelgrass, sea otter concentration areas, herring spawning areas, seabird colonies, and Steller's eider abundance and distribution (Figures 3.7 and 3.8). Individual suitability maps are provided for the EFH combined data layer (Figures 3.9 and 3.10).

Herring spawning occurrence data were included in both the Natural Resources and Cultural Resources Submodels but were scored differently between them to reflect how herring spawning interacts distinctively with these two types of resources. For the Natural Resources Submodel, the herring spawning occurrence values (occurrences per year) were linearly rescaled between 0.5 and 1.0, with areas of most frequent occurrence receiving the lowest score of 0.5. This scoring directly reflects the importance of spawning frequency from a natural resource perspective, increasingly down-scoring areas with more significant biological activity for herring. Sea otters also hold substantial ecological and cultural significance in Alaska, and sea otter density data were included in both the Natural Resources and Cultural Resources Submodels but were scored differently between them to reflect how otters interact distinctively with these two types of resources. For the Natural Resources Submodel, the estimated otter density values were linearly rescaled between 0.5 and 1.0, with areas of highest density receiving the lowest score of 0.5. This approach ensures that the scoring directly reflects areas with increased sea otter presence and importance from a species distribution perspective, thereby down-scoring locations with higher ecological significance for otters. Down-scoring areas with otter densities is also reflective of concerns related to sea otter interactions with

aquaculture. Maps showing the mean occurrence per year for herring spawning are shown for areas with survey data (Figures 3.11 and 3.12), and predicted density maps are displayed for sea otters (Figures 3.13 and 3.14). Final Natural Resources Submodel relative suitability results can be seen in Figures 3.15 and 3.16. Natural resources considerations included in the relative suitability analysis and the score assigned to each data layer can be found in Table 3.3.

Table 3.3. Natural resources considerations included in the relative suitability analysis and the score assigned to each dataset. Each dataset is listed with the percentage value (%) of total down-scored grid cells in each study area after all constrained areas were removed. Symbols, units, and abbreviations are as in Table 3.1.

Natural Resources Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Alaska National Parks, Preserves, Monuments	0.5	-	3.9	-	-	1.8	-	-	-	-	0.1
Essential Fish Habitat (EFH) Combined	Comb.†	33.3	32.6	32.9	33.3	30.4	32.4	-	-	33	-
Herring Spawn Occurrences per Year	Cont.*	-	-	7.7	25.8	1.8	4.8	0.1	-	1.4	1.3
North Pacific Seabird Data	0.8	1.5	1.7	1.3	-	-	0.3	0	0	0.1	-
Northern Sea Otter Abundance and Distribution, Southeast Alaska	Cont.*	-	-	-	-	31.6	31.5	31	30.9	32.5	32
Pacific Herring Spawning Areas, Kodiak and Seward	0.5	6	4.4	-	-	-	-	-	-	-	-
Protected Species Combined	Comb.†	33.3	-	-	-	-	28.8	-	-	-	-
Sea Otter Relative Population Density Estimate	Cont.*	21.6	16.9	28.3	32.2	-	-	-	-	-	-
ShoreZone Coastal Mapping – Eelgrass Bioband	0.2	1.1	-	3.7	2.5	0.3	1.4	0.1	0.2	2	1
Steller Sea Lion Haulout and Rookery Locations	Cont.*	3.7	5.8	-	-	1.3	5.1	0.7	0	0.7	0.7
Steller's Eider Abundance and Distribution, Kodiak	0.5	1	-	-	-	-	-	-	-	-	-

* Data layers represent continuous data scored between 0.5 – 1.
† Data layers were scored and then combined using the product method.

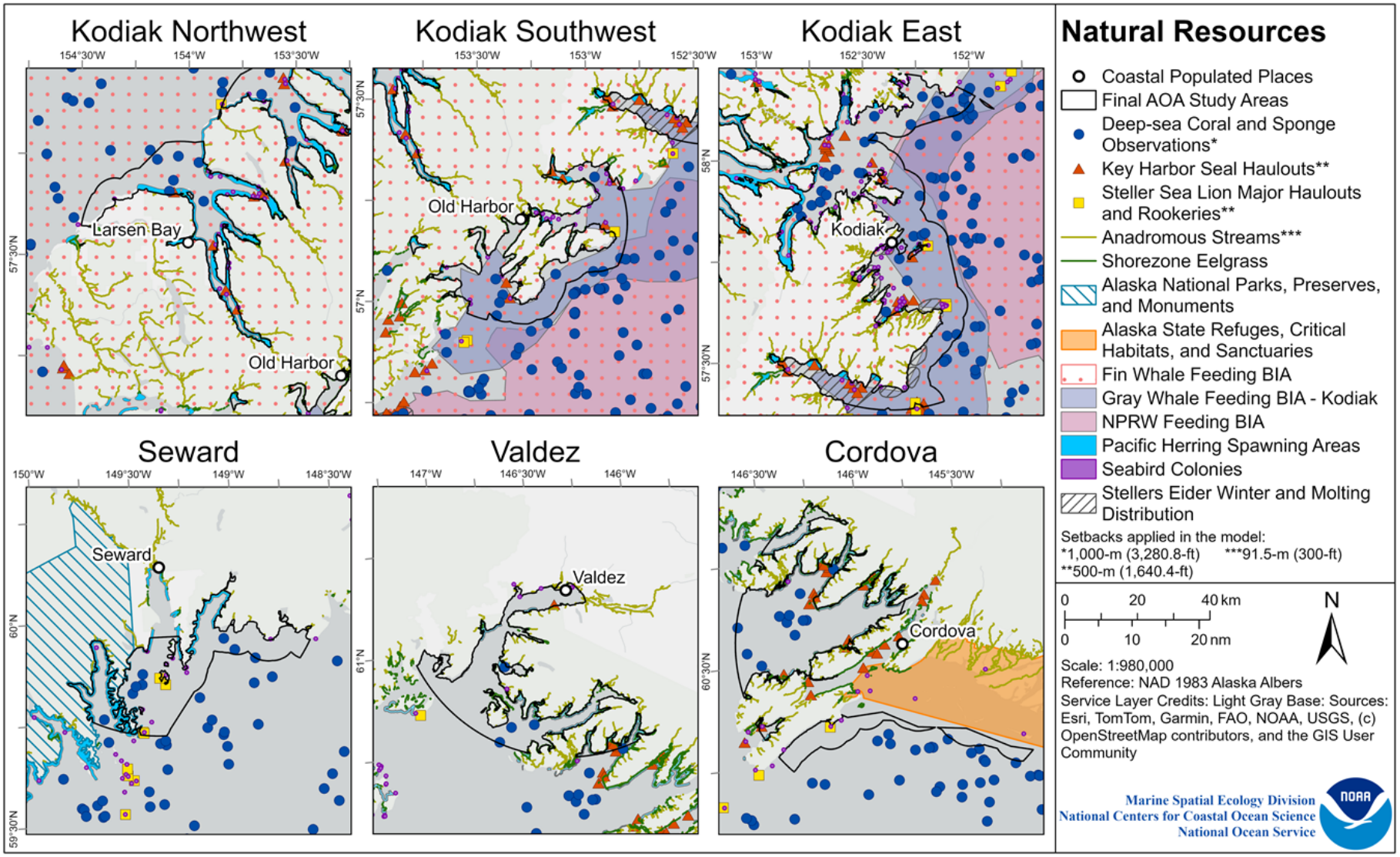


Figure 3.7. Natural resource considerations for the Southwest and Southcentral Study Areas. Excluding sea otters, herring, and combined EFH layer.

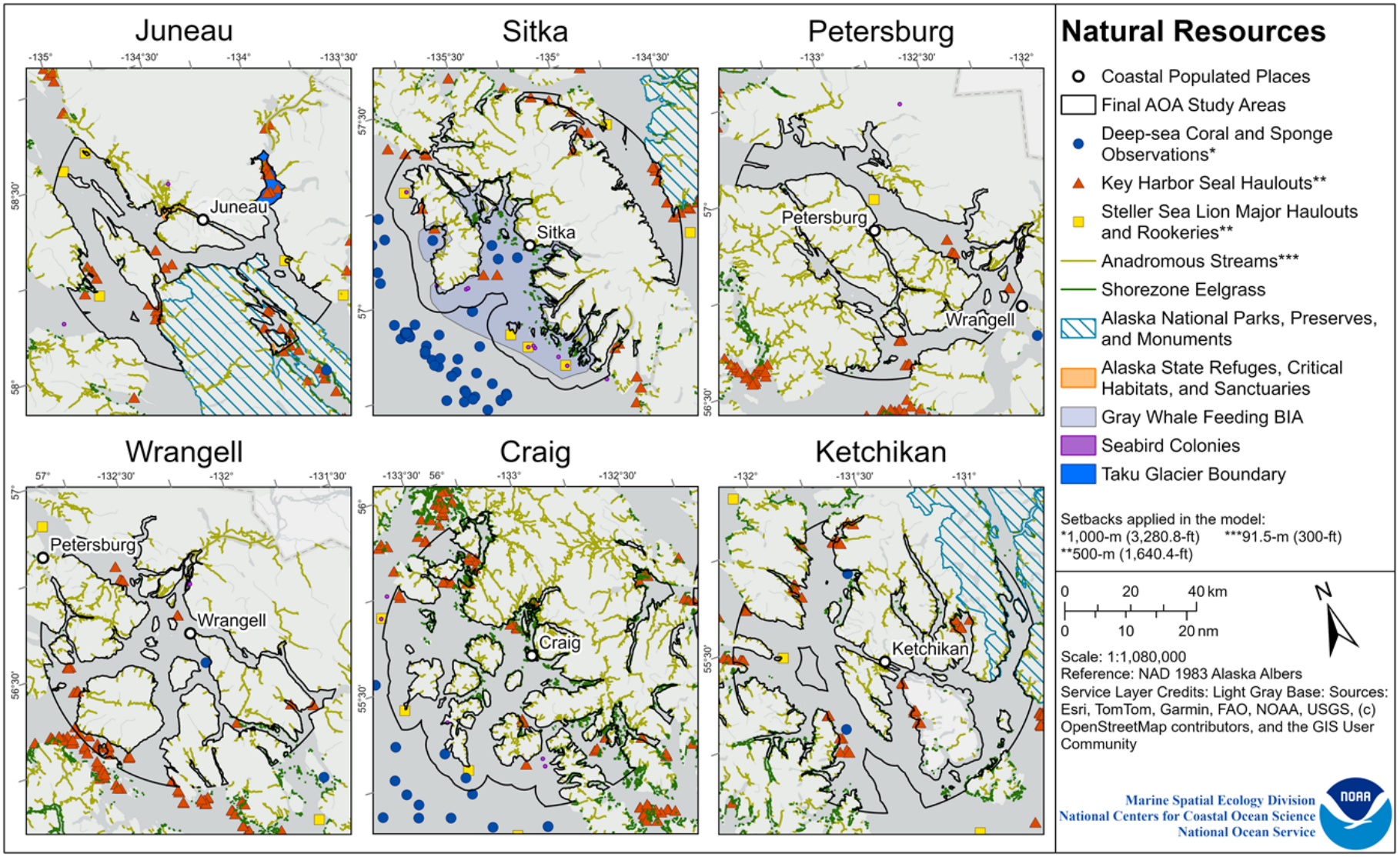


Figure 3.8. Natural resource considerations for the Southeast Alaska Study Areas. Excluding sea otters, herring, and combined EFH layer.

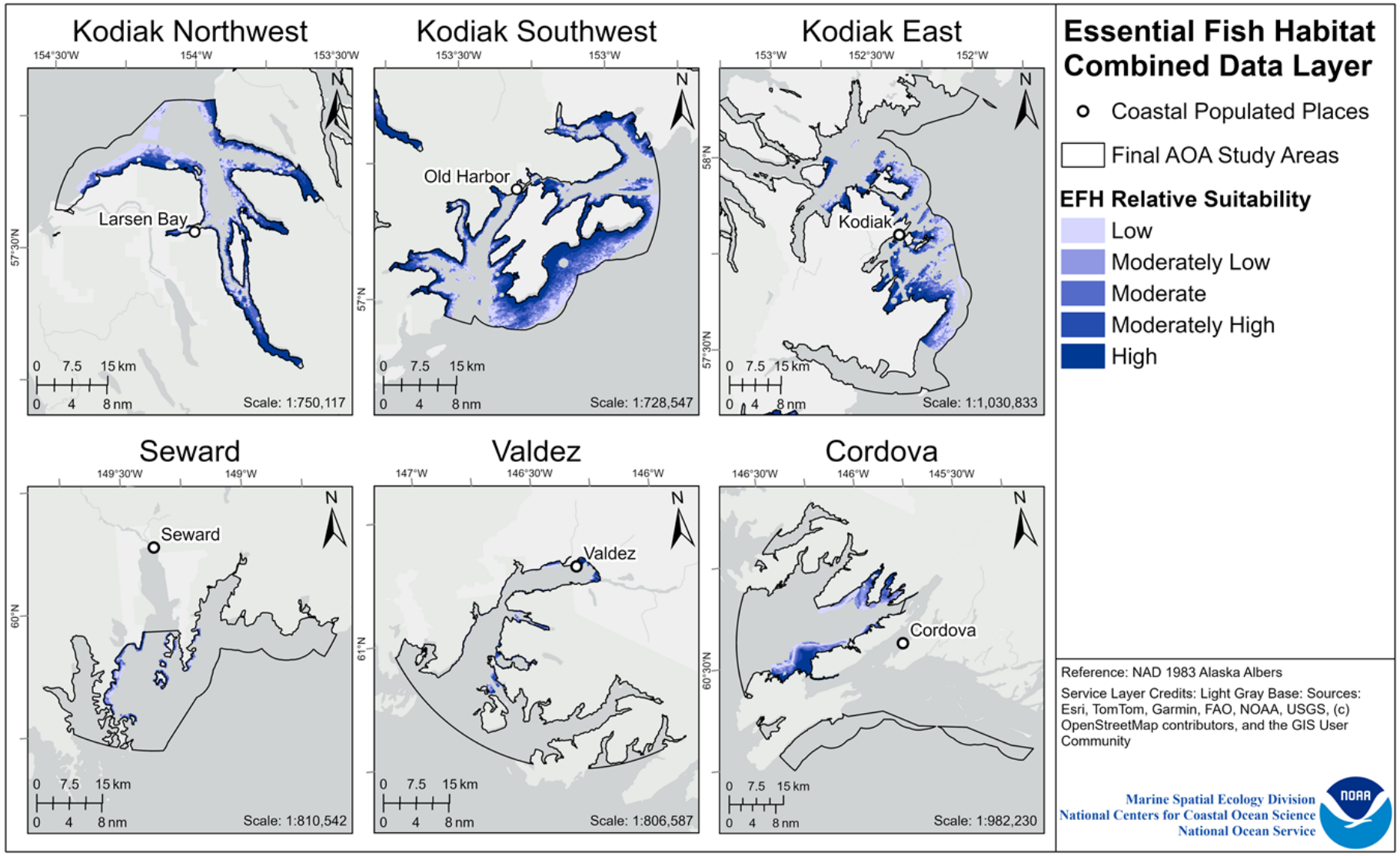


Figure 3.9. Relative suitability of the Essential Fish Habitat combined data layer utilized in the Natural Resources Submodel for the Southwest and Southcentral Study Areas.

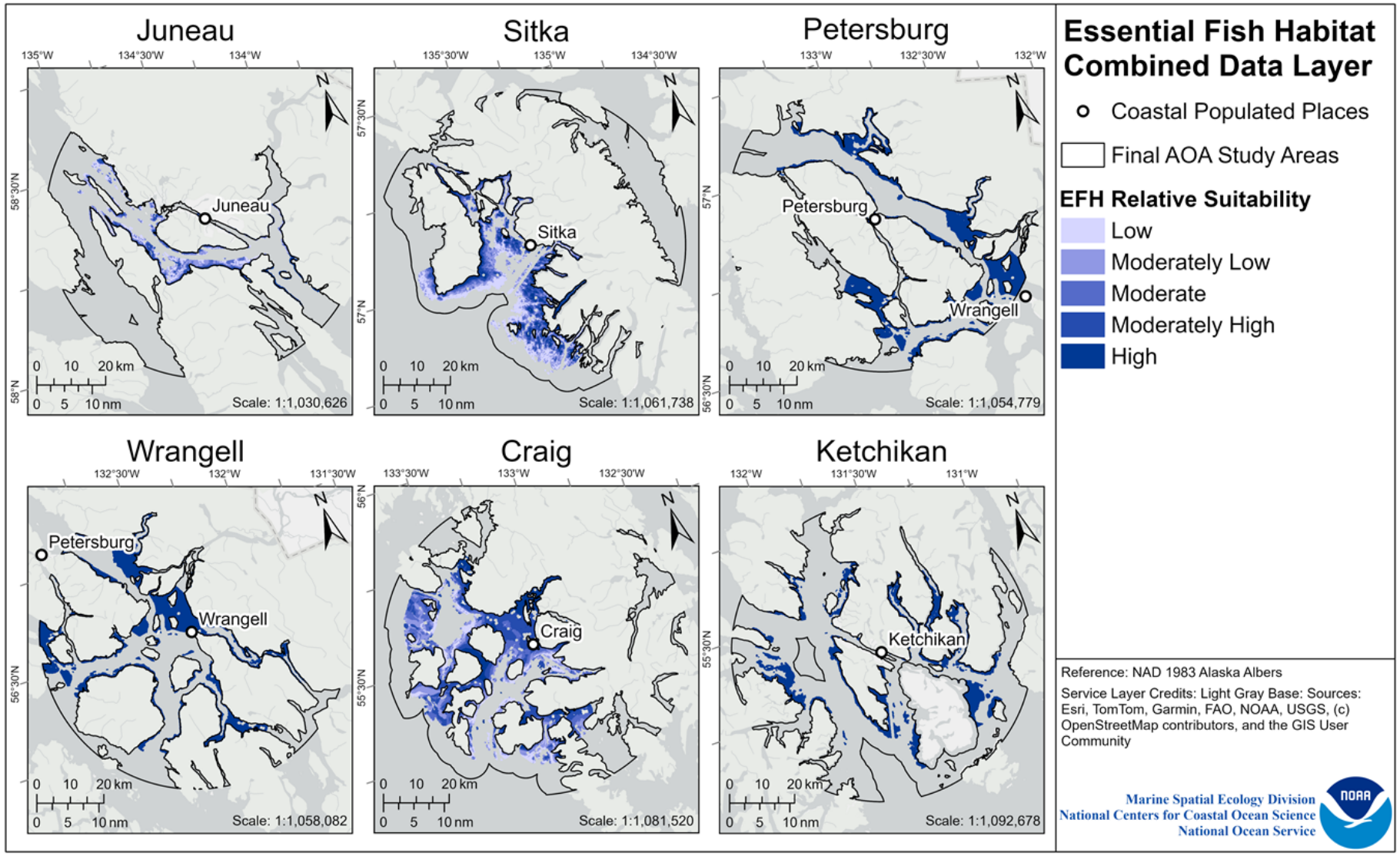


Figure 3.10. Relative suitability of the Essential Fish Habitat combined data layer utilized in the Natural Resources Submodel for Southeast Alaska Study Areas.

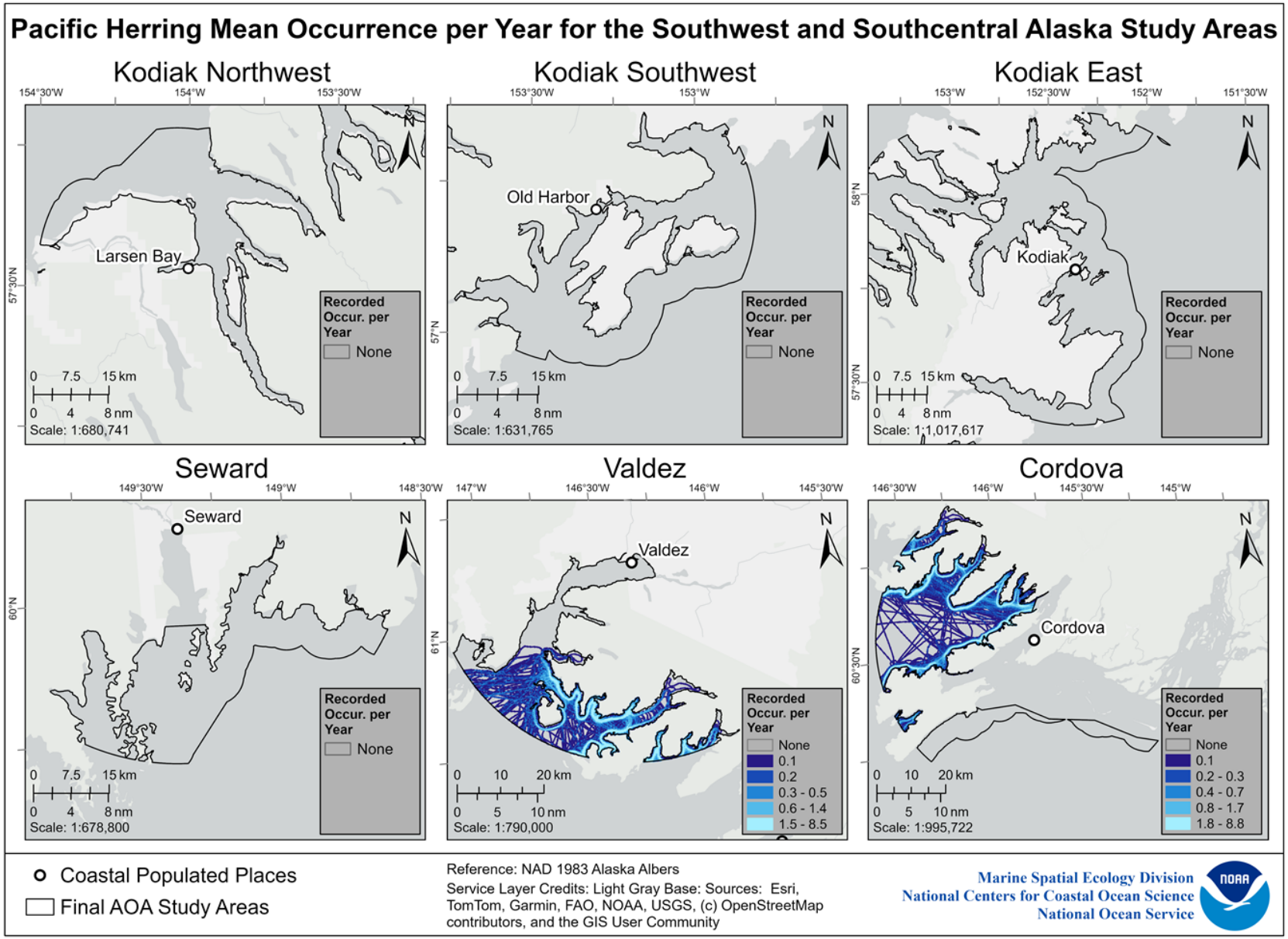


Figure 3.11. Mean recorded occurrence per year for Pacific herring across the Southwest and Southcentral Study Areas.

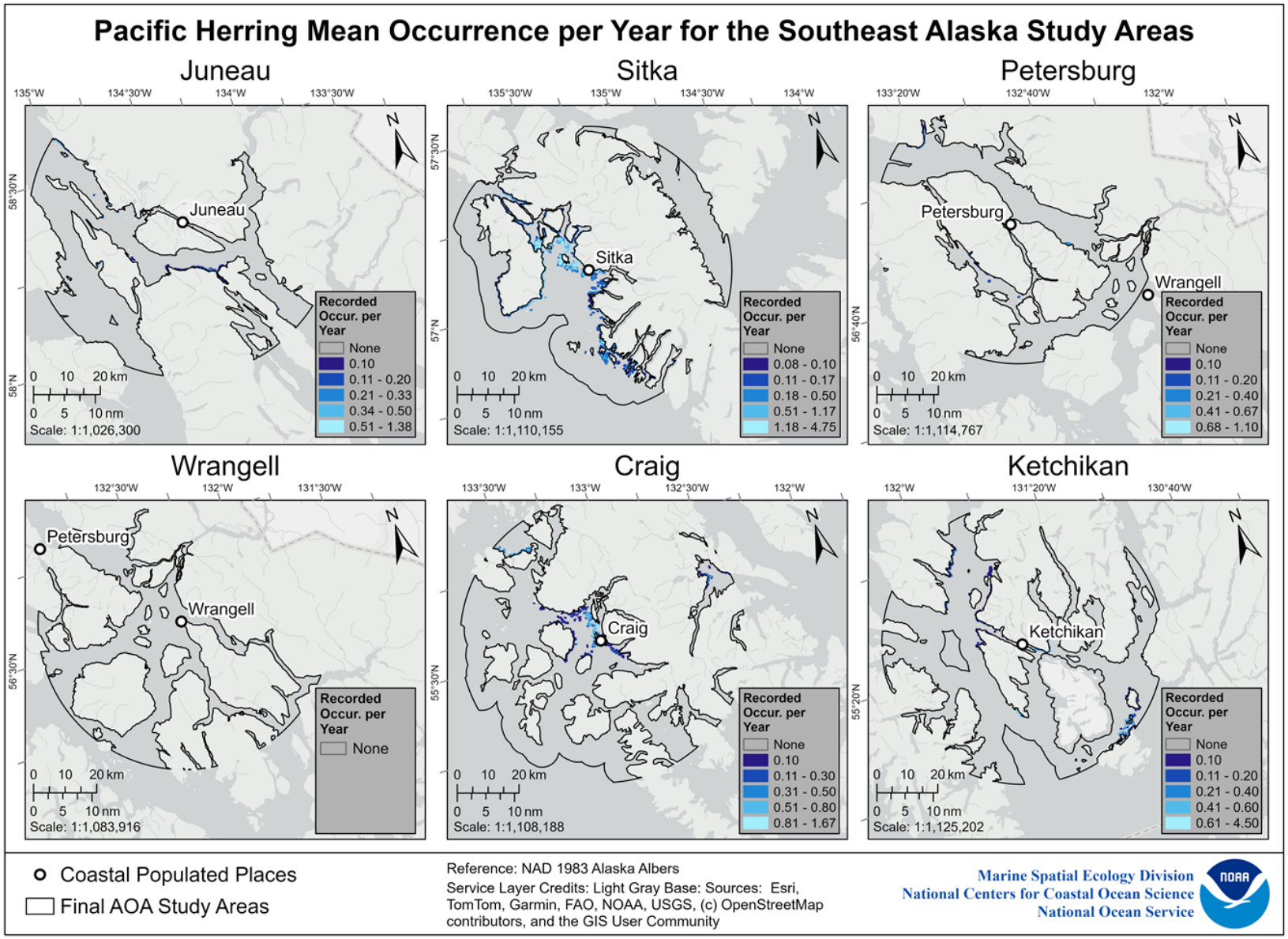


Figure 3.12. Mean recorded occurrence per year for Pacific herring across the Southeast Alaska Study Areas. No herring occurance was recorded in the Wrangell Study Area.

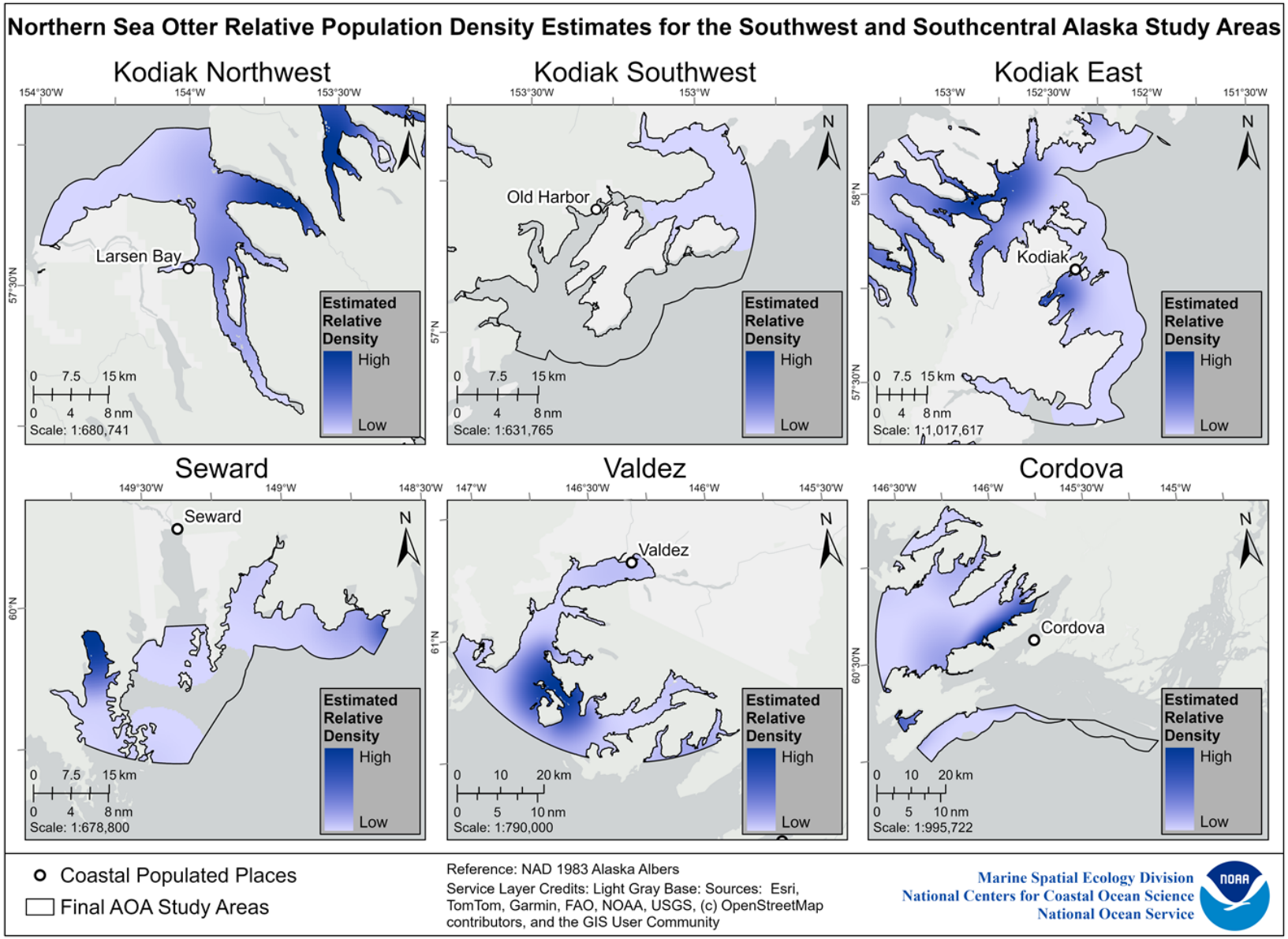


Figure 3.13. Estimated relative density of the northern sea otter across the Southwest and Southcentral Study Areas.

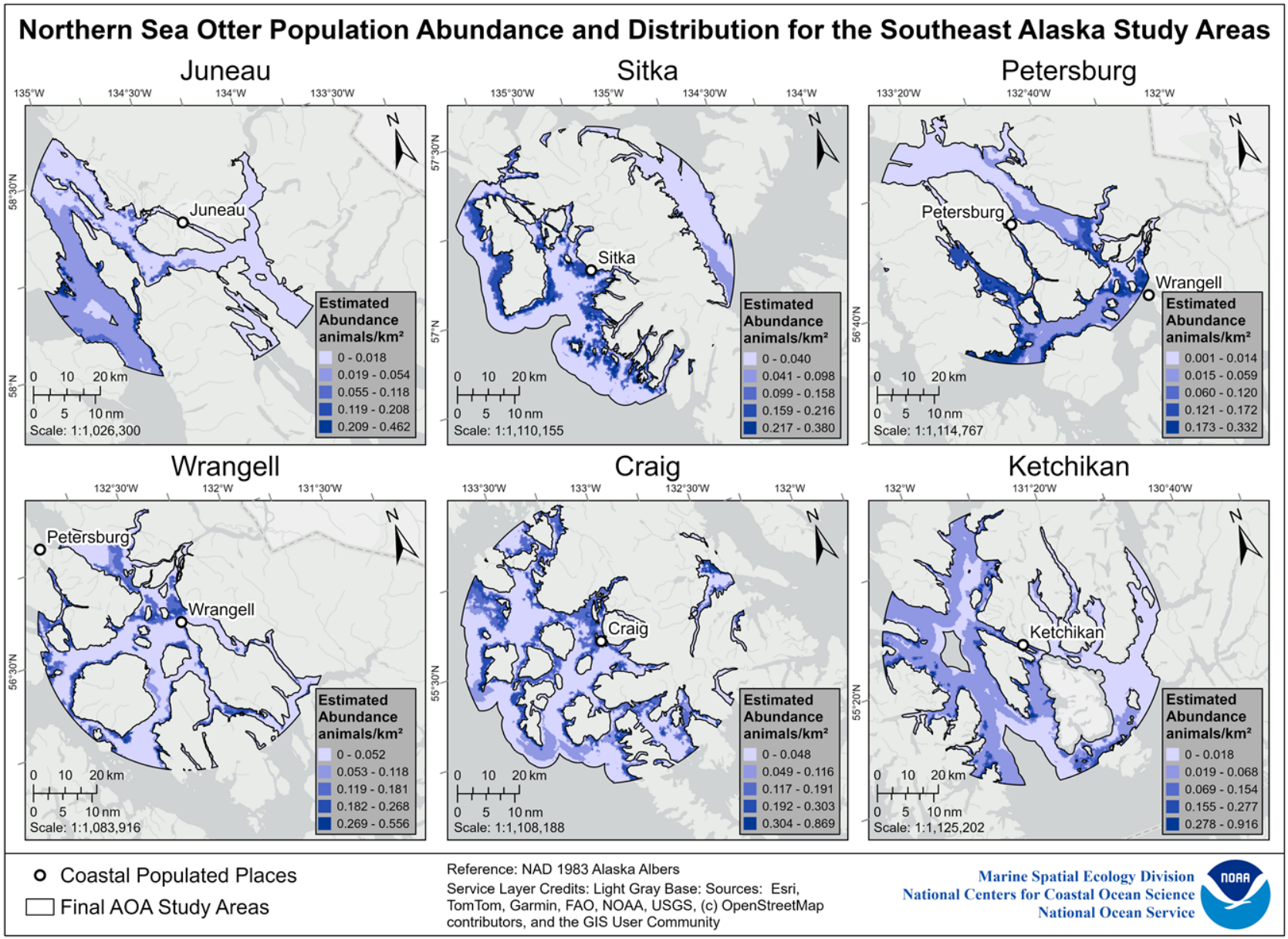


Figure 3.14. Estimated relative density of the northern sea otter across the Southeast Alaska Study Areas.

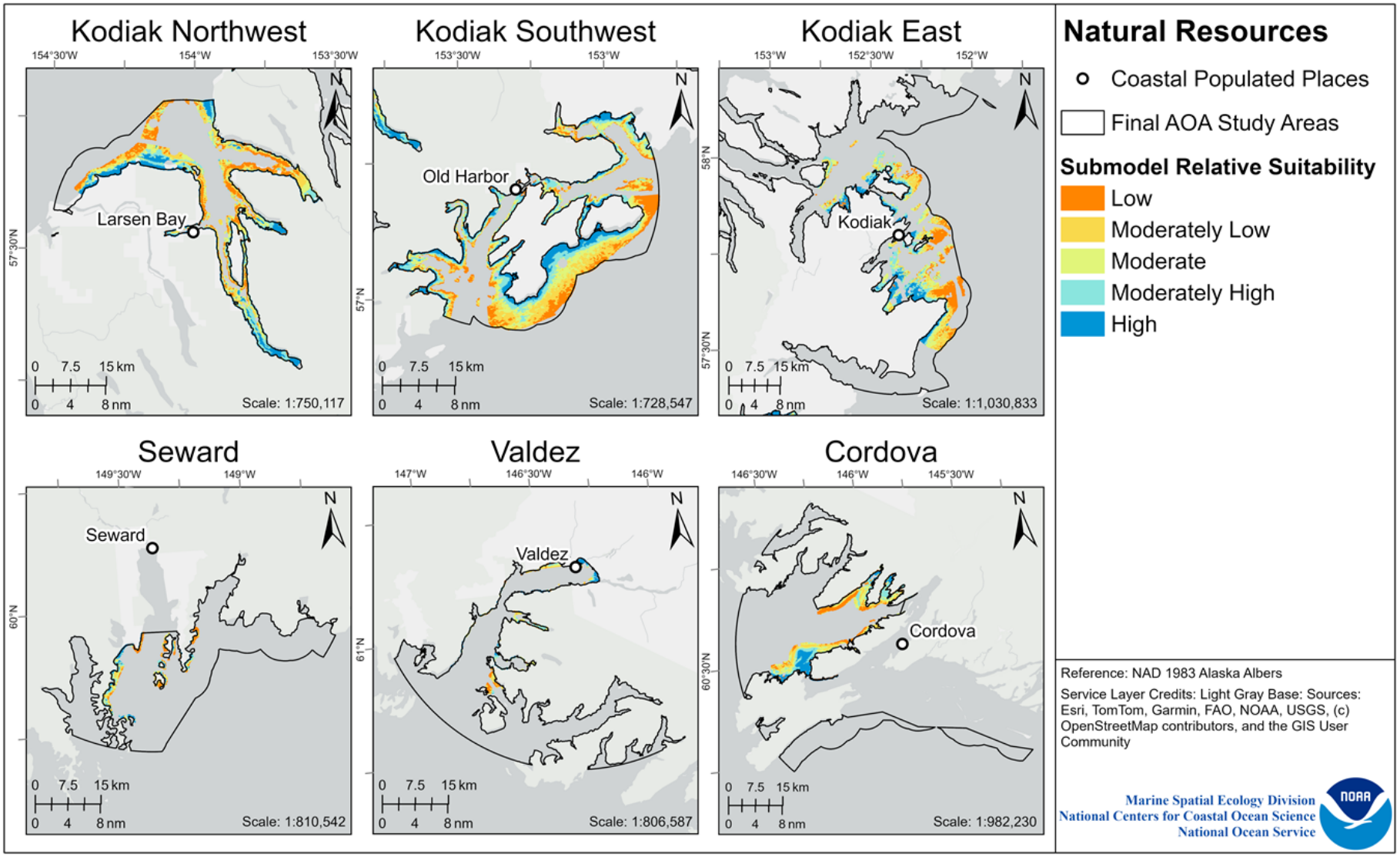


Figure 3.15. Final Natural Resources Submodel results utilized in the suitability model for the Southwest and Southcentral Study Areas.

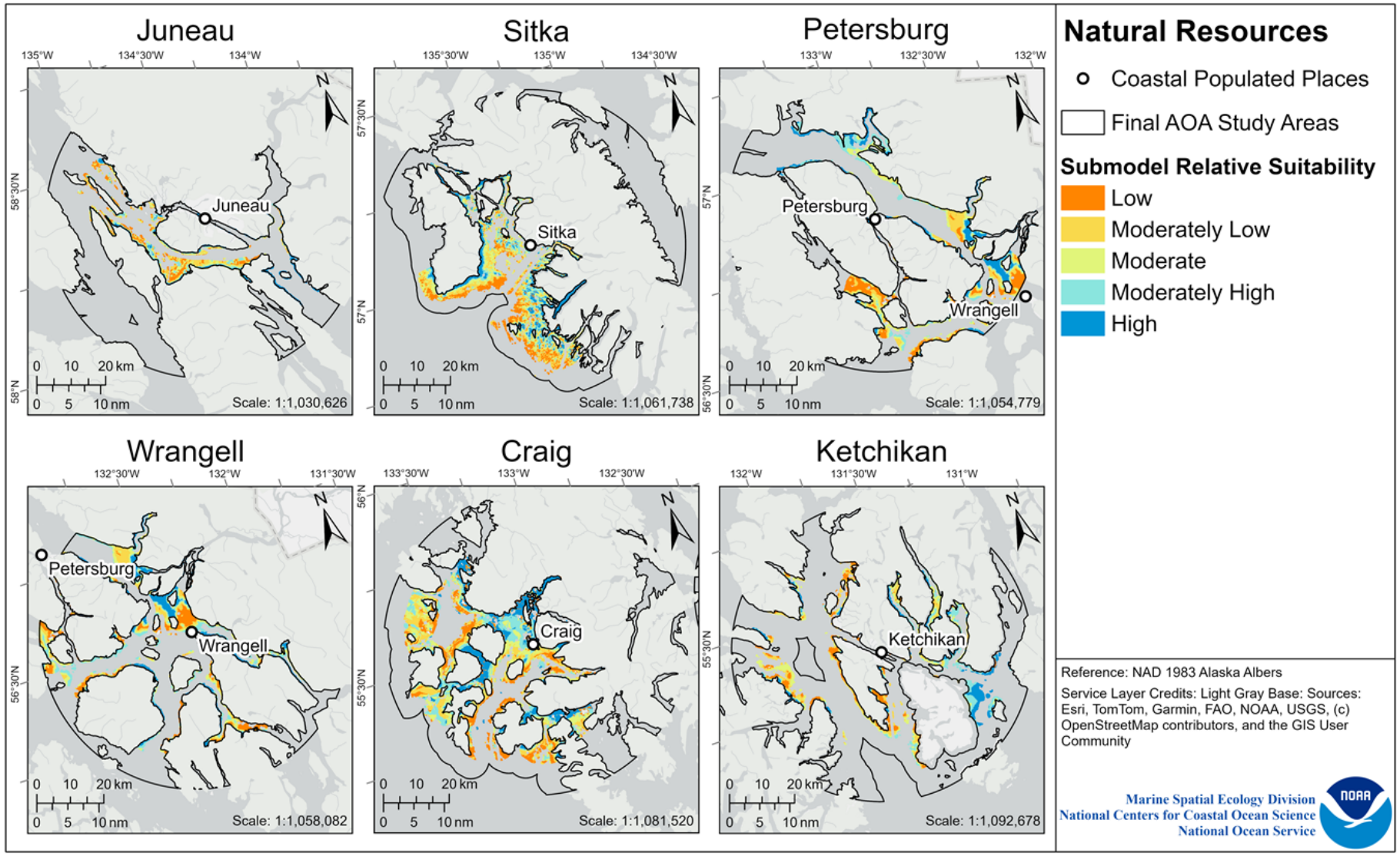


Figure 3.16. Final Natural Resources Submodel results utilized in the suitability model for the Southeast Alaska Study Areas.

Industry, Navigation, and Transportation Submodel

The ocean economy in Alaska contributed an estimated $8.9 billion to the state's GDP in 2021 and comprises six distinct sectors, including: marine construction, offshore mineral resources, tourism and recreation, living resources, ship and boat building, and marine transportation (NOAA OCM 2024). Of significant importance concerning overlap with the AOA study areas is Alaska's marine transportation network. Approximately 90% of consumer and industrial goods arrive in Alaska by ship. Of the nine study areas, only Valdez and Seward are connected to Anchorage, Fairbanks and other regional hubs by the state's road system. All the study areas rely heavily on barges, ships, the Alaska Marine Highway (ferry) system, and especially a particularly robust air transport system for the movement of goods and people around the state. Similarly, submarine power and telecommunications cables are crucial, providing power and high-speed internet and data connectivity to many of the communities within the study areas. Also of substantial importance is the cruise industry in Alaska. Approximately 1.7 million cruise ship passengers visited Alaska in 2024, with the AOA study areas serving as major ports of call.[13] Several layers are included that identify critical ports, transportation corridors, and cable areas that overlap the study areas. Many of these layers are considered constraints due to their importance and need for avoidance (Table 3.4; Figures 3.17 - 3.18). Related data layers which received a score of 0, and were therefore treated as constraints, include marine highways with a 500-m setback, shipping lanes with a 500-m setback, and ferry routes and terminals with a 500-m setback, maintained channels with a 500-m setback, Navy undersea cables with a 500-m setback, pipelines with a 500-m setback, and fiberoptic cables, submarine cables, and cable areas with a 200-m setback. AIS data were also included within the submodel and scored based on the average transects per month for each ship type (cargo, fishing, military, passenger, pleasure, tanker, tug and tow, and other), normalized by ship type. A key limitation of these data is that not all vessel traffic is represented since certain smaller recreational and commercial vessels are not required by regulations to carry AIS transponders. Individual plots of vessel transits are provided for individual options (Figures 3.19 - 3.34).

Proximity to wastewater outfalls, marine disposal and carcass disposal areas, as well as seafood processing outfalls, is constrained due to concerns related to shellfish and general seafood sanitation. ADEC is responsible for ensuring the waters adjacent to aquatic farms permitted to culture molluscan shellfish meet National Shellfish Sanitation Program water quality criteria. As a result, other data layers that were scored 0 and moved to the Constraints Model include wastewater treatment outfalls and ocean and carcass disposal sites with a 500-m setback, and seafood processing discharge locations, outfalls, and offshore seafood processors. These layers are critical as they identify potential and actual pollution sources which could impact the water quality around sites and ultimately ADEC's classification of a site.

In addition, sensors and buoys with a 500-m setback, U.S. Army Corps of Engineers (USACE) Alaska District (AD) navigation and erosion/flood mitigation projects, and aids to navigation with a 500-m setback were also scored 0 and removed from consideration. Other layers in the submodel were scored according to their compatibility with aquaculture development and operations.

[13] https://akcruise.org/economy/alaska-cruise-history/

These include U.S. Forest Service (USFS) marine recreation and access facilities, including cabin rentals and mooring locations, and marine access facilities, such as log transfer facilities. These were all scored 0.3 and given a 500-m setback. In addition, mapped anchorages and Alaska area plan subunits with text references to anchorages were down-scored to 0.5. Modeled and proxy data for wave height were also included, with areas down-scored based on estimated wave height (Figures 3.35 and 3.36). Final Industry and Navigation Submodel relative suitability results can be seen in Figures 3.37 and 3.38.

Table 3.4. Industry, transportation, and navigation considerations included in the relative suitability analysis and the score assigned to each dataset. Each dataset is listed with the percentage value (%) of total down-scored grid cells in each study area after all constrained areas were removed. Symbols, units, and abbreviations are as in Table 3.1. AIS = automatic identification system. DNR = Department of Natural Resources; USFS = U.S. Forest Service.

Industry, Navigation, and Transportation Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
AIS Combined	Comb.§	32.1	33.3	30.7	32	32.8	32.9	29	28.7	30.3	32.2
Alaska Area Plans (Anchorages)	0.5	-	23.7	10.3	2.3	6.6	-	2.3	2.8	18	0.2
Alaska Area Plans (Species Management)	0.5	-	8.5	-	-	-	-	-	-	1.1	-
Alaska DNR Land Permit or Lease	0.5	0.2	0	2.4	-	0.1	0	0	0	0	0
Harbors (500-m setback)	0.5	0	-	-	-	0.2	-	0	0	0	0.1
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	0.3	0	0	0	0	0	0.42	0.5	0.88	0	0.16
Permitted Log transfer facility (500-m setback)	0.2	-	-	-	-	-	0.1	0.2	0.3	0.1	0.1
ShoreZone Coastal Mapping – Wave Exposure	0.2, 0.4, 0.6	3.1	12	-	-	0.2	8.5	0	0.2	8.4	9.9
Significant Wave Height	0.2, 0.4, 0.6	12.9	7.2	-	-	-	12.2	-	-	3.2	-
Tongass National Forest Mooring Buoys	0.3	-	-	-	-	-	0.16	-	-	-	1.02
USFS Recreation Opportunities – Cabin Rentals	0.3	-	-	-	-	-	0.3	0.55	0.26	-	-

** Data layers represent continuous data scored using a fuzzy logic Z-shaped membership function.
§ Data layers were scored and then combined using the geometric mean.

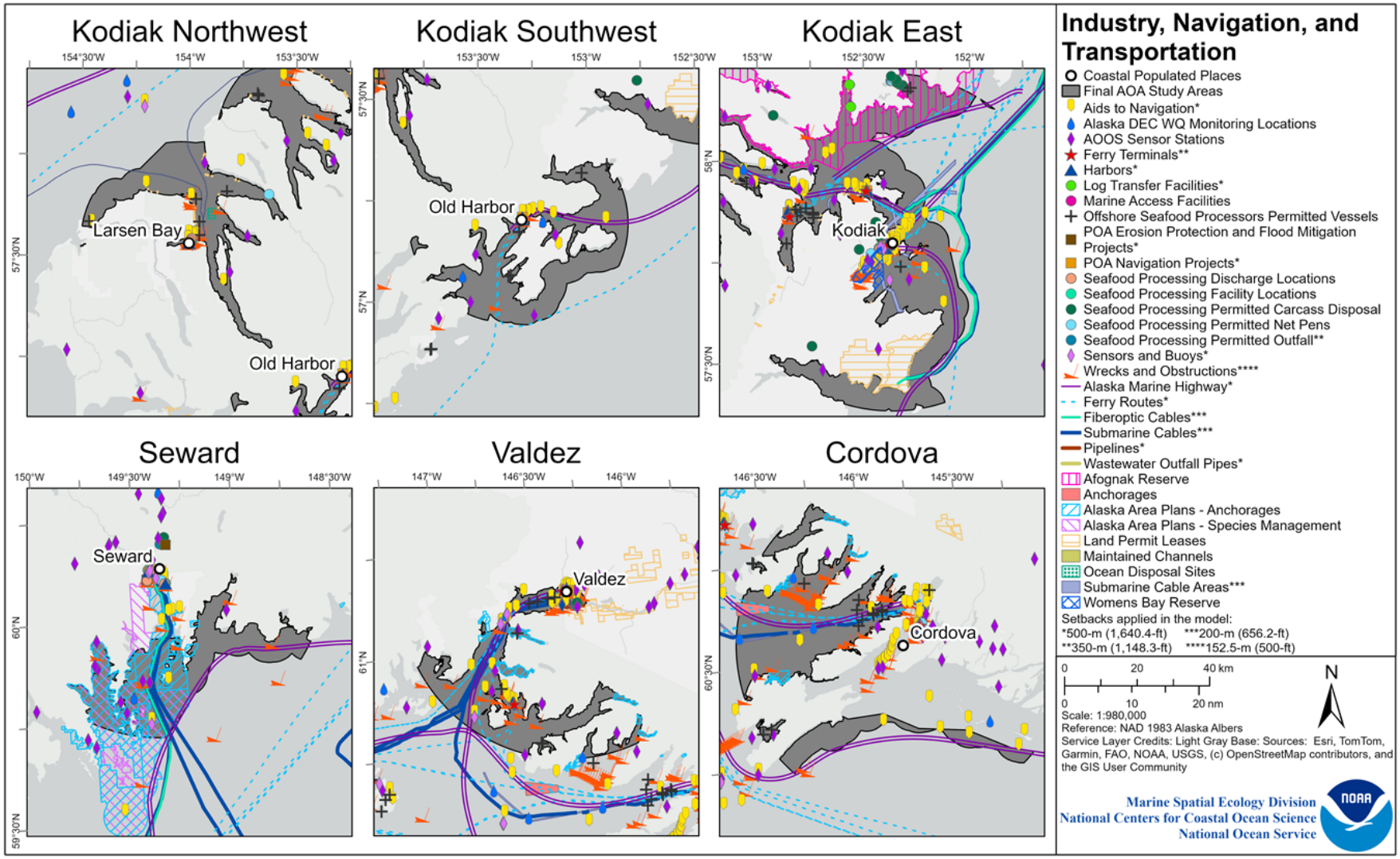


Figure 3.17. Industry, navigation, and transportation considerations for the Southwest and Southcentral Study Areas. Considerations include shipping infrastructure and routes (e.g., aids to navigation, marine highways, maintained channels, anchorage areas, harbors, and ferry terminals and routes), seafood industry infrastructure (e.g., processing facilities, carcass disposal, net pens, and outfalls), and other ocean industries (e.g., ocean disposal sites, fiberoptic and submarine cables).

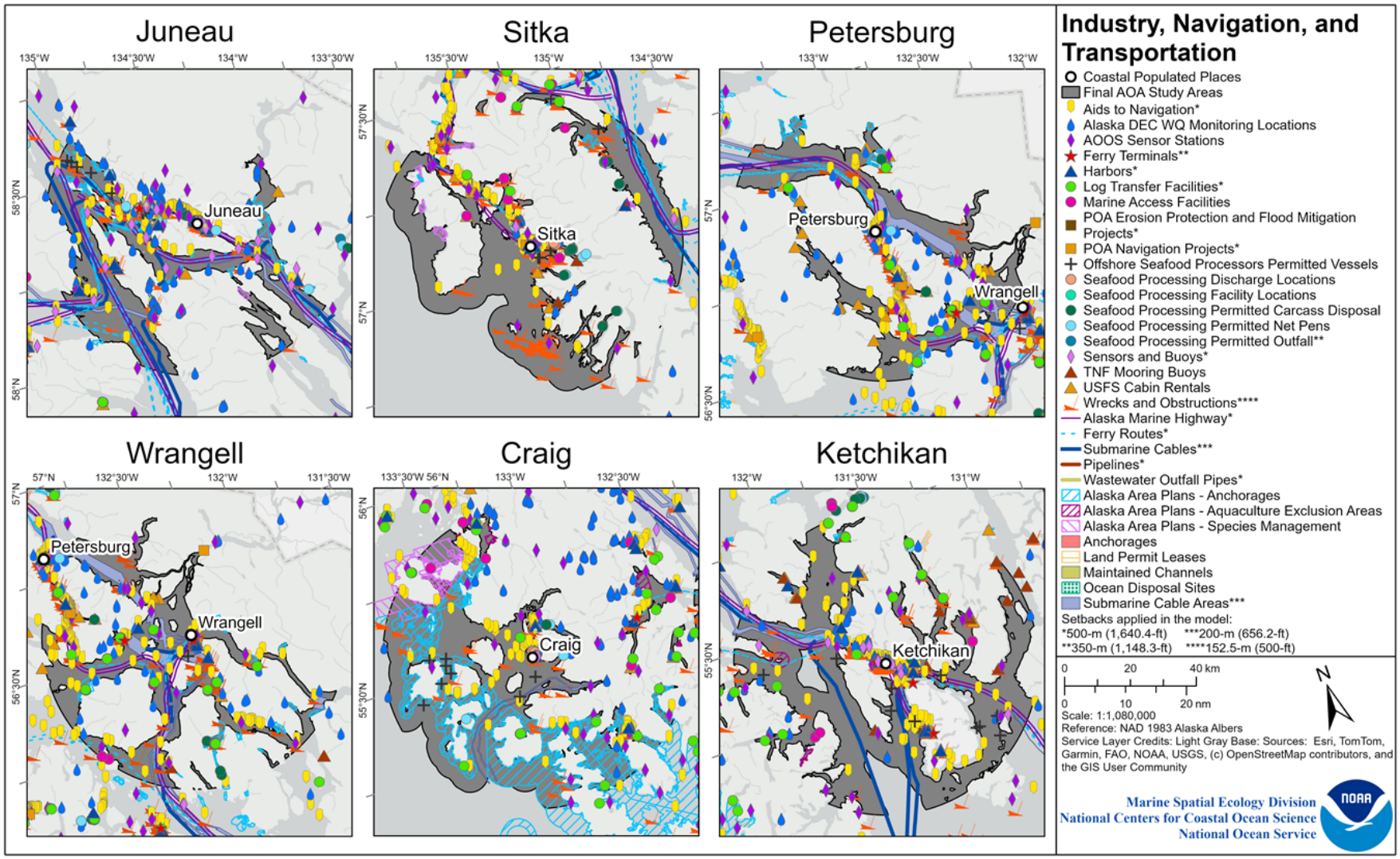


Figure 3.18. Industry, navigation, and transportation considerations for the Southeast Alaska Study Areas. Considerations include shipping infrastructure and routes (e.g., aids to navigation, marine highways, maintained channels, anchorage areas, harbors, and ferry terminals and routes), seafood industry infrastructure (e.g., processing facilities, carcass disposal, net pens, and outfalls), and other ocean industries (e.g., ocean disposal sites, fiberoptic and submarine cables).

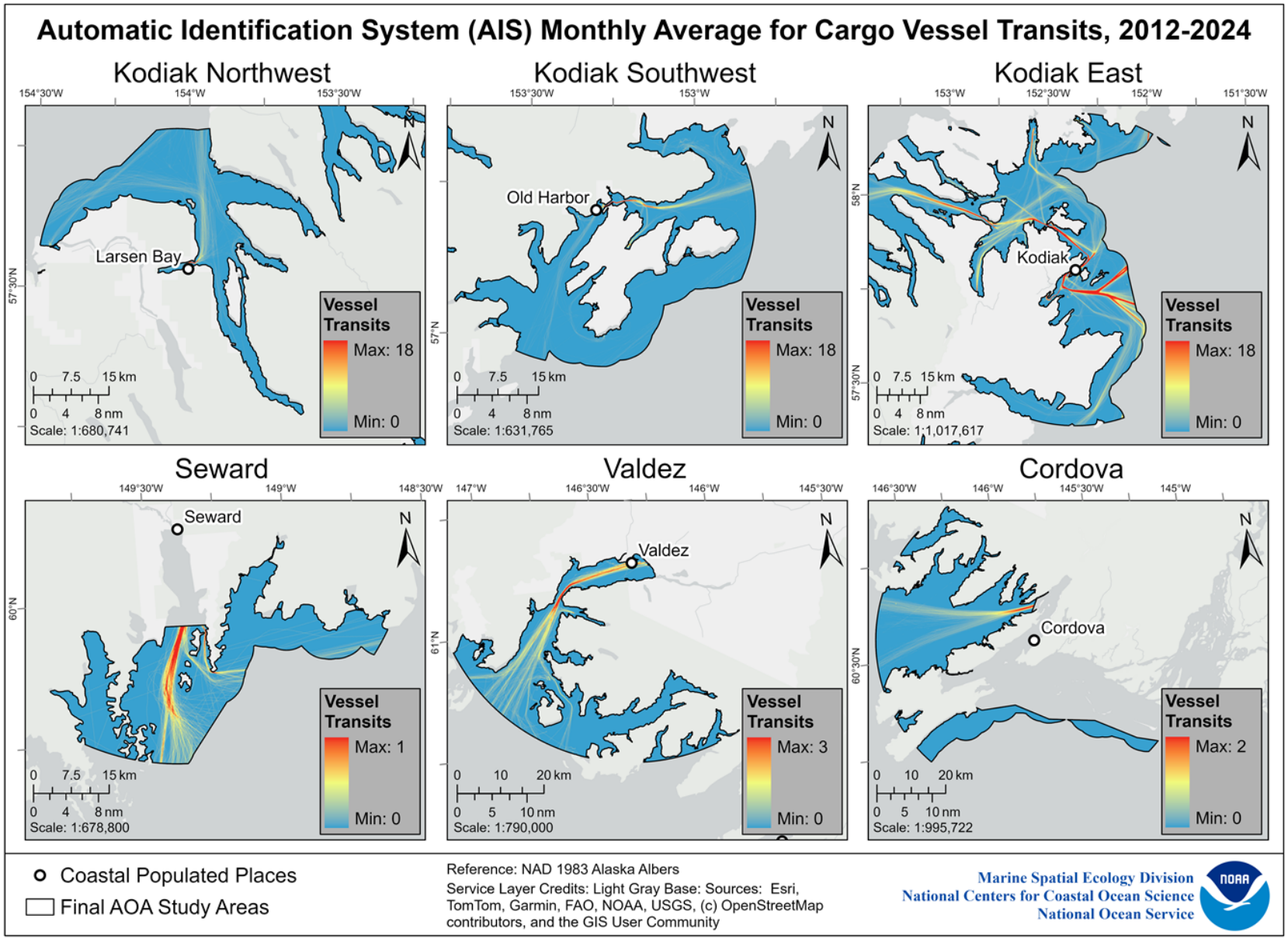


Figure 3.19. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for cargo vessels in the Southwest and Southcentral Study Areas.

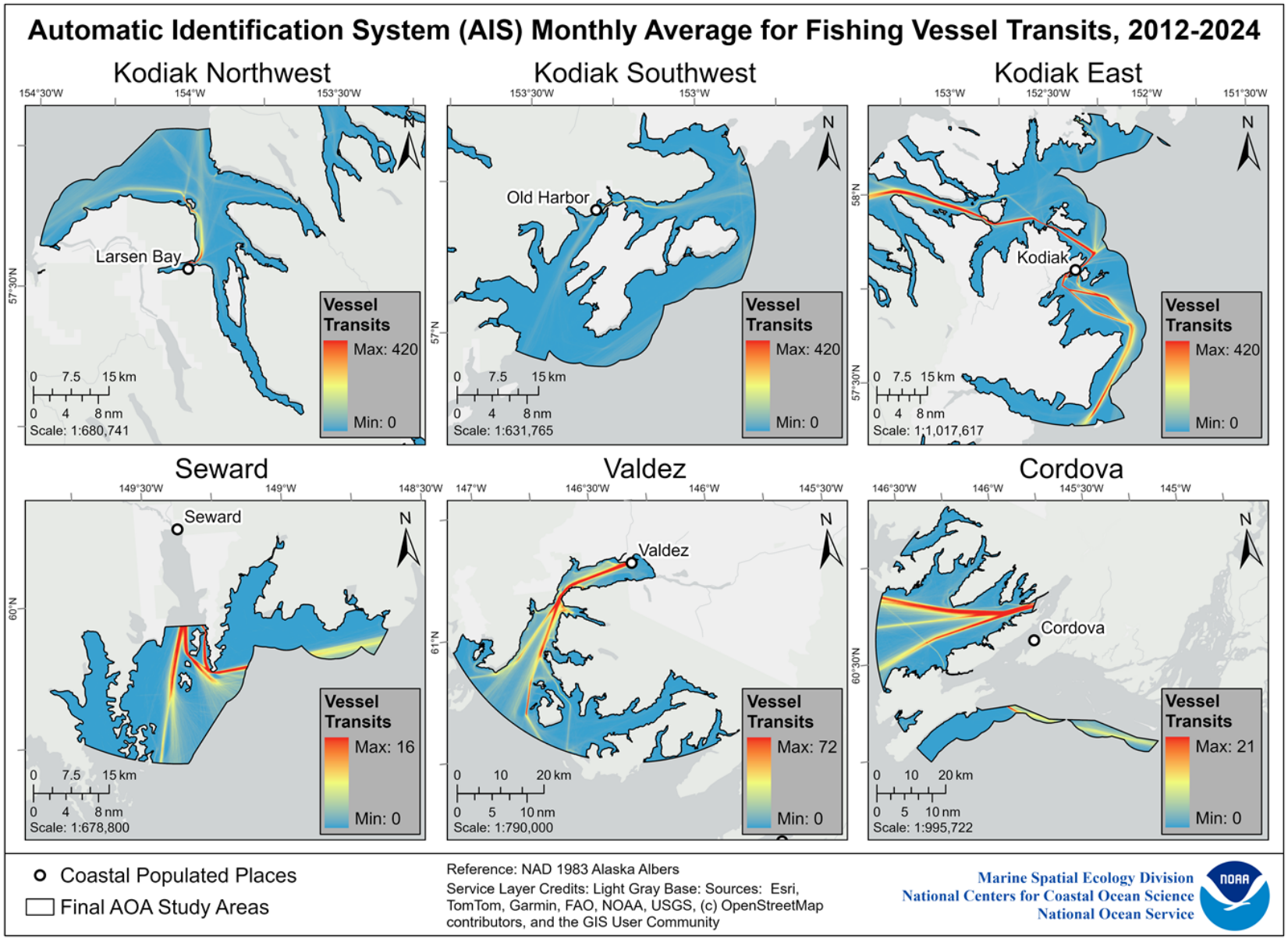


Figure 3.20. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for fishing vessels in the Southwest and Southcentral Study Areas.

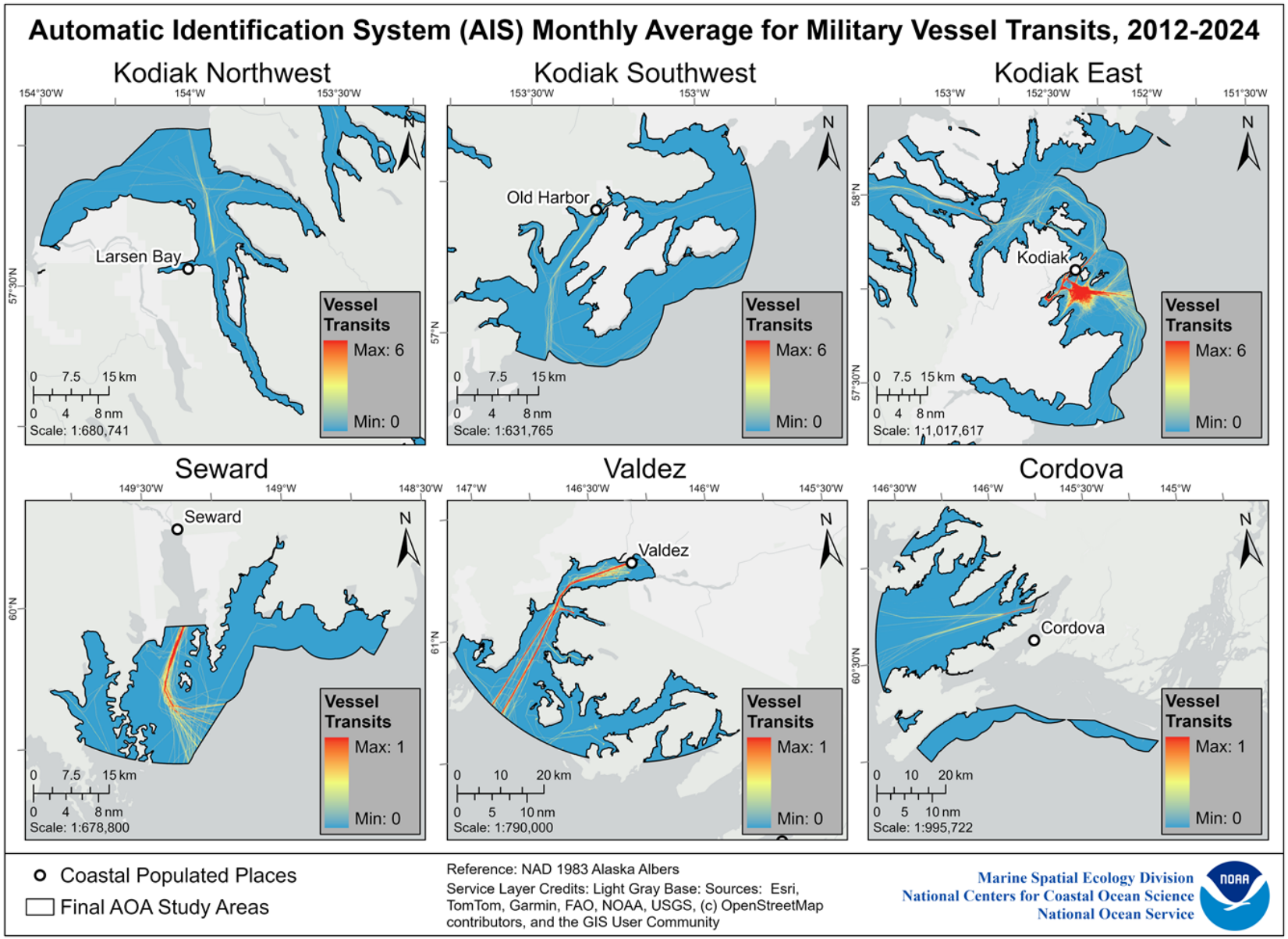


Figure 3.21 Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for military vessels in the Southwest and Southcentral Study Areas.

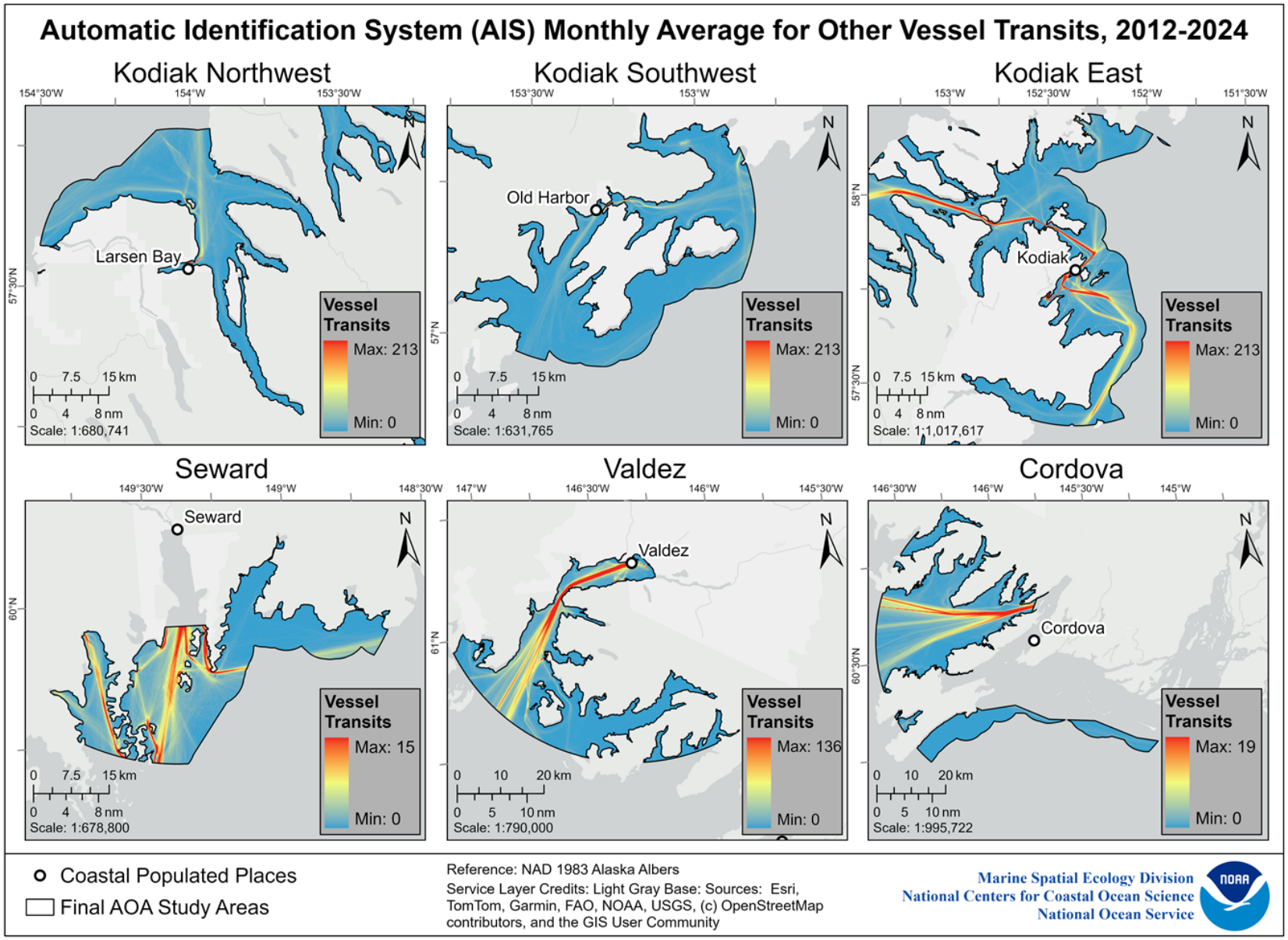


Figure 3.22. Automatic identification system vessel traffic data from 2012–2024 for (years 2020, 2021 omitted) vessels classified as other in the Southwest and Southcentral Study Areas.

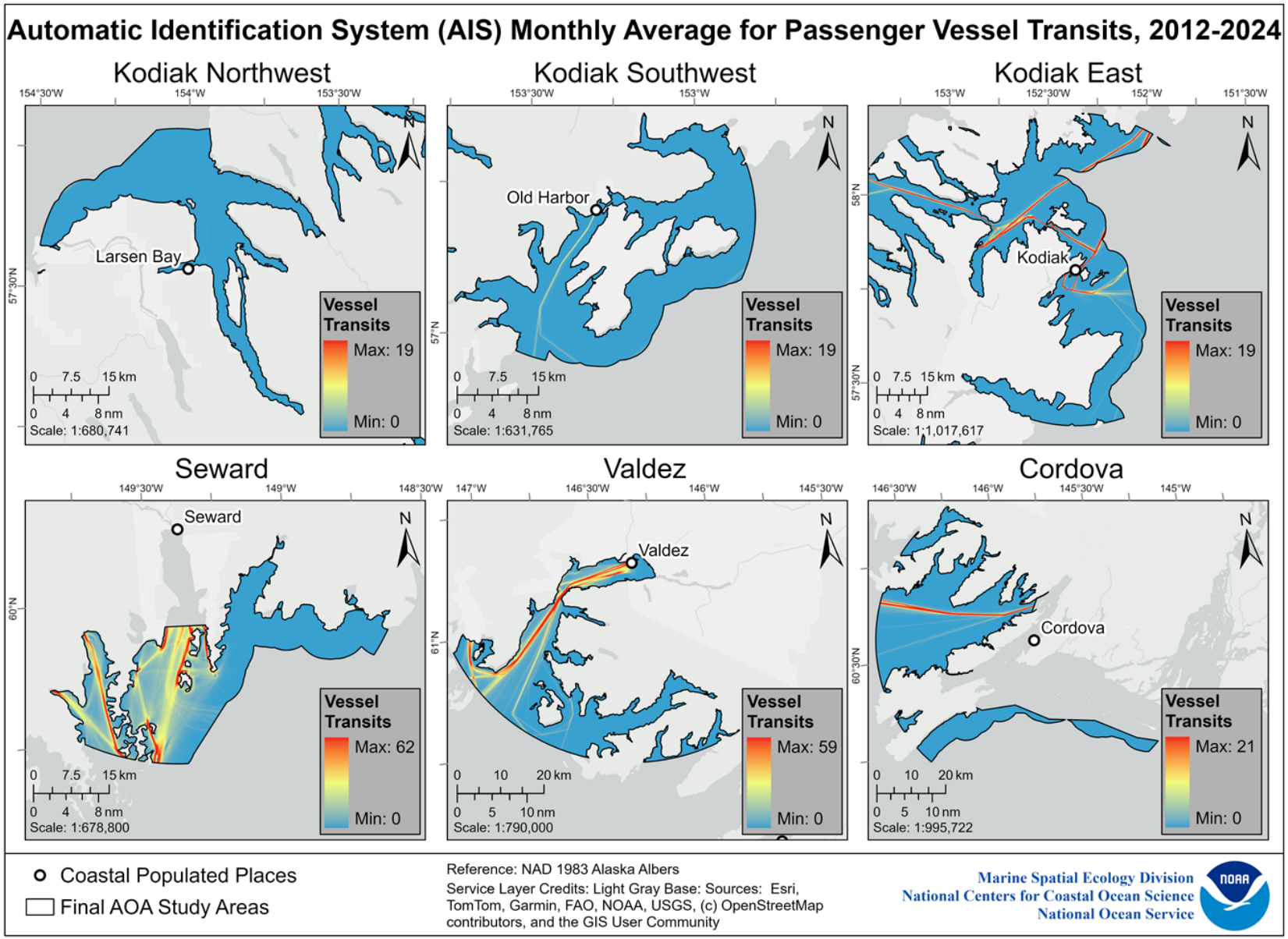


Figure 3.23. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for passenger vessels in the Southwest and Southcentral Study Areas.

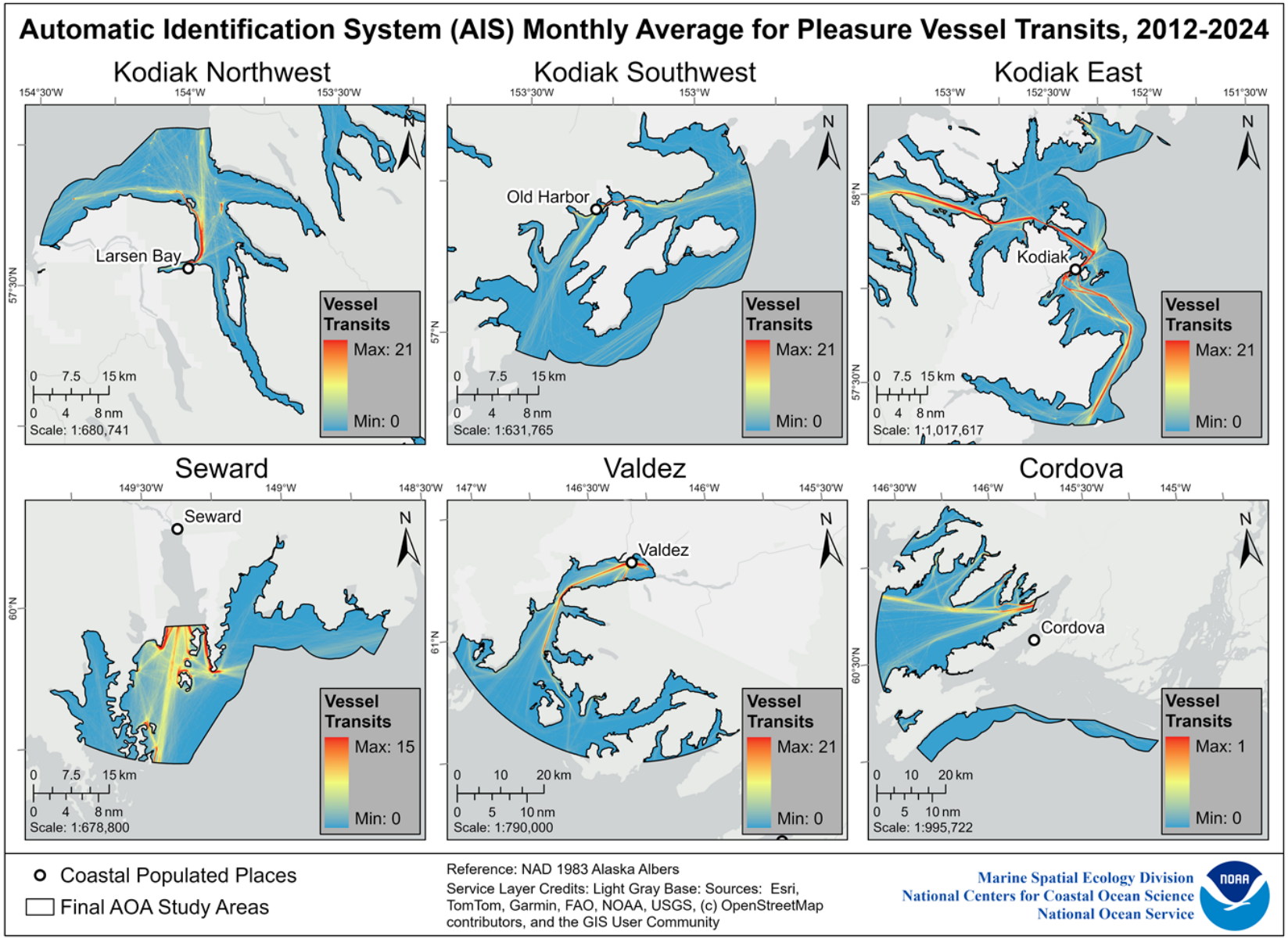


Figure 3.24. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for pleasure craft vessels in the Southwest and Southcentral Study Areas.

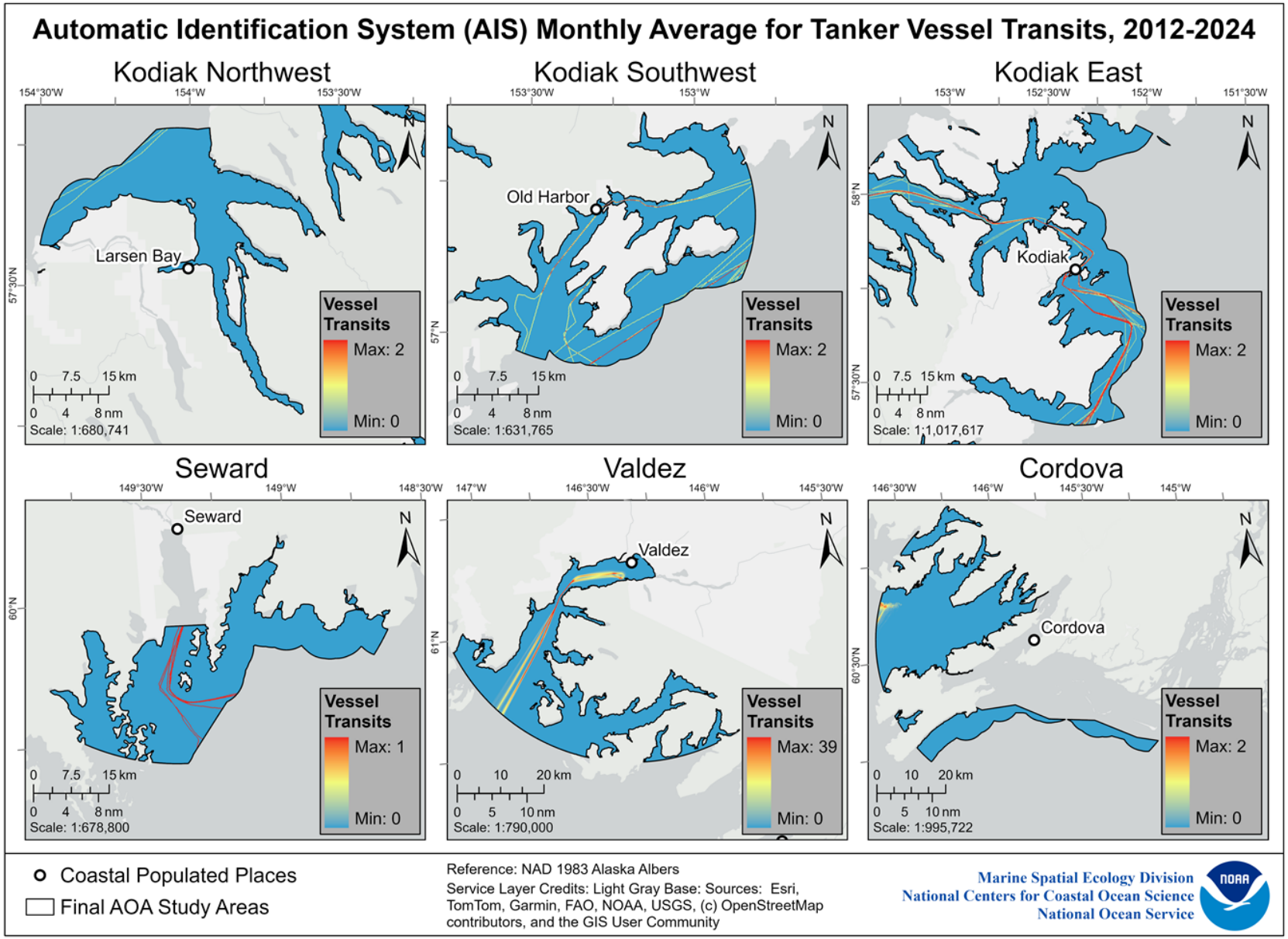


Figure 3.25. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for tanker vessels in the Southwest and Southcentral Study Areas.

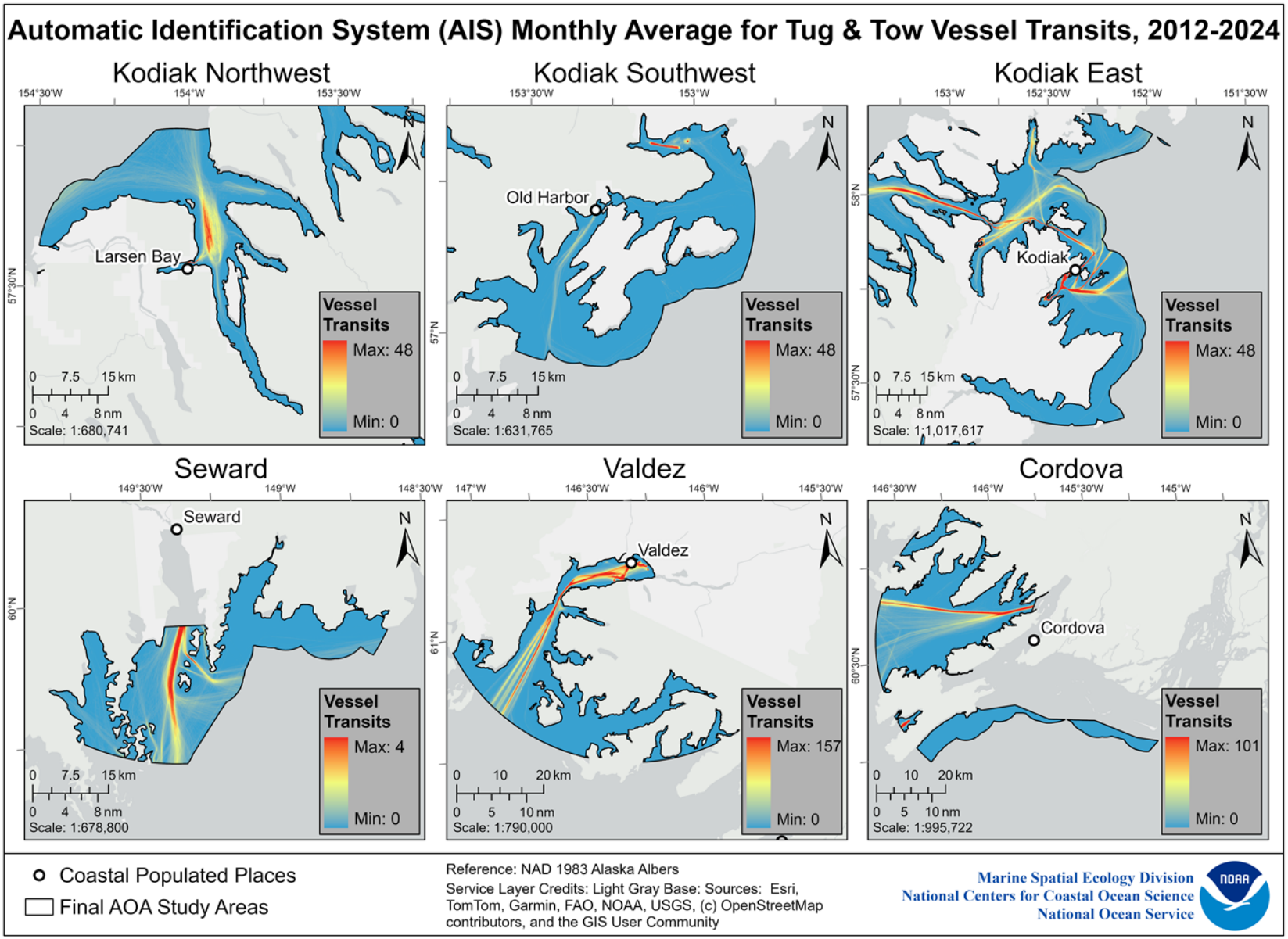


Figure 3.26. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for tug and tow vessels in the Southwest and Southcentral Study Areas.

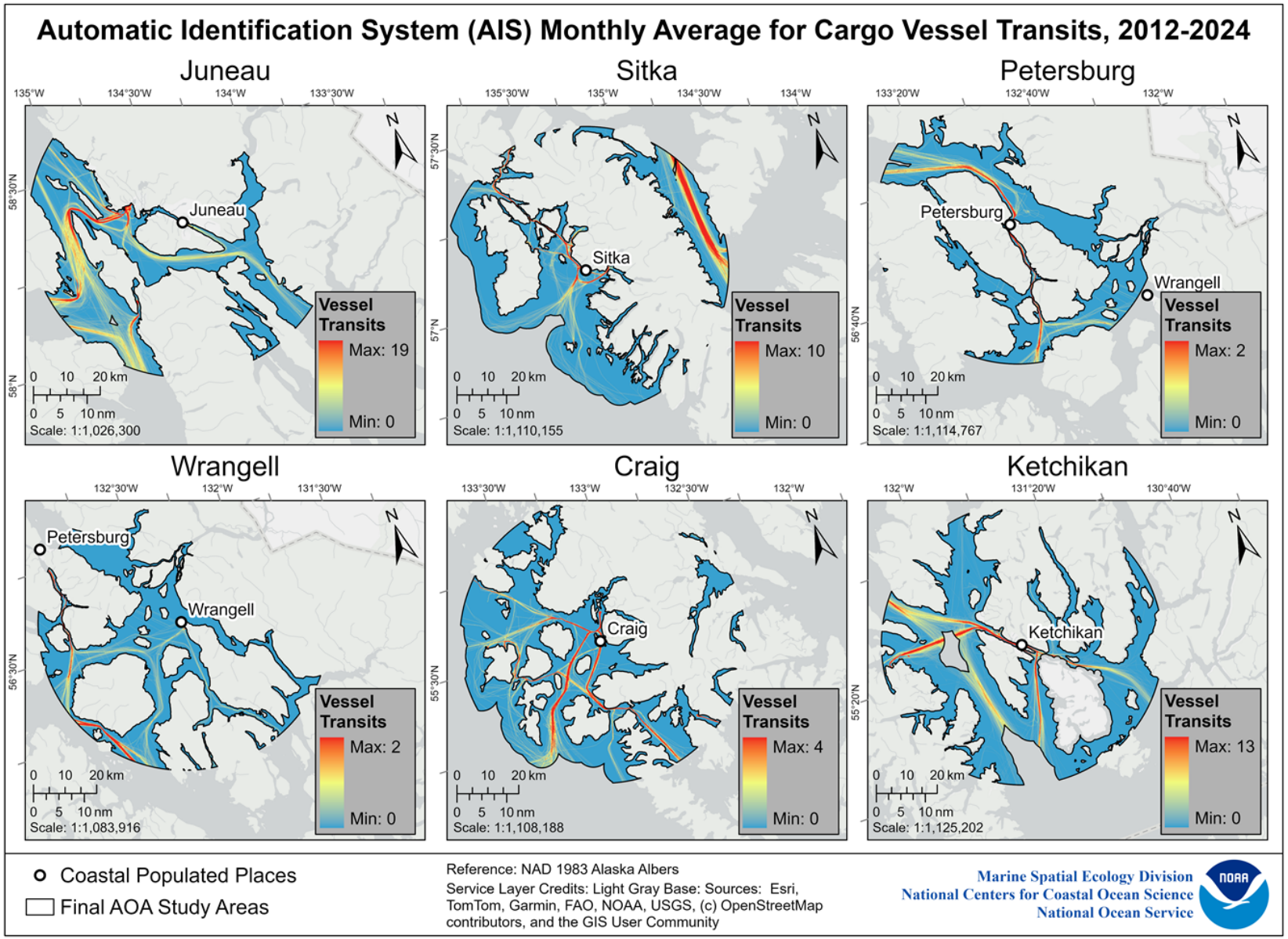


Figure 3.27. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for cargo vessels in the Southeast Alaska Study Areas.

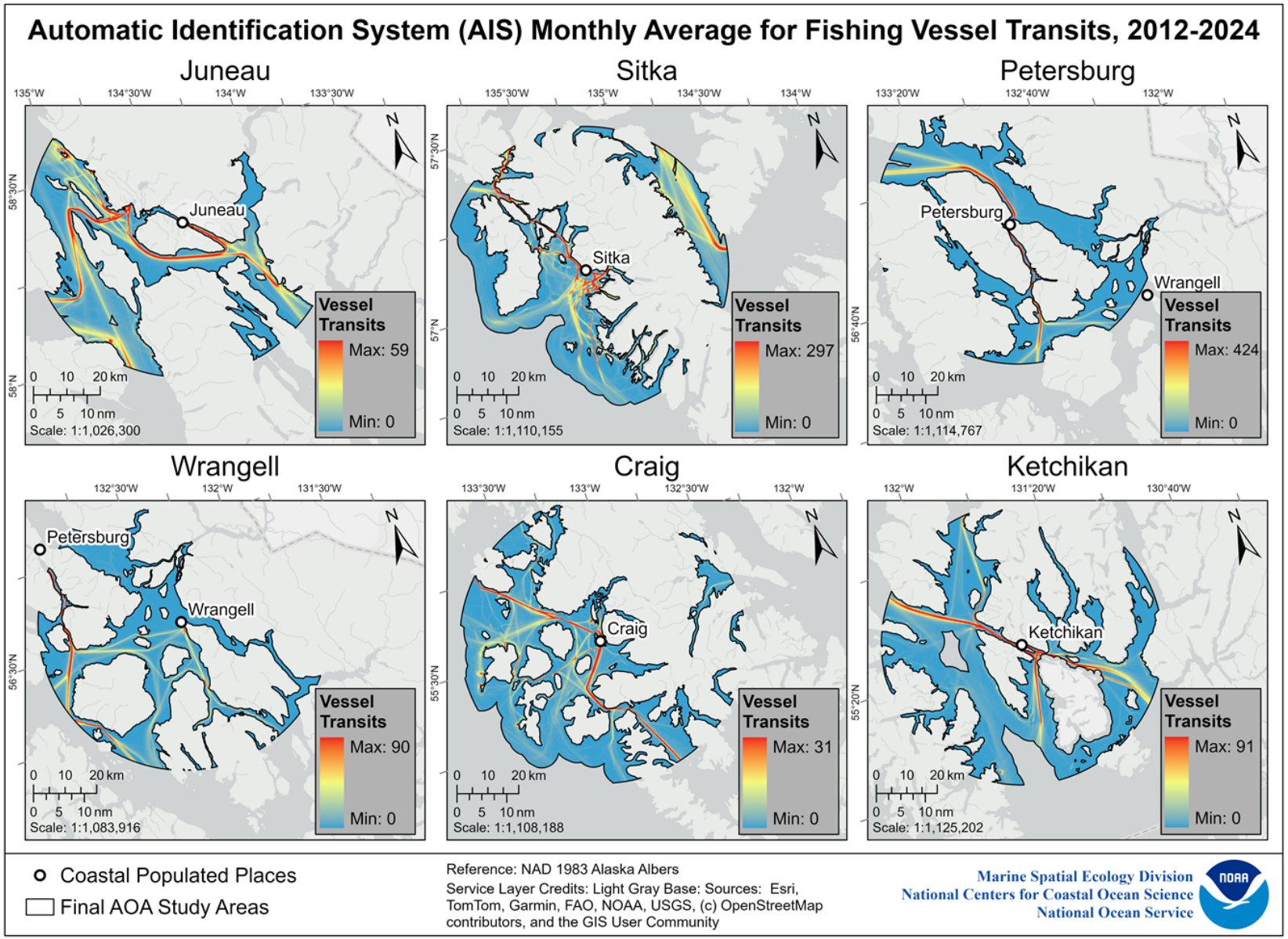


Figure 3.28. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for fishing vessels in the Southeast Alaska Study Areas.

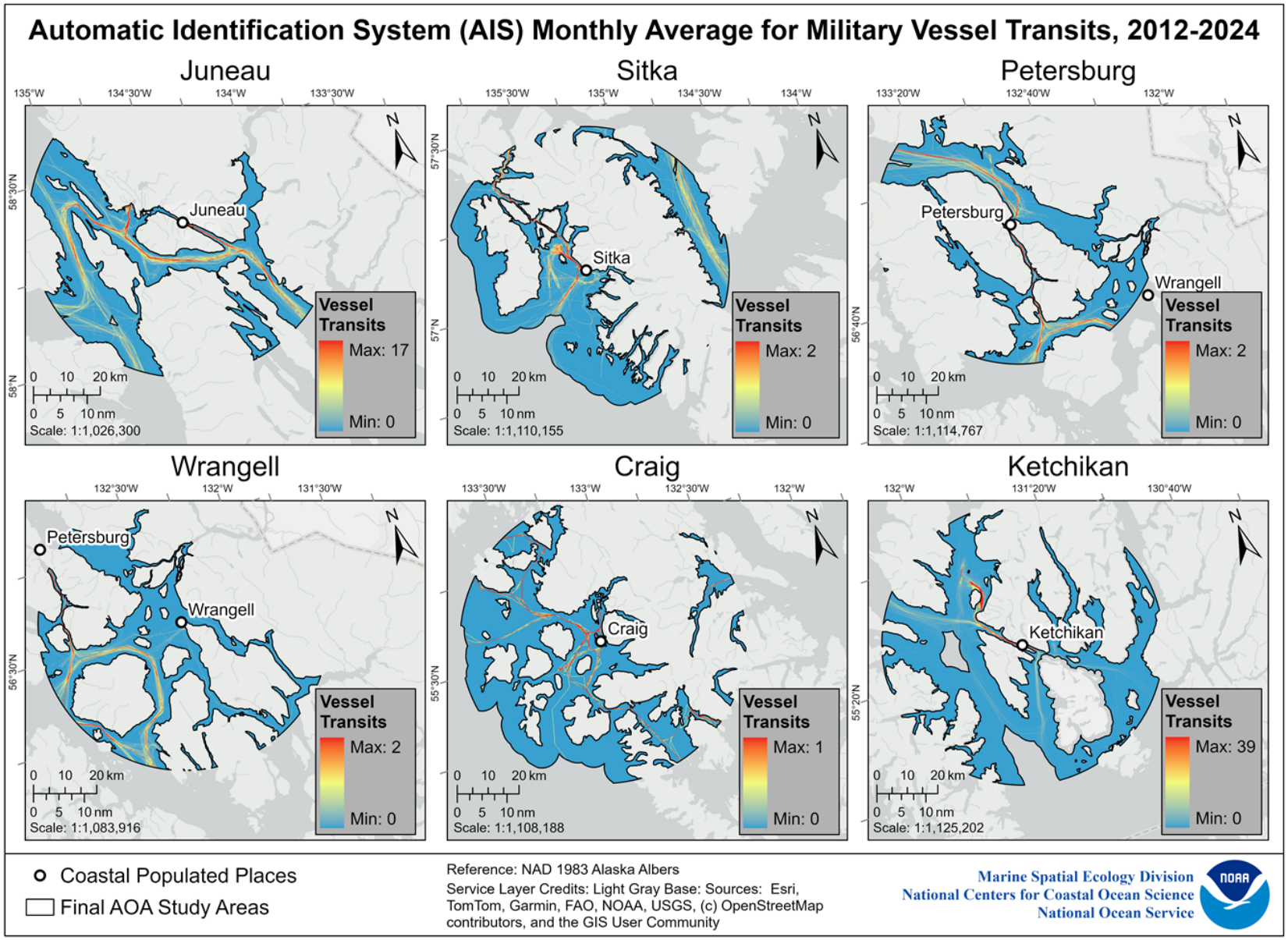


Figure 3.29. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for military vessels in the Southeast Alaska Study Areas.

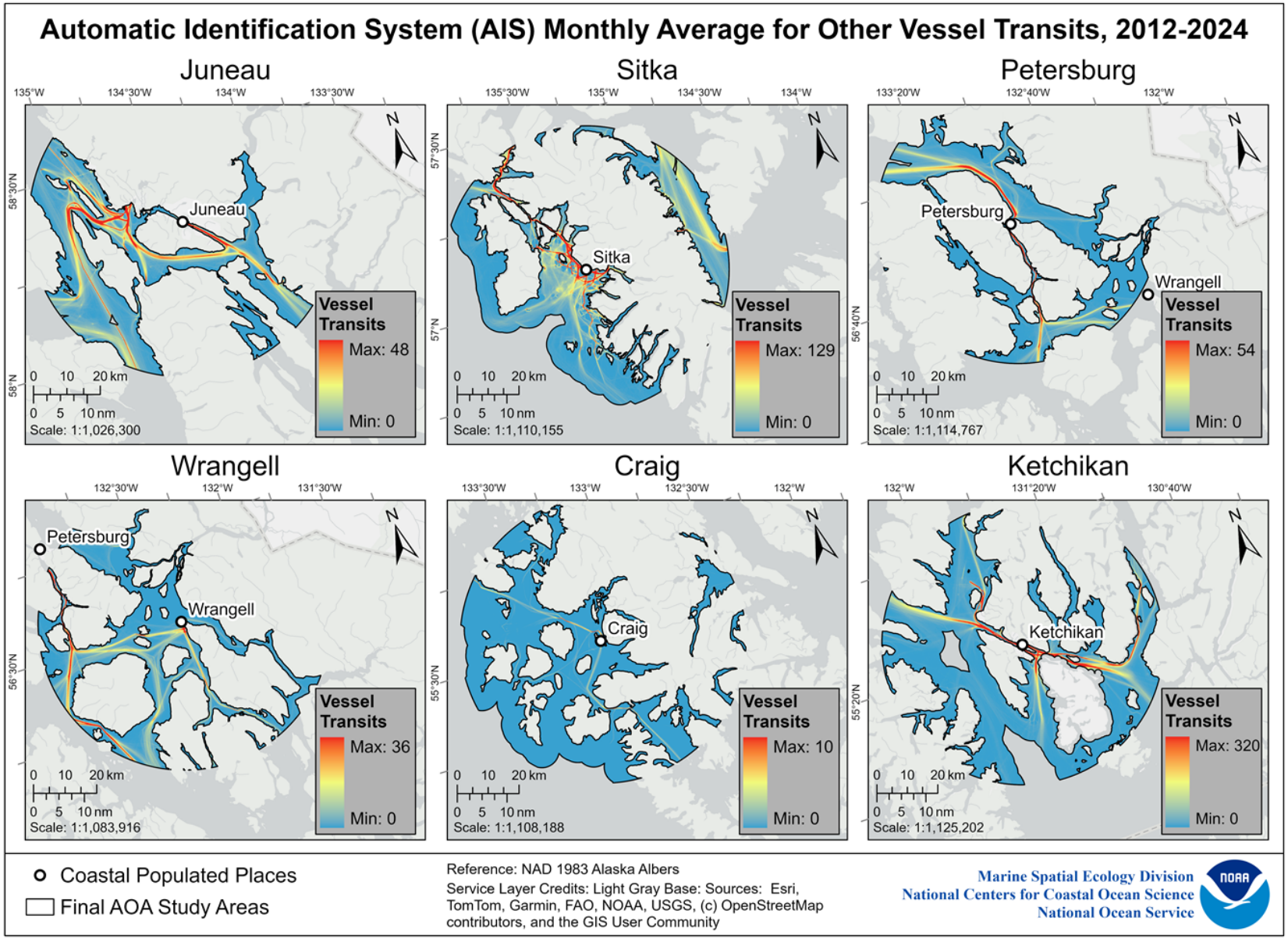


Figure 3.30. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for vessels classified as other in the Southeast Alaska Study Areas.

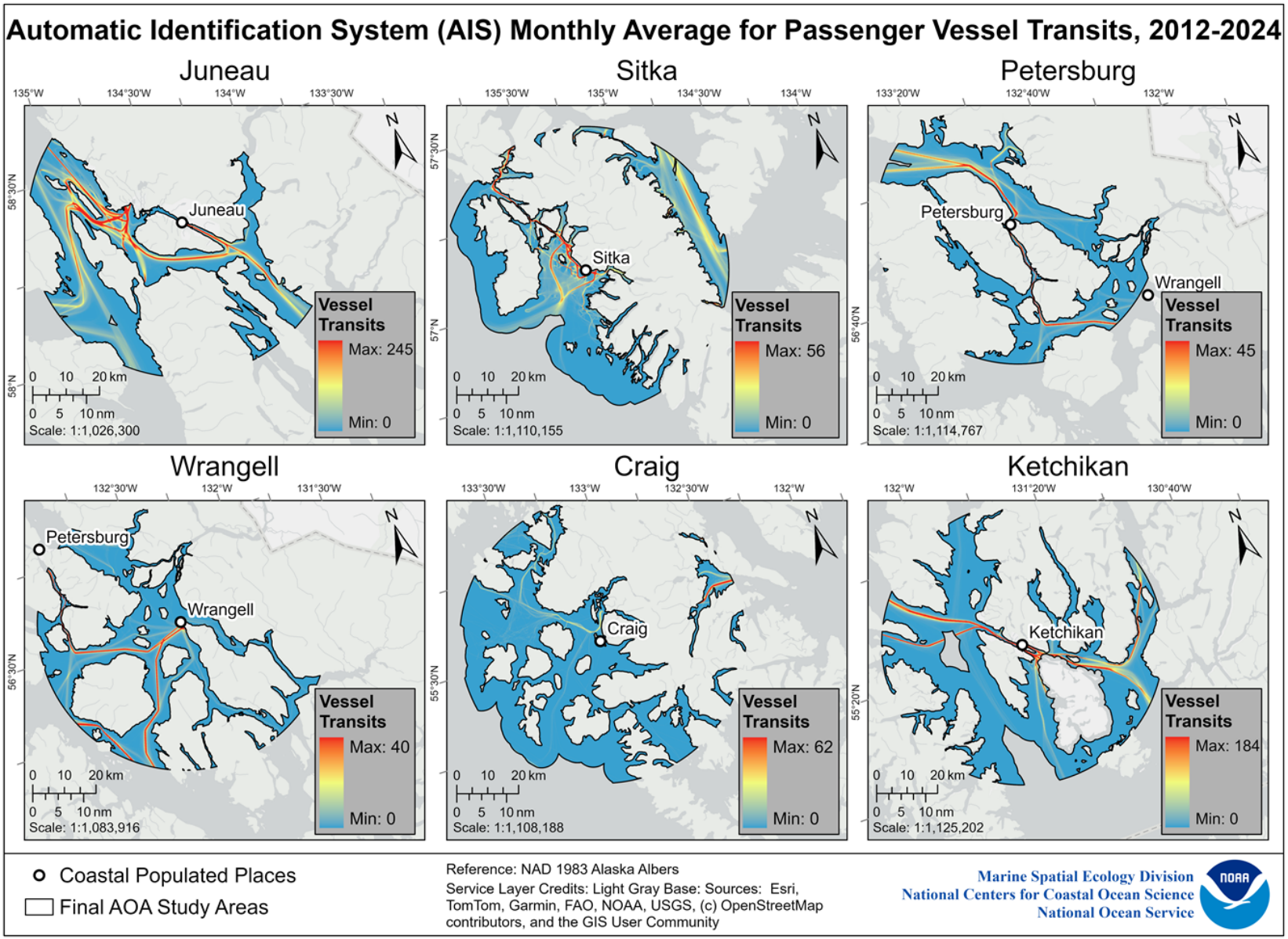


Figure 3.31. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for passenger vessels in the Southeast Alaska Study Areas.

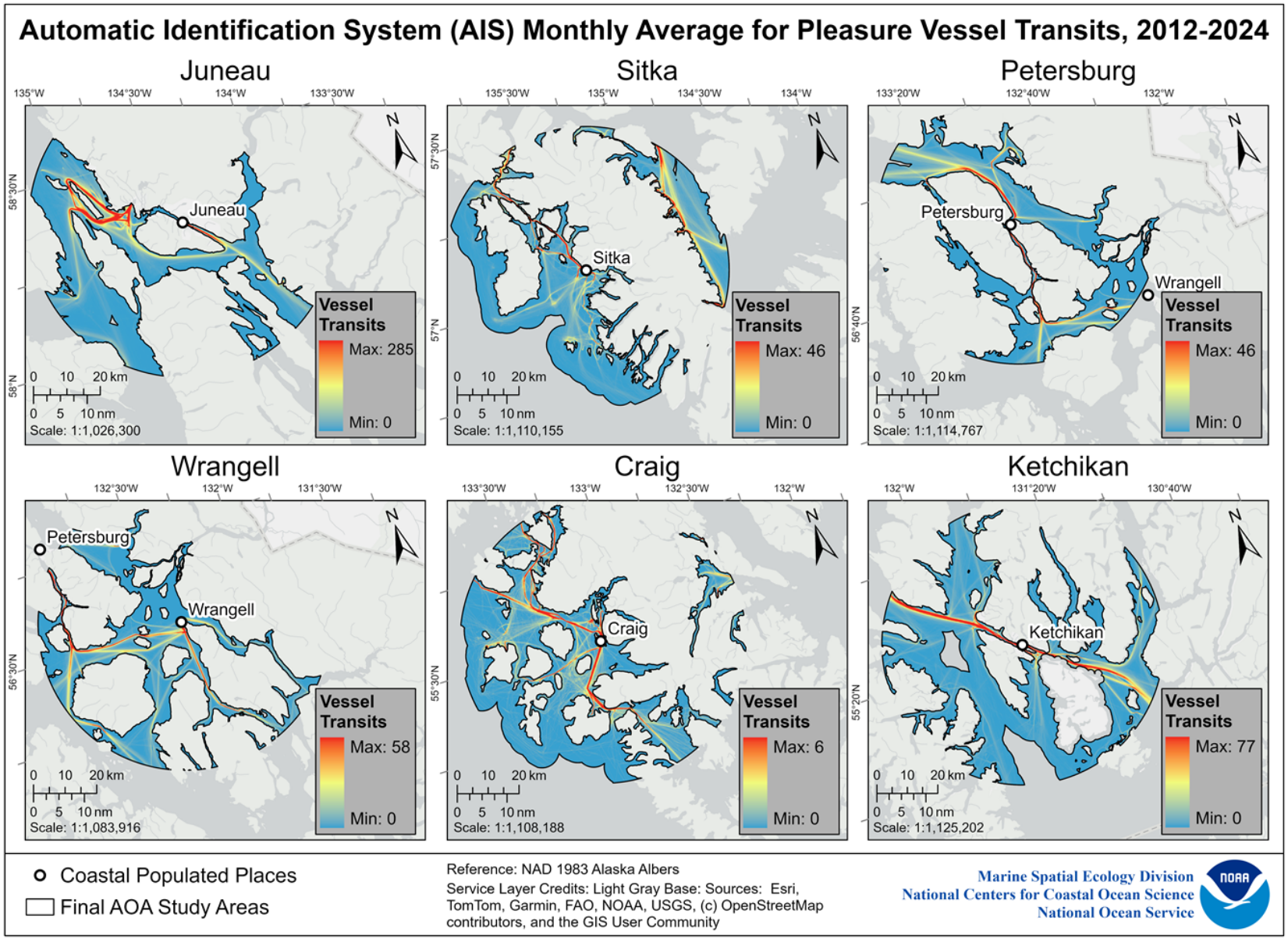


Figure 3.32. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for pleasure craft vessels in the Southeast Alaska Study Areas.

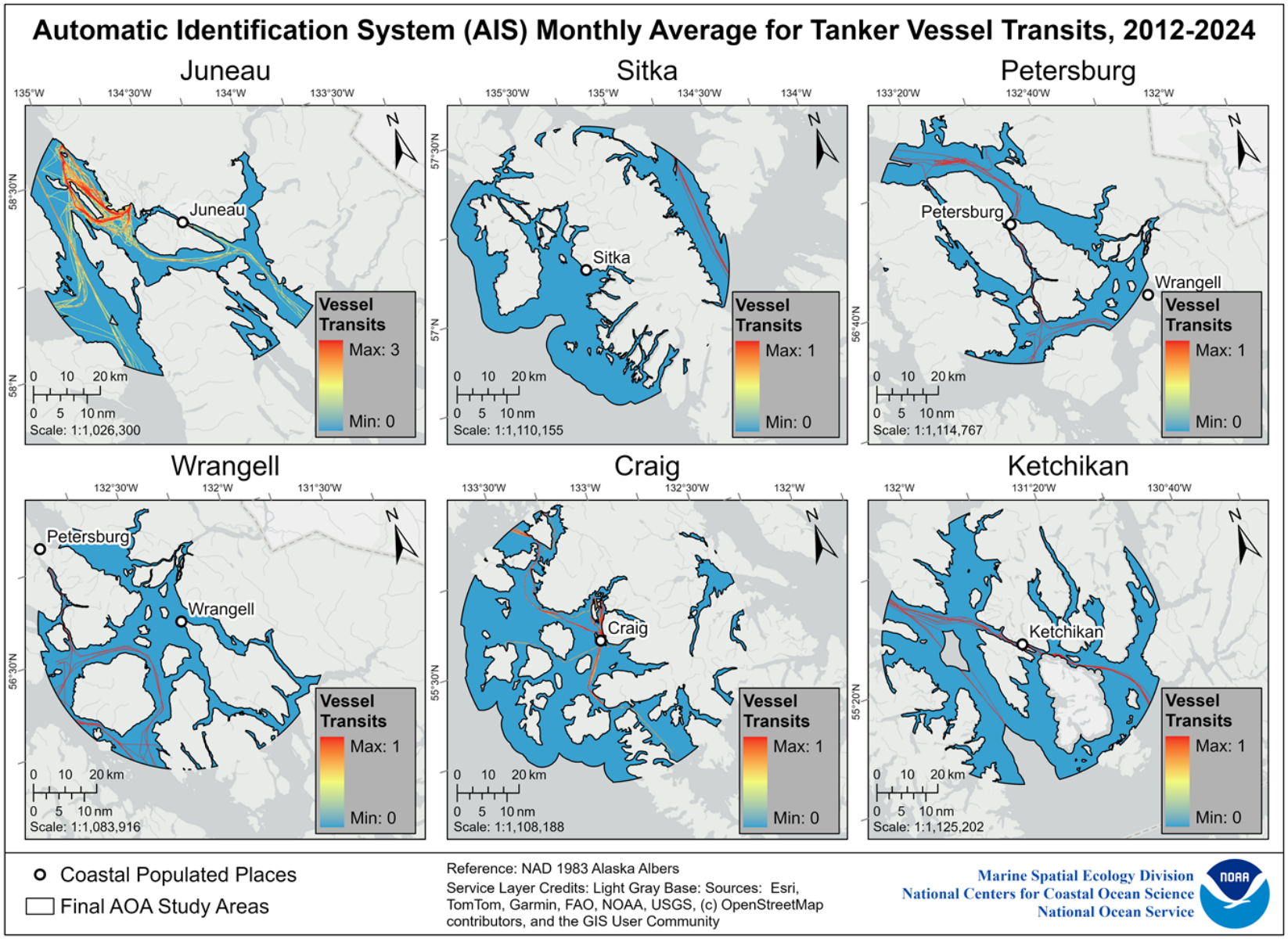


Figure 3.33. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for tanker vessels in the Southeast Alaska Study Areas.

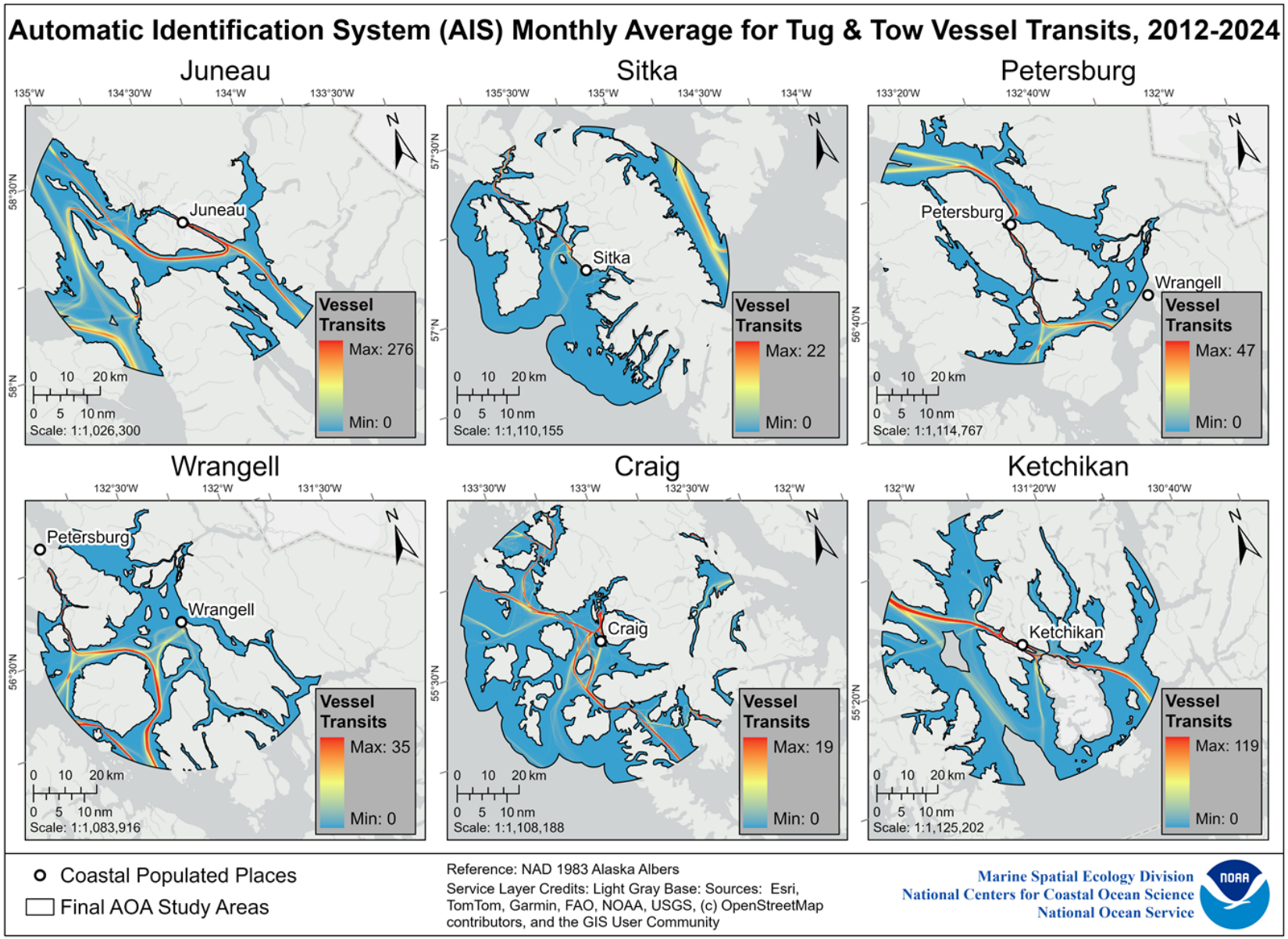


Figure 3.34. Automatic identification system vessel traffic data from 2012–2024 (years 2020, 2021 omitted) for tug and tow vessels in the Southeast Alaska Study Areas.

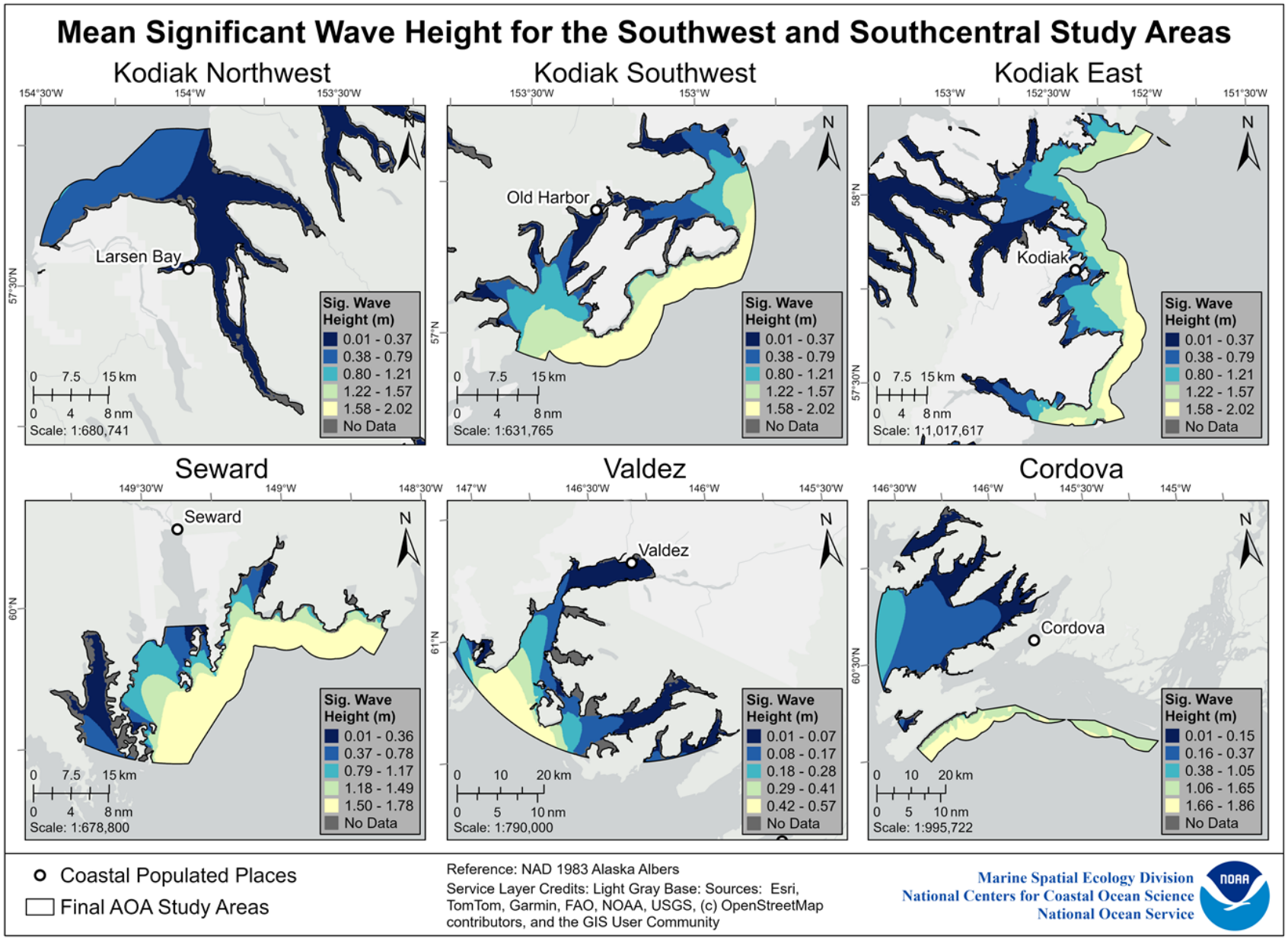


Figure 3.35. Mean significant wave height across the Southwest and Southcentral Study Areas.

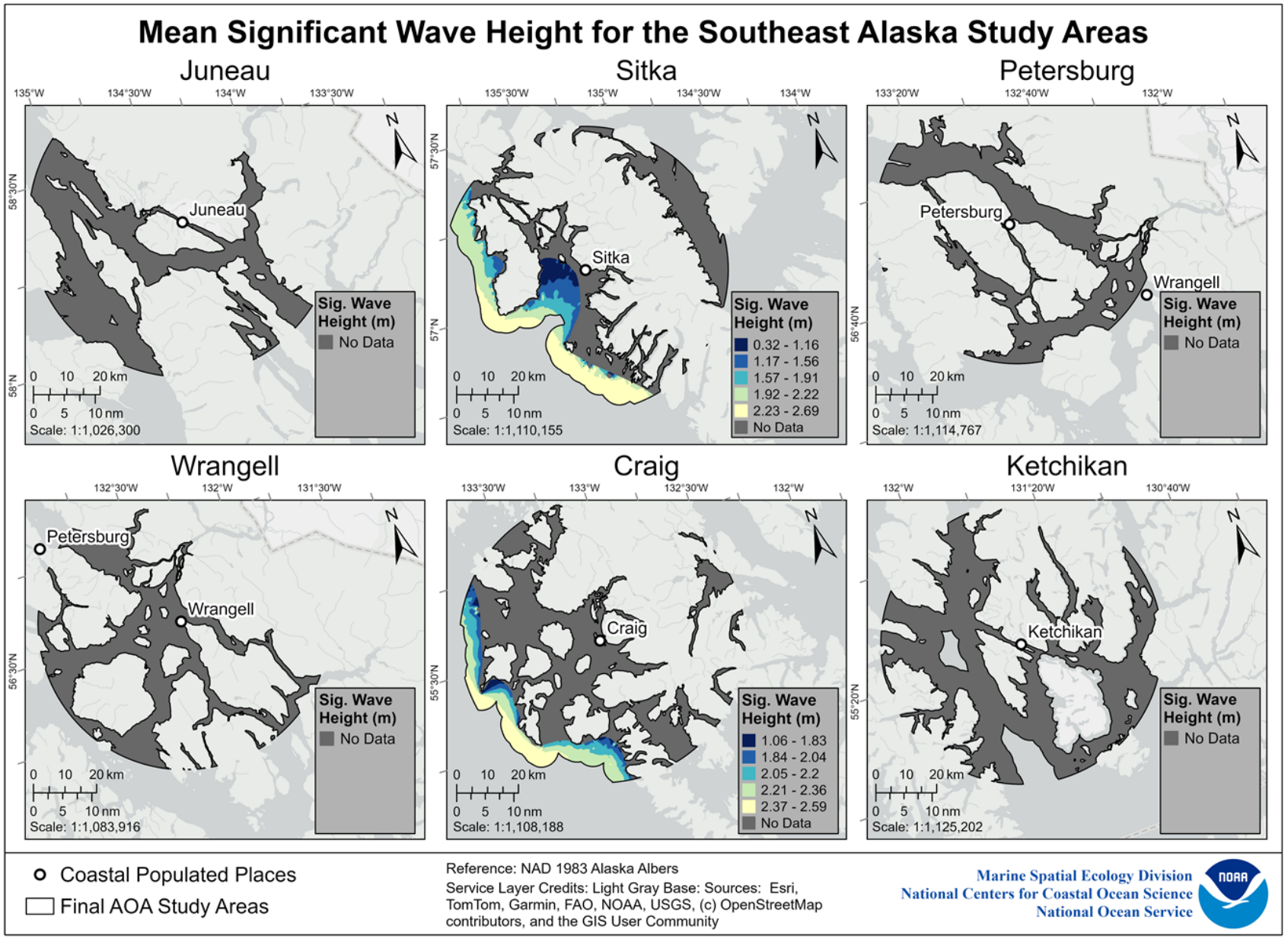


Figure 3.36. Mean significant wave height across the Southeast Alaska Study Areas.

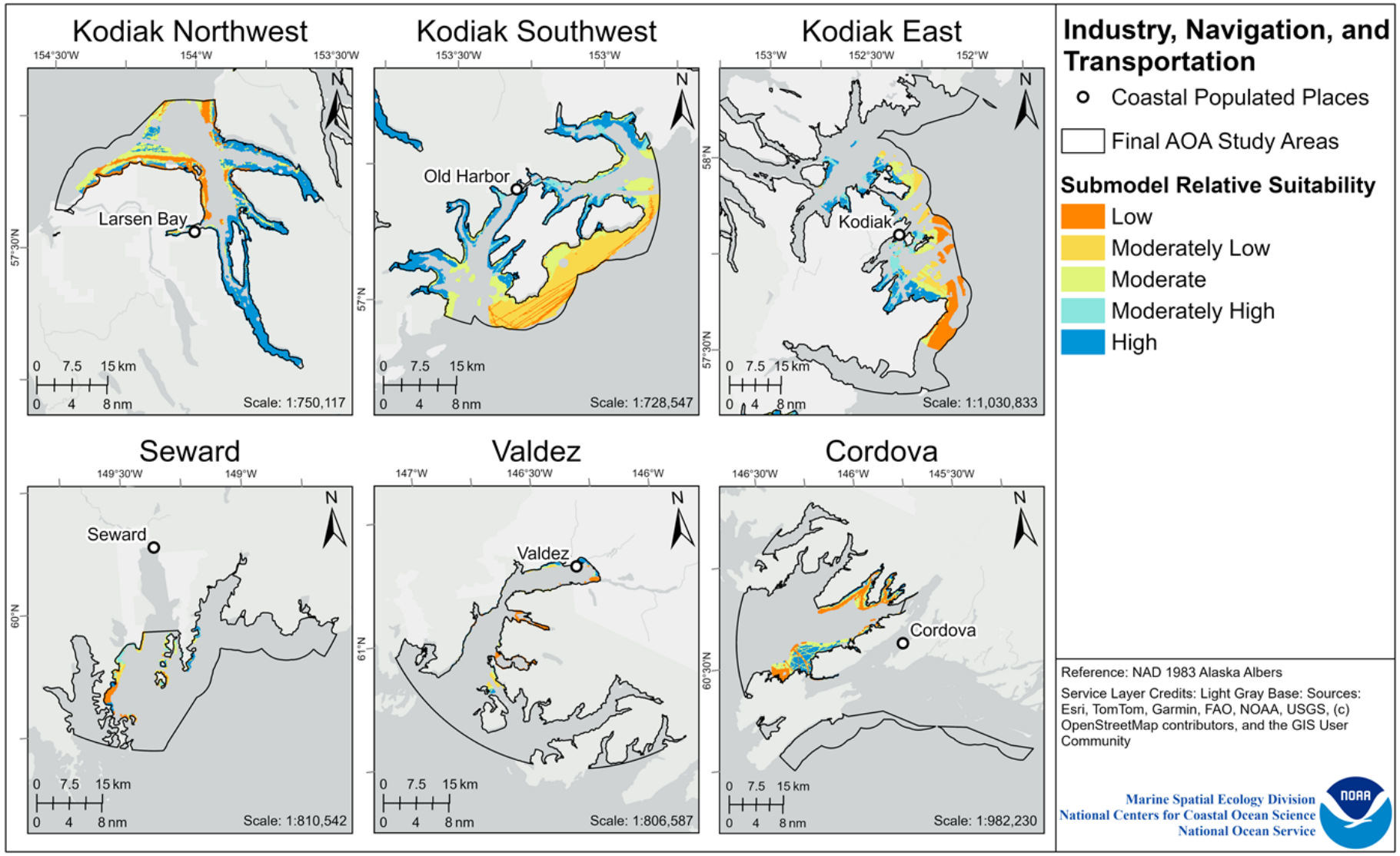


Figure 3.37. Final Industry, Navigation, and Transportation Submodel results utilized in the suitability model for the Southwest and Southcentral Study Areas.

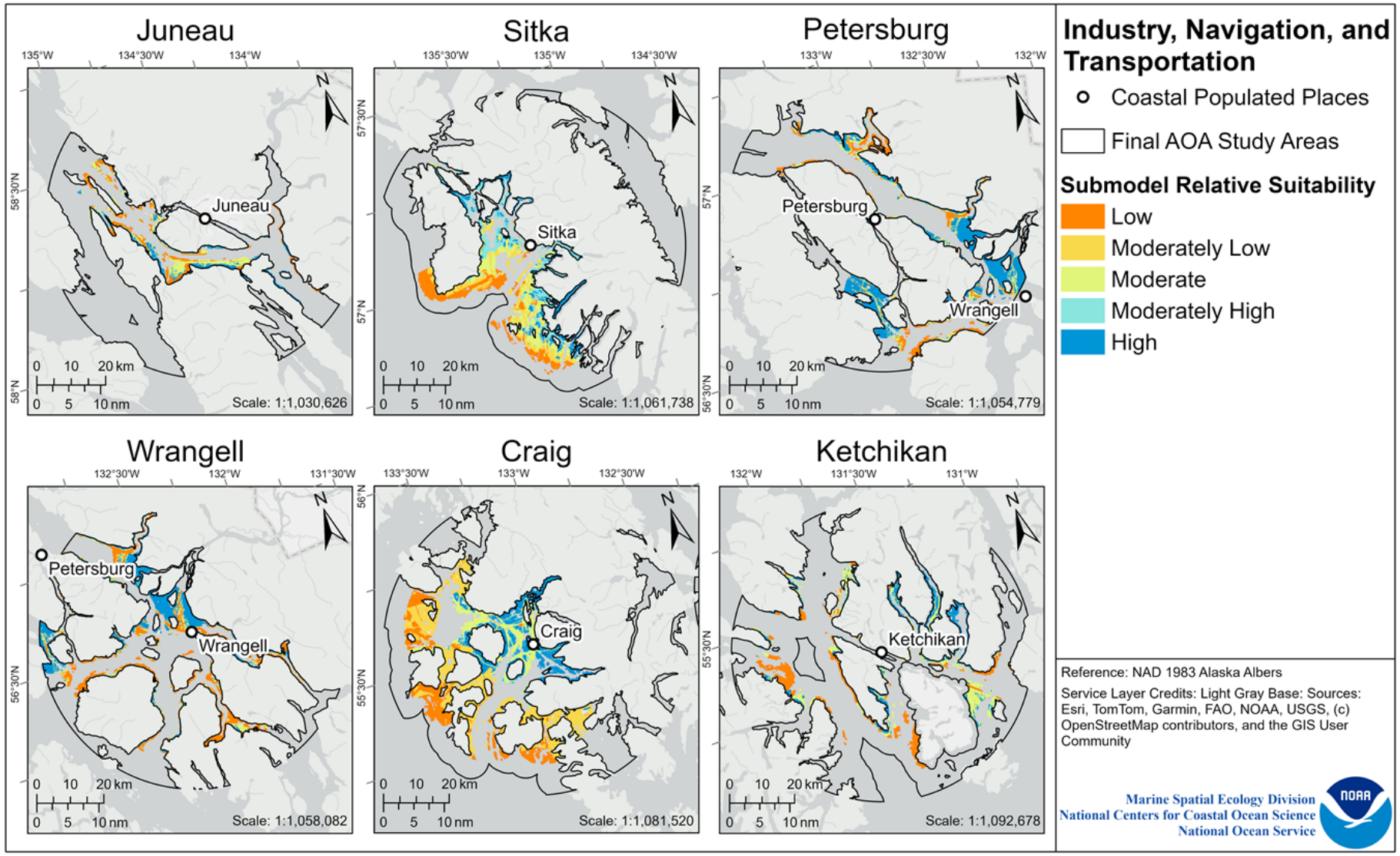


Figure 3.38. Final Industry, Navigation, and Transportation Submodel results utilized in the suitability model for the Southeast Alaska Study Areas.

Cultural Resources Submodel

Alaska has over 45,000 documented cultural and historic sites with many yet to be discovered. These sites offer invaluable insight into thousands of years of human occupation across the study areas and are central to Alaska's cultural identity, particularly for Alaska Native communities whose ancestral connections to land and sea remain deeply rooted (Figures 3.39 and 3.40).



The Cultural Resources Submodel (Figures 3.41 and 3.42) draws from the Alaska Heritage Resources Survey (AHRS), a comprehensive repository of archaeological and historical sites. The AHRS data layers include both terrestrial resources, such as burial sites, traditional cultural places, and petroglyphs, and submerged resources, including shipwrecks, downed aircraft, and submerged coastal pre-contact sites (AK DNR 2024). AHRS sites, along with a 500-m setback, were conservatively down-scored to 0.2 to reflect their potential sensitivity. Due to legal restrictions and the sensitive nature of these locations, some specific site locations are not visualized on maps. Cultural resources considerations included in the relative suitability analysis and the score assigned to each dataset can be found in Table 3.5.

Subsistence fishing and hunting are essential for many rural and Alaska Native communities, providing food security, cultural identity, and community resilience. These practices are legally protected and often prioritized over other uses, reflecting their critical importance to life in Alaska both culturally and as a means of sourcing food and nutrition. Subsistence fishing encompasses a wide range of activities, from intertidal gathering, such as collecting clams, mussels, seaweed, and barnacles during low tides, to harvesting salmon, herring, eulachon, and other species using diverse methods.



Pacific herring holds deep cultural, ecological, and subsistence significance for many Alaska Natives. As a keystone species, herring support salmon, seals, birds, and other marine life. Herring spawning occurrence data were included in both the Natural Resources and Cultural Resources Submodels but were scored differently between them to reflect how herring spawning interacts

distinctively with these two types of resources. For the Cultural Resources Submodel, the data were scored specifically to differentiate areas of cultural significance. Areas with a higher frequency of spawning occurrences (greater than 0.5 occurrences per year) were assigned a score of 0.5, categorizing these as major herring spawning areas. From a cultural perspective, this represents human interaction with herring spawning that recognizes locations that are known to have regular spawning activity as culturally important areas. This value of 0.5 occurrences per year specifically identifies the areas where spawning is observed more frequently than every other year as these major spawning areas.



Sea otters also hold significant cultural importance for Alaska Native communities. Their pelts are traditionally used for clothing, regalia, and art. Sea otter density data were included in both the Natural Resources and Cultural Resources Submodels but were scored differently between them to reflect how otters interact distinctively with these two types of resources. For the Cultural Resources Submodel, the data were scored specifically to differentiate areas of cultural significance. The top quartile (values above the 75th percentile) of the otter density data were assigned a score of 0.5, categorizing major sea otter areas as an important cultural resource. From a cultural perspective, human interaction with sea otters defines distinct high-activity zones as culturally important areas by the known presence of otters. Alaska Native communities also harvest harbor seals for subsistence and traditional uses. This resource provides vital food and traditional materials. Key harbor seal haulouts (> 50 animals) with a 500-m setback were included in the Constraints Model (scoring 0). Additionally, historical lighthouses with a 500-m setback and Alaska Area Plan subunits referencing subsistence or community harvest and heritage sites were similarly down-scored to 0.5.

Together, these data layers form the foundation for evaluating cultural sensitivity in marine and coastal development planning. Proposed aquaculture projects must consider potential impacts to cultural resources, as required under the Alaska Historic Preservation Act (Alaska Statute 41.35.070) and Section 106 of the National Historic Preservation Act (36 Code of Federal Regulations 800). As part of the lease approval process, the ADNR conducts a Traditional Use Finding to assess whether a proposed site conflicts with long-standing subsistence, cultural, or recreational uses. This process includes a review of historical and current use, public notice, and a comment period to gather input from residents and tribal entities. These legal frameworks require consultation, documentation, and mitigation to ensure development does not compromise culturally or historically significant areas. However, evaluating potential impacts depends on the specific nature and location of the proposed activity. As such, assigning conservative scores to cultural data layers without detailed knowledge of the aquaculture type and site is inherently limited. Ultimately, proactive coordination with affected communities prior to development is essential for successful and respectful planning.

Table 3.5. Cultural resources considerations included in the relative suitability analysis and the score assigned to each dataset. Each dataset is listed with the percentage value (%) of total down-scored grid cells in each study area after all constrained areas were removed. Symbols, units, and abbreviations are the same as in Table 3.1.

Cultural Resources Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Alaska Area Plans (Community Harvest)	0.5	1.2	13.1	30	27.1	14	0	6.9	7.3	32.4	6.9
Alaska Area Plans (Heritage Sites)	0.5	1.3	6.3	-	-	0.6	0	1.8	1.4	32.5	6.3
Alaska Heritage Resources Survey Sites (500-m setback)	0.2	4.2	0.5	1.2	1.9	1	2.7	1.5	2.2	1.8	3.5
Herring Spawn Occurrences per Year	0.5	-	-	7.7	25.8	1.8	4.8	0.1	-	1.4	1.3
Historic Lighthouses (500-m setback)	0.5	-	-	-	-	-	-	-	-	-	-
Northern Sea Otter Abundance and Distribution, Southeast Alaska	0.5‡	-	-	-	-	8.3	8.3	8.3	8.3	8.3	8.3
Pacific Herring Spawning Areas, Kodiak and Seward	0.5	6	4.4	-	-	-	-	-	-	-	-
Sea Otter Relative Population Density Estimate	0.5‡	5.4	4.2	7.1	8.1	-	-	-	-	-	-
‡ Data were analyzed using a quantile membership function.											



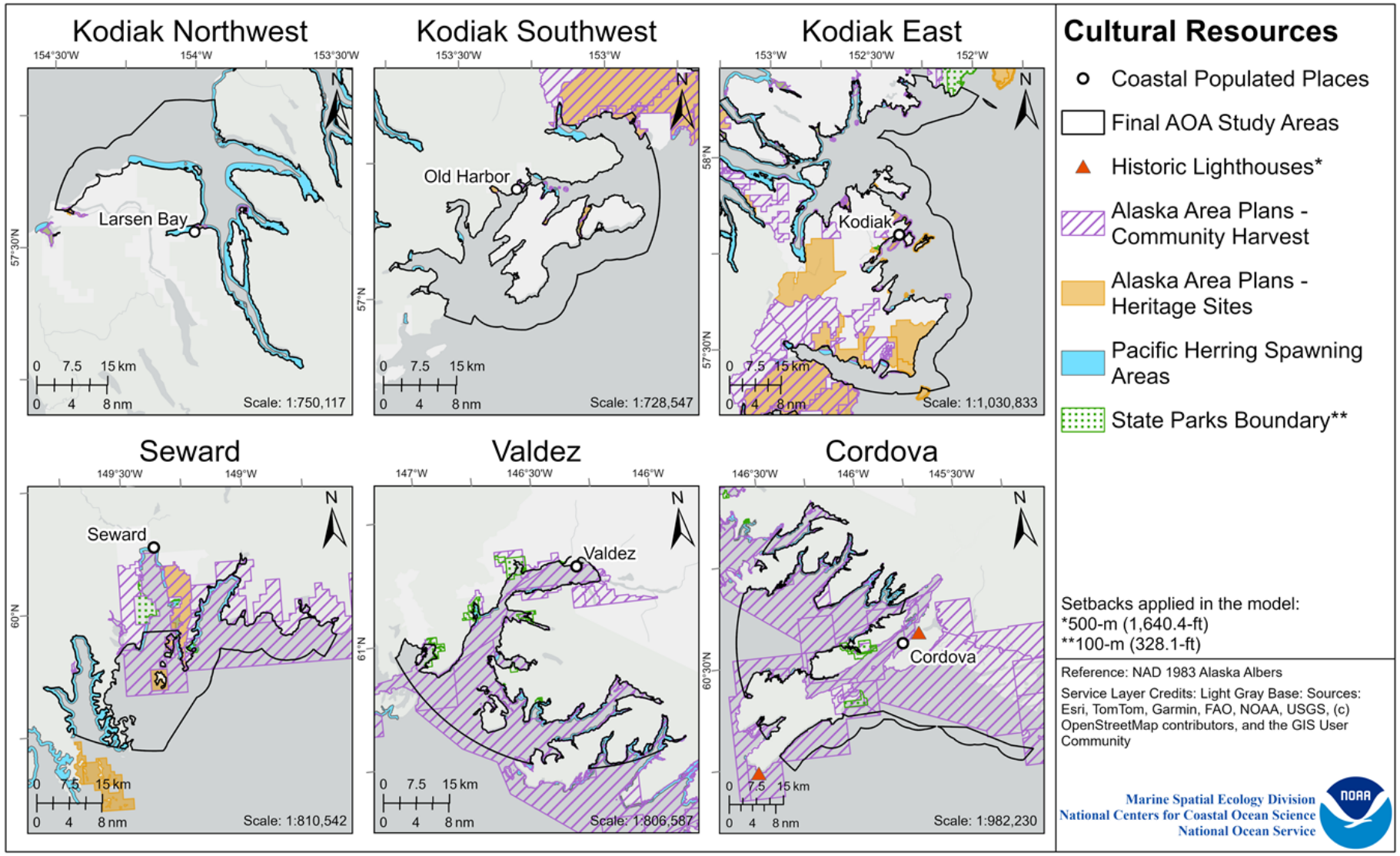


Figure 3.39. Cultural resource considerations for the Southwest and Southcentral Study Areas. Considerations include historic lighthouses, Alaska state parks, community harvest areas, heritage sites, and Alaska Heritage Resource Surveys (not displayed above).

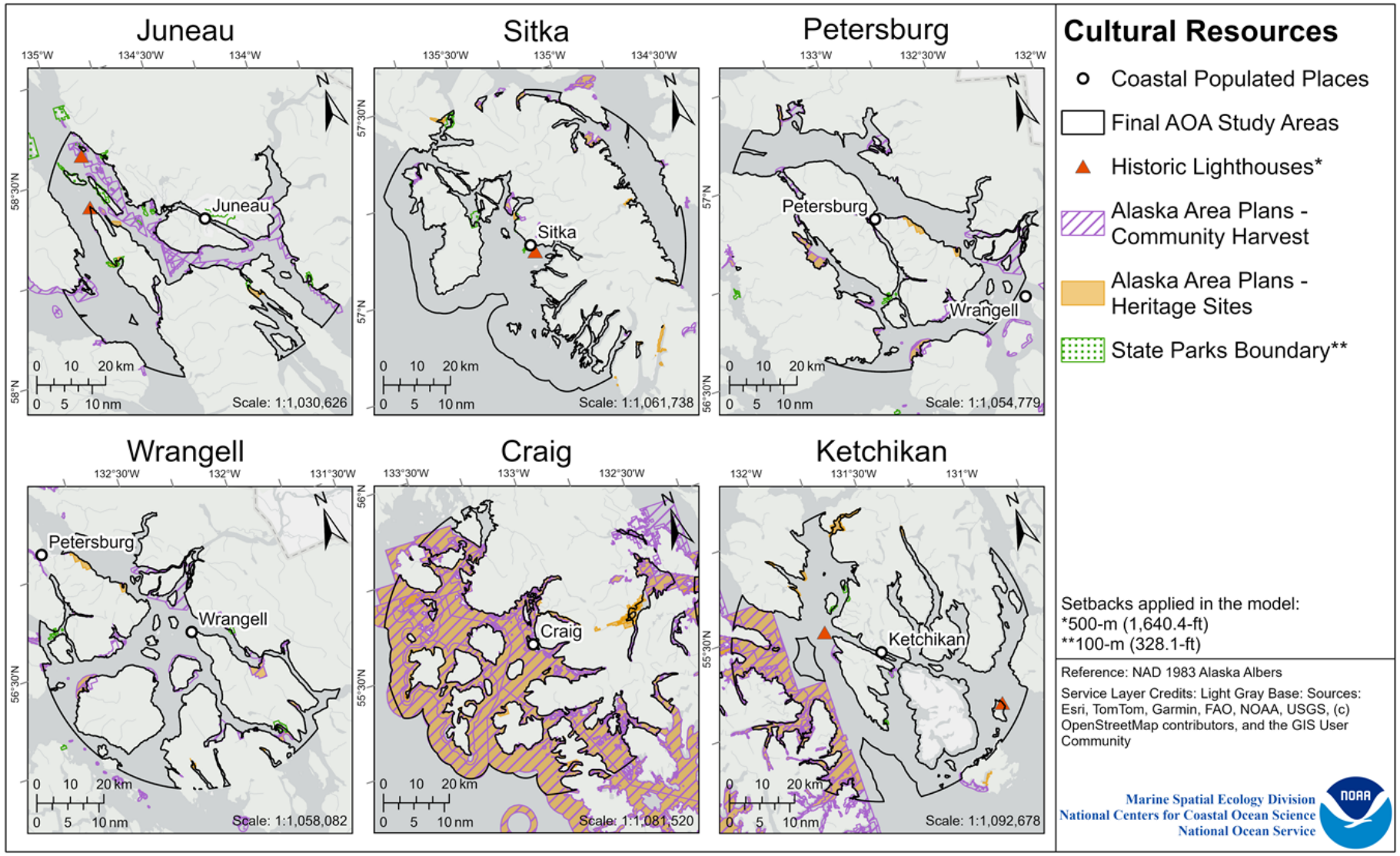


Figure 3.40. Cultural resource considerations for the Southeast Alaska Study Areas. Considerations include historic lighthouses, Alaska state parks, community harvest areas, heritage sites, and Alaska Heritage Resource Surveys (not displayed above).

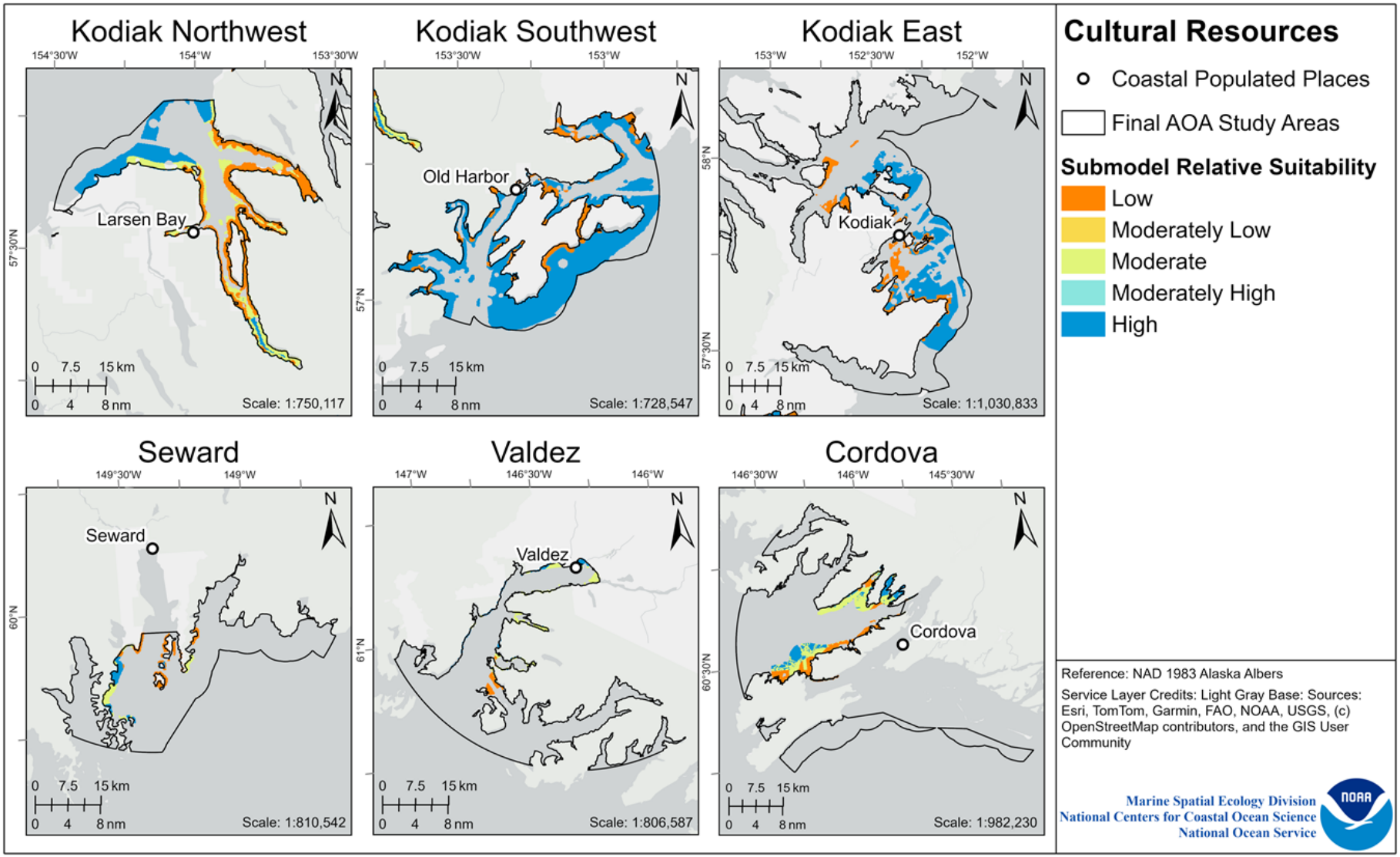


Figure 3.41. Final Cultural Resources Submodel results utilized in the suitability model for the Southwest and Southcentral Study Areas.

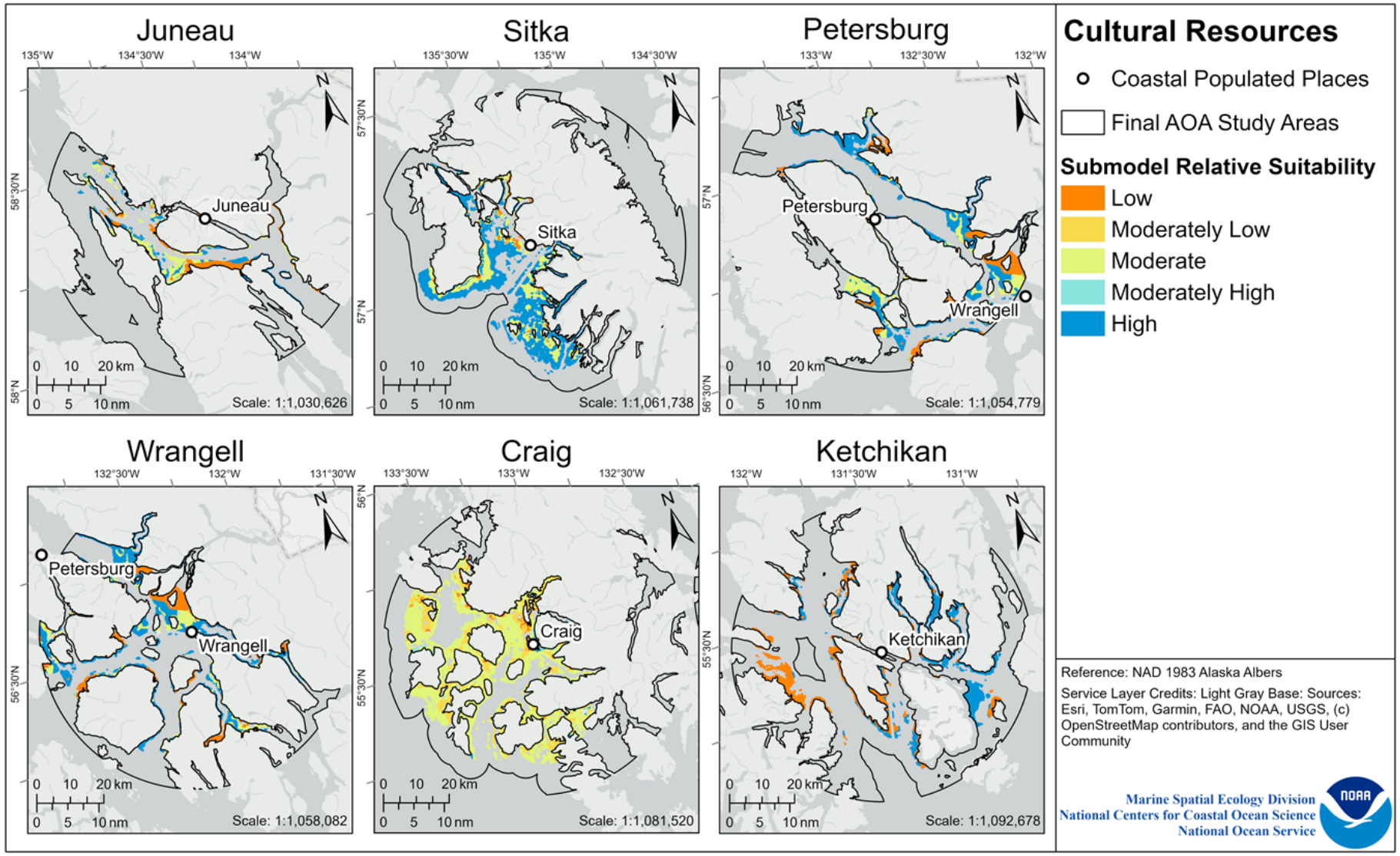


Figure 3.42. Final Cultural Resources Submodel results utilized in the suitability model for the Southeast Alaska Study Areas.

Aquaculture and Fisheries Submodel

Commercial fishing is a major economic driver in Alaska (Lew and Larson 2017, NMFS 2024b), and understanding use patterns is essential for effective marine spatial planning and minimizing conflicts within this established and vital industry. ADFG provided 10 years of commercial landings data for three primary reporting classes, salmon, groundfish, and shellfish/other, sourced from a fish ticket database. Because the smallest spatial unit for landings is a state statistical area, average annual landings (in pounds per acre) were calculated by dividing total landings by the area size and number of years recorded, then assigned to grid cells within each statistical area.



To refine spatial accuracy, feedback was gathered for identifying habitat-specific fishing zones. Some fisheries operate within defined depth ranges, and landings values were redistributed accordingly: geoduck and sea cucumber dive fisheries were limited to areas shallower than 25 m, and most crab pot fisheries to depths shallower than 100 m. As a result, average landings for gear codes associated with diving and pot fisheries were applied only to portions of statistical areas within these depth constraints. Additionally, geoduck clam survey data from ADFG enabled conservative down-scoring (0.3) of areas with known resource abundance, and Shore Fishery (setnet) lease locations from the ADNR were incorporated into the Constraints Model (scoring 0).

Sport fishing also plays a significant role in Alaska's economy, attracting residents and tourists and supporting the recreation and tourism sectors. Marine sport fishing typically targets species such as salmon and halibut. Data on sport fishing were derived from ADNR Alaska Area Plans at the subunit level. These subunits range from 1,000 to over 200,000 ac, but specific fishing locations within them are often unspecified, limiting the ability to assess spatial overlap with potential aquaculture sites. Subsistence fishing, restricted to Alaska residents, allows harvest for household consumption and involves methods like dip netting under strict permit, quota, and gear regulations to ensure sustainability. Personal-use fishing data, also extracted from ADNR Area Plan layers, faced similar resolution challenges. Because terms like personal use, community harvest, and subsistence were often used interchangeably in the plans, these data were assigned to the Cultural Resources Submodel. Despite their economic significance, spatially explicit data for fishing activities in Alaska remain limited. Datasets from ADFG and other agencies provide relative effort across the statistical area and subunit levels but lack the granularity needed to identify specific locations warranting overly conservative

scoring. While fishing is one of Alaska's most critical industries and a key source of healthy local food, it is important to recognize that potential conflicts with aquaculture depend heavily on the type of fishery or aquaculture operation, their seasonality, and specific gear types utilized. These factors influence the degree of interaction and potential conflicts between aquaculture development and fishing practices and can generally only be assessed through individual project review.

Aquaculture data layers provided by ADFG and ADNR include hatchery locations, hatchery release sites, and active aquatic farm and aquaculture leases. These data layers were scored as zero in the analysis due to conflicts arising from overlapping activities and incorporated into the constraints. The integration of these data layers aims to balance aquaculture development with the preservation of existing fishing and aquaculture activities, ensuring that resource management considers economic, ecological, and cultural factors. Aquaculture and fisheries considerations (Figures 3.43 and 3.44), fisheries landings combined data layer (Figures 3.45 and 3.46), and final Aquaculture and Fisheries Submodel relative suitability results (Figures 3.47 and 3.48) can be seen below. Aquaculture and fisheries considerations included in the relative suitability analysis and the score assigned to each data layer can be found in Table 3.6.



Table 3.6. Aquaculture and Fisheries considerations included in the relative suitability analysis and the score assigned to each dataset. Each dataset is listed with the percentage value (%) of total down-scored grid cells in each study area after all constrained areas were removed. Symbols, units, and abbreviations are the same as in Table 3.1.

Aquaculture and Fisheries Dataset	Score	Southwest and Southcentral AK				Southeast AK					
		KOD	SEW	VAL	COR	JUN	SIT	PET	WRA	CRA	KET
Alaska Area Plans (Sport Fishing)	0.5	1.3	15.3	18.5	3.1	17.4	2	-	0.3	19.4	6.1
Alaska DNR Shore Fishery Lease	0.5	0.2	-	-	-	-	-	-	-	-	-
Fisheries Landings Combined	Comb.¶	32.9	32.4	33	33.3	32.4	32.5	33	32.9	33.1	32.9
Geoduck Bed Surveys	0.3	-	-	-	-	-	-	-	-	0.9	0.2
Hatchery Release Sites (500-m setback)	0.5	0	-	0.3	-	0.2	0	0.1	0.1	0	0
¶ Data layers were individually scored and then combined by taking the minimum value over all layers.											

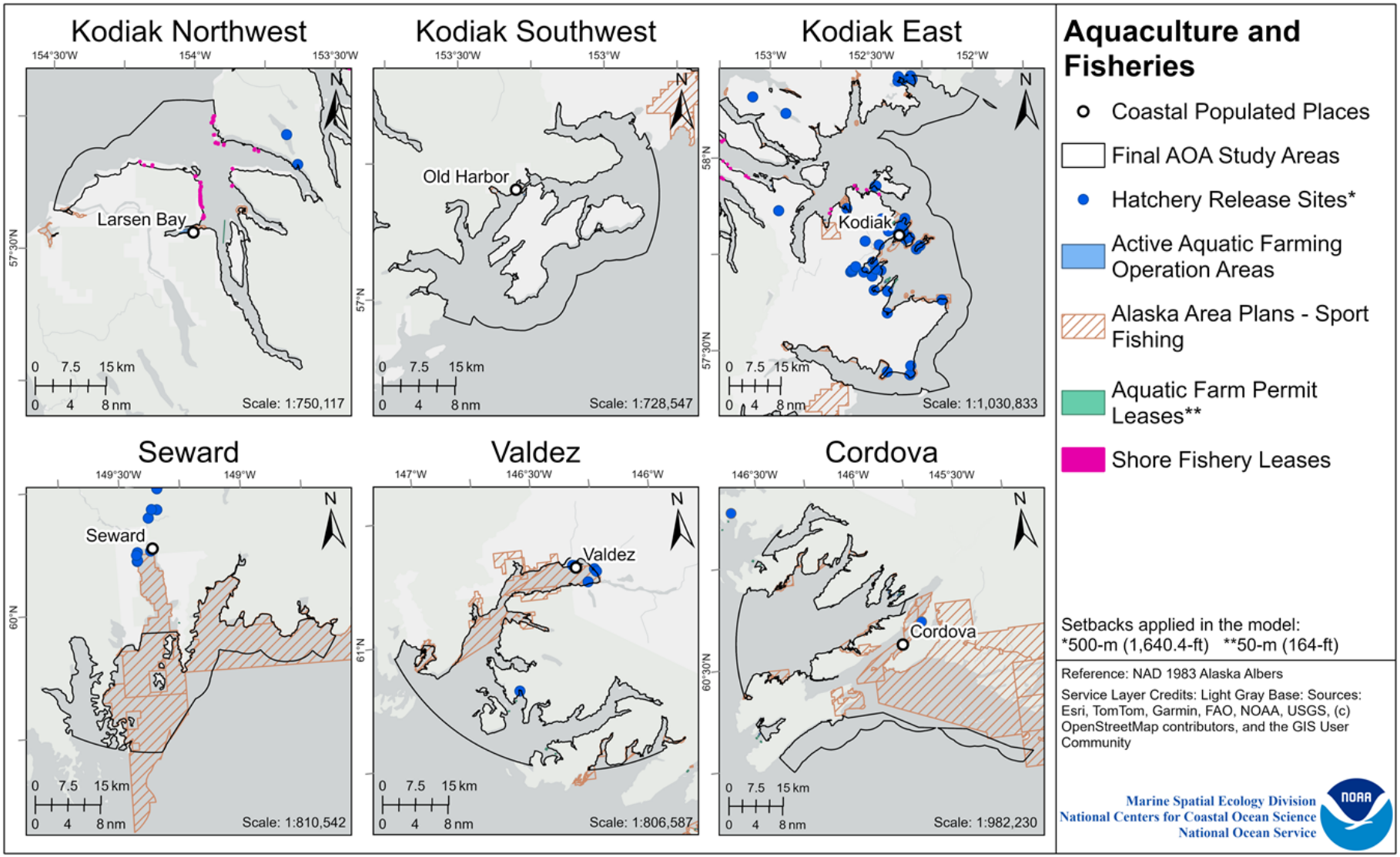


Figure 3.43. Aquaculture and fisheries considerations for the Southwest and Southcentral Study Areas. Considerations include commercial fisheries landings (not pictured), hatchery release sites, and shore fishing areas and sport leases

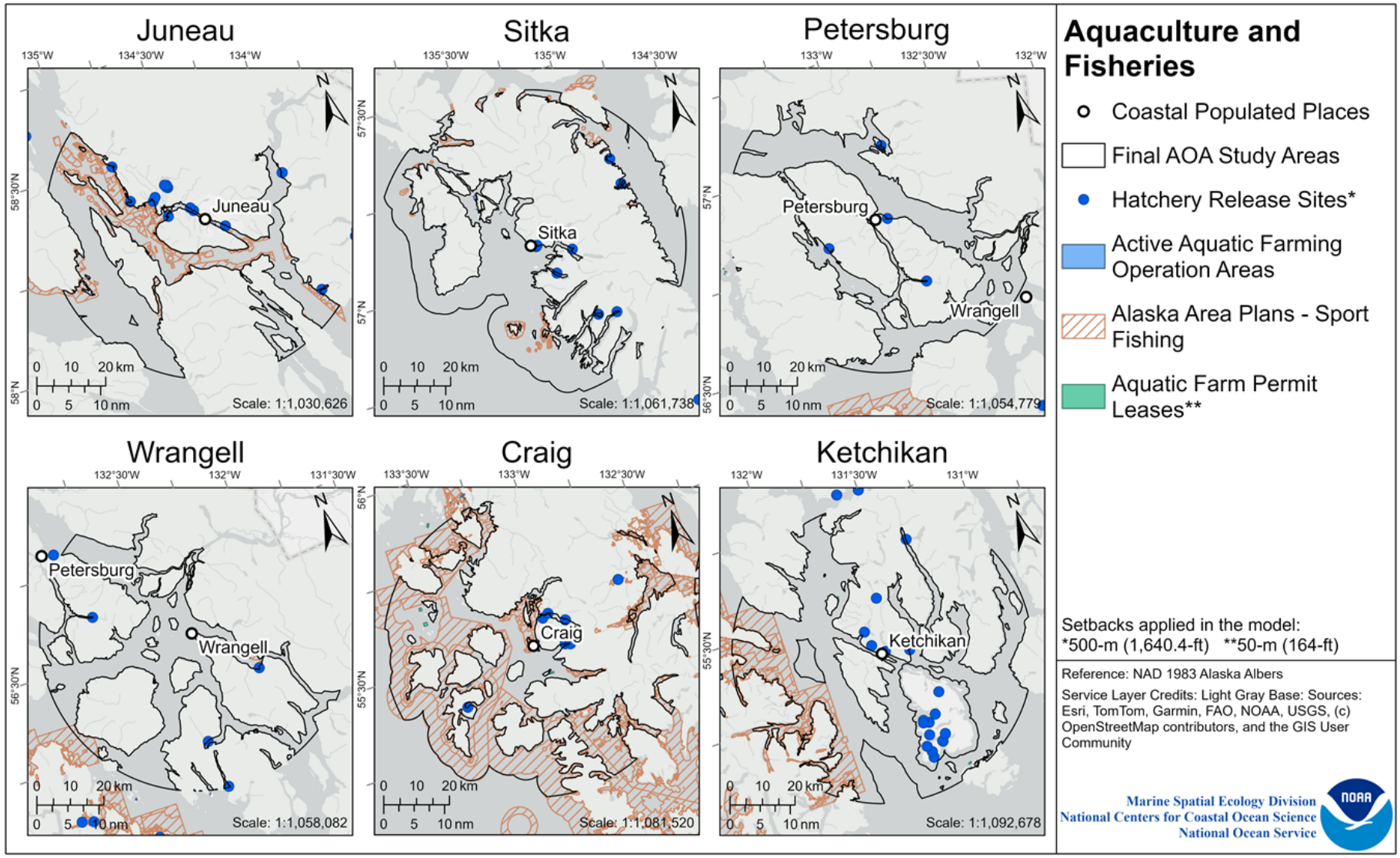


Figure 3.44. Aquaculture and fisheries considerations for the Southeast Alaska Study Areas. Considerations include commercial fisheries landings (not pictured), hatchery release sites, geoduck beds, and shore fishing areas.

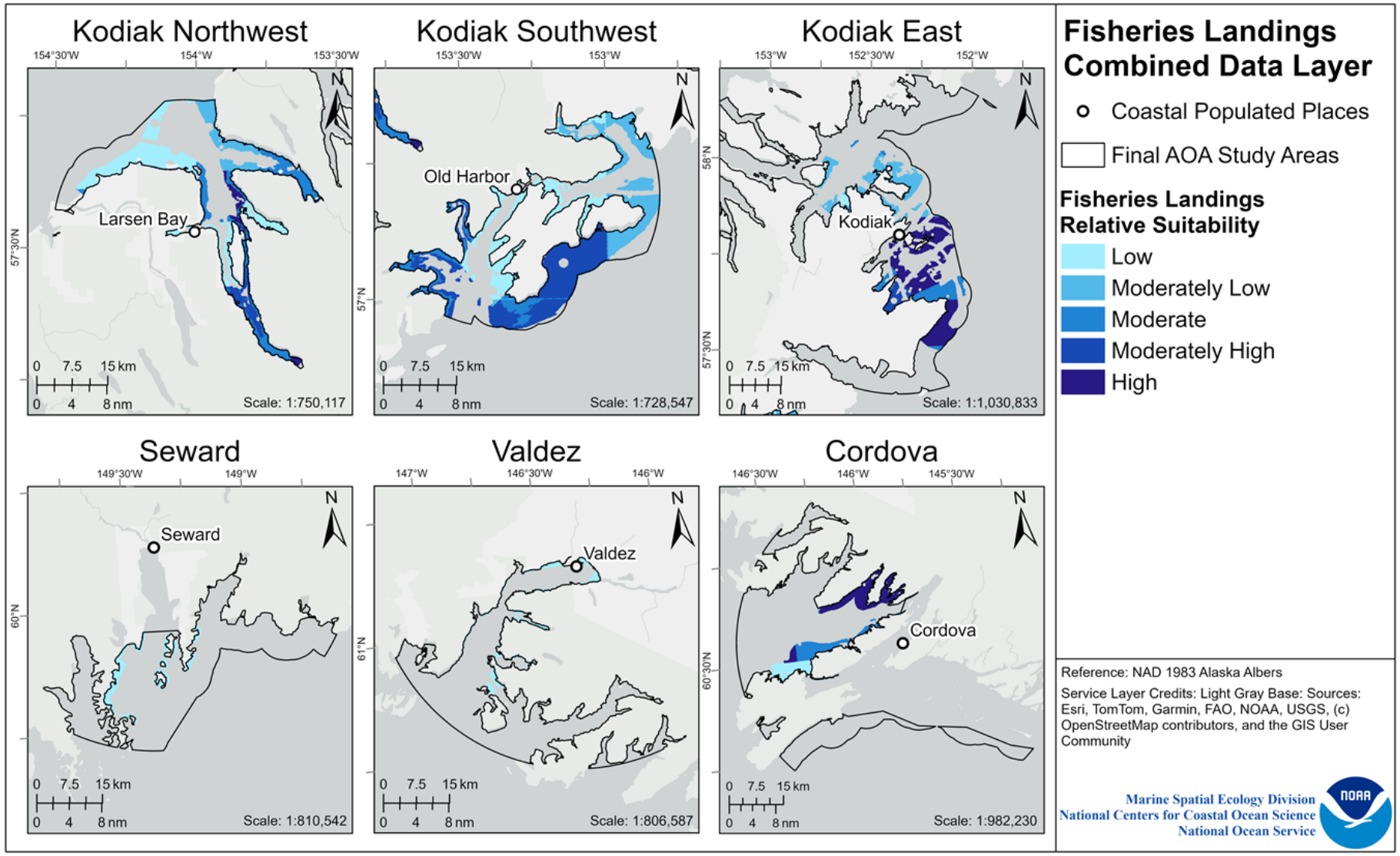


Figure 3.45. Fisheries landings combined data layer utilized in the Fisheries Submodel for the Southwest and Southcentral Study Areas. The color orange represents areas with relatively high fisheries landings, indicating low suitability, and blue colors represent areas of relatively low fisheries landings, indicating high suitability.

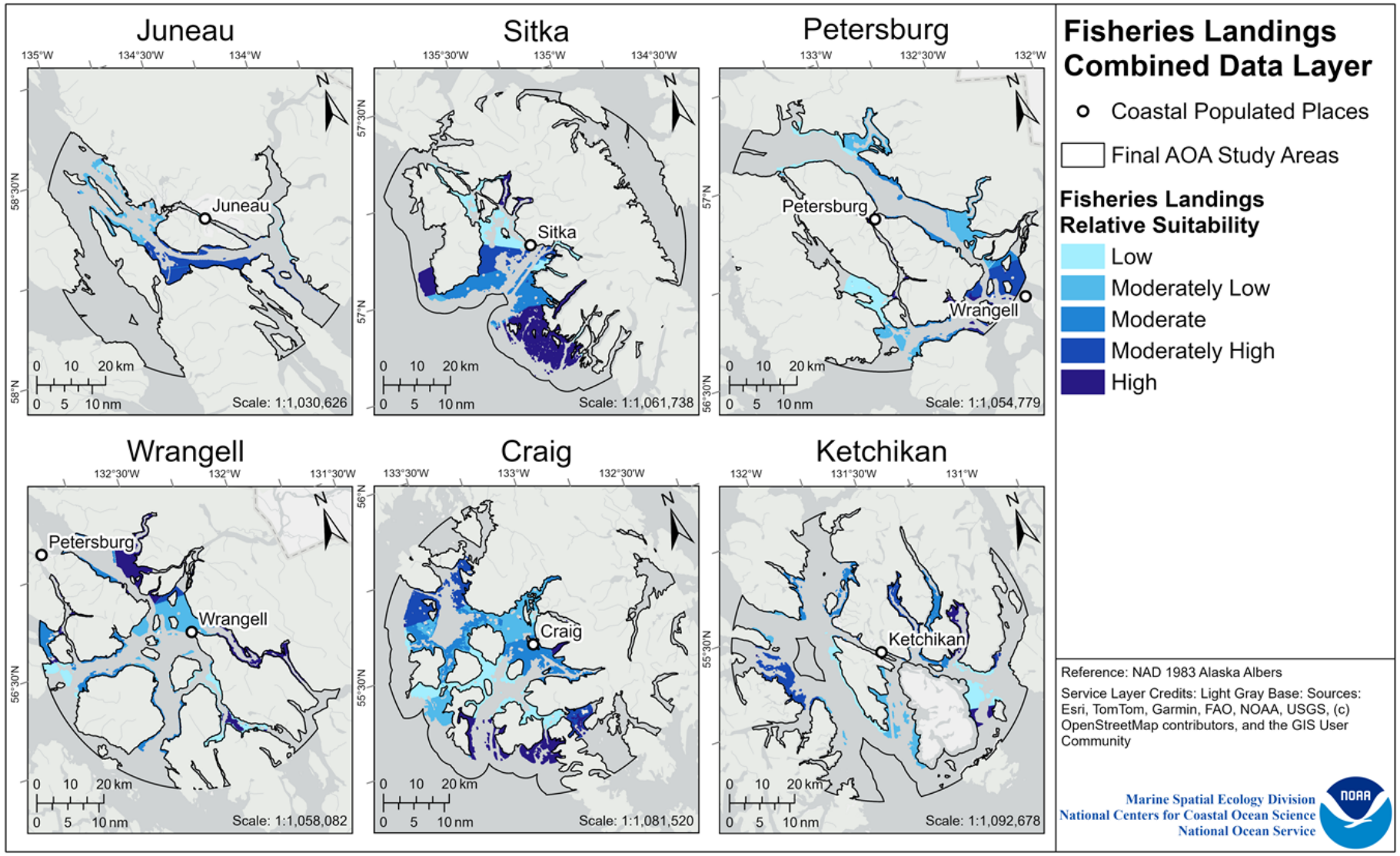


Figure 3.46. Fisheries landings combined data layer utilized in the Fisheries Submodel for the Southeast Alaska Study Areas. The color orange represents areas with relatively high fisheries landings, indicating low suitability, and blue colors represent areas of relatively low fisheries landings, indicating high suitability.

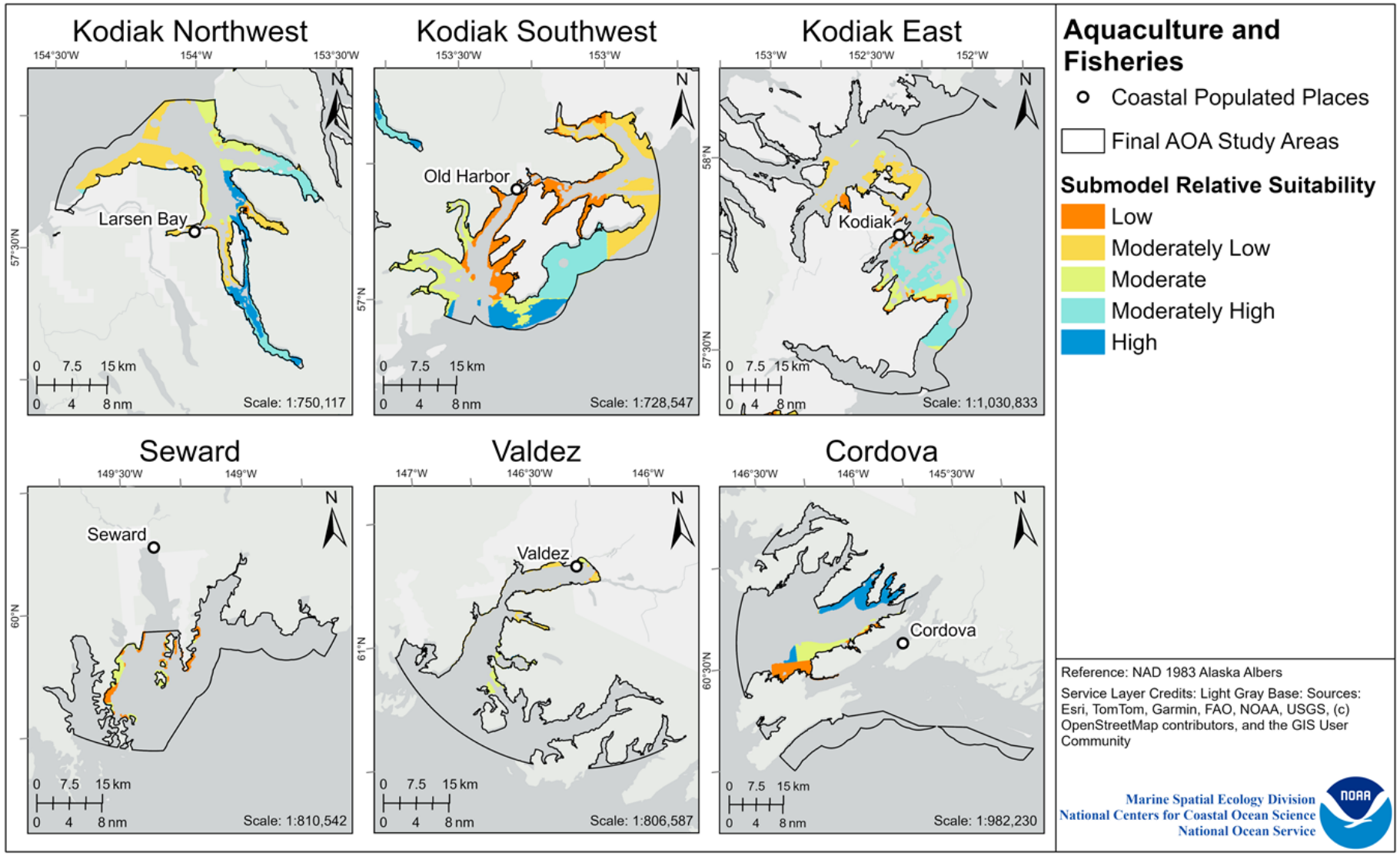


Figure 3.47. Final Aquaculture and Fisheries Submodel results utilized in the suitability model for the Southwest and Southcentral Study Areas.

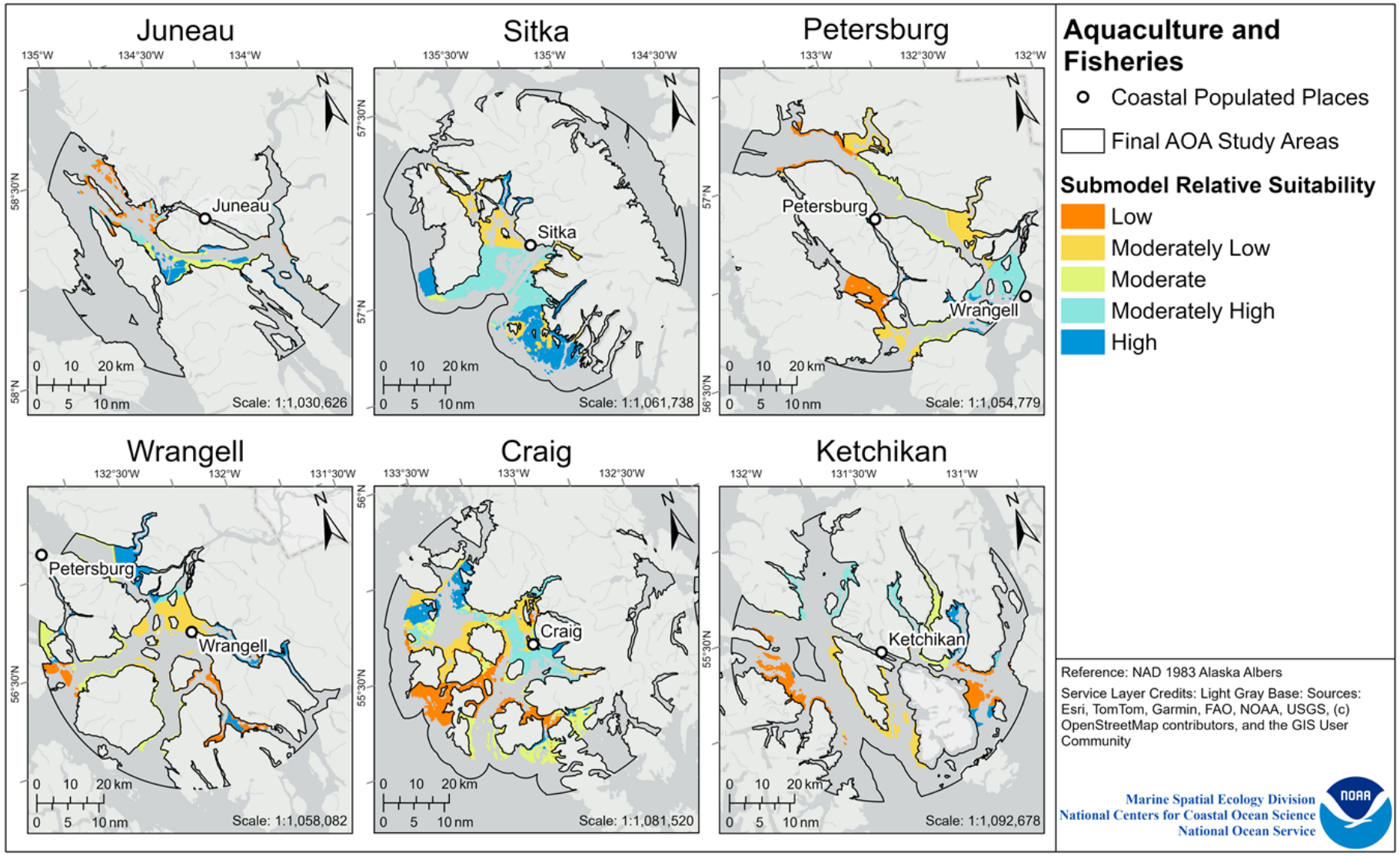


Figure 3.48. Final Aquaculture and Fisheries Submodel results utilized in the suitability model for the Southeast Study Areas.

Final Suitability

Final relative suitability results for all study areas are shown in Figures 3.49 and 3.50. To generate final relative suitability maps, the remaining portion of the study area after applying the Constraints Model was divided equally into five quantile-based categories. The maps present the quantile categories as “Low,” “Moderately Low,” “Moderate,” “Moderately High,” and “High” based on the final scores, which range from 0.1 to 1. The maps use standardized colors to depict scores: orange for the lowest scores (areas with higher potential conflict) and blue for the highest scores (areas with minimal conflict). This categorical approach simplifies interpretation and enhances visual contrast. Because suitability scores are unique to each study area, they should be interpreted as relative rankings rather than absolute values and cannot be directly compared across study areas, since each reflects its own relative scale.



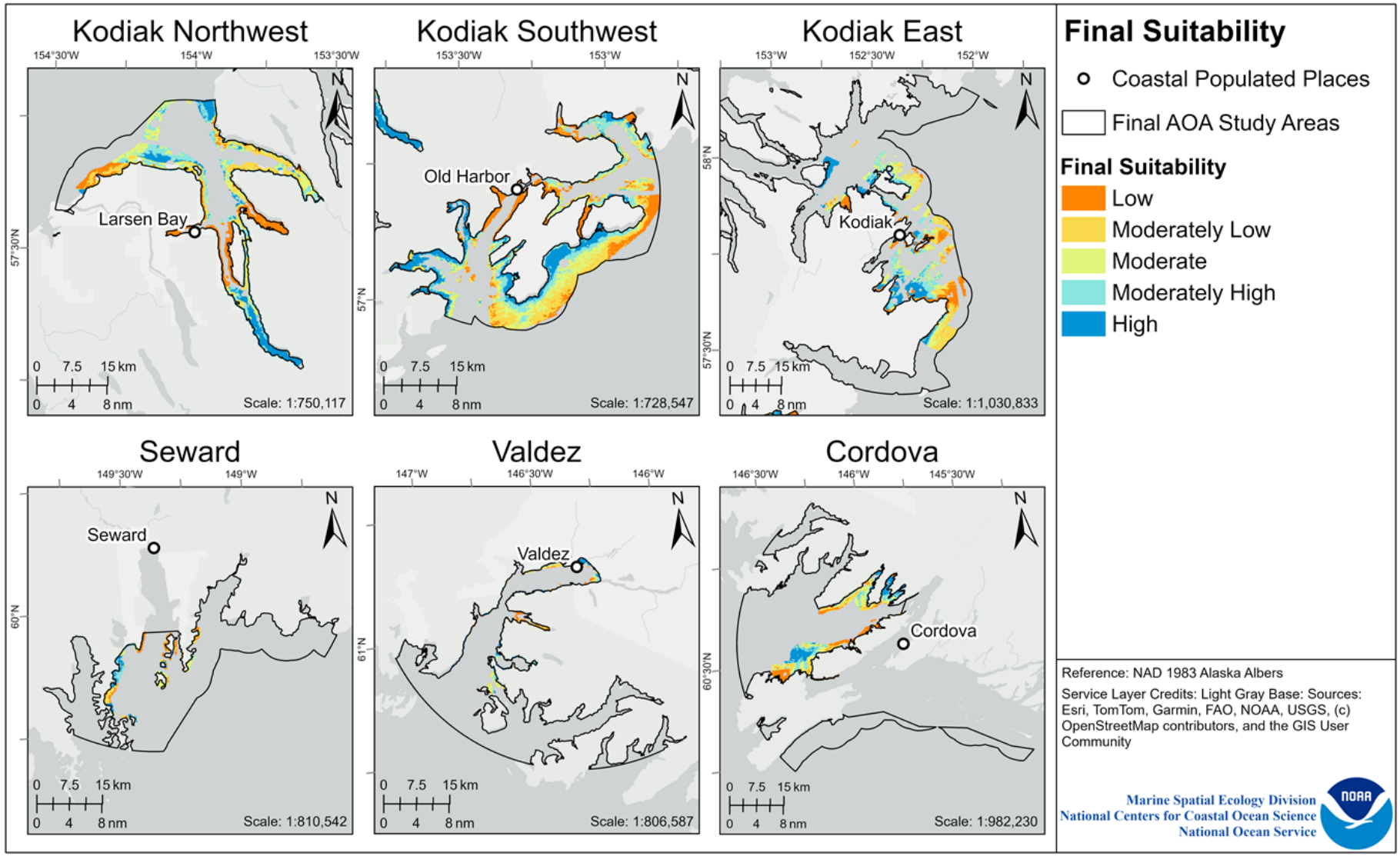


Figure 3.49. Final suitability analysis results for the Southwest and Southcentral study areas.

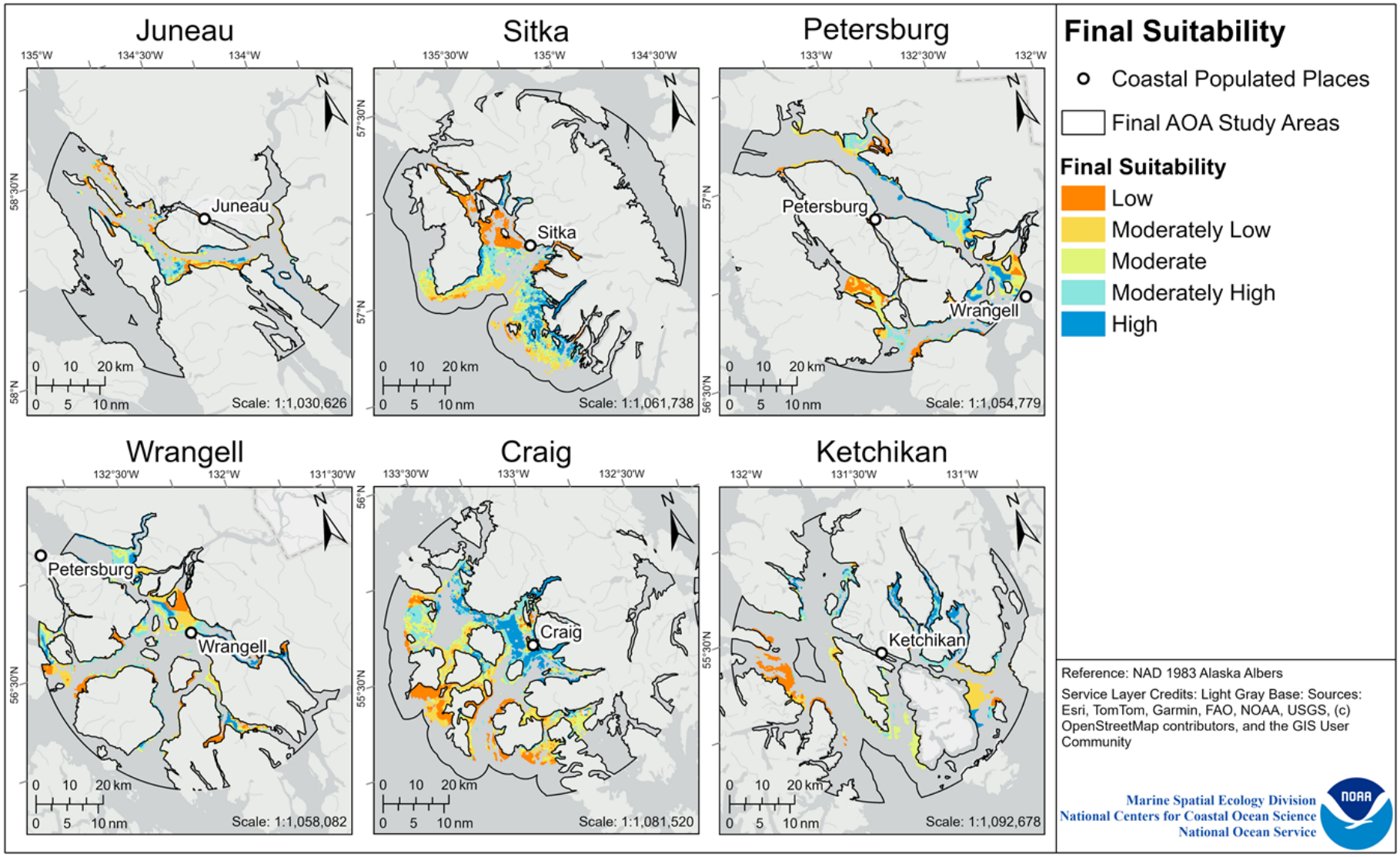


Figure 3.50. Final suitability analysis results for the Southeast Alaska study areas.

Cluster Analysis and Precision Siting

Using the suitability values for each grid cell, a cluster analysis was performed to identify statistically significant (p-value < 0.05) areas for both intertidal and subtidal scenarios within each study area. The cluster analysis identified 3,341,873 ac of the highest suitability areas across all clusters.

"Within" and "among" cluster precision siting models were run to narrow down further potential options to the portions of clusters that presented the most ideal conditions based on industry input, criteria for which are outlined in the methods. The candidate polygon locations returned from the within-cluster siting model were then assessed using the among-cluster model, which ranked these areas from different parts of the study area against each other. Before final ranking, a "simplify geometry" tool was applied using R terra to simplify the geometry of the candidate polygons slightly. The TOPSIS ranking metric was then produced for each of these potential AOA options, run separately for each study area and scenario, which informed the final step of this process: manual inspection and AOA option selection.

In the Kodiak Study Area, it was necessary to break the study area into three regions, the eastern extent (surrounding the town of Kodiak); the northwestern extent (surrounding Larsen Bay); and the southwestern extent (surrounding Old Harbor), after the suitability analysis was complete. Cluster analyses were run for each region separately, and minimum distances were calculated to the closest town or harbor within each region. A total of 115 high suitability subtidal clusters were identified (Figure 3.51). Clusters ranged in size from 20 to 11,820 ac, covering a total of 75,710 ac. This total high cluster acreage corresponds to 26.1% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 61 areas ranging in size from 45 to 3,201 ac, covering a total of 19,283 ac. This remaining total acreage corresponds to 6.6% of the unconstrained area in the Study Area. A total of 112 high suitability intertidal clusters were identified. Clusters ranged in size from 15 to 455 ac, covering a total of 9,910 ac. This total high cluster acreage corresponds to 3.4% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 63 areas ranging in size from 45 to 475 ac, covering a total of 8,683 ac. This remaining total acreage corresponds to 3.0% of the unconstrained area in the Study Area.

In the Seward Study Area, a total of nine high suitability subtidal clusters were identified (Figure 3.52). Clusters ranged in size from 60 to 2,145 ac, covering a total of 3,575 ac. This total high cluster acreage corresponds to 34.8% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to nine areas ranging in size from 60 to 466 ac, covering a total of 1,748 ac. This remaining total acreage corresponds to 17.0% of the unconstrained area in the Study Area. A total of six high suitability intertidal clusters were identified. Clusters ranged in size from 35 to 65 ac, covering a total of 270 ac. This total high cluster acreage corresponds to 2.6% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to three areas ranging in size from 40 to 58 ac, covering a total of 148 ac. This remaining total acreage corresponds to 1.4% of the unconstrained area in the Study Area.

In the Valdez Study Area, a total of nine high suitability subtidal clusters were identified (Figure 3.53). Clusters ranged in size from 15 to 270 ac, covering a total of 830 ac. This total high cluster acreage corresponds to 11.9% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed

down to five areas ranging in size from 79 to 260 ac, covering a total of 675 ac. This remaining total acreage corresponds to 9.7% of the unconstrained area in the Study Area. A total of two high suitability intertidal clusters were identified. Clusters ranged in size from 30 to 380 ac, covering a total of 410 ac. This total high cluster acreage corresponds to 5.9% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to one 380-ac area. This remaining total acreage corresponds to 5.5% of the unconstrained area in the Study Area.

In the Cordova Study Area, a total of 19 high suitability subtidal clusters were identified (Figure 3.54). Clusters ranged in size from 15 to 5,685 ac, covering a total of 10,195 ac. This total high cluster acreage corresponds to 25.9% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 20 areas ranging in size from 35 to 498 ac, covering a total of 3,158 ac. This remaining total acreage corresponds to 8.0% of the unconstrained area in the Study Area. There was a total of 11 high suitability intertidal clusters were identified. Clusters ranged in size from 10 to 225 ac, covering a total of 895 ac. This total high cluster acreage corresponds to 2.3% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to six areas ranging in size from 68 to 233 ac, covering a total of 813 ac. This remaining total acreage corresponds to 2.1% of the unconstrained area in the Study Area.

In the Juneau Study Area, a total of 39 high suitability subtidal clusters were identified (Figure 3.55). Clusters ranged in size from 10 to 2,215 ac, covering a total of 11,130 ac. This total high cluster acreage corresponds to 25.0% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 37 areas ranging in size from 48 to 510 ac, covering a total of 6,116 ac. This remaining total acreage corresponds to 13.7% of the unconstrained area in the Study Area. A total of 35 high suitability intertidal clusters were identified. Clusters ranged in size from 20 to 340 ac, covering a total of 3,560 ac. This total high cluster acreage corresponds to 8.0% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 18 areas ranging in size from 40 to 338 ac, covering a total of 2,957 ac. This remaining total acreage corresponds to 6.6% of the unconstrained area in the Study Area.

In the Sitka Study Area, a total of 64 high suitability subtidal clusters were identified (Figure 3.56). Clusters ranged in size from 20 to 15,390 ac, covering a total of 38,245 ac. This total high cluster acreage corresponds to 28.9% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 60 areas ranging in size from 35 to 1,066 ac, covering a total of 11,722 ac. This remaining total acreage corresponds to 8.8% of the unconstrained area in the Study Area. A total of 77 high suitability intertidal clusters were identified. Clusters ranged in size from 10 to 795 ac, covering a total of 9,255 ac. This total high cluster acreage corresponds to 7.0% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 51 areas ranging in size from 35 to 507 ac, covering a total of 7,716 ac. This remaining total acreage corresponds to 5.8% of the unconstrained area in the Study Area.

In the Petersburg Study Area, a total of 56 high suitability subtidal clusters were identified (Figure 3.57). Clusters ranged in size from 15 to 1,810 ac, covering a total of 15,990 ac. This total high cluster acreage corresponds to 15.1% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 42 areas ranging in size from 40 to 505 ac, covering a total of 9,616 ac. This remaining total acreage corresponds to 9.1% of the unconstrained area in the Study Area. A total of 52 high

suitability intertidal clusters were identified. Clusters ranged in size from 15 to 5,405 ac, covering a total of 16,230 ac. This total high cluster acreage corresponds to 15.3% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 32 areas ranging in size from 40 to 506 ac, covering a total of 5,887 ac. This remaining total acreage corresponds to 5.6% of the unconstrained area in the Study Area.

In the Wrangell Study Area, a total of 76 high suitability subtidal clusters were identified (Figure 3.58). Clusters ranged in size from 15 to 2,620 ac, covering a total of 18,180 ac. This total high cluster acreage corresponds to 17.7% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 54 areas ranging in size from 35 to 505 ac, covering a total of 11,840 ac. This remaining total acreage corresponds to 11.5% of the unconstrained area in the Study Area. A total of 76 high suitability intertidal clusters were identified. Clusters ranged in size from 10 to 5,110 ac, covering a total of 17,160 ac. This total high cluster acreage corresponds to 16.7% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 39 areas ranging in size from 42 to 517 ac, covering a total of 5,390 ac. This remaining total acreage corresponds to 5.3% of the unconstrained area in the Study Area.

In the Craig Study Area, a total of 75 high suitability subtidal clusters were identified (Figure 3.59). Clusters ranged in size from 10 to 24,515 ac, covering a total of 48,770 ac. This total high cluster acreage corresponds to 24.9% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 70 areas ranging in size from 40 to 1,060 ac, covering a total of 13,468 ac. This remaining total acreage corresponds to 6.9% of the unconstrained area in the Study Area. A total of 103 high suitability intertidal clusters were identified. Clusters ranged in size from 15 to 510 ac, covering a total of 9,475 ac. This total high cluster acreage corresponds to 4.8% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 65 areas ranging in size from 40 to 507 ac, covering a total of 7,993 ac. This remaining total acreage corresponds to 4.1% of the unconstrained area in the Study Area.

In the Ketchikan Study Area, a total of 104 high suitability subtidal clusters were identified (Figures 3.60). Clusters ranged in size from 10 to 3,980 ac, covering a total of 21,720 ac. This total high cluster acreage corresponds to 27.4% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 62 areas ranging in size from 43 to 521 ac, covering a total of 11,965 ac. This remaining total acreage corresponds to 15.1% of the unconstrained area in the Study Area. A total of 65 high suitability intertidal clusters were identified. Clusters ranged in size from 15 to 345 ac, covering a total of 4,590 ac. This total high cluster acreage corresponds to 5.8% of the unconstrained area in the Study Area. Following precision siting, these were further narrowed down to 36 areas ranging in size from 35 to 340 ac, covering a total of 3,597 ac. This remaining total acreage corresponds to 4.5% of the unconstrained area in the Study Area.



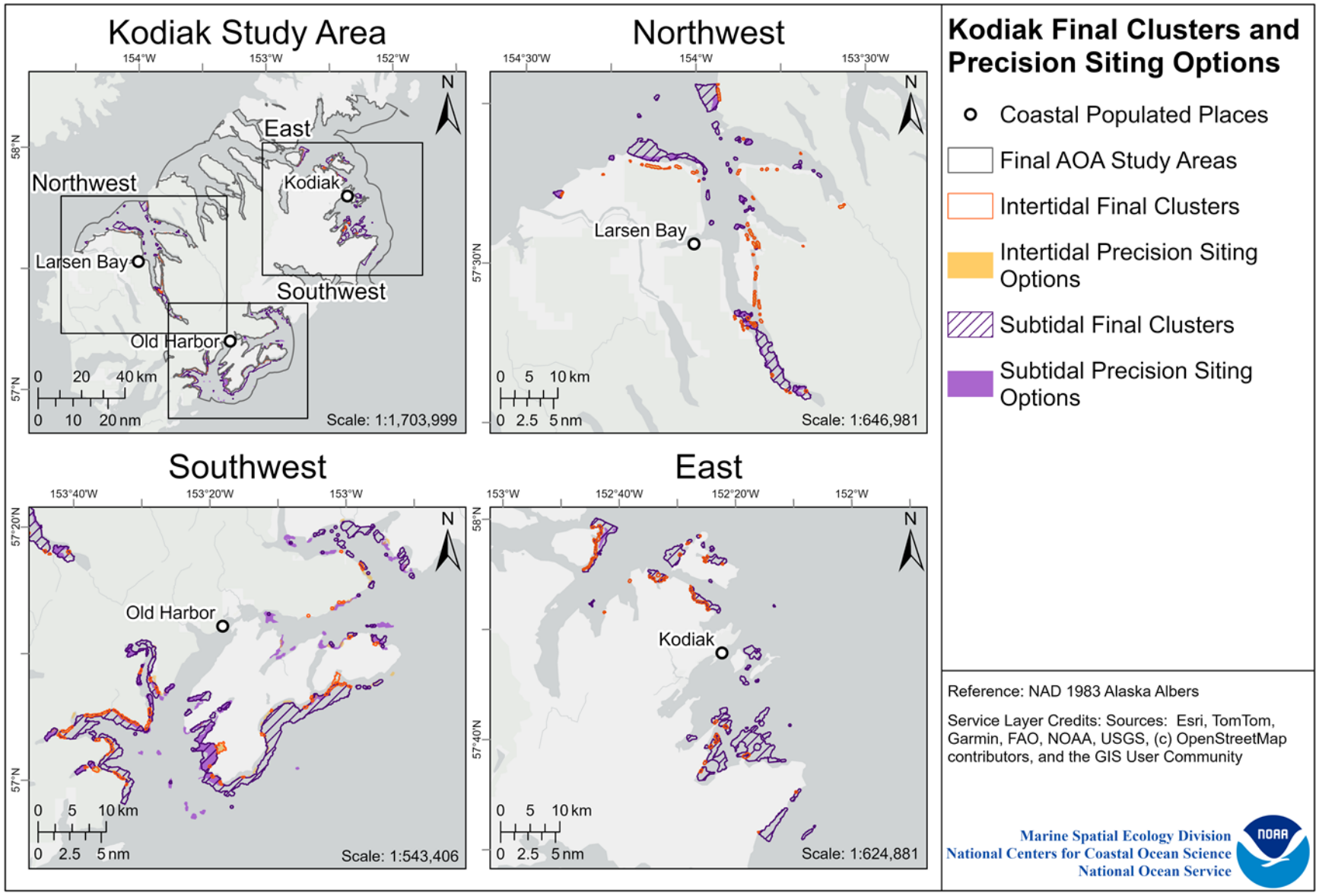


Figure 3.51. Cluster analysis results overlaid with precision siting option results for the Kodiak Study Area. The cluster analysis used a local indicators of spatial association analysis, which identified statistically significant high suitability clusters ($p < 0.05$).

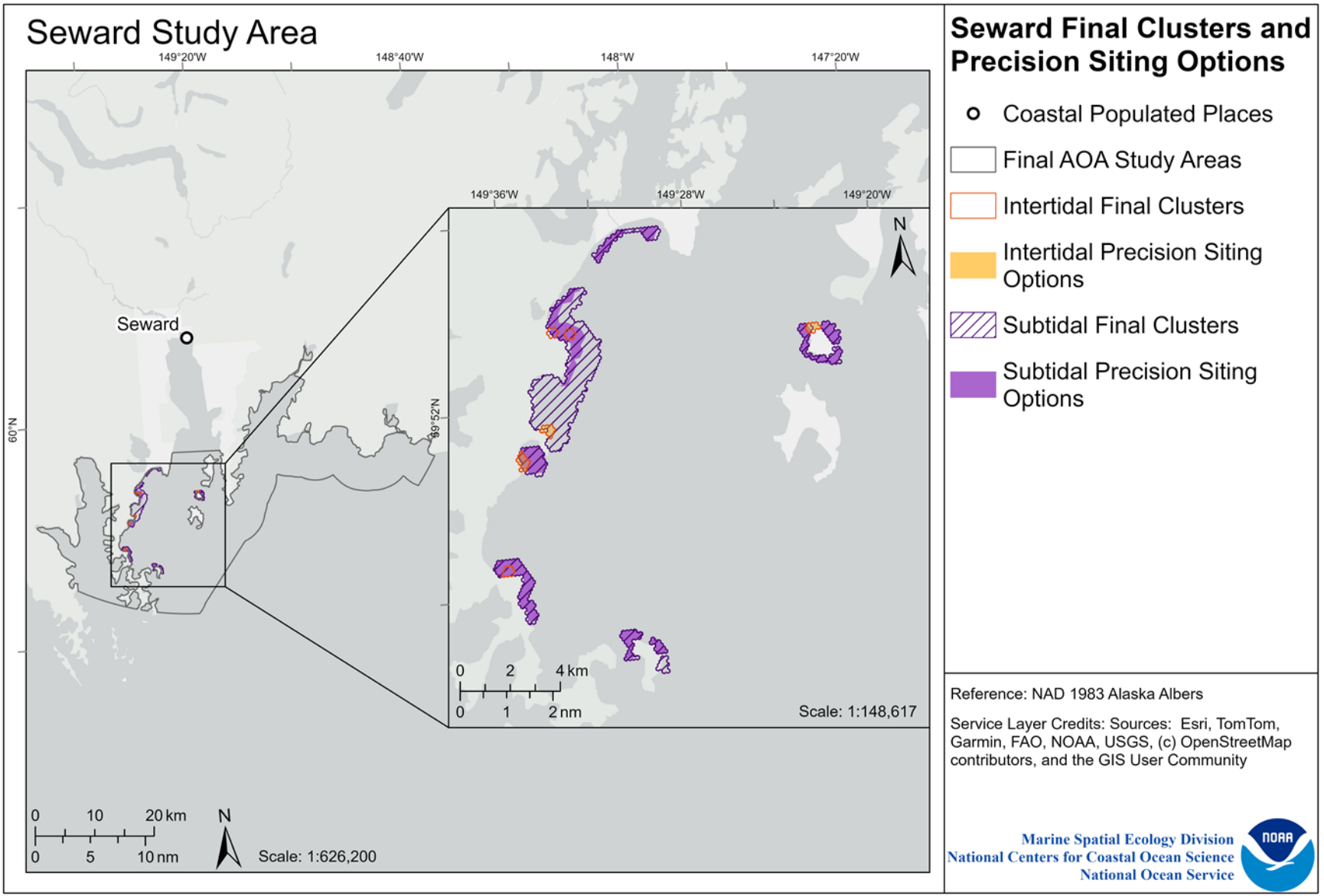


Figure 3.52. Cluster analysis results overlaid with precision siting option results for the Seward Study Area. The cluster analysis used a local indicators of spatial association analysis, which identified statistically significant high suitability clusters ($p < 0.1$).

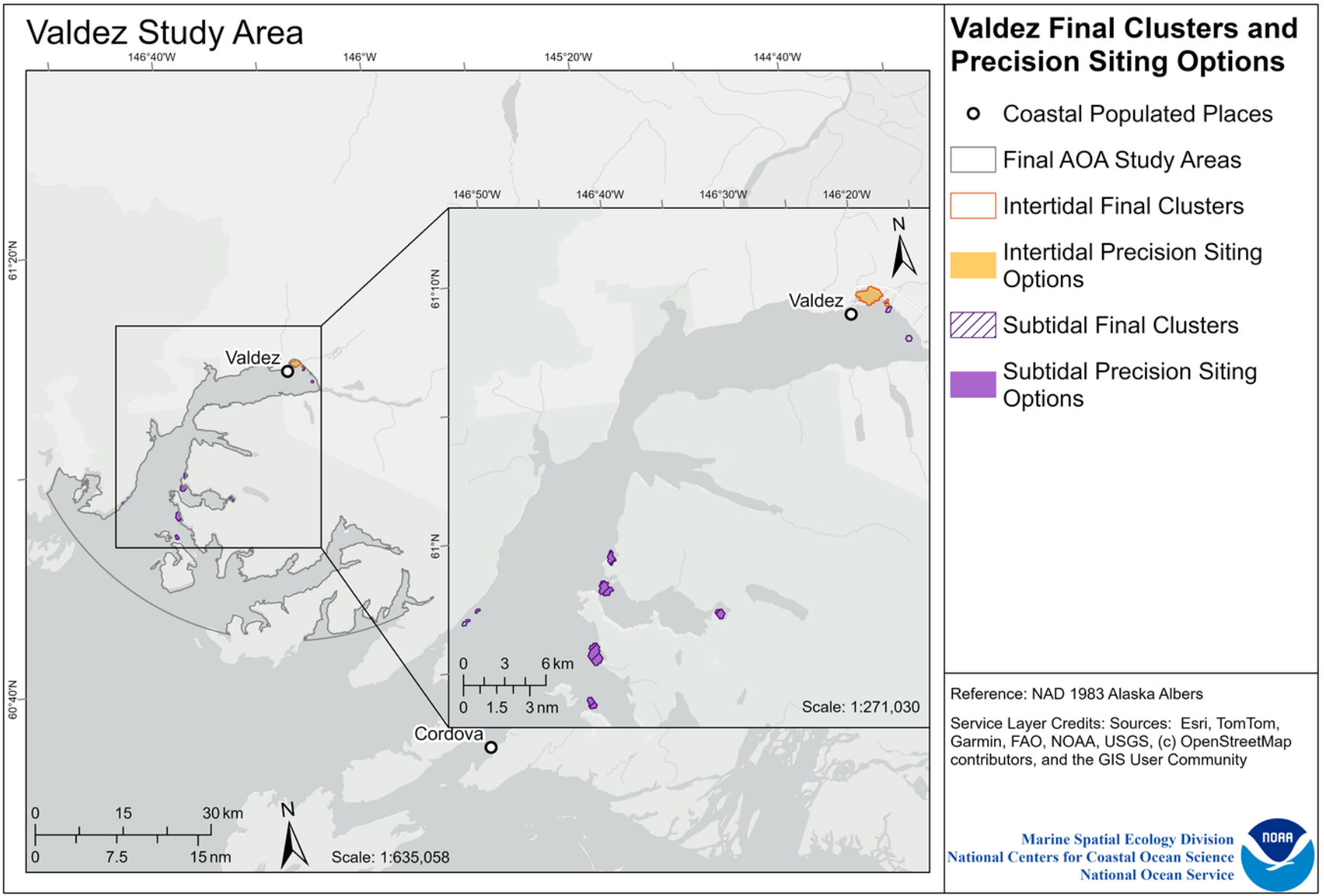


Figure 3.53. Cluster analysis results overlaid with precision siting option results for the Valdez Study Area. The cluster analysis used a local indicators of spatial association analysis, which identified statistically significant high suitability clusters ($p < 0.05$).

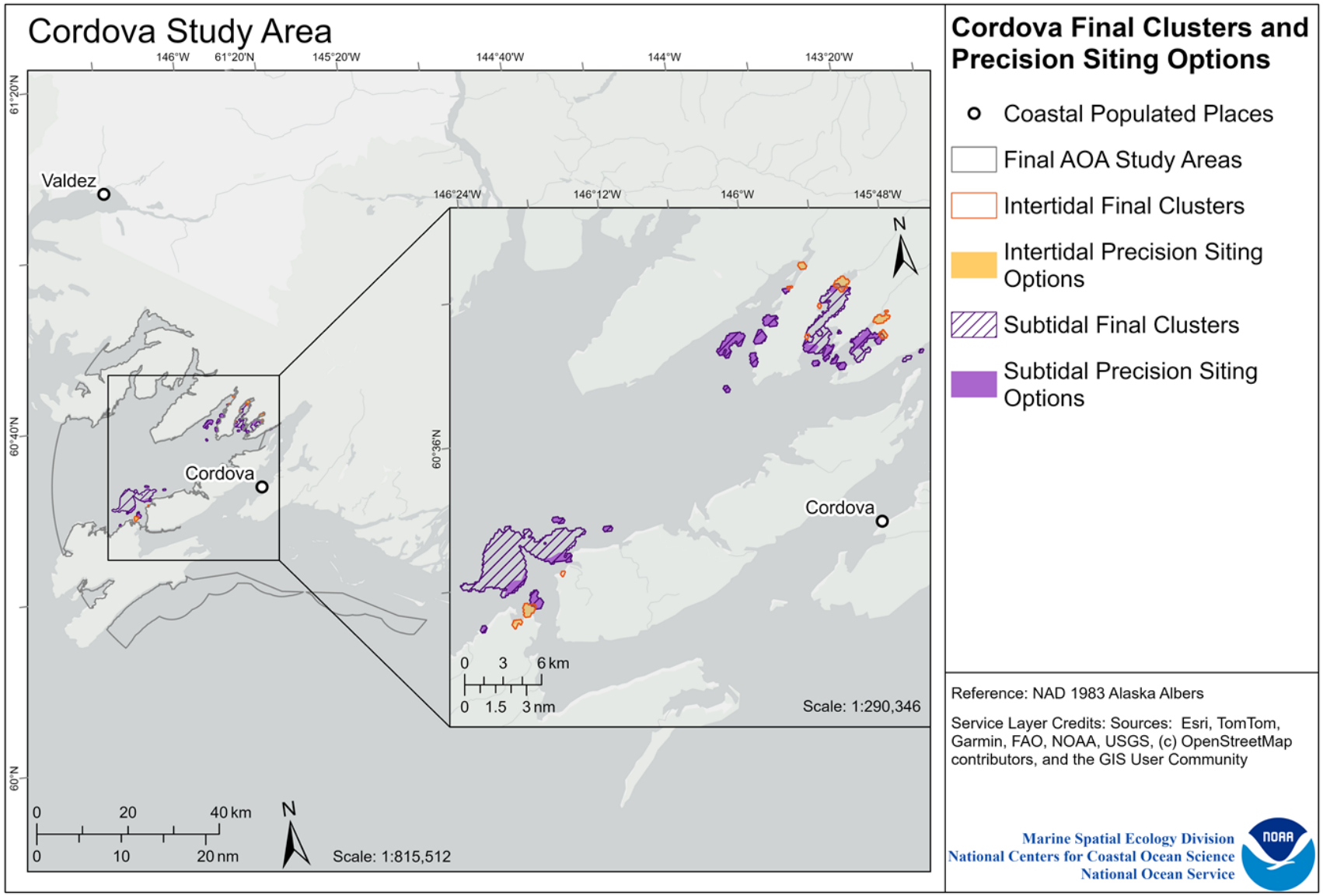


Figure 3.54. Cluster analysis results overlaid with precision siting option results for the Cordova Study Area. The cluster analysis used a local indicators of spatial association analysis, which identified statistically significant high suitability clusters ($p < 0.05$).

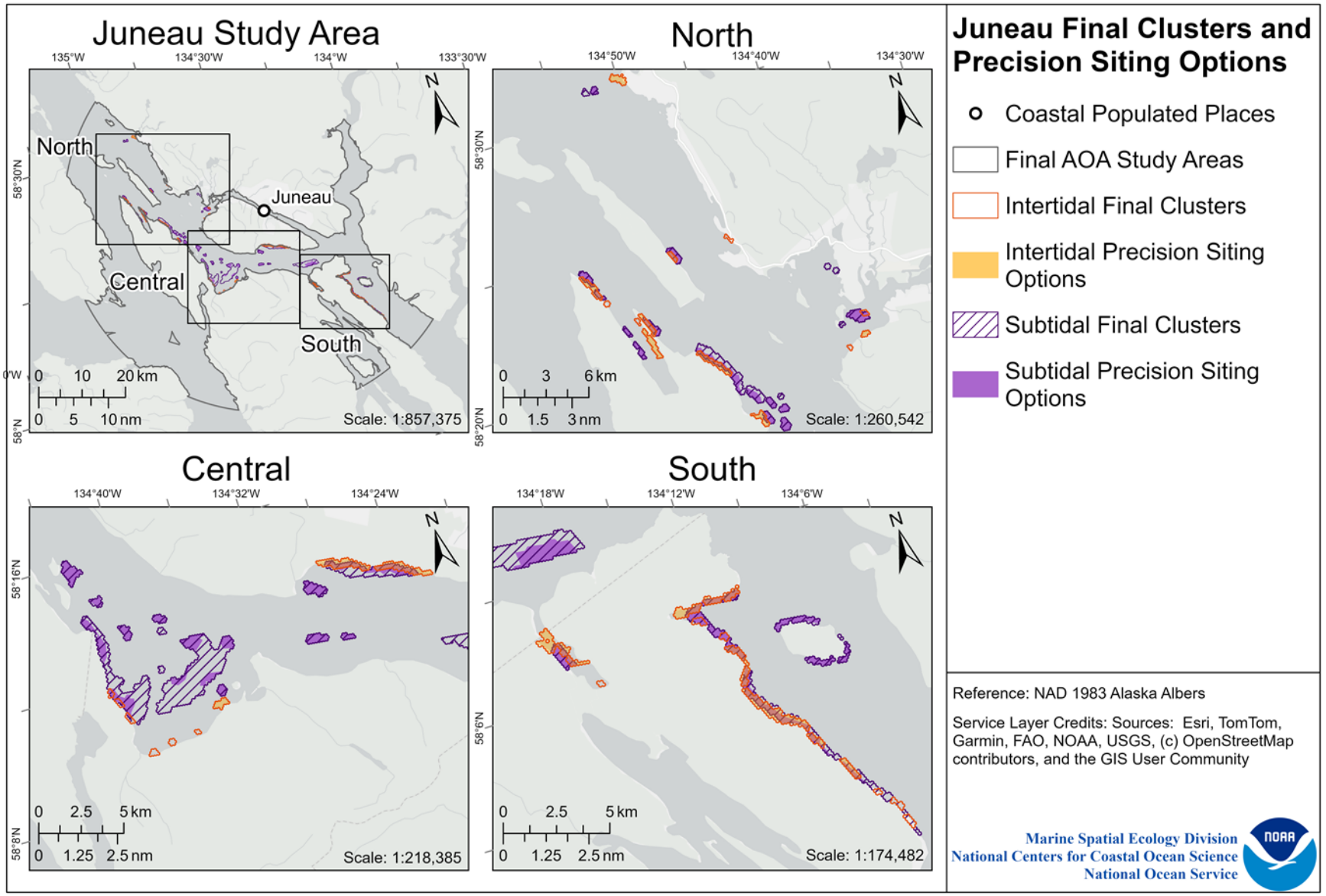


Figure 3.55. Cluster analysis results overlaid with precision siting option results for the Juneau Study Area. The cluster analysis used a local indicators of spatial association analysis, which identified statistically significant high suitability clusters ($p < 0.05$).

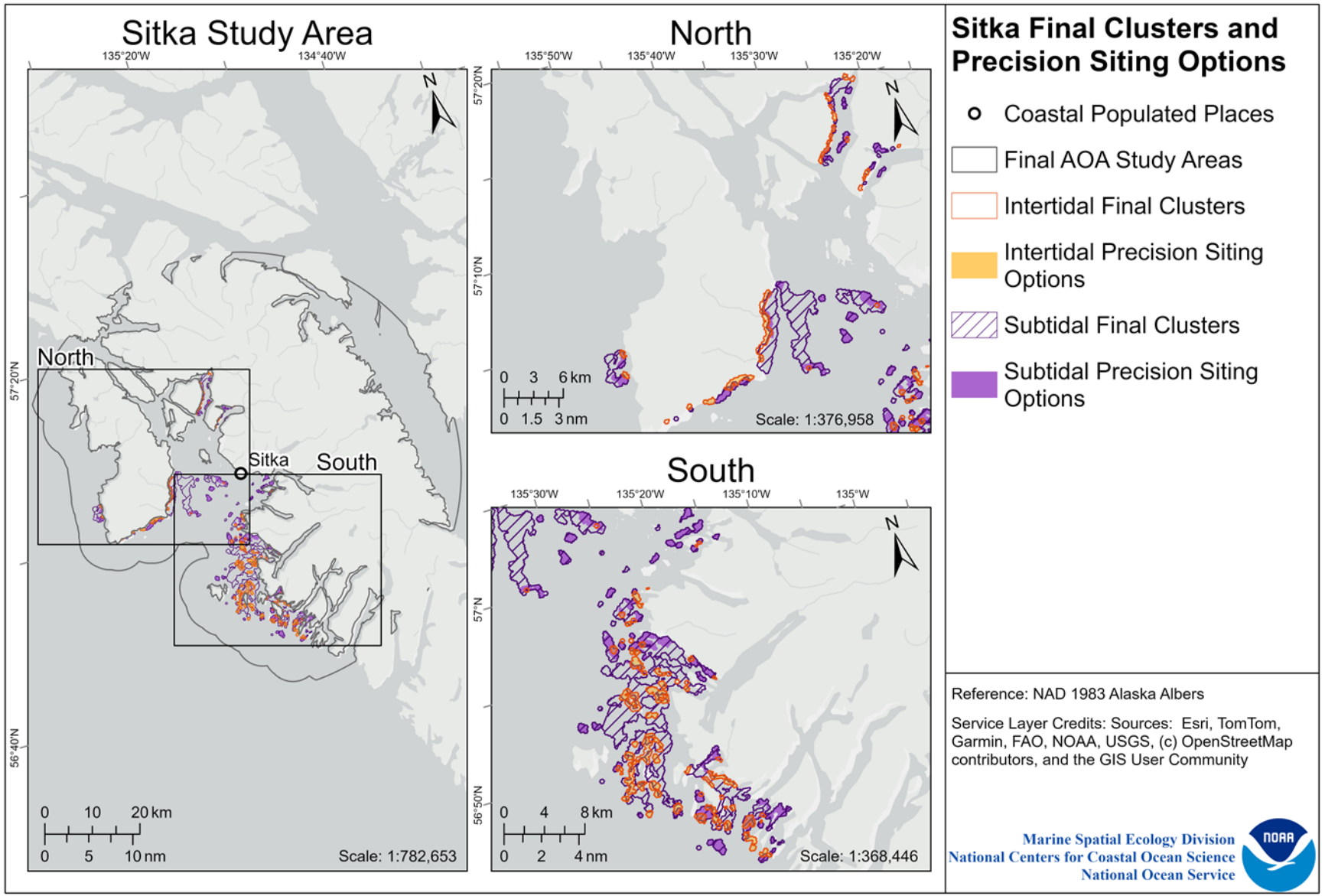


Figure 3.56. Cluster analysis results overlaid with precision siting option results for the Sitka Study Area. The cluster analysis used a local indicators of spatial association analysis, which identified statistically significant high suitability clusters ($p < 0.05$).

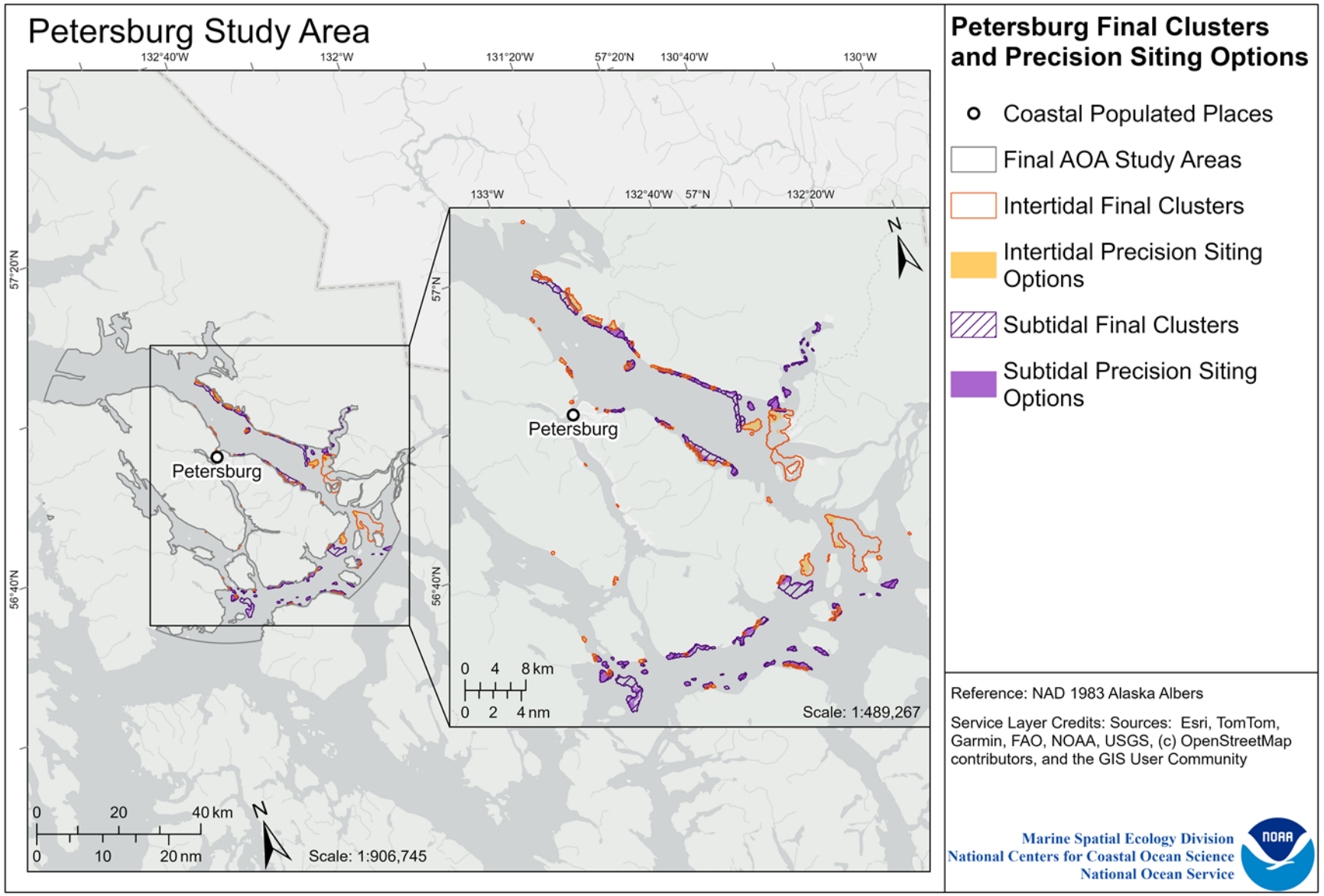


Figure 3.57. Cluster analysis results overlaid with precision siting option results for the Petersburg Study Area. The cluster analysis used a local indicators of spatial association analysis, which identified statistically significant high suitability clusters ($p < 0.05$).

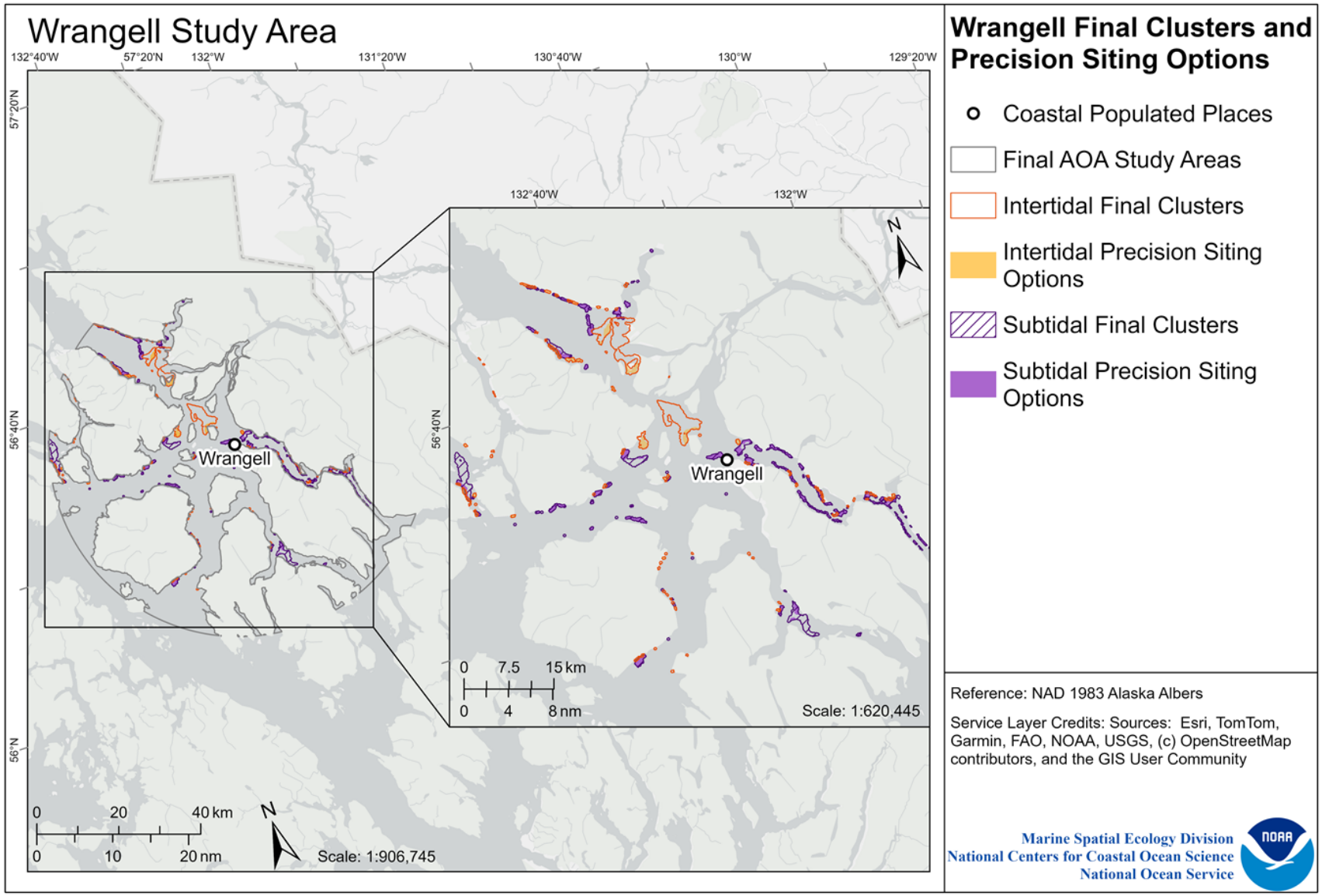


Figure 3.58. Cluster analysis results overlaid with precision siting option results for the Wrangell Study Area. The cluster analysis used a local indicators of spatial association analysis, which identified statistically significant high suitability clusters ($p < 0.05$).

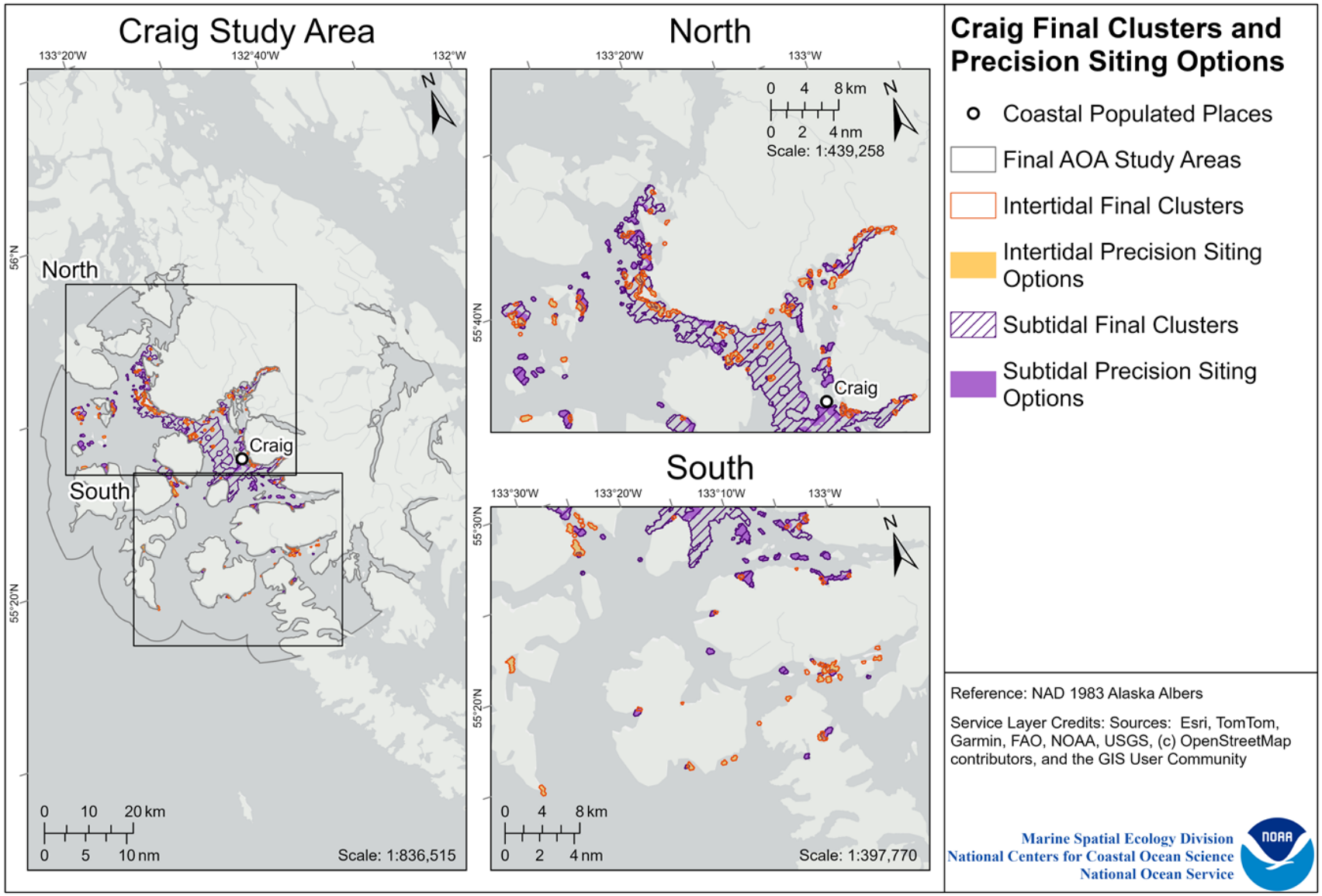


Figure 3.59. Cluster analysis results overlaid with precision siting option results for the Craig Study Area. The cluster analysis used a local indicators of spatial association analysis, which identified statistically significant high suitability clusters ($p < 0.05$).

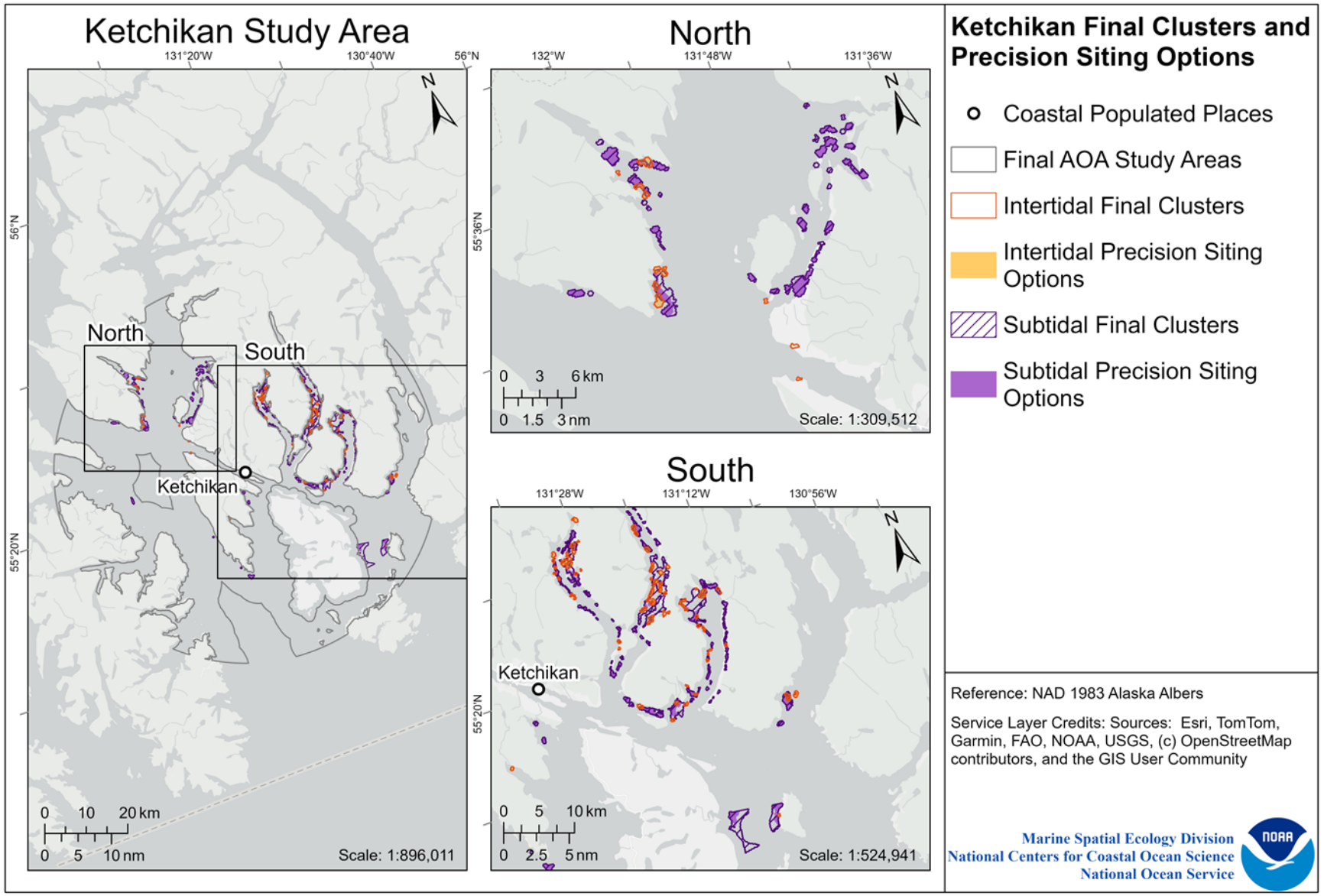


Figure 3.60. Cluster analysis results overlaid with precision siting option results for the Ketchikan Study Area. The cluster analysis used a local indicators of spatial association analysis, which identified statistically significant high suitability clusters ($p < 0.05$).

Draft AOA Option Selection

After removing clusters that did not meet the minimum 50-ac size, the highest-ranking areas within each study area were identified based on a combination of precision siting scores, manual inspection of geometry, and location. Manual inspection was conducted to remove areas with shapes that were not compatible with the planning goal of identifying AOA options that can support multiple aquaculture operations (e.g., clusters primarily consisting of a width of 1–3 adjacent grid cells or other irregular geometry). The remaining high scoring areas within each study area were subjected to review by the Team as well as MAIASC and the U.S. Coast Guard to address possible permitting, leasing, national security, navigation, and other constraints not included within the suitability model structure (e.g., changes in upland ownership and/or lease status since model initiation, navigation safety conflicts, national security conflicts, unidentified hazards, etc.). Areas with identified regulatory or safety constraints were removed or modified (e.g., conflicted portions removed). Further, in some locations, such as Cordova, Valdez, Seward, Juneau, and Wrangell, the model structure did not account for constraints associated with episodic freshwater inundation and debris flows. Such locations were identified using a combination of public reports, charts, remote sensing, and local knowledge, and were also removed. Intertidal areas identified in Cordova, Seward, and Valdez that met the 50-ac minimum planning goal were primarily found to be subject to significant seasonal freshwater inundation and debris flows, and were removed. The remaining top-ranking options within each Study Area were identified as draft AOA options. Where necessary, boundaries of the draft AOA options were further simplified to reduce the number of corners and/or adjusted to address deviations in shoreline and bathymetric boundaries and the grid structure (e.g., the landward edges of grid cells with portions that extended into upland areas were clipped to the shoreline). During the review of draft AOA options, the Team decided to consolidate the Wrangell and Petersburg study areas into a single analytical unit. This was prompted by the significant overlap of the two Study Areas, which is unique to Wrangell and Petersburg, and the observation that the highest-scoring options for each resided within this overlapping spatial area (Figures 3.57 and 3.58). To prevent redundant outputs and ensure a streamlined evaluation of this shared space, a single, cohesive set of AOA options was identified for this broader Wrangell-Petersburg area. A total of 97 draft AOA options spanning a total of 17,593 ac were identified across all 10 Study Areas. Of the 97 Draft AOA options, 76 were subtidal locations able to support submerged seaweed and shellfish farms, spanning a total of 15,669 ac, and 21 were intertidal options for shellfish bottom culture, spanning a total of 1,924 ac.

Public Notice of Draft AOA Options

NMFS published a Notice of Availability in the Federal Register with a 30-day public comment opportunity (90 FR 17051; April 3, 2025) seeking input on the draft AOA options. The initial report, which includes the draft AOA options, can be found online.[14] Following the publication of the notice, NMFS held two virtual listening sessions to collect oral comments. NMFS received 39 comments during the public comment period (4 oral comments, 35 written).[15] Oral

[14] https://cdn.coastalscience.noaa.gov/page-attachments/MSP/Report-for-Notice-for-Comment-for-Alaska-Draft-Final.pdf
[15] https://www.regulations.gov/document/NOAA-NMFS-2023-0113-0021/comment

comments are available in listening session transcripts.[16] Comments received for the Notice of Availability included information that supported improvements in scoring or data processing to existing model layers as well as new authoritative spatial data sources not initially included in previous model runs. Review of these comments and best available information, by NMFS and the State of Alaska, resulted in the following specific changes to the model:

- The scoring for areas within a 500-m setback from Alaska Heritage Resources Survey (AHRS) sites was adjusted from a 0.5 to a 0.2. This down-scoring reflects the new information provided and increased regulatory complexity and uncertainty associated with siting within or in close proximity to documented historic resource sites identified in comment letters.
- New USFS data layers, specifically mooring buoys, cabin rentals, and marine access facilities, were incorporated to account for the regulatory complexity and uncertainty siting aquaculture around these high-use recreational locations. Areas within a 500-m setback of these locations were assigned a suitability score of 0.3. These data were not provided during previous engagement with USFS.
- Crab pot fisheries landings values (filtered by gear code) were redistributed to the portions of statistical areas shallower than 320 ft. This approach allowed for a more refined fisheries model that used the approximate maximum depth for pot fisheries provided in a letter by the Southeast Alaska Fishermen's Alliance.
- ShoreZone exposure and significant wave height layers were adjusted to address the multiple comments emphasizing the logistical and economic difficulties associated with operating in highly exposed marine environments. Suitability scores were adjusted downward from 0.8, 0.5, and 0.3 to 0.6, 0.4, and 0.2, respectively, across the ShoreZone exposure and average significant wave height categories: semi-exposed, exposed, significantly exposed; and 1–1.5 m, 1.5–2 m, and greater than 2 m.

The model structure was updated, and the suitability model and cluster analysis rerun. The results of the revised model run and cluster analysis were used solely to evaluate changes within the footprint of the draft AOA options presented for public comment. This was due to concerns from the Team that areas outside of the boundaries of the draft AOA options presented for public comment would not have the benefit of public input. As a result of the revisions and analysis, there were no changes observed to overlap with high suitability clusters for 47 of the 97 draft AOA options, and those 47 draft AOA options were adopted as final AOA options. Twenty-nine of the 97 draft AOA options had areas that no longer overlapped with high suitability clusters but retained > 50 ac of overlapping area. The boundaries of these options were modified to bound only the remaining area overlapping area, and the newly bounded areas were adopted as final AOA options. Some examples can be seen in Figures 3.61–3.63. In one case, a draft AOA option was modified by removing a reduced suitability portion in the middle of the draft AOA option, resulting in the bounding of the remaining overlapping areas to form two individual final AOA options (JUN-S4 and JUN-S5) (Figure 3.62). Twelve of the 97 draft AOA options

[16] https://www.fisheries.noaa.gov/alaska/aquaculture/identifying-aquaculture-opportunity-areas-alaska

were not adopted as final AOA options because they no longer contained > 50 ac of area overlapping high suitability clusters. Five of the 97 draft AOA options had no remaining overlap with high suitability clusters and were not adopted as final AOA options. Four of the 97 draft AOA options were identified for removal by the MAIASC due to proximity to sensitive military infrastructure. The modification of the draft AOA option boundaries removed any overlap with final AOA options and AHRS sites, USFS mooring buoys, cabin rentals, and marine access in all but one instance. Likewise, 11 draft AOA options were also not adopted as final AOA options or had boundaries modified prior to adoption as final AOA options as a result of the scoring modifications to the combined fisheries data layer and ShoreZone exposure data layers.

Not all public comments resulted in modeling changes. The Team determined that the majority of comments could best be addressed including summary information in characterization or during the aquatic farm lease application and permitting process, as many could be resolved through fine-scale siting and project design considerations. This is particularly true for comments related to overlap with fishing and other uses, where the seasonality of an operation, gear type, specific siting decisions within an option, and other factors need to be considered to determine if the project will have an adverse effect on other users or the environment. A summary of comments is provided in the characterization section of the results. This allowed NOAA to acknowledge the comments, highlight local knowledge, and provide valuable context to proponents and agencies on potential use conflicts and other factors that may need to be considered during the design, review, and permitting of an aquatic lease.



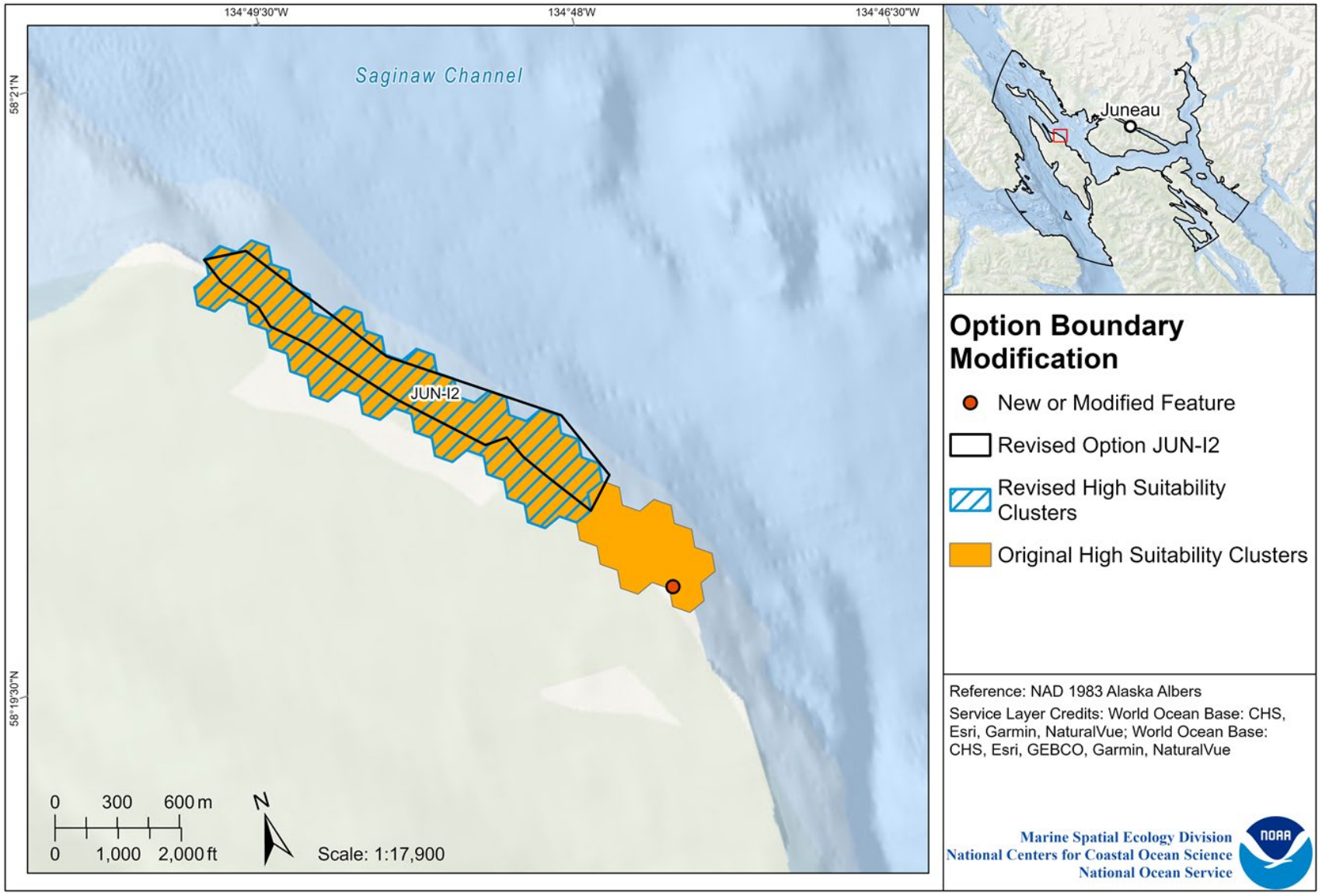


Figure 3.61. Example of an intertidal option boundary modification from updated model features. The black line depicts the newly revised boundary for option JUN-I2.The original high suitability clusters (orange polygon) were revised due to new or modified model features (red points) resulting in revised high suitability clusters (blue hatched polygons).

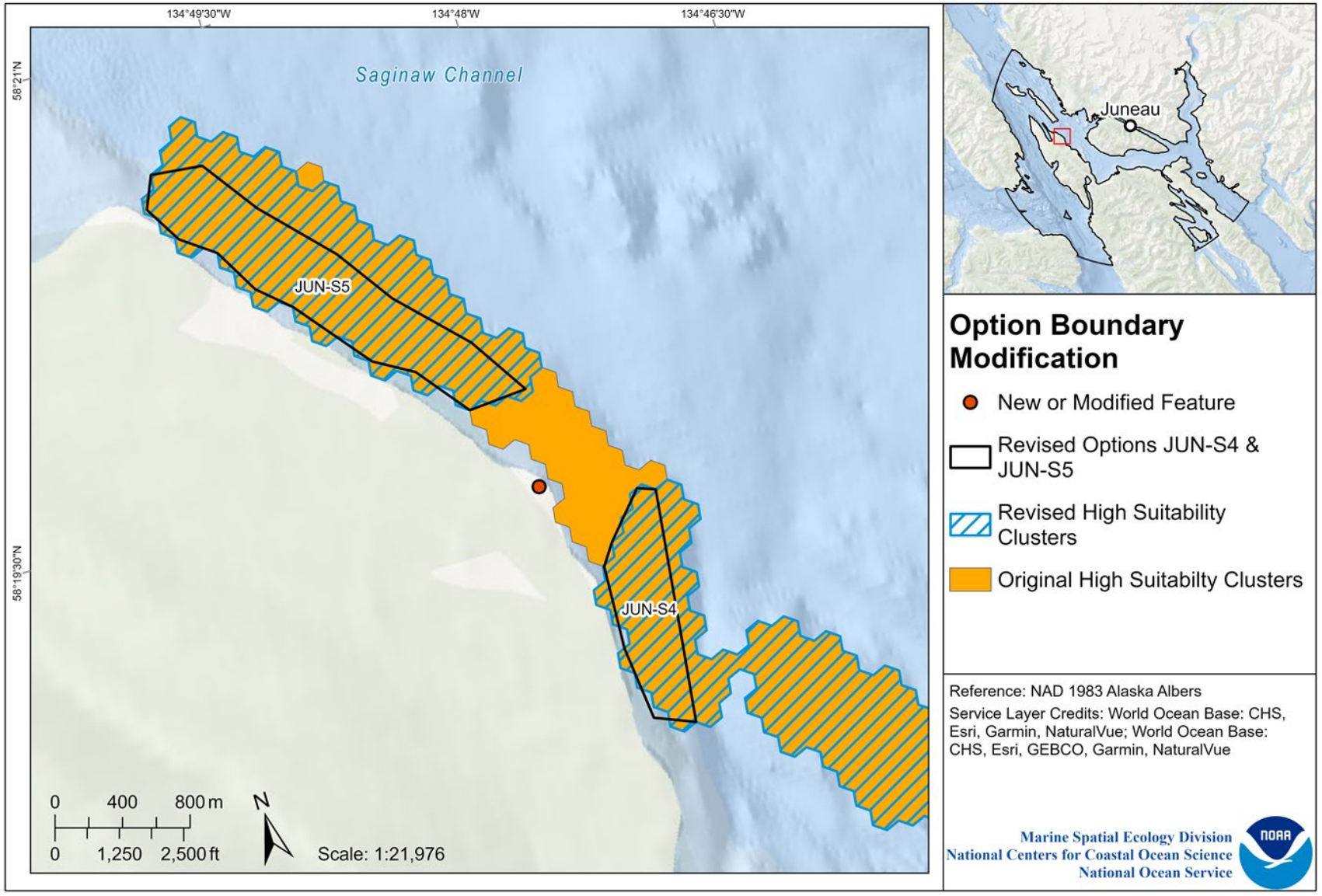


Figure 3.62. Example of a subtidal option boundary modification from updated model features. The black line depicts the newly revised boundary for options JUN-S4 and JUN-S5. The original high suitability clusters (orange polygon) were revised due to new or modified model features (red points) resulting in revised high suitability clusters (blue hatched polygons).

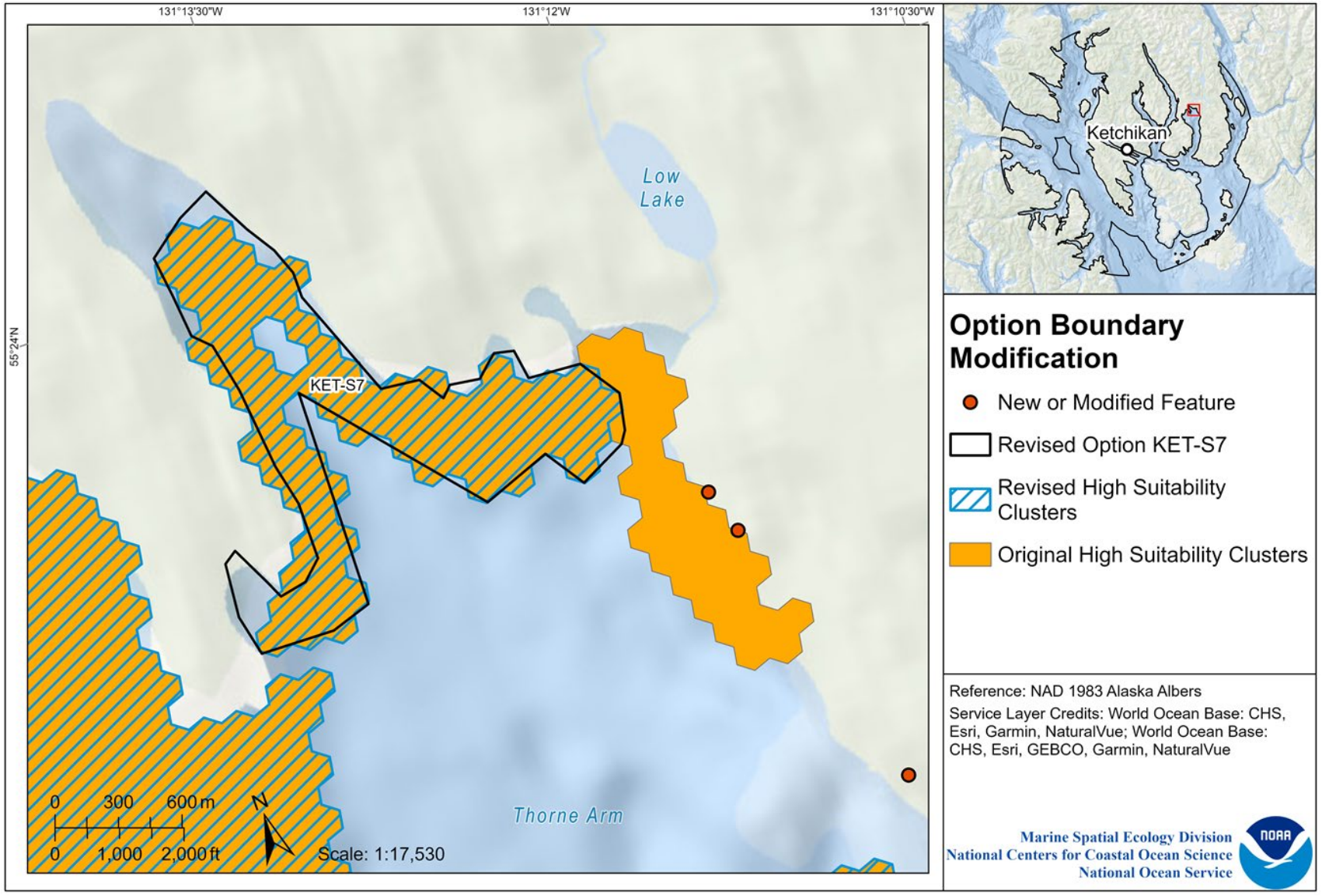


Figure 3.63. Example of a subtidal option boundary modification from updated model features. The black line depicts the newly revised boundary for option KET-S7. The original high suitability clusters (orange polygon) were revised due to new or modified model features (red points) resulting in revised high suitability clusters (blue hatched polygons).

Final AOA Options

A total of 77 final AOA options totaling 13,032 ac were identified as final AOA options by the Team. This results in a 26% reduction in total acreage between the draft AOA options and final AOA options. In the southeast region, this includes 53 AOA options (44 subtidal and nine intertidal). Final AOA options for the Kodiak Study Area include 13 subtidal sites totaling 1,947 ac and two intertidal sites totaling 131 ac. (Table 3.7). In the Southcentral region, this includes nine final options (all subtidal). Final options of the Southcentral Study Areas include: two subtidal options in Seward totaling 440 ac, three subtidal options in Valdez totaling 431 ac, and four subtidal options in Cordova totaling 629 ac. No intertidal sites were identified in Southcentral Study Areas. Final AOA options for the Southeast Study Areas include: nine options in the Juneau Study Area (seven subtidal and two intertidal) totaling 1,449 ac, 12 options in the Sitka Study Area (11 subtidal and one intertidal) totaling 1,734 ac, nine options in the Petersburg and Wrangell Study Areas (seven subtidal and two intertidal) totaling 2,689 ac, 14 options in the Craig Study Area (11 subtidal sites and three intertidal) sites totaling 2,088 ac, and nine options in the Ketchikan Study Area (eight subtidal sites and one intertidal) totaling 1,486 ac.

Table 3.7. Summary table showing the total number of options and total cumulative acreage, broken down by scenario (subtidal, intertidal) as well as the total combined count and acreage for each study area. The final row represents the total combined count of options and acreage over all study areas, broken down by scenario and total combined values. Acreage values are rounded to the nearest whole number.

Study Area	Number of Subtidal Options	Total Subtidal Acreage	Number of Intertidal Options	Total Intertidal Acreage	Total Number of Options Per Study Area	Total Acreage Per Study Area
Southwest AK						
Kodiak	13	1,947	2	131	15	2,078
Southcentral AK						
Seward	2	440	0	0	2	440
Valdez	3	431	0	0	3	431
Cordova	4	629	0	0	4	629
Southeast AK						
Juneau	7	1,277	2	172	9	1,449
Sitka	11	1,631	1	112	12	1,743
Wrangell-Petersburg	7	2,500	2	189	9	2,689
Craig	11	1,855	3	233	14	2,088
Ketchikan	8	1,429	1	56	9	1,485
Total						
All Study Areas	66	12,139	11	893	77	13,032

Characterization of Final AOA Options by Study Area

Below, detailed characterizations are provided for each of the AOA options selected across the study areas (Tables 3.8–3.19; Figures 3.64–3.235). The characterizations provide study area and site-specific details regarding the geographic location of AOA options, industry considerations, natural and cultural resource considerations, and environmental conditions. This is done through maps, tables, and text, and the information is curated to complement factors considered during the Alaska state aquatic farm lease application and review process, and to assist proponents in the identification of key user groups and resource agencies to engage with during the project design and application process. The characterizations include summations of substantive comments received during the Notice of Availability (90 FR 17051) that provide option-specific or geographic-specific context that may be useful in aquaculture planning. Comments related to general sentiments around aquaculture development or AOAs were not included in characterization. All written public comments on the draft AOA options Notice of Availability can be found in the Federal Register.[17]

The characterization maps include visualizations of data used within the suitability model and are not meant to directly illustrate the information in the characterization tables but instead to complement them. The results for the Wrangell and Petersburg Study Areas are presented as a single set of AOA options, including characterization for both study areas. This is due to the overlap of the two study areas, resulting in potential overlap and close proximity of AOA options between the two study areas. Appendix C provides large-format maps to aid in viewing and interpretation of data.



[17] https://www.federalregister.gov/documents/2025/04/23/2025-07029/draft-aquaculture-opportunity-area-options-alaska-state-waters

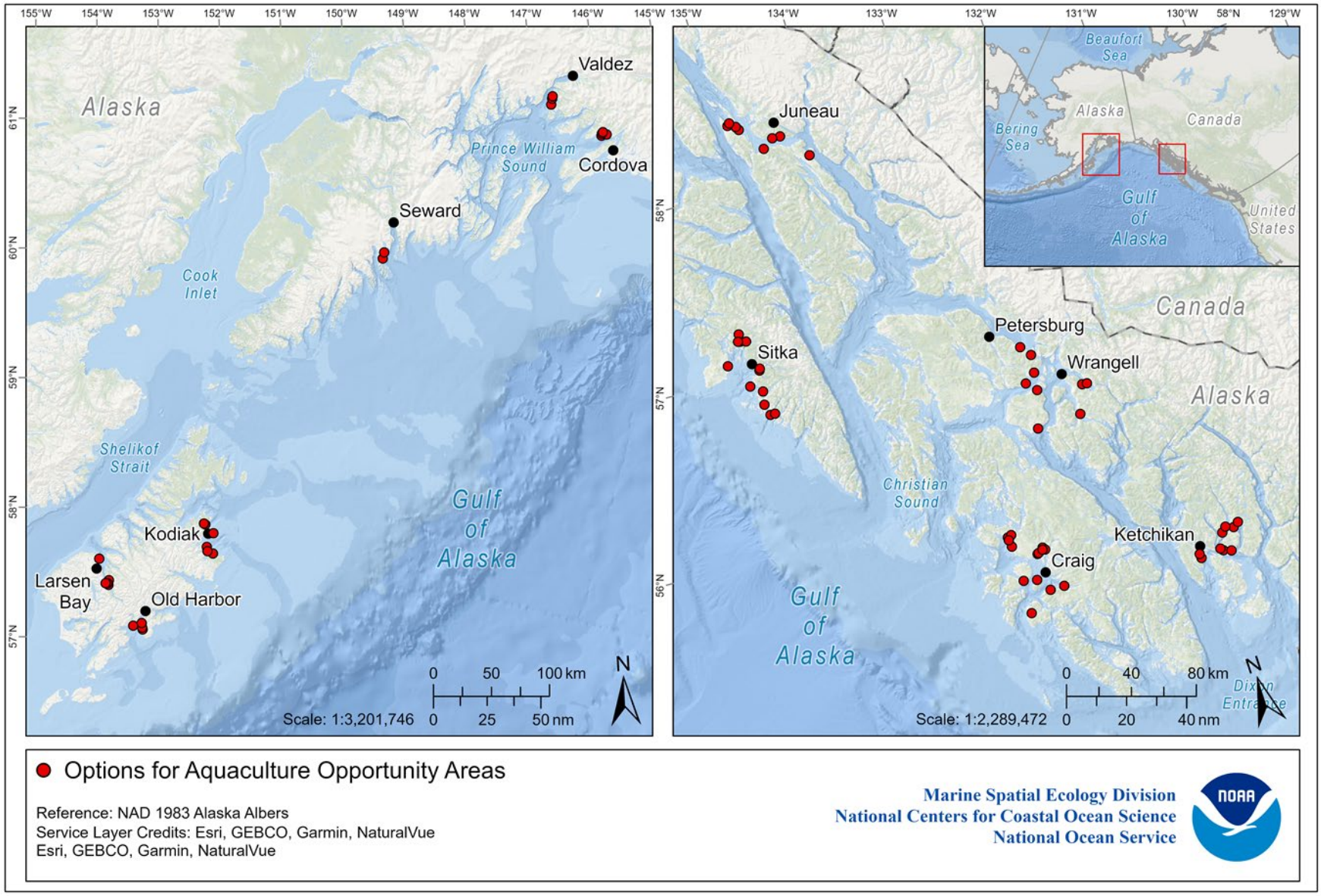


Figure 3.64. Distribution of final AOA options in Alaska State waters for the Kodiak, Prince William Sound, and Southeast Alaska Study Areas. Red circles represent the locations of the options but do not reflect the size of the options.

Southwest Study Area

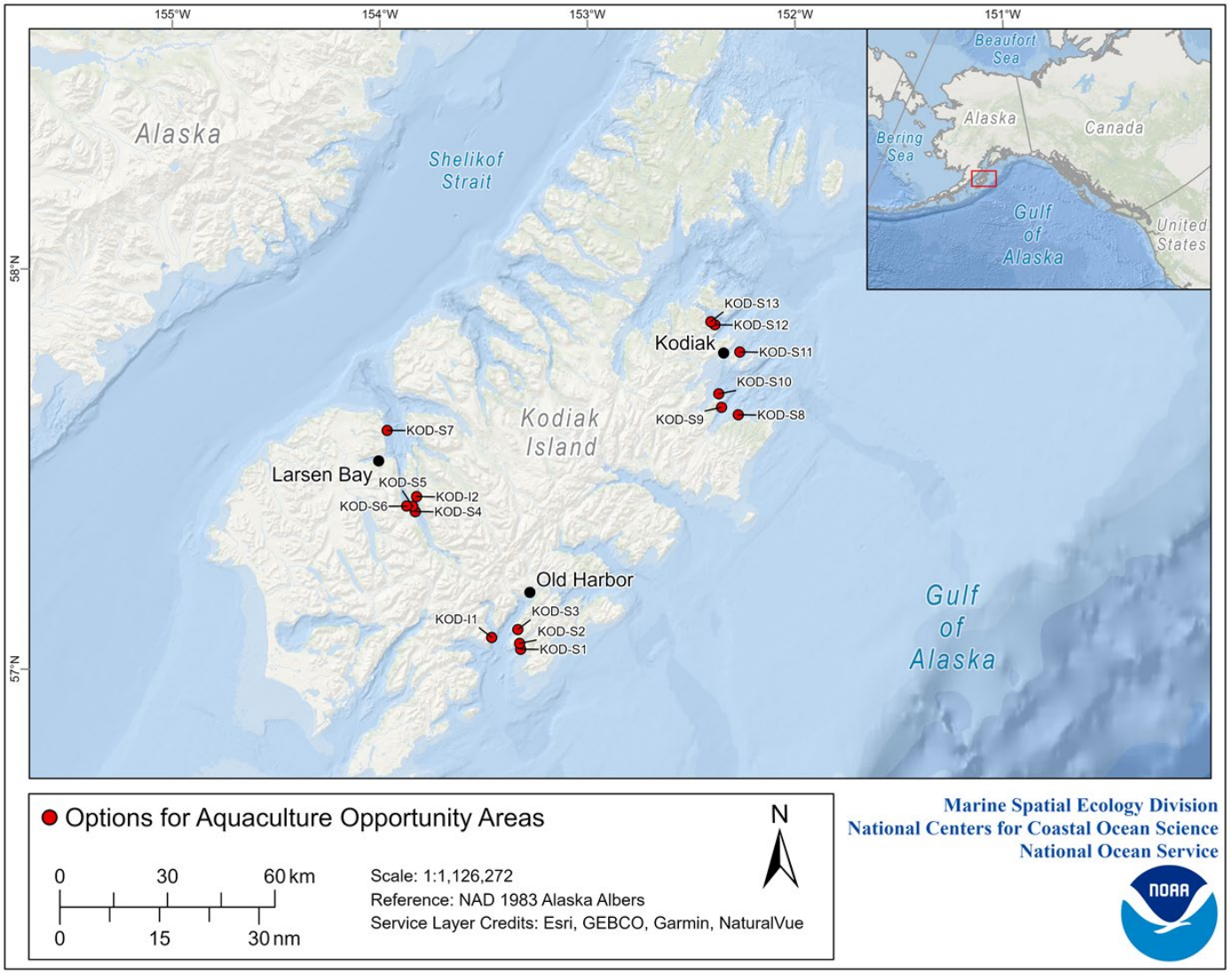


Figure 3.65. Distribution of final AOA options in Alaska State waters for the Southwest Study Area. Red circles represent the locations of the options but do not reflect the size of the options.

Kodiak Study Area

Final AOA options within the Kodiak Study Area include 13 subtidal sites encompassing 1,947 ac and two intertidal sites covering 131 ac (Figure 3.66). Options range in size from 52.4 ac to 374.8 ac and are distributed across the Study Area (Tables 3.8 and 3.9; Figures 3.66–3.92). Several sites may directly overlap with, or are within the 5-km search distance of, ecologically sensitive resources including historically mapped eelgrass beds, high-use areas for humpback whales, Steller sea lion major haulouts (within a 3-nm protection area), and both key and non-key harbor seal haulouts. Some sites may also overlap, or are within 5 km of Mexico and Western North Pacific (WNP) humpback whale critical habitat, Steller sea lion critical habitat, the gray whale migratory route, and fin, gray, and humpback whale feeding BIAs. Given the proximity to these resources, project planning should account for potential ecological impacts and may require coordination or consultation with appropriate resource agencies.

The threatened Steller's eider, the threatened southwest distinct population segment of northern sea otter, and the designated critical habitat for northern sea otters also occur in this study area. This study area overlaps marine bird concentration areas and important habitats, specifically the Chiniak Bay Marine Important Bird Area (IBA), Eastern Kodiak Island Marine IBA, Marmot Bay Marine IBA, Marmot Bay Colonies IBA, and the Kodiak Archipelago Sea Duck Key Habitat Site, all containing high densities of marine birds. There are numerous, sizeable seabird colonies located throughout. These seabird colonies are notable due to the total number of nesting birds and because they contain species of increased conservation concern and/or species prone to nest failure resulting from disturbance. Additional, smaller colonies containing species of increased conservation concern also occur throughout the study area.



In the Larsen Bay portion of the study area, there are numerous sizeable seabird colonies located throughout Uyak Bay (Twin Islands, Alf Islands, Amook Bay Island in Amook Pass, islands on the north and northwest sides of Amook Bay, and Carlsen Point) and Spiridon Bay (Clover Rock, Thistle Rock, Ditto Islands, Spiridon Bay Islands, nesting sites along the cliffs on the northern side of Spiridon Bay, Aux Triangle, Bird Rock, and Chief Point). There are also numerous sizeable seabird colonies in the Old Harbor portion of the study area (Cape Kiavik, Kiavik Triangle, John Island, Puffin Island, Cub Island, Amee Island, Granite Islands, Nut Island, Cathedral Island, Ghost Rocks, Coxcombe Point Colony, Ladder Island, Nest Island, Dusk Island, Inner and Outer Right Cape Islets).

Finally, there are numerous, sizeable seabird colonies throughout the Eastern portion of the study area (Whale Island; Treeless Island; the Triplets; islets at Island Bay, the stack at Knee Bay, the largest island in South Icon Bay, and Eider and Nelson Islands off Spruce Island; Nut Triangle; the stack at Monashka Bay, Blow Triangle; Miller Point; three colonies at Long Island; Kulichikof Island; Crooked Island; Popof Island; Gull Island; Gibson Cove; Puffin Island; Mary Island; Blodgett Island; Cliff Island; Zaimka Island; Marathon Island; Viesoki Island; Queer Island; Kalsin Island; head of Kalsin Bay; Utesistoi Island; Svitlak Island; Middle Island; Kekur Island; and Chiniak Island and islets).

A single submitter provided detailed feedback on all draft AOA options within the Kodiak Study Area. Their comments addressed environmental conditions, potential land use conflicts, and ecological considerations that influenced the final selection and refinement of AOA boundaries. For draft AOA options KOD-I1, KOD-I2, and KOD-I5, the submitter identified several concerns: wave exposure, winter icing, potential conflicts with upland landowners, and overlap with natural macroalgae beds that rendered these sites potentially unsuitable for intertidal culture. These three options were not carried forward as final AOA options. For the final AOA option KOD-I1 (draft AOA option KOD-I3), noted concerns included wave exposure and proximity to a cultural resource site. Final AOA option KOD-I2 (draft AOA option KOD-I4) was noted for winter icing and potential upland landowner conflict. Final AOA options KOD-S1, S2, and S3 (draft AOA options KOD-S6, S7, S8, respectively) were flagged for wave exposure and existing kelp beds. At the same time, KOD-S4, S5, and S6 (draft AOA options KOD-S10, S11, S9, respectively) raised concerns about winter icing and the absence of source populations for particular kelp species within 50 km. For KOD-S7 (draft AOA option KOD-S12), the submitter cited wave exposure, nearby shore fisheries leases, and vessel traffic concerns. KOD-S8 (draft AOA option KOD-S3) was noted for wave exposure and the presence of natural bull kelp beds. KOD-S9 (draft AOA option KOD-S1) was identified as containing a large subtidal reef exposed at minus tides, existing bull and giant kelp beds, and proximity to active kelp and oyster farms. Following the final suitability model run, boundaries for several AOA options, KOD-I1, S1, S2, S4, S5, S8, S9, S10, S11, S12, and S13 (draft AOA options KOD-I3, S6, S7, S10, S11, S3, S1, S2, S5, respectively), were modified to retain only the high suitability areas. These adjustments were primarily driven by proximity to AHRS sites and refinements to the exposure layer scoring.

Relevant general comments focused on potential overlaps between AOA study areas and documented cultural resource sites. In response, the final model run incorporated additional down-scoring of AHRS data layers, resulting in reduced suitability and, ultimately, the removal of portions of, or entire, draft AOA options located within 500 m of AHRS-listed locations. Comments also noted potential impacts to subsistence harvest activities from aquaculture development. The degree of possible adverse effect to subsistence harvest activities is highly dependent on the specific harvest activity (e.g., intertidal gathering vs herring roe collection) and the nature of proposed aquaculture development (e.g., subtidal vs intertidal culture). All aquaculture projects will be subject to further review during the Alaska state leasing and permitting process. Early and ongoing coordination with coastal communities, nearby Alaska Native Villages, Alaska Native Corporations, and other Tribal Associations is strongly recommended to ensure access to common-use resources and cultural resource sites, and that traditional uses are not adversely impacted.

Below are additional characterizations of site-specific details regarding the geographic location and environmental conditions of AOA options within the Kodiak Study Area, as well as considerations regarding national security, natural resources, navigation and transportation, cultural resources, and various industries including aquaculture and fisheries. These are presented as tables containing location information for each option and proximity to these considerations (Tables 3.8–3.9). Following these tables are maps that visualize the options along with data used within the suitability model (Figures 3.66–3.72). Next are plots summarizing available time series data to provide additional context on environmental conditions and observed vessel traffic within the options (Figures 3.73–3.92). Following these tables and figures are individual text descriptions for each option summarizing the characteristics observed. These tables, figures, and text summaries were created using many different spatial datasets curated to complement factors considered during the Alaska state aquatic farm lease application and review process, and to assist proponents in the identification of key user groups and resource agencies to engage with during the project design and application process. These data are unlikely to be exhaustive, and there may be additional considerations not captured in this characterization. These different presentation methods are meant not only to communicate site-specific characteristics in multiple ways but also to complement each other. They may also contain unique bits of information not found in the other parts of this characterization.

Table 3.8. Characterization summary for Kodiak Aquaculture Opportunity Area subtidal and intertidal options in southwestern extent: KOD-I1, KOS-S1, KOD-S2, KOD-S3; northwestern extent: KOD-I2, KOD-S4, KOD-S5, KOD-S6, KOD-S7. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km). TRMZ = Tideland Resource Management Zone; GU = General Use.

	Southwestern extent				Northwestern extent				
	KOD-I1	KOD-S1	KOD-S2	KOD-S3	KOD-I2	KOD-S4	KOD-S5	KOD-S6	KOD-S7
General characteristics									
Center Coordinates (longitude, latitude)	−153.4838, 57.0893	−153.3506, 57.0591	−153.3638, 57.0711	−153.3627, 57.1086	−153.8296, 57.4432	−153.8351, 57.405	−153.8472, 57.4184	−153.8785, 57.4201	−153.9654, 57.6081
Size (ac)	52.4	273.4	116.7	326.8	78.4	57.6	79.2	86.4	159.2
Distance to Harbors or Coastal Populated Places (nm)	8.9 (Old Harbor)	10.4 (Old Harbor)	9.6 (Old Harbor)	6.4 (Old Harbor)	10.5 (Larsen Bay)	11.2 (Larsen Bay)	10.4 (Larsen Bay)	9.7 (Larsen Bay)	4.7 (Larsen Bay)
Depth (m) (min, max, mean), Average Slope (degrees)	1.36, 7.71, 3.92, 1.36	1.55, 25.63, 12.59, 2.91	8.51, 48.62, 35.15, 4.13	−4.47, 83.06, 37.16, 11.6	20.33, 34.54, 27.14, 5.12	27.77, 48.13, 37.93, 1.59	22.77, 46.73, 33.8, 3.48	18.42, 48.6, 32.28, 3.25	35.36, 64.65, 45.04, 3.47

	Southwestern extent				Northwestern extent				
	KOD-I1	KOD-S1	KOD-S2	KOD-S3	KOD-I2	KOD-S4	KOD-S5	KOD-S6	KOD-S7
Alaska Area Plan Subunit	TRMZ, GU	GU	GU	GU	GU	TRMZ, GU	TRMZ, GU	TRMZ, GU	GU
Commercial Statistical Areas – Groundfish, Shellfish	535703	535703	535703	535703	535701	535701	535701	535701	535733
Commercial Statistical Areas – Salmon	25853, 25851	25851	25851	25851	25421	25421	25421	25421	25410
Constraints									
Anadromous Waters Catalog – Streams (91.5-m Setback)	-	-	-	-	-	4.36	-	-	-
Deep Sea Coral and Sponge Occurrences (1,000-m Setback)	-	3.56	2.69	-	-	-	-	-	2.84
Ferry Routes (500-m Setback)	3.84	3.09	2.00	0.94	-	-	-	-	-
Key Harbor Seal Haulouts (500-m Setback)	-	0.25	1.62	-	1.80	0.26	0.13	1.64	-
Navy Undersea Cables (500-m Setback)*	-	-	-	-	-	-	-	-	Yes
Pipelines (500-m Setback)	-	-	-	-	-	-	-	-	-
Submarine Cable Areas (200-m Setback)	-	-	-	-	-	-	-	-	0.65
Wastewater Outfalls (500-m Setback)	-	-	-	-	-	-	-	-	-
Wrecks and Obstructions (152.5-m Setback)	-	-	-	-	-	-	-	-	3.13
National Security									
Munitions and Explosives of Concern	-	-	-	-	-	-	-	-	-

	Southwestern extent				Northwestern extent				
	KOD-I1	KOD-S1	KOD-S2	KOD-S3	KOD-I2	KOD-S4	KOD-S5	KOD-S6	KOD-S7
Natural Resources									
Cetacean Biologically Important Areas – Feeding	Fin Whale (0.11), Gray Whale (0.11), Humpback Whale (0.11)	Fin Whale (1.46), Gray Whale (1.46), Humpback Whale (1.46)	Fin Whale (1.09), Gray Whale (1.09), Humpback Whale (1.09)	Fin Whale (0), Gray Whale (0), Humpback Whale (0)	Fin Whale (0), Humpback Whale (0)	Fin Whale (0), Humpback Whale (0)	Fin Whale (0), Humpback Whale (0)	Fin Whale (0), Humpback Whale (0)	Fin Whale (0), Humpback Whale (0)
Cetacean Biologically Important Areas – Migratory	Gray Whale (0.11)	Gray Whale (1.46)	Gray Whale (1.09)	Gray Whale (0)	Gray Whale (0)	Gray Whale (0)	Gray Whale (0)	Gray Whale (0)	Gray Whale (0)
Humpback Whale High-Use Areas	-	-	-	-	-	-	-	-	0
NMFS ESA Critical Habitat	Humpback Whale (Mexico) (0), Humpback Whale (WNP) (0)	Humpback Whale (Mexico) (0), Humpback Whale (WNP) (0)	Humpback Whale (Mexico) (0), Humpback Whale (WNP) (0)	Humpback Whale (Mexico) (0), Humpback Whale (WNP) (0)	Humpback Whale (Mexico) (0), Humpback Whale (WNP) (0)	Humpback Whale (Mexico) (0), Humpback Whale (WNP) (0)	Humpback Whale (Mexico) (0), Humpback Whale (WNP) (0)	Humpback Whale (Mexico) (0), Humpback Whale (WNP) (0)	Humpback Whale (Mexico) (0), Humpback Whale (WNP) (0)
Non-Key Harbor Seal Haulout Locations (500-m Setback)	-	-	-	-	-	-	-	-	-
North Pacific Seabird Data**	1.77	1.59	0.18	3.84	1.39	0	0	0	-
ShoreZone Coastal Mapping – Eelgrass Bioband	1.64	0	0	0	0.51	0.08	1.29	2.57	4.33
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	-	-	-	-	-	-	-	-	-

	Southwestern extent				Northwestern extent				
	KOD-I1	KOD-S1	KOD-S2	KOD-S3	KOD-I2	KOD-S4	KOD-S5	KOD-S6	KOD-S7
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-	-	-	-	-	-	-	-
Industry, Navigation, and Transportation									
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-	-	-	-	-	-	-	-
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	-	-	-	-	-	-	-	-	-
Permitted Log Transfer Facility (500-m Setback)	-	-	-	-	-	-	-	-	-
USFS Recreation Opportunities – Cabin Rentals	-	-	-	-	-	-	-	-	-
Cultural Resources									
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m Setback)*	1	3	2	5	7	4	5	7	1
Alaska Area Plans (Community Harvest) Overlap	-	-	-	-	-	-	-	-	-
Subsistence Search and Harvest Areas within 5 km	-	-	-	-	-	-	-	-	-
Aquaculture and Fisheries									
Alaska Area Plans (Sport Fishing) Overlap	-	-	-	-	-	-	-	-	-

	Southwestern extent				Northwestern extent				
	KOD-I1	KOD-S1	KOD-S2	KOD-S3	KOD-I2	KOD-S4	KOD-S5	KOD-S6	KOD-S7
Alaska DNR Shore Fishery Lease	-	-	-	-	-	-	-	-	0.48
Hatchery Release Sites	-	-	-	-	-	-	-	-	-
Aquatic Farm Permits	-	-	-	-	-	-	-	-	-
*Classified data layer; if the option is within the specified distance, a value of "Yes" is shown instead of the travel distance value. **A straight-line distance was used to calculate minimum travel distance.									

Table 3.9. Characterization summary for Kodiak Aquaculture Opportunity Area subtidal and intertidal options in eastern extent: KOD-S8, KOD-S9, KOD-S10, KOD-S11, KOD-S12, KOD-S13. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km). GU = General Use.

	Eastern extent					
	KOD-S8	KOD-S9	KOD-S10	KOD-S11	KOD-S12	KOD-S13
General characteristics						
Center Coordinates (longitude, latitude)	−152.323, 57.636	−152.3995, 57.6568	−152.4046, 57.6906	−152.3056, 57.7925	−152.4195, 57.8619	−152.4396, 57.8699
Size (ac)	52.7	117.9	132	374.8	73.9	96.8
Distance to Harbors or Coastal Populated Places (nm)	9.6 (Kodiak)	7.3 (Kodiak)	5.5 (Kodiak)	3.9 (Kodiak)	8.1 (Kodiak)	8.9 (Kodiak)
Depth (m) (min, max, mean), Average Slope (degrees)	1.78, 17.37, 7.25, 2.02	3.04, 31.03, 18.49, 2.89	4.38, 20.14, 13.83, 1.44	4.54, 29.76, 13.95, 1.3	1.06, 20.73, 8.38, 2.29	4.16, 15.14, 8.45, 1.89
Alaska Area Plan Subunit	GU	GU	GU	KT-14B, GU	GU	GU
Commercial Statistical Areas – Groundfish, Shellfish	525733	525733	525733	525733	525731	525731
Commercial Statistical Areas – Salmon	25924, 25921, 25927	25924	25923, 25927	25921	25933	25933
Constraints						
Anadromous Waters Catalog – Streams (91.5-m Setback)	1.30	1.78	-	2.90	1.81	0.13
Deep Sea Coral and Sponge Occurrences (1,000-m Setback)	-	3.68	4.65	1.39	-	-

	Eastern extent					
	KOD-S8	KOD-S9	KOD-S10	KOD-S11	KOD-S12	KOD-S13
Ferry Routes (500-m Setback)	-	-	-	0.59	1.35	1.46
Key Harbor Seal Haulouts (500-m Setback)	0.34	1.78	-	3.79	-	-
Navy Undersea Cables (500-m Setback)*	-	-	-	Yes	Yes	Yes
Pipelines (500-m Setback)	-	-	-	-	-	-
Submarine Cable Areas (200-m Setback)	1.20	0.28	0.31	2.50	1.23	1.35
Wastewater Outfalls (500-m Setback)	-	-	-	-	-	-
Wrecks and Obstructions (152.5-m Setback)	-	-	-	2.51	-	-
National Security						
Munitions and Explosives of Concern	0	1.07	0	2.35	0	0
Natural Resources						
Cetacean Biologically Important Areas – Feeding	Gray Whale (3.61) Fin and Humpback Whale (0)	Fin and Humpback Whale (0)	Gray Whale (4.03) Fin and Humpback Whale (0)	Gray, Fin, Humpback Whale (2.38)	Gray, Fin, Humpback Whale (0.59)	Gray, Fin, Humpback Whale (0.79)
Cetacean Biologically Important Areas – Migratory	Humpback and Fin Whale (0)	Gray Whale (0)	Gray Whale (0)	Gray Whale (0)	Gray Whale (0.5)	Gray Whale (0.7)
Humpback Whale High-Use Areas	0.24	0.79	0.39	0	1.82	3.21
NMFS and USFWS ESA Critical Habitat	Steller Sea Lion Critical Habitat (0) Northern Sea Otter (0) Humpback Whale (WNP) (0)	Steller Sea Lion Critical Habitat (0) Northern Sea Otter (0) Humpback Whale (WNP) (0)	Steller Sea Lion Critical Habitat (0) Northern Sea Otter (0) Humpback Whale (WNP) (0)	Steller Sea Lion Critical Habitat (0) Northern Sea Otter (0) Humpback Whale (WNP) (0)	Steller Sea Lion Critical Habitat (0) Northern Sea Otter (0) Humpback Whale (WNP) (0)	Steller Sea Lion Critical Habitat (0) Northern Sea Otter (0) Humpback Whale (WNP) (0)
North Pacific Seabird Data**	0	0	1.16	1.41	0.62	0.52

	Eastern extent					
	KOD-S8	KOD-S9	KOD-S10	KOD-S11	KOD-S12	KOD-S13
ShoreZone Coastal Mapping – Eelgrass Bioband	1.17	0.28	0.71	0.83	3.83	4
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	-	-	-	Long Island (0)	-	-
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-	-	-	-	-
Industry, Navigation, and Transportation						
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-	-	-	-	-
Permitted Log Transfer Facility (500-m Setback)	-	-	-	-	-	-
USFS Recreation Opportunities – Cabin Rentals	-	-	-	-	-	-
Cultural Resources						
Alaska Heritage Resources Survey (AHRS) Sites (500-m setback) *	Yes	Yes	Yes	Yes	Yes	Yes
Alaska Area Plans (Community Harvest)	-	Yes	-	Yes	Yes	Yes
Aquaculture and Fisheries						
Alaska Area Plans (Sport Fishing)	Yes	Yes	-	Yes	Yes	Yes
Alaska DNR Shore Fishery Lease	-	-	-	-	-	3.79
*Classified data layer; if the option is within the specified distance, a value of “Yes” is shown instead of the travel distance value. **A straight-line distance was used to calculate minimum travel distance.						

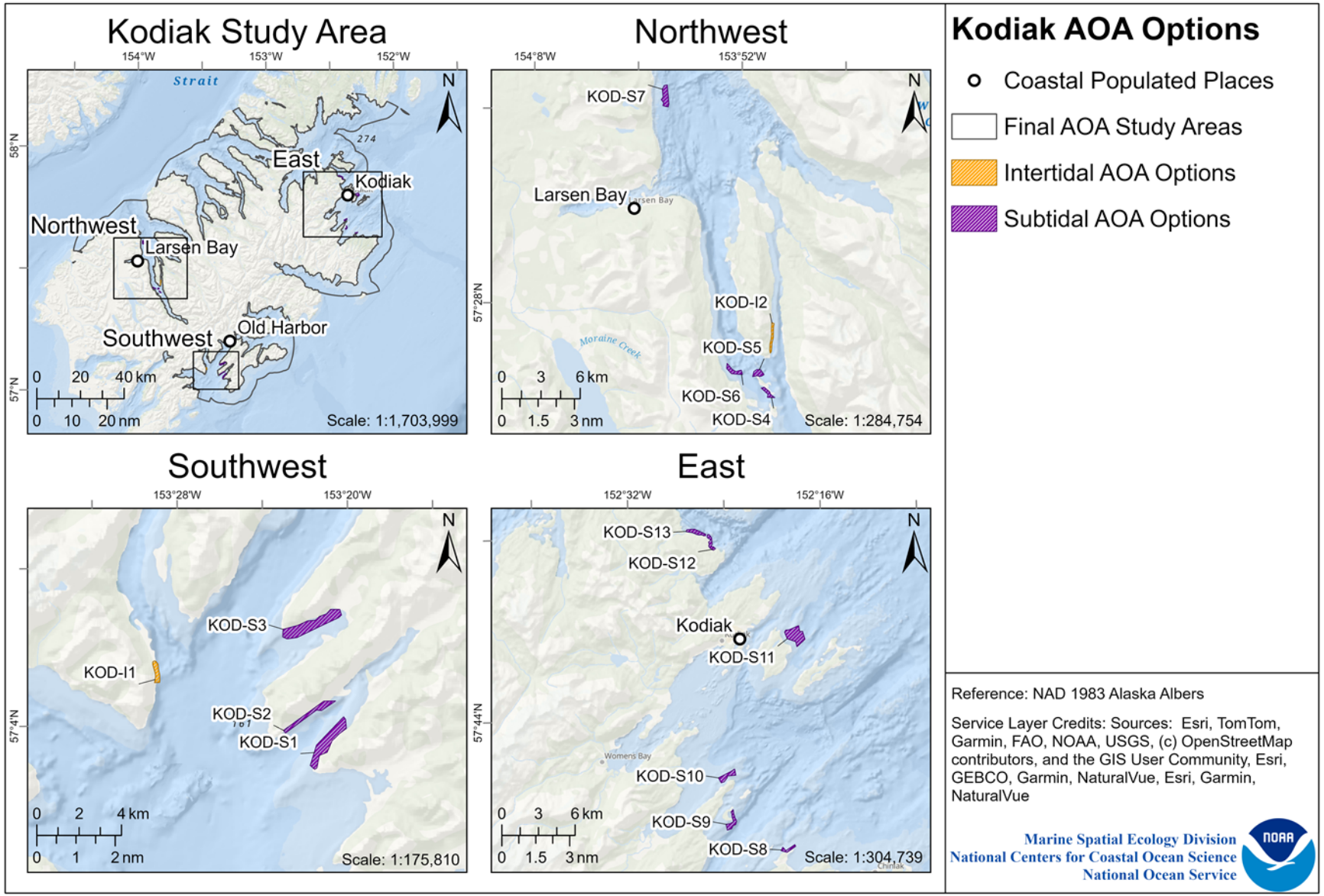


Figure 3.66. Final intertidal and subtidal AOA options for the Kodiak Study Area.

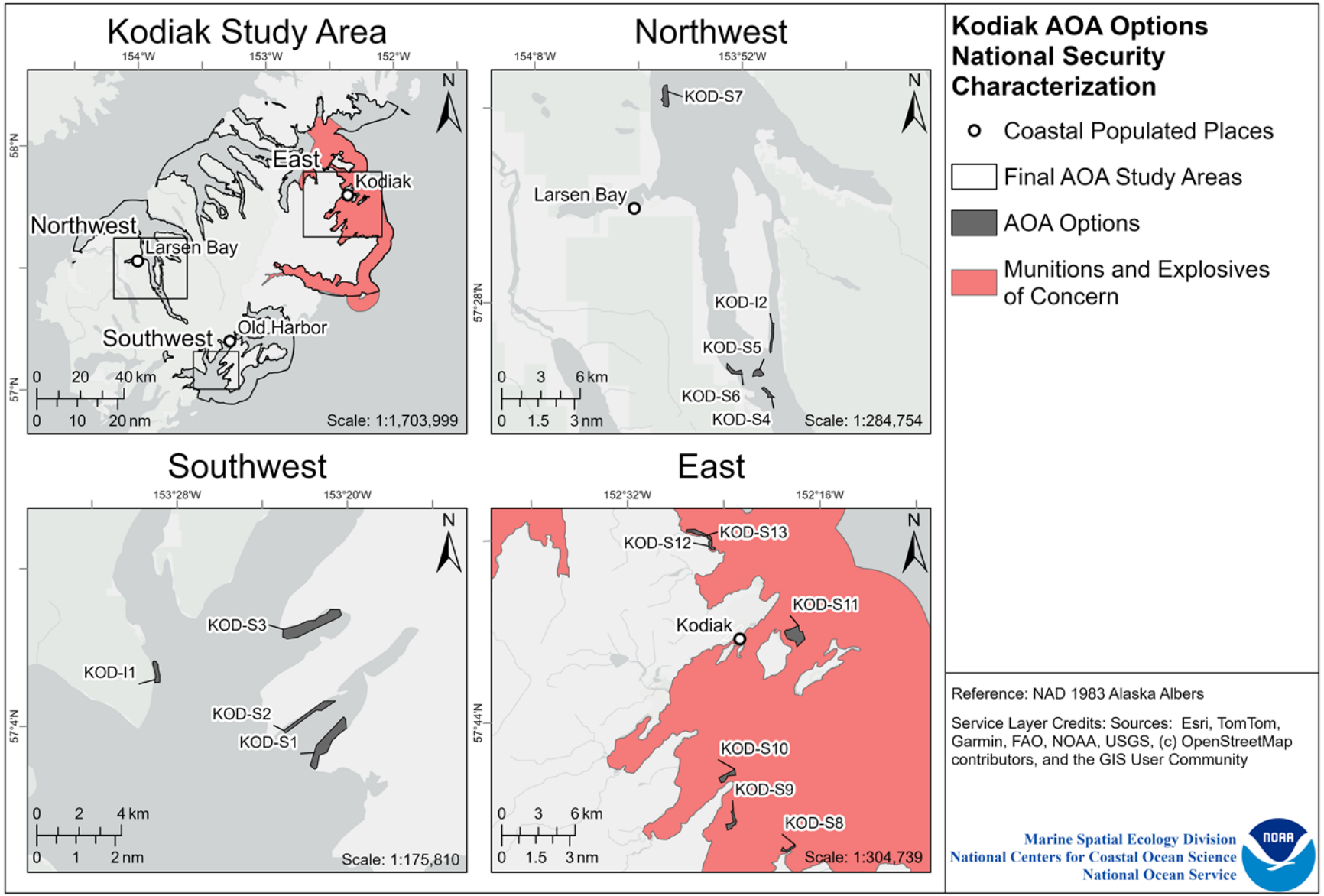


Figure 3.67. National security interactions with the final AOA options in the Kodiak Study Area.

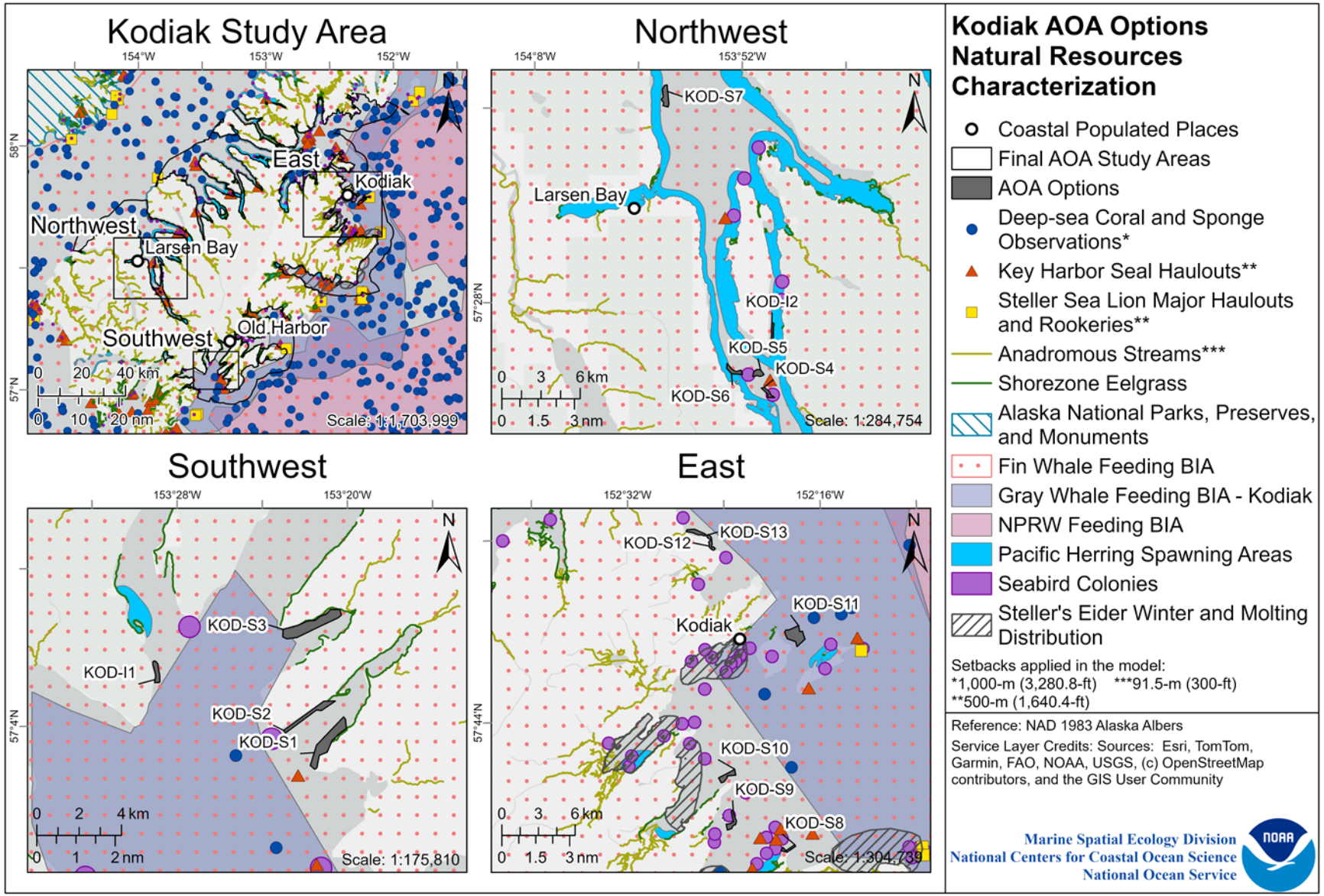


Figure 3.68. Natural resource interactions with the final AOA options in the Kodiak Study Area.

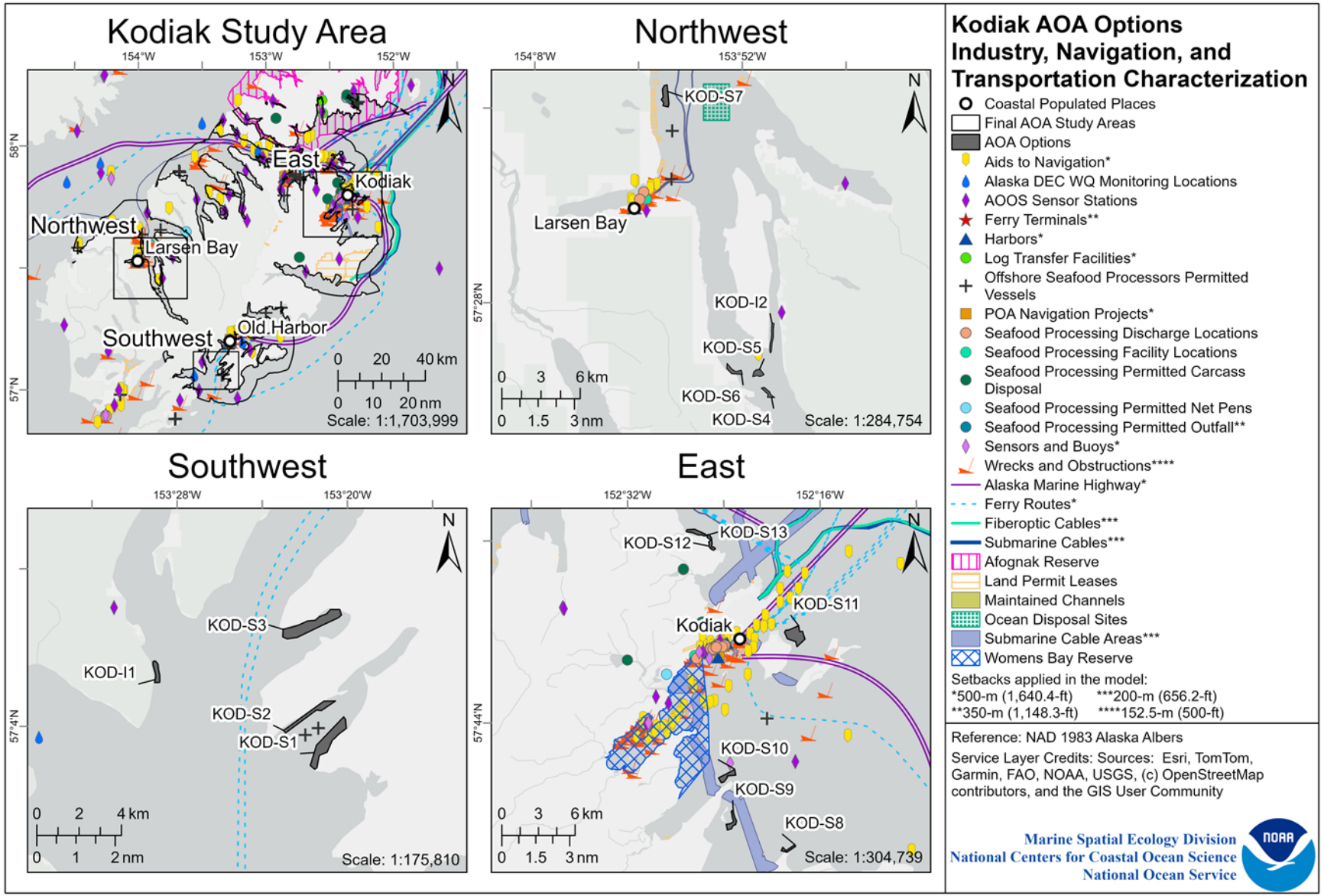


Figure 3.69. Industry, navigation, and transportation interactions with the final AOA options in the Kodiak Study Area.

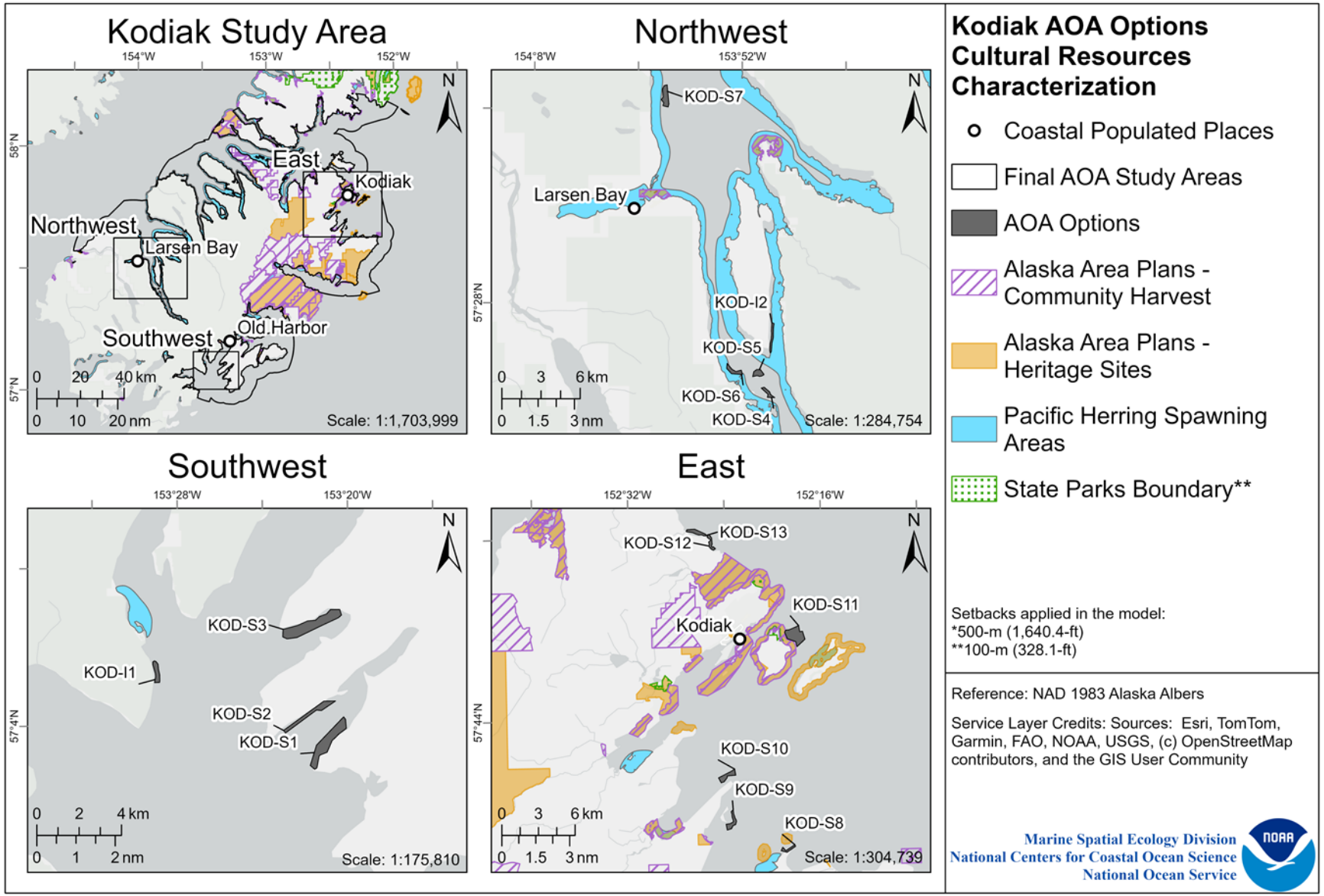


Figure 3.70. Cultural resource interactions with the final AOA options in the Kodiak Study Area.

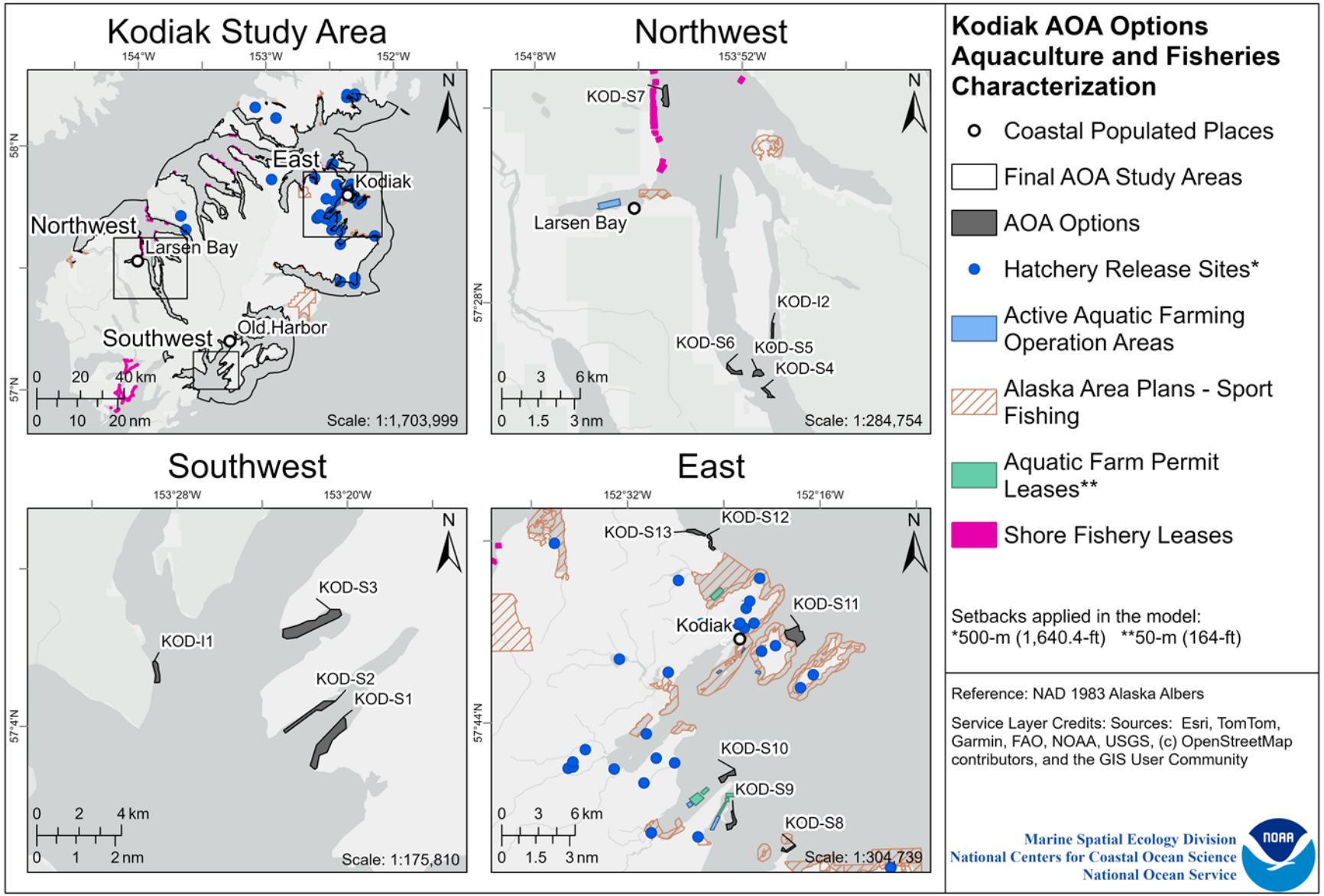


Figure 3.71. Aquaculture and fisheries interactions with the final AOA options in the Kodiak Study Area.

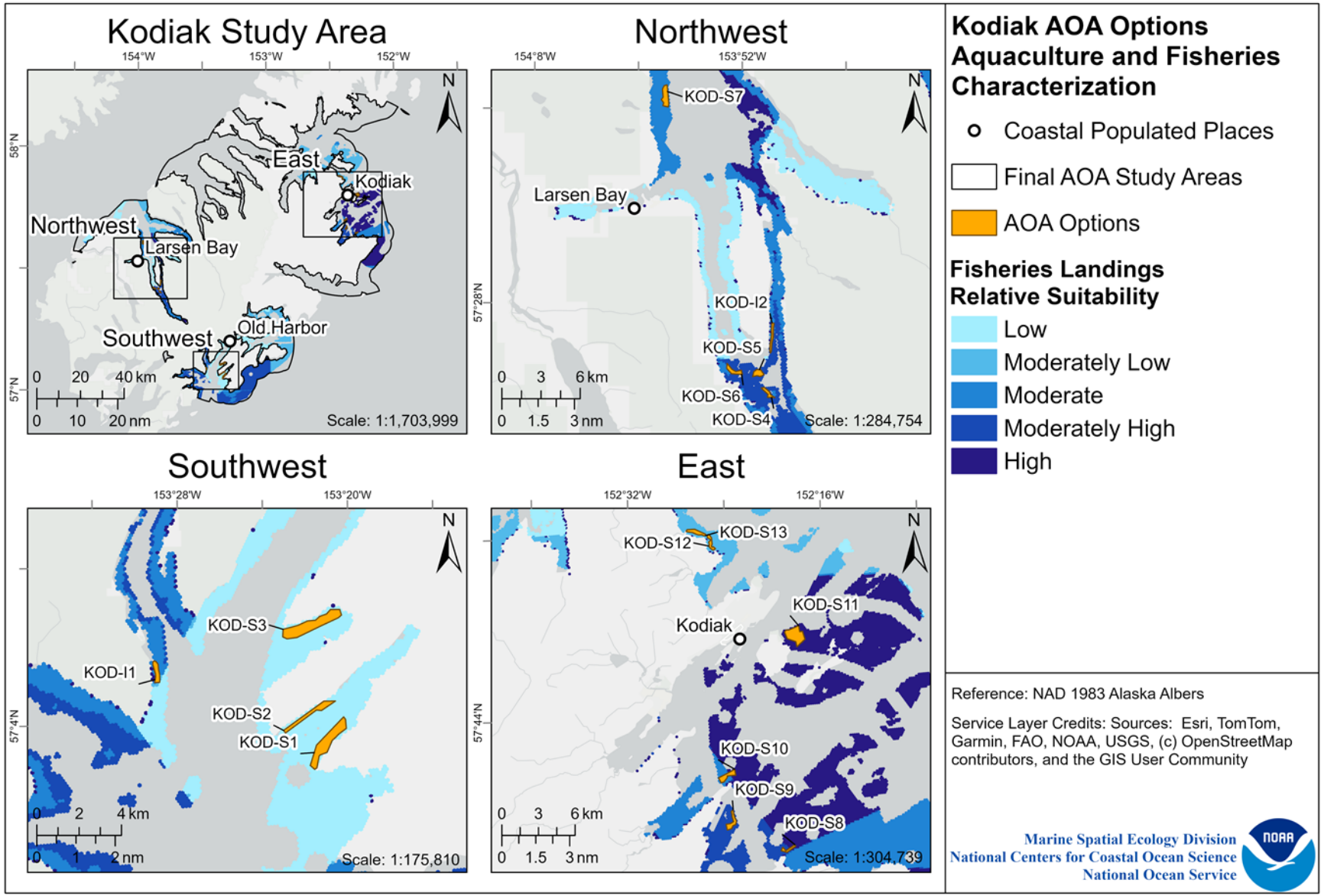


Figure 3.72. Relative suitability of the fishing landings combined data layer in relation to the final AOA options in the Kodiak Study Area.

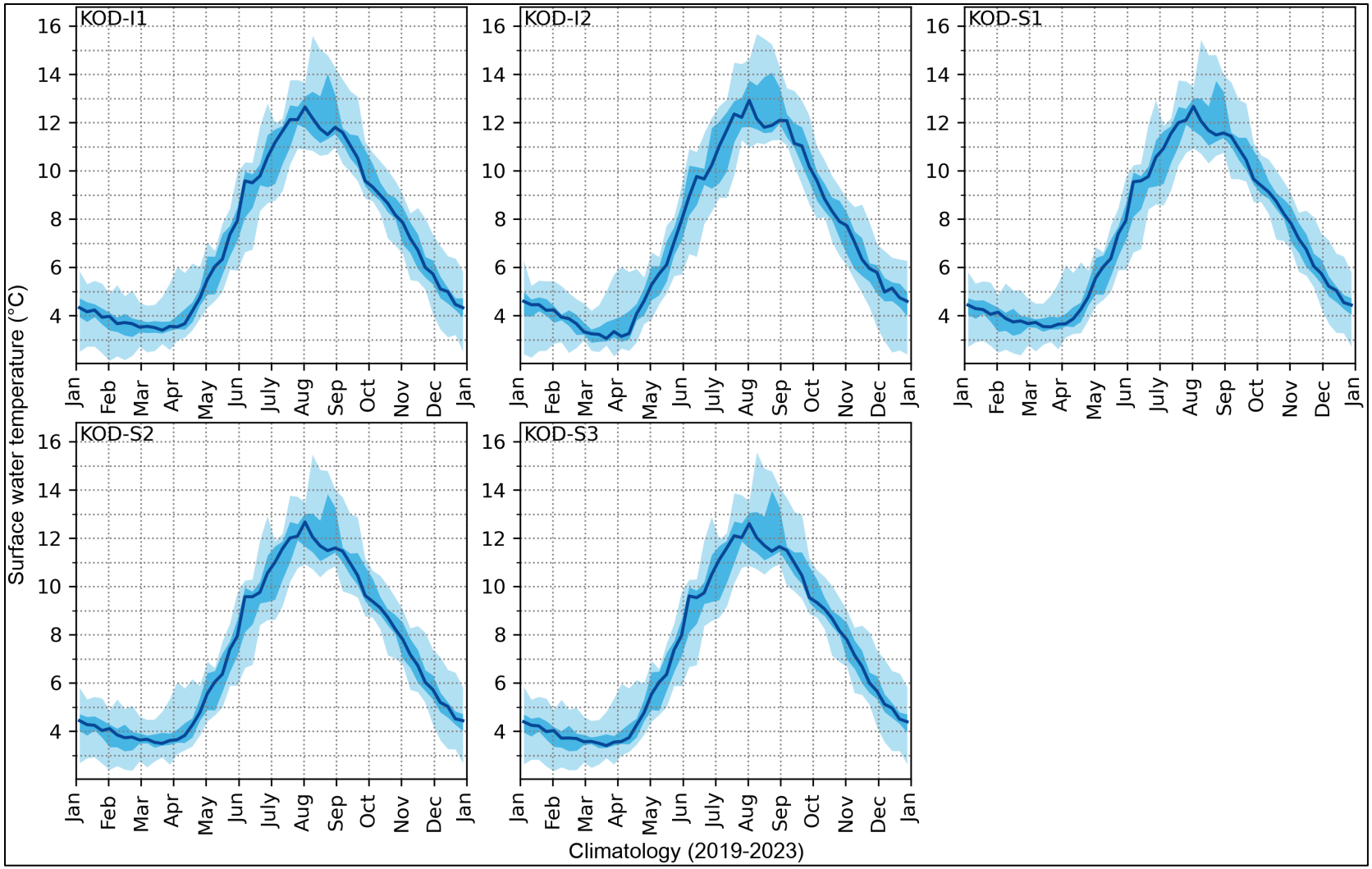


Figure 3.73. Sea surface temperatures for a subset of options from the Kodiak Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

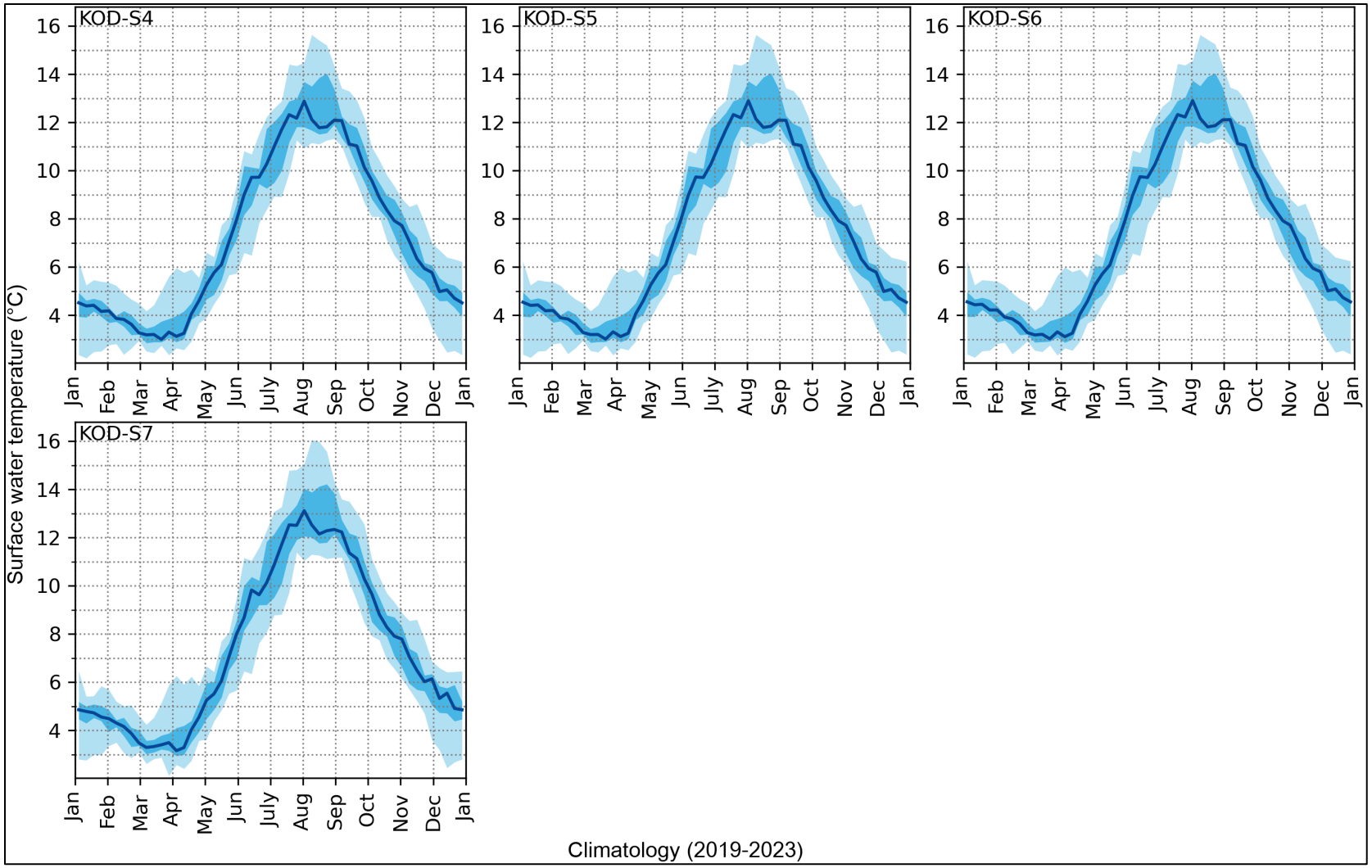


Figure 3.74. Sea surface temperatures for a subset of options from the Kodiak Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

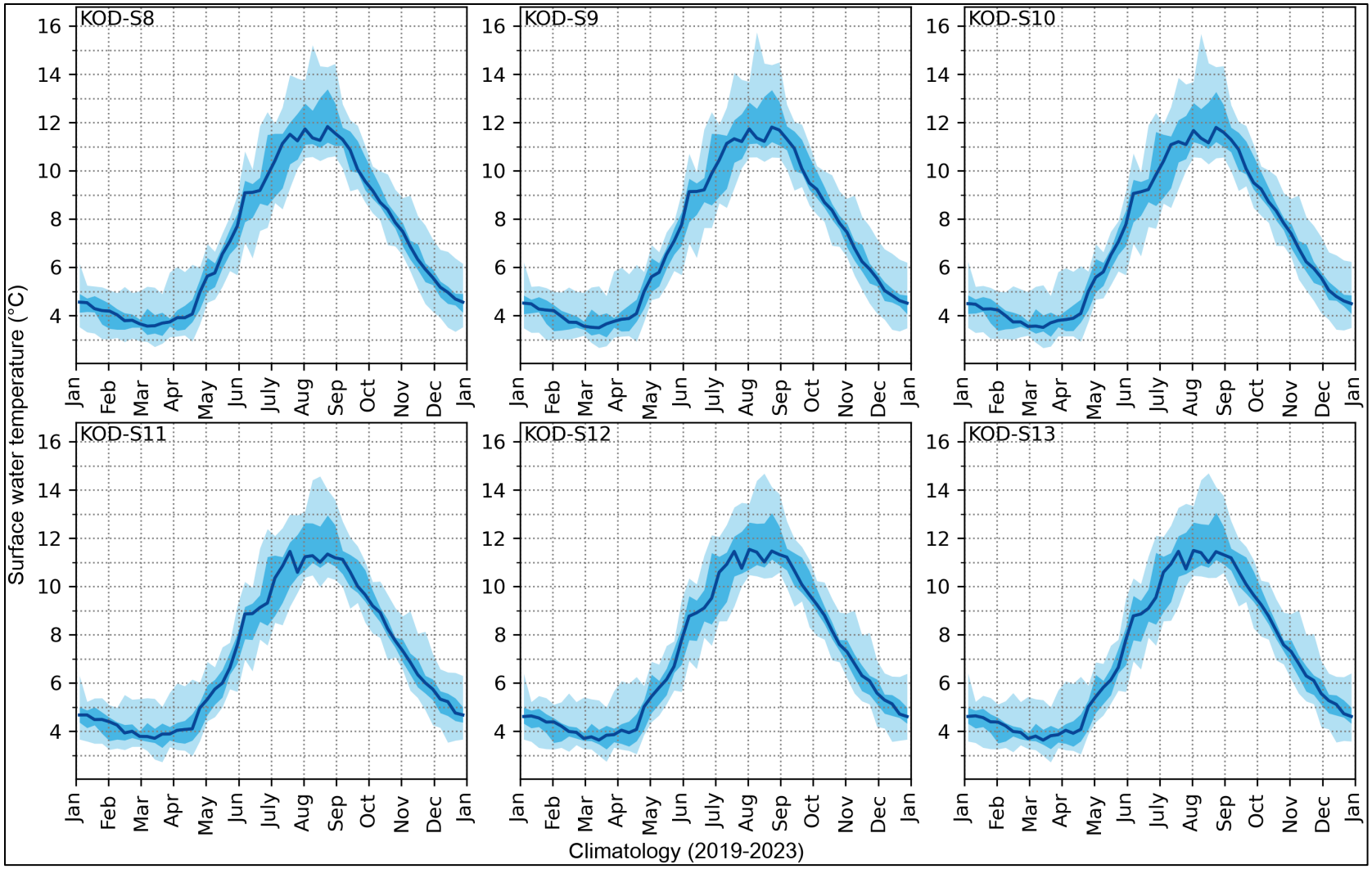


Figure 3.75. Sea surface temperatures for a subset of options from the Kodiak Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

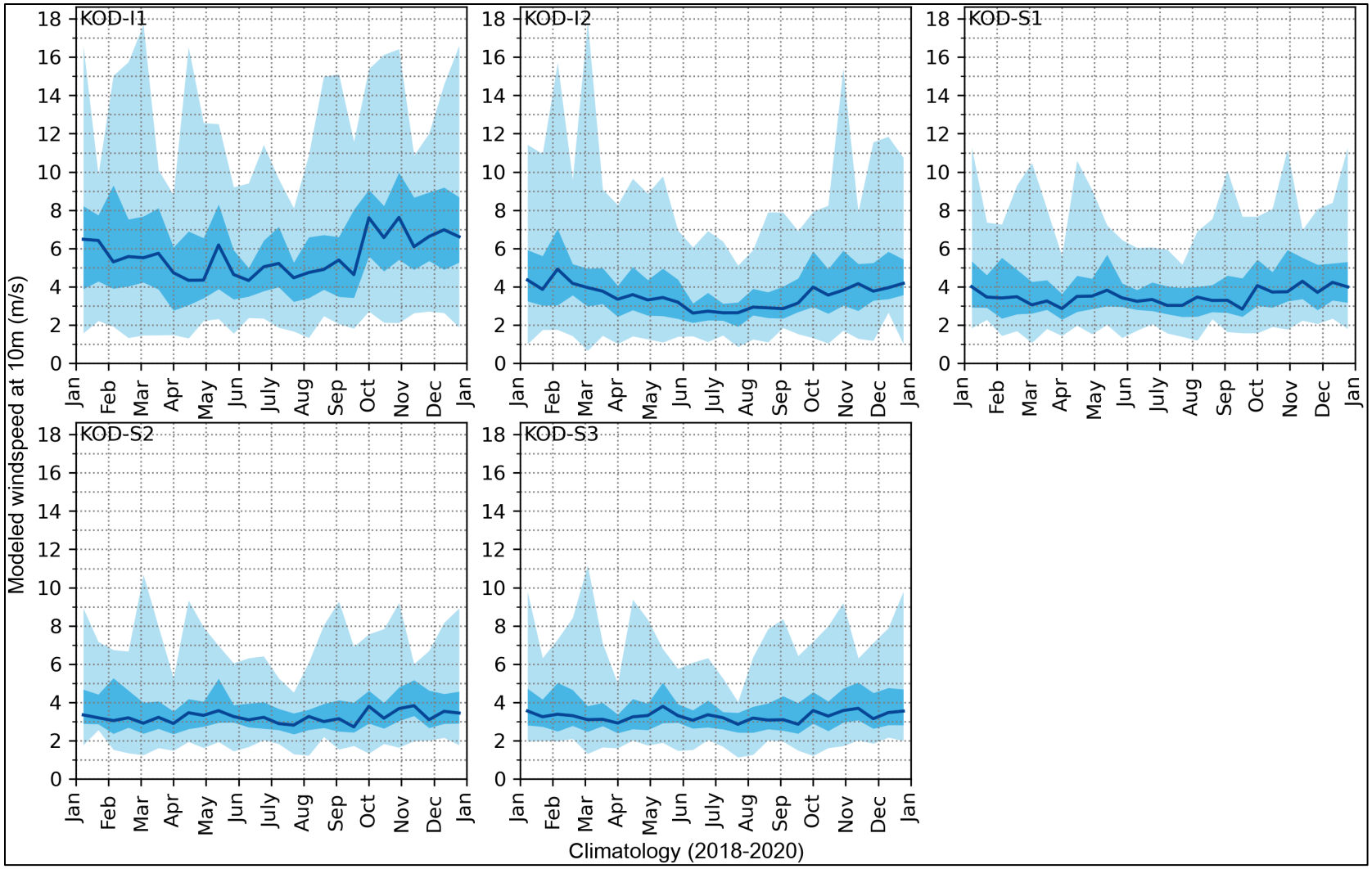


Figure 3.76. Wind speed at 10-m altitude for a subset of options from the Kodiak Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

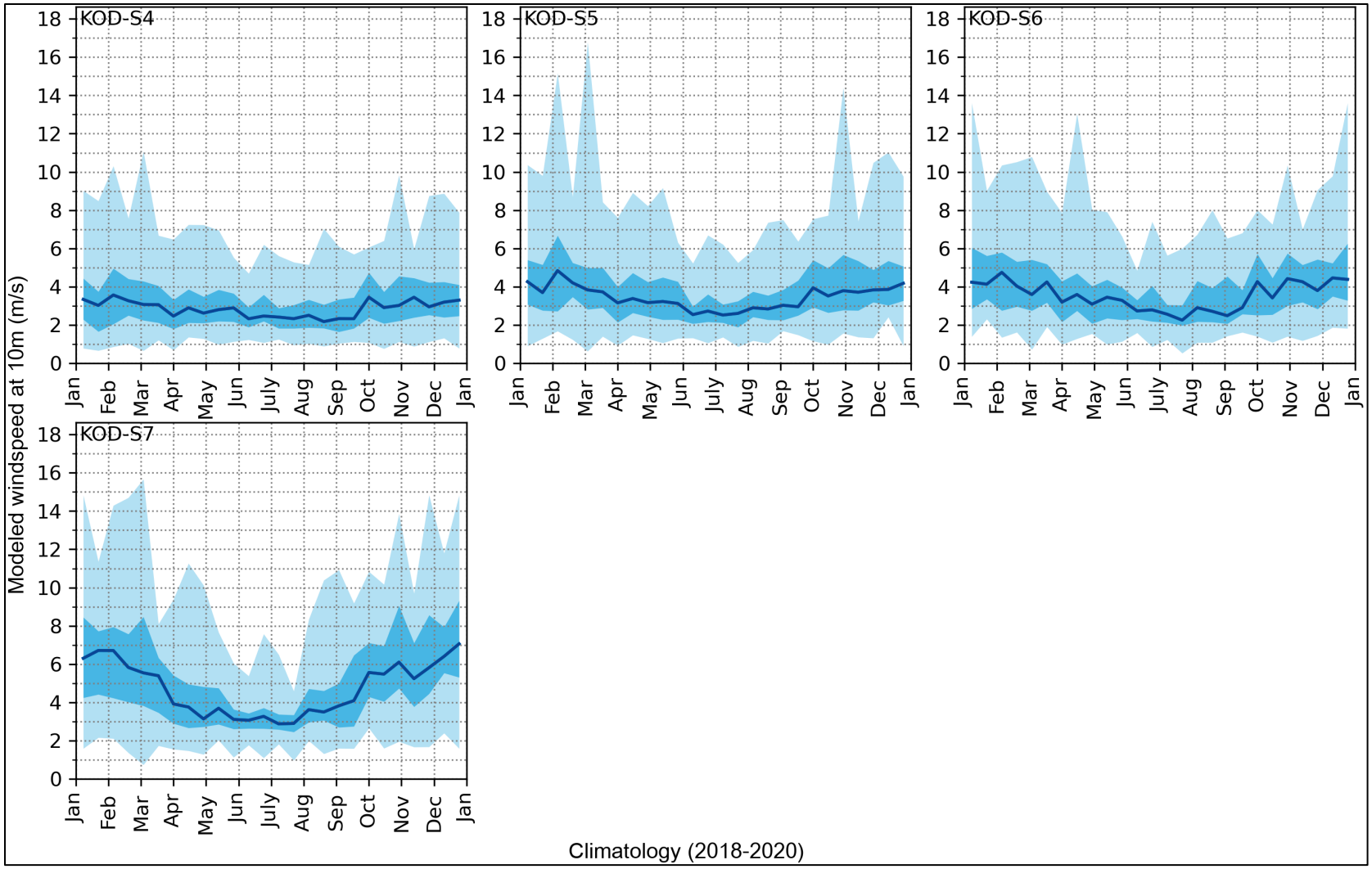


Figure 3.77. Wind speed at 10-m altitude for a subset of options from the Kodiak Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

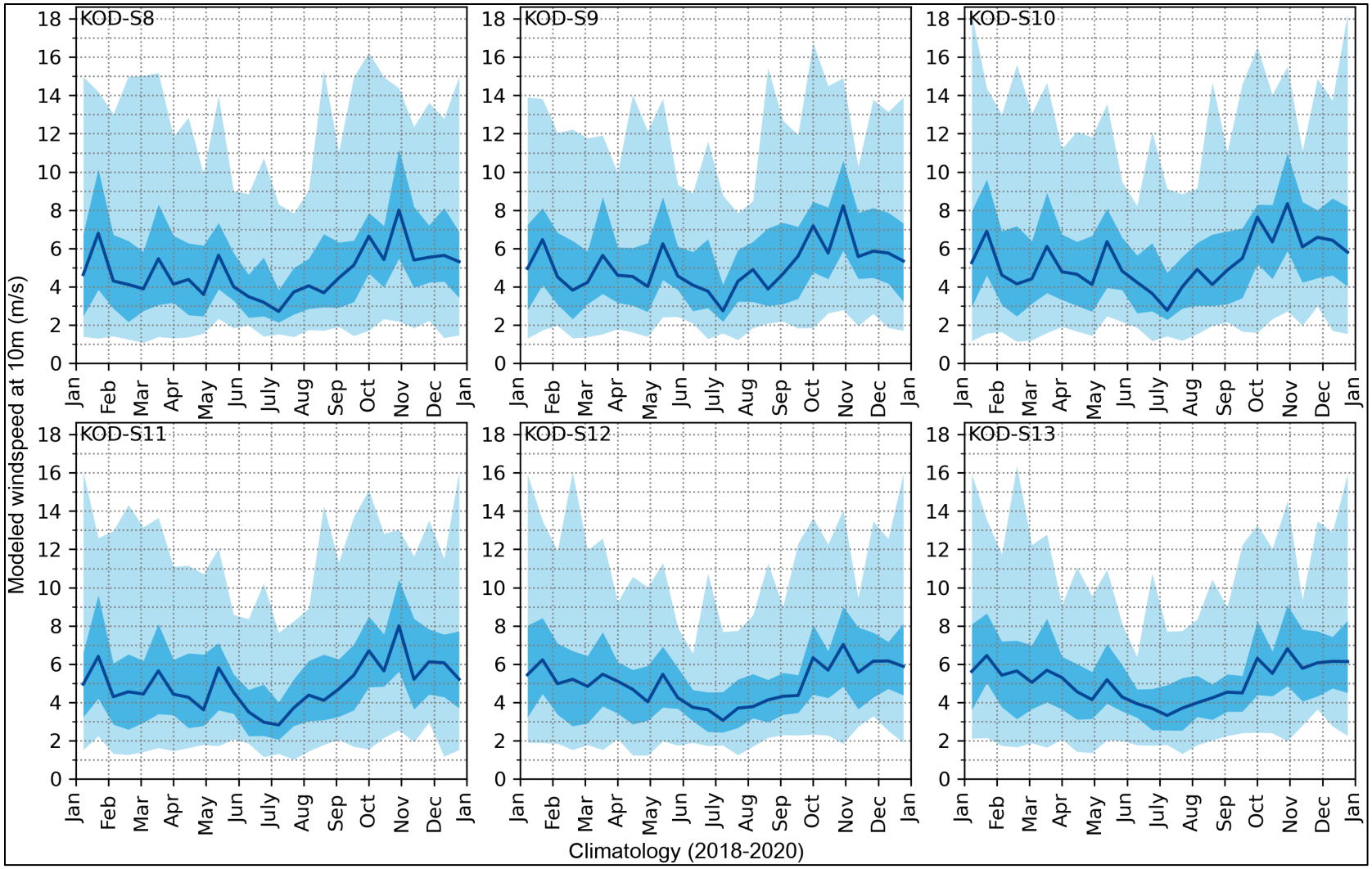


Figure 3.78. Wind speed at 10-m altitude for a subset of options from the Kodiak Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

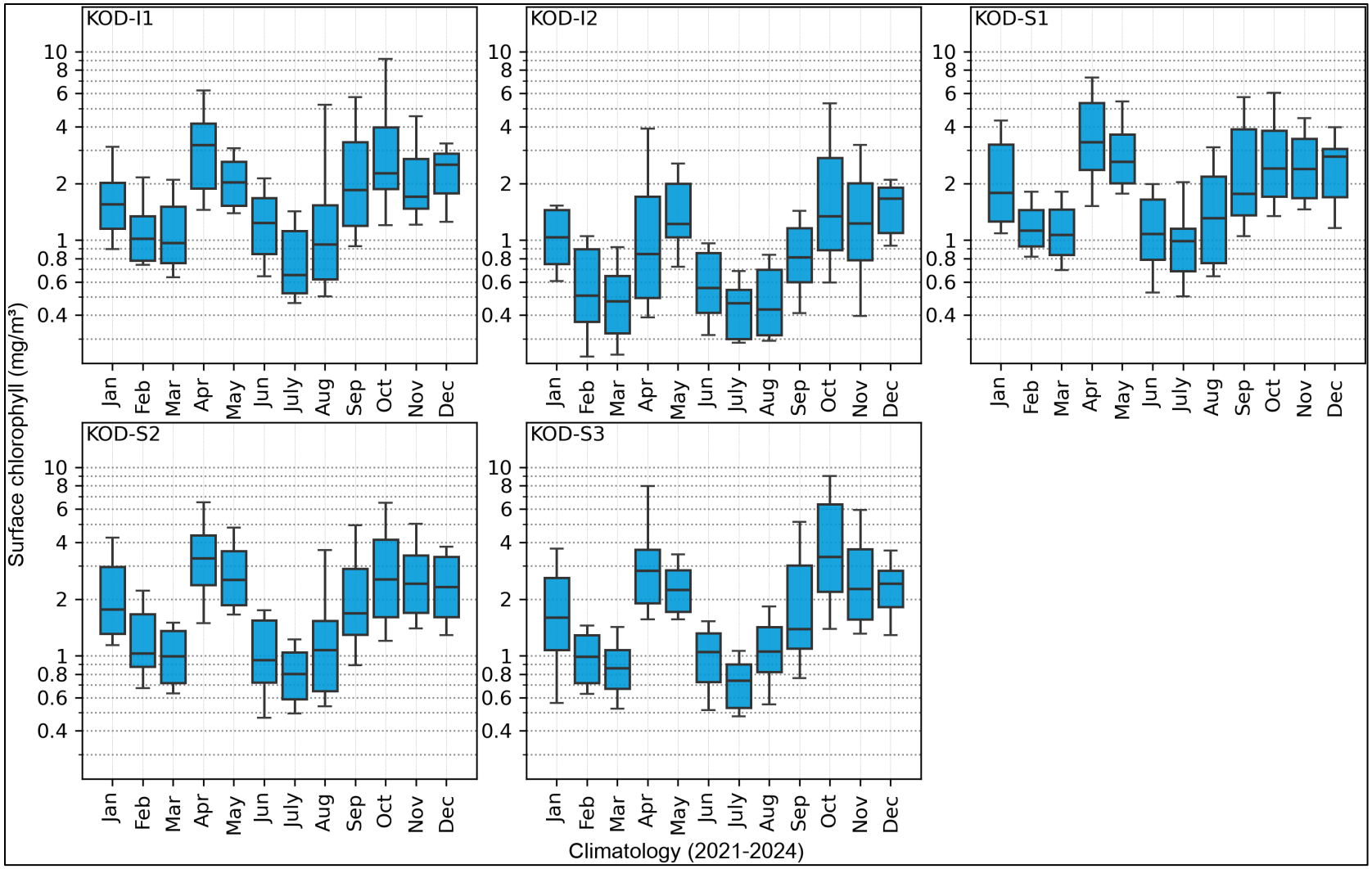


Figure 3.79. Monthly climatological surface chlorophyll *a* for a subset of options from the Kodiak Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

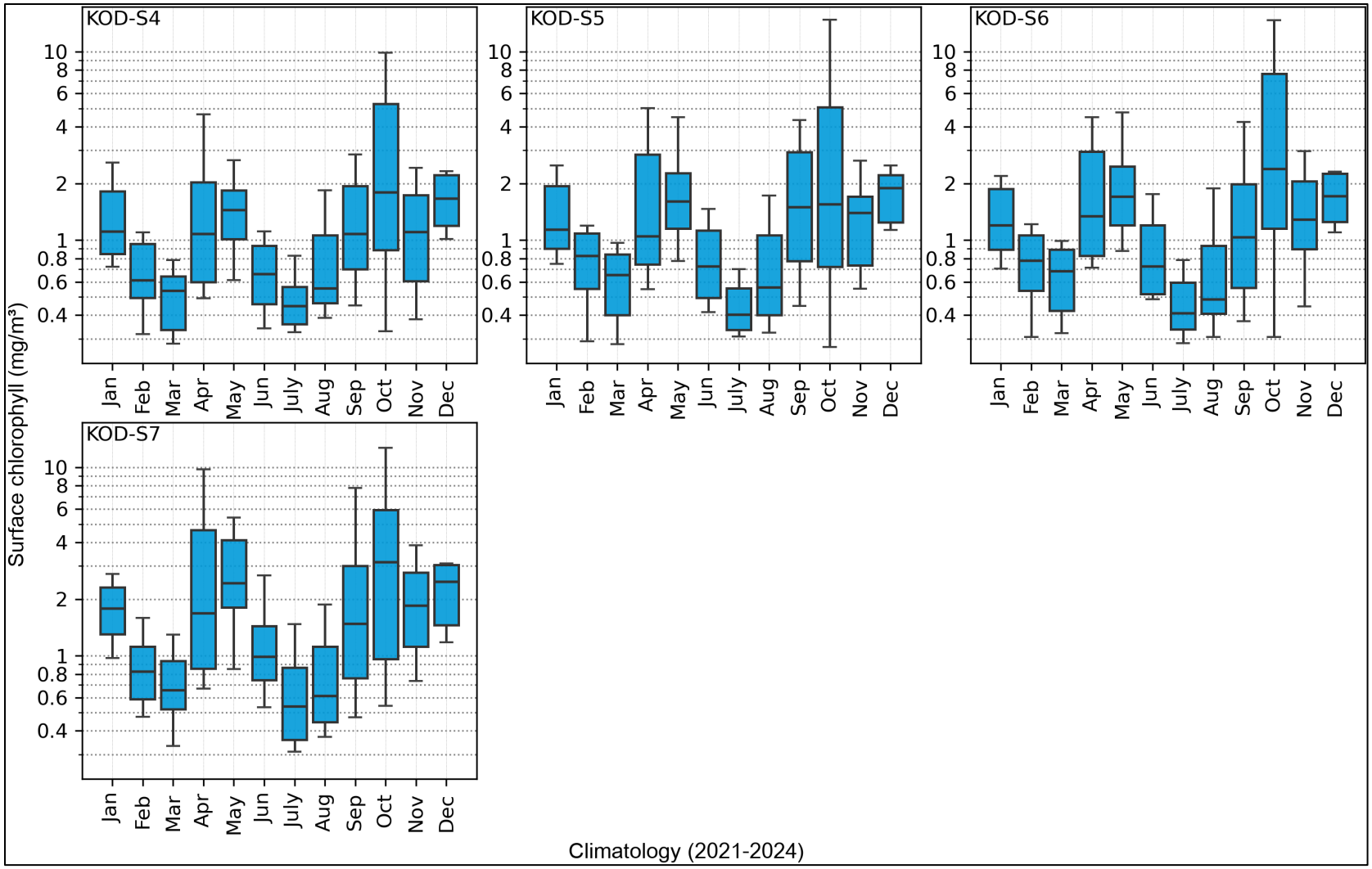


Figure 3.80. Monthly climatological surface chlorophyll *a* for a subset of options from the Kodiak Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

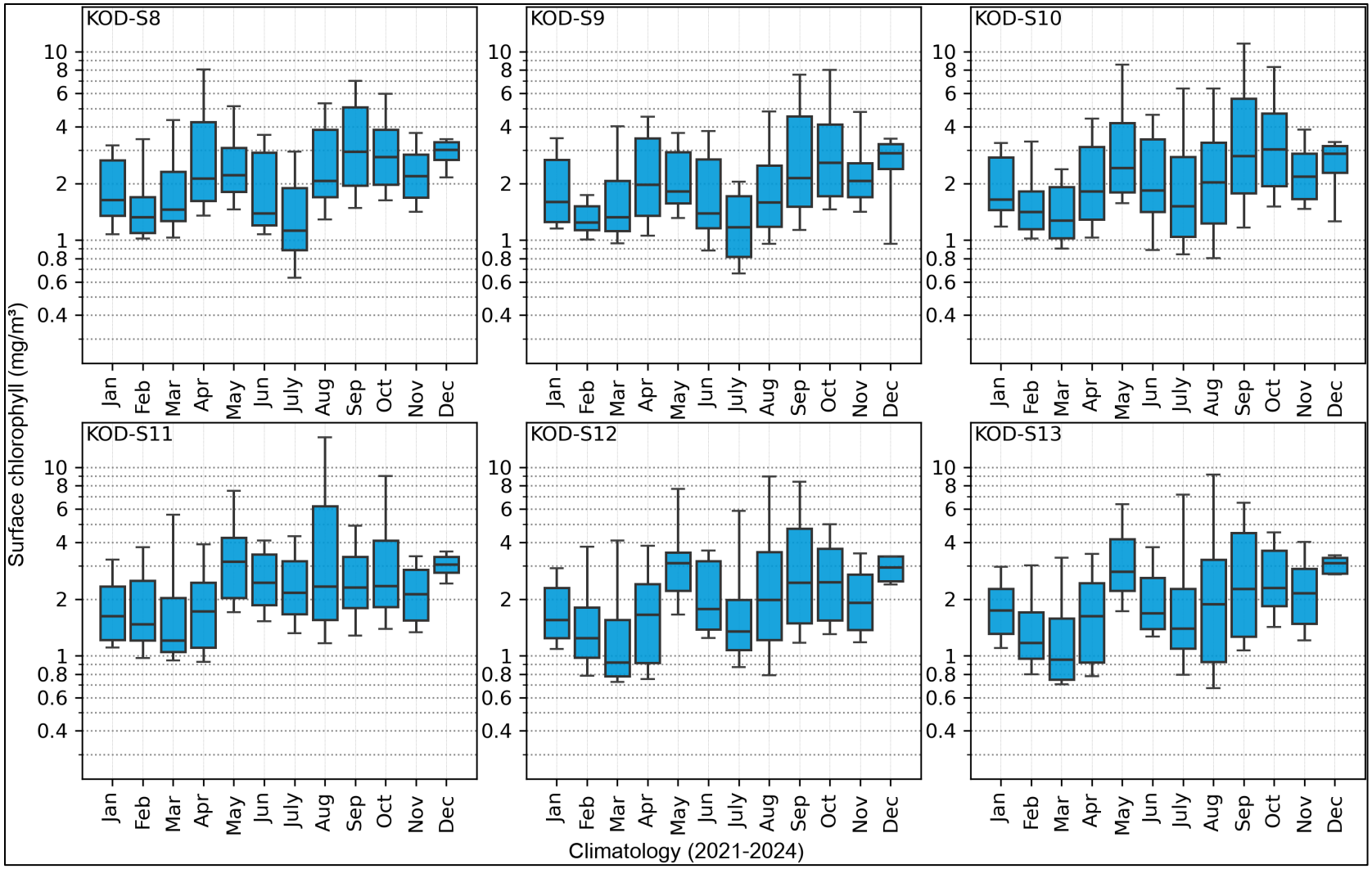


Figure 3.81. Monthly climatological surface chlorophyll *a* for a subset of options from the Kodiak Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

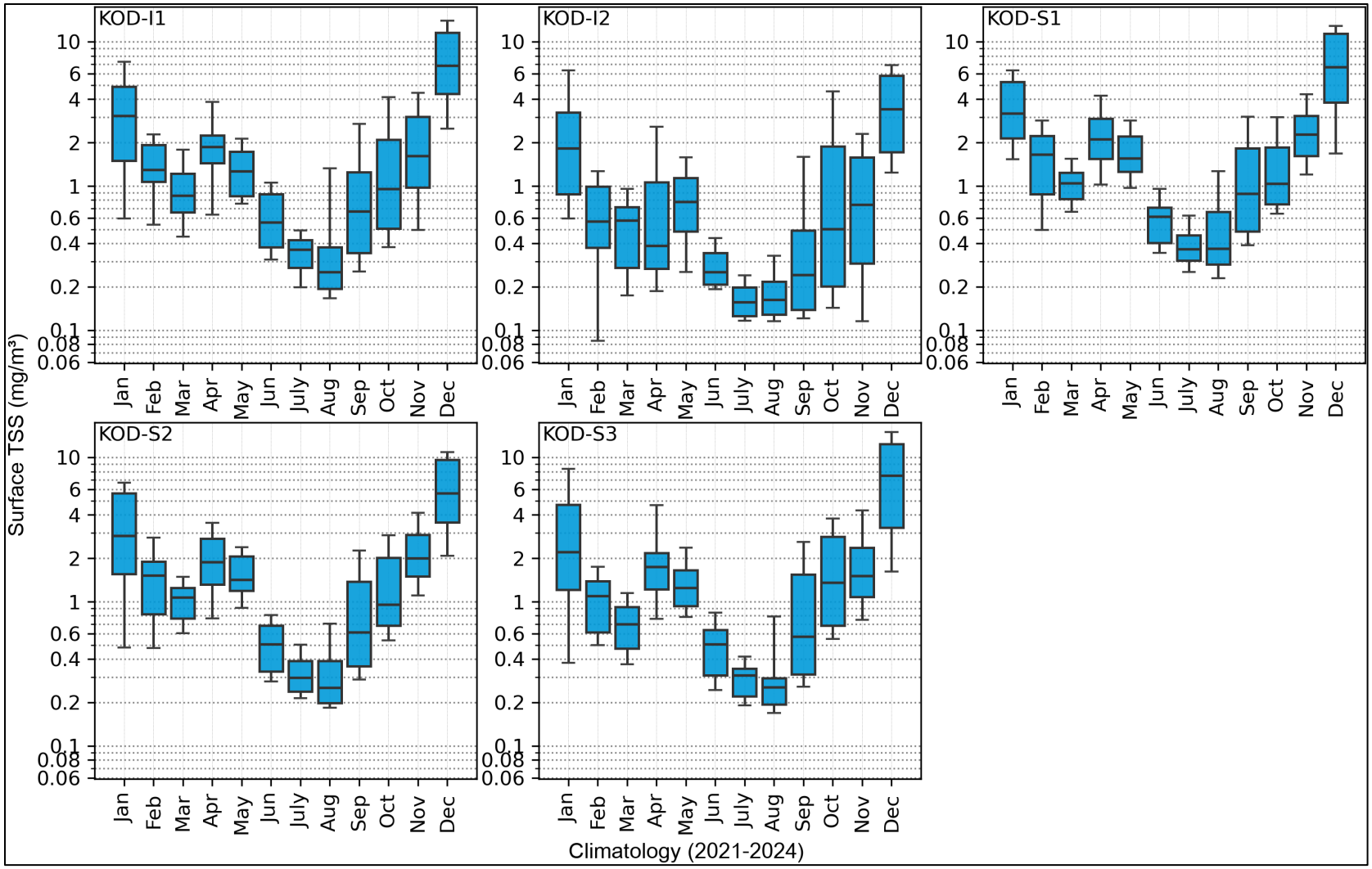


Figure 3.82. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Kodiak Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

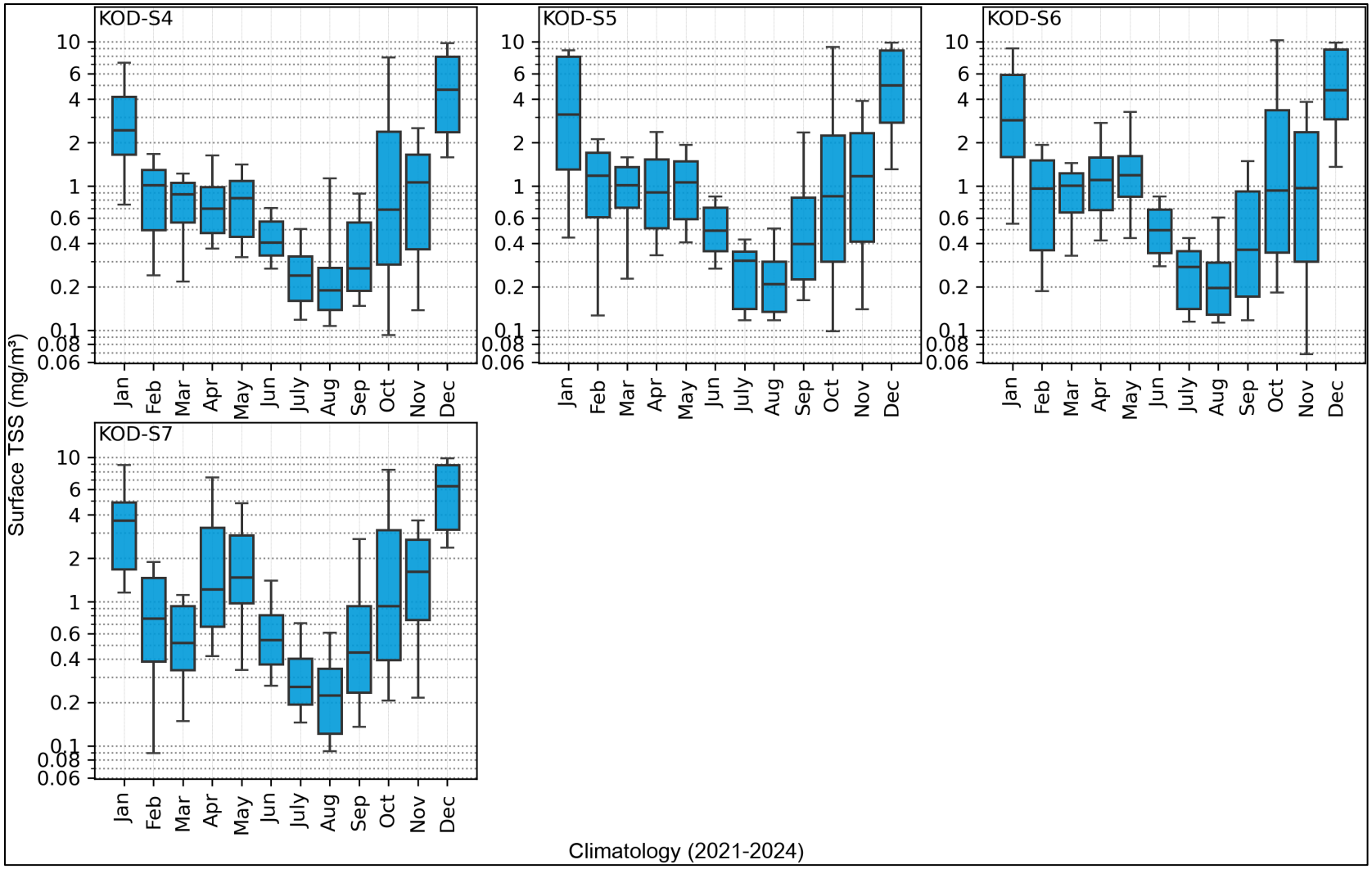


Figure 3.83. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Kodiak Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

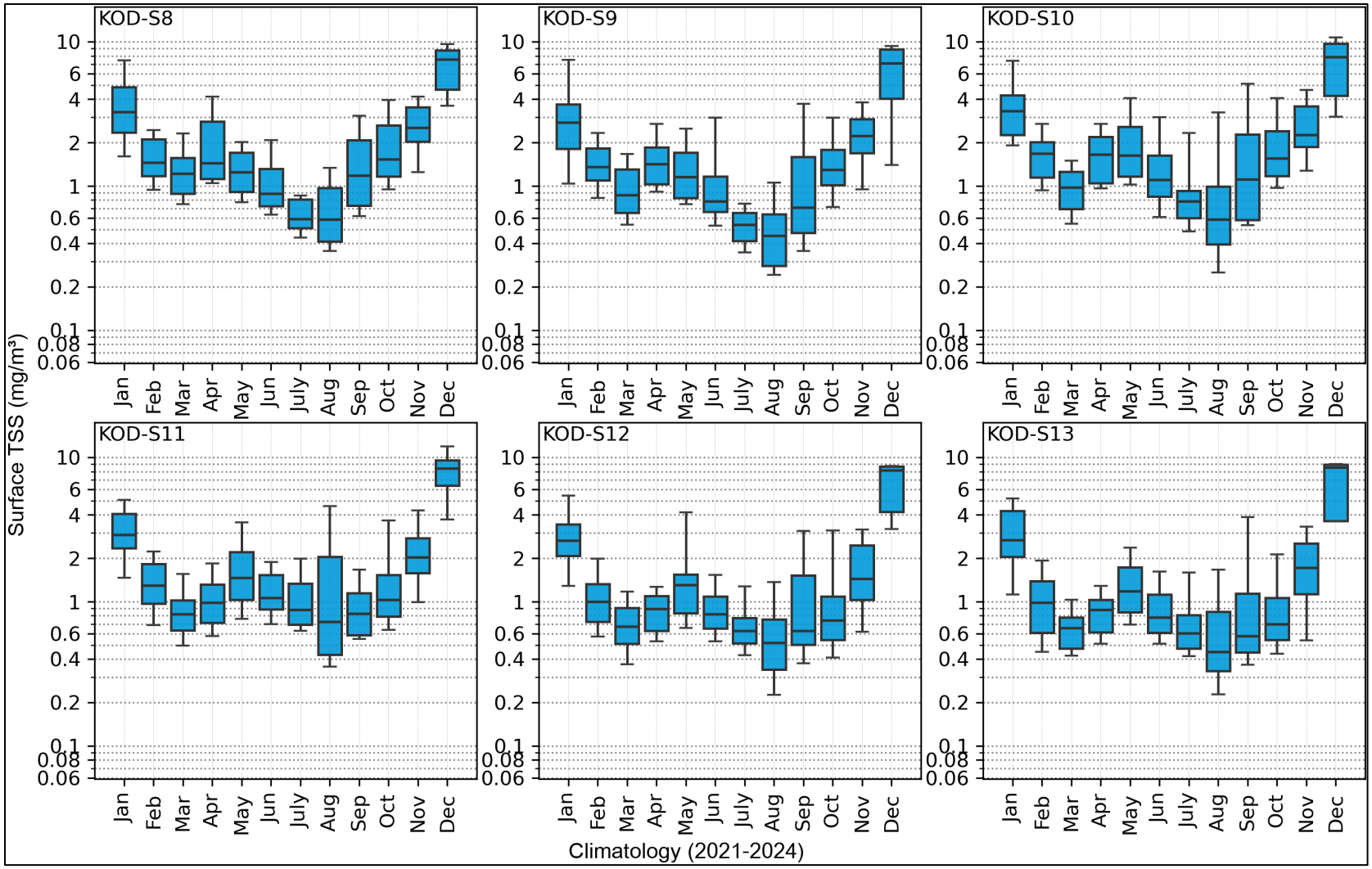


Figure 3.84. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Kodiak Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

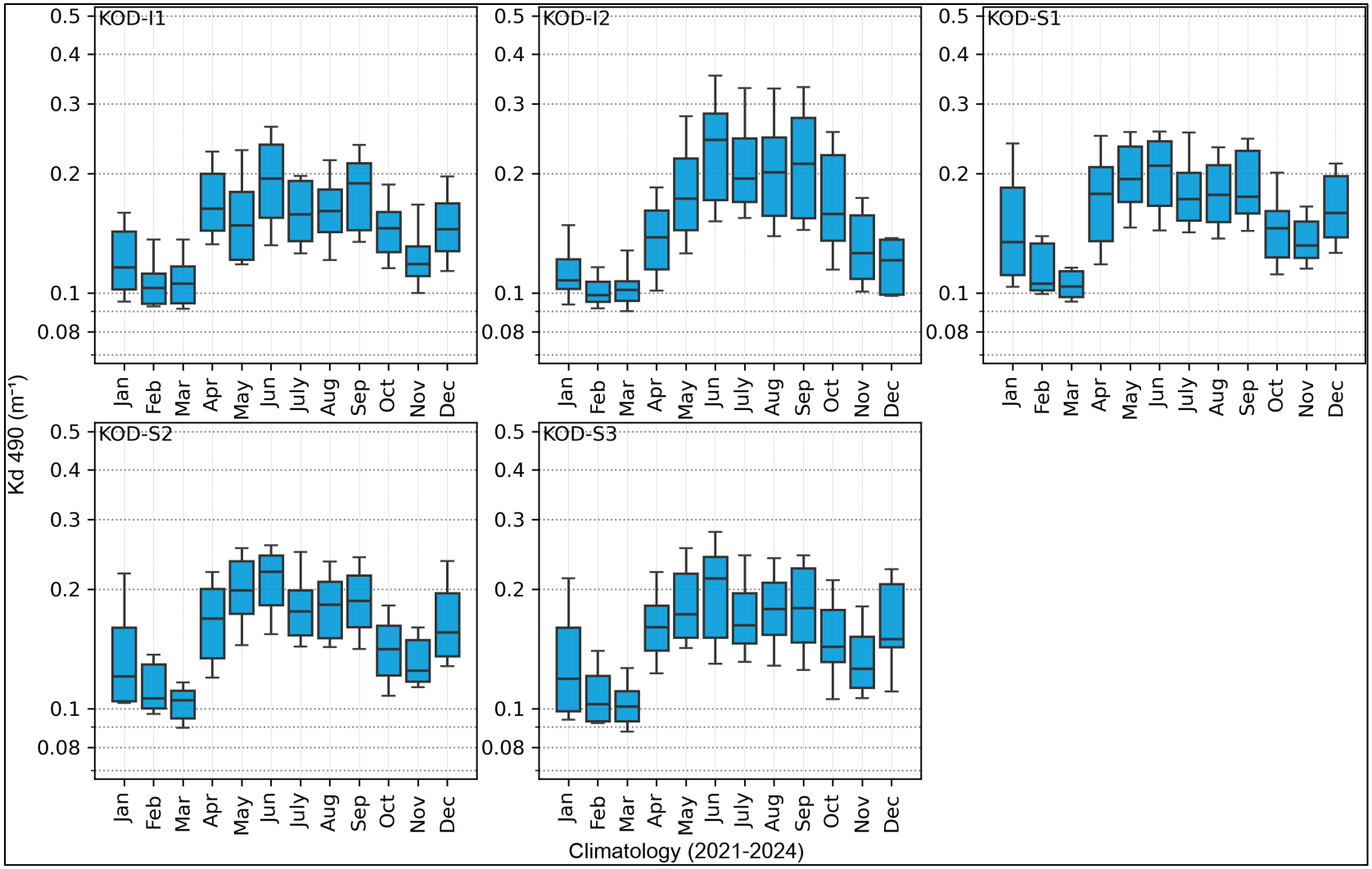


Figure 3.85. Monthly climatological light attenuation, Kd(490), for a subset of options from the Kodiak Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

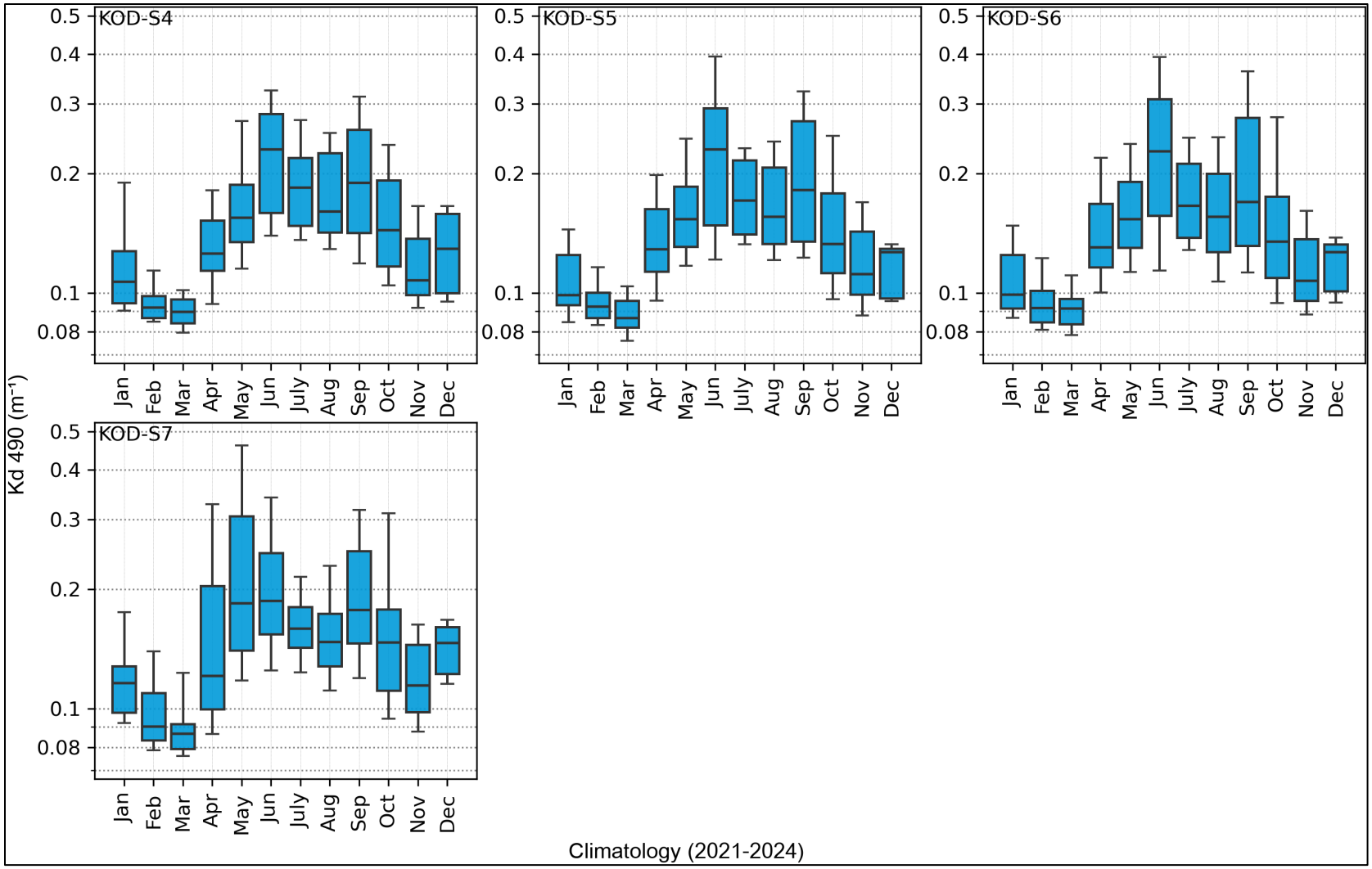


Figure 3.86. Monthly climatological light attenuation, Kd(490), for a subset of options from the Kodiak Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

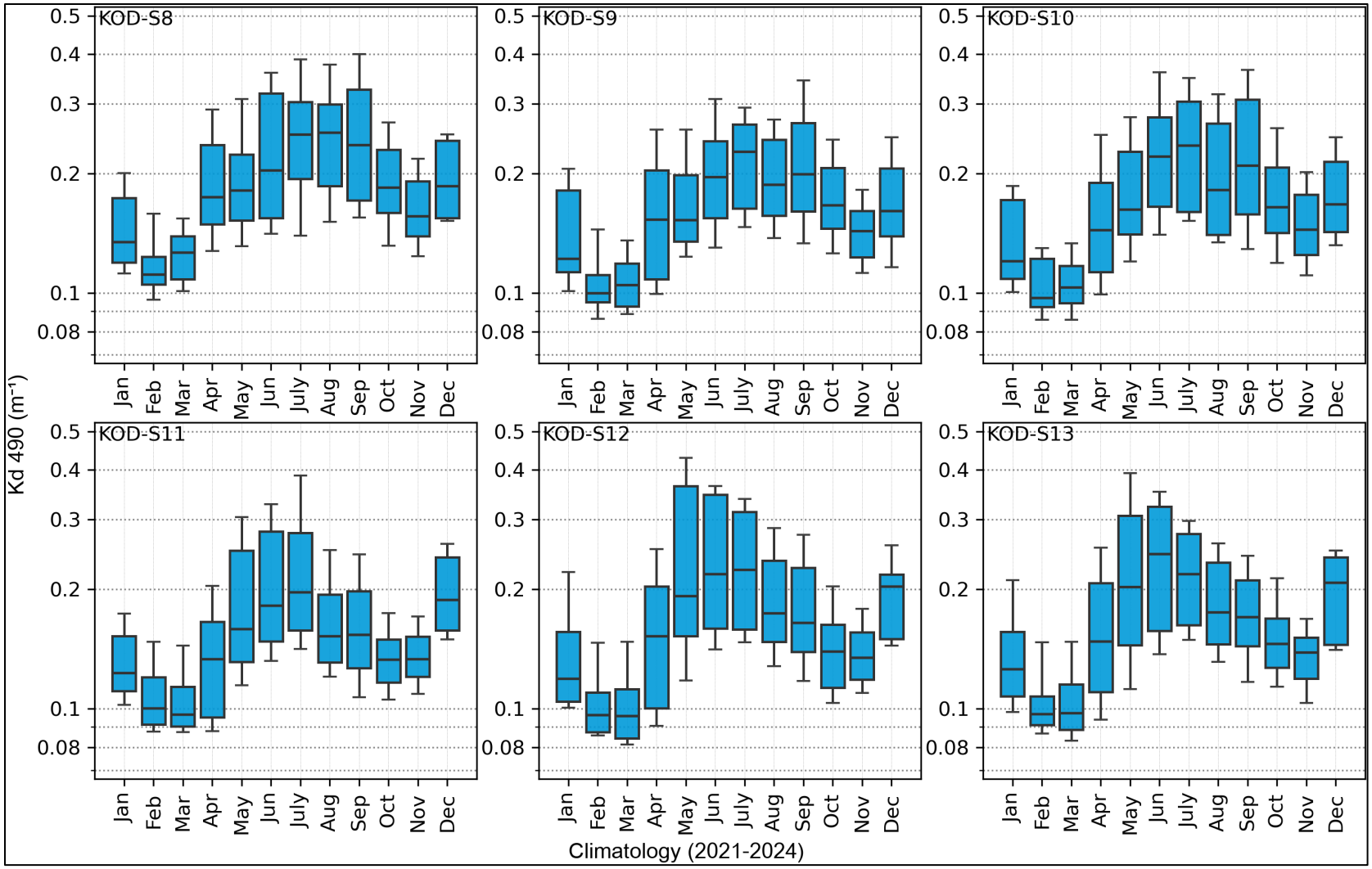


Figure 3.87. Monthly climatological light attenuation, Kd(490) for a subset of options from the Kodiak Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

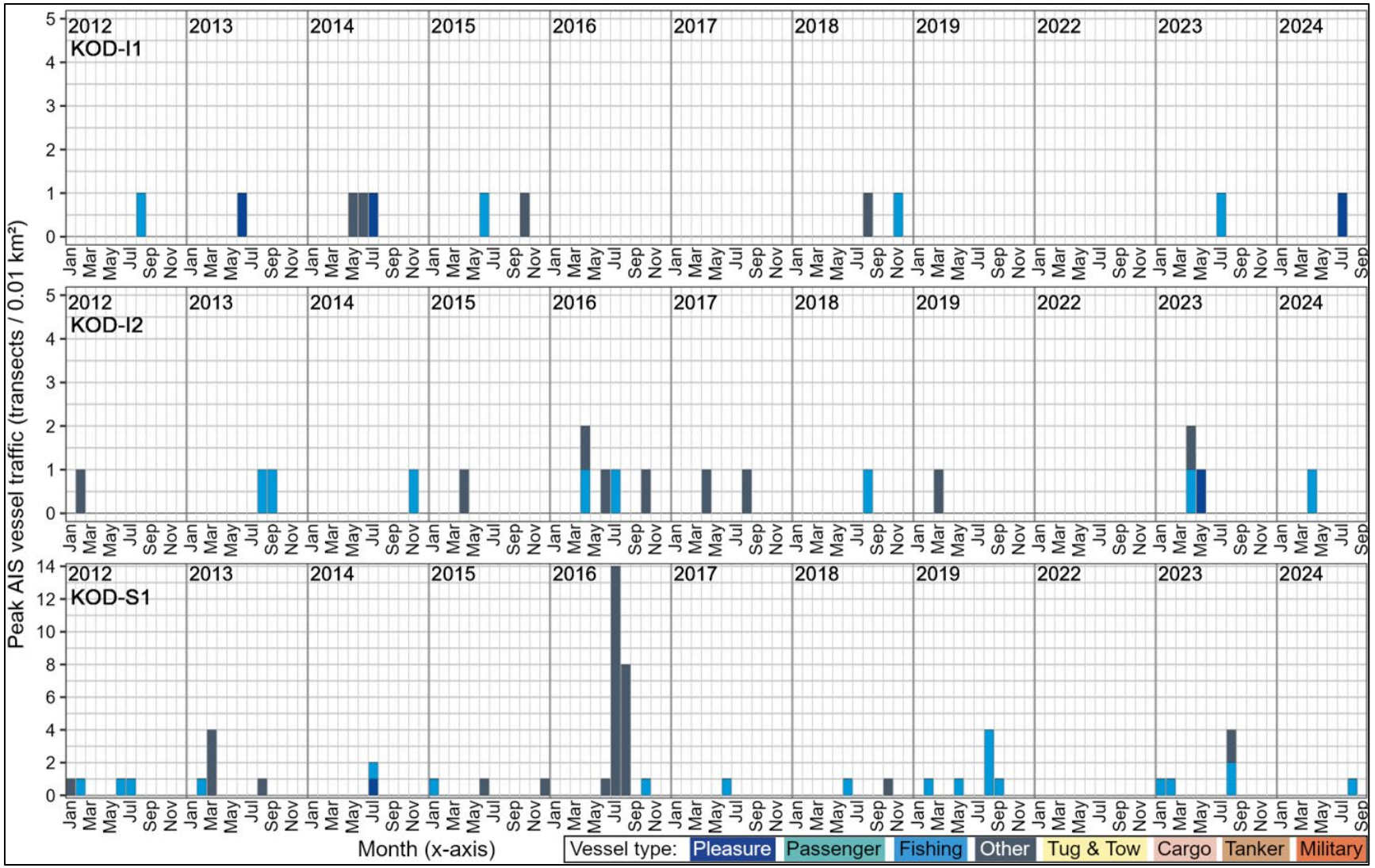


Figure 3.88. Monthly peak vessel traffic activity within options from a subset of the Kodiak Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

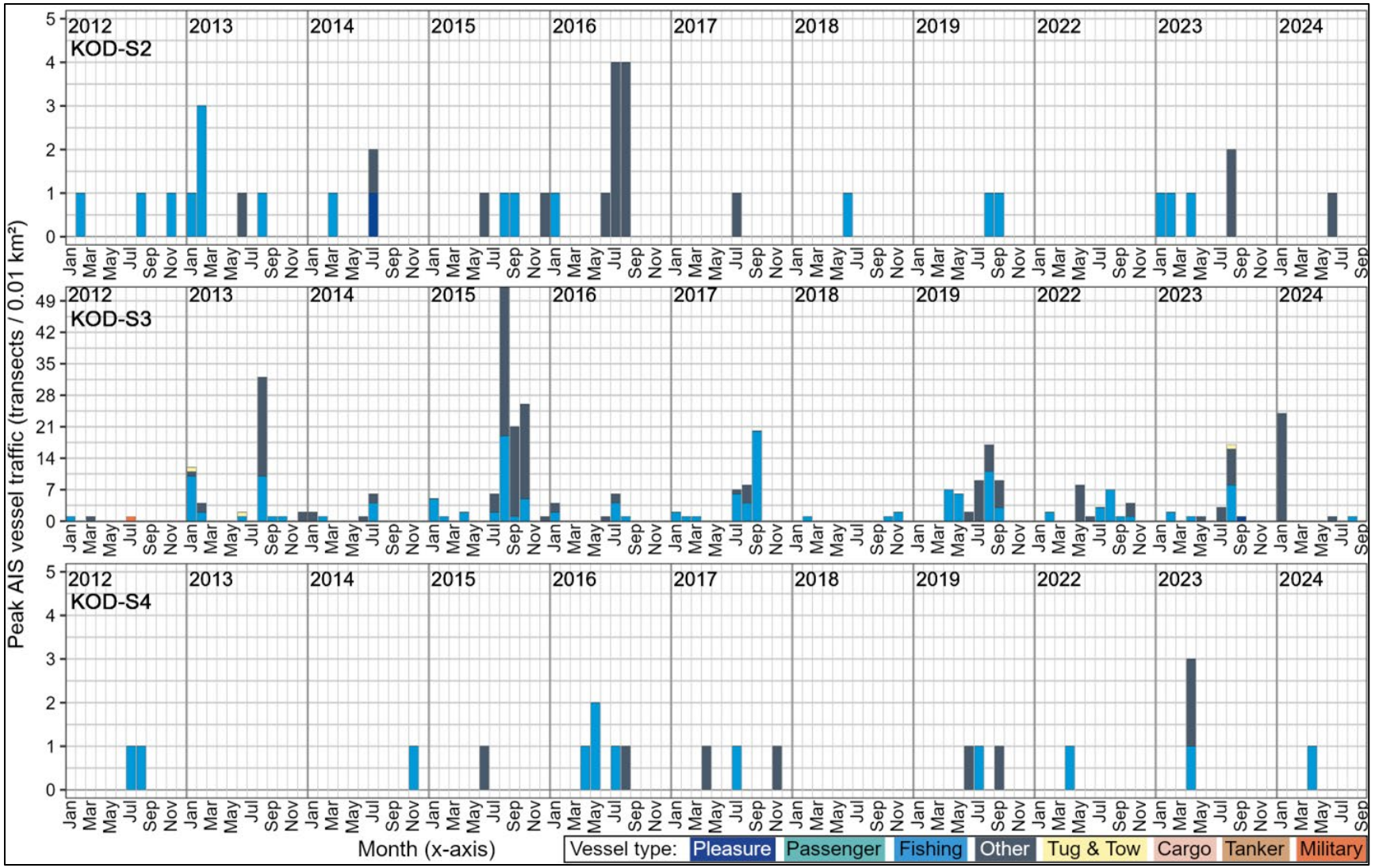


Figure 3.89. Monthly peak vessel traffic activity within options from a subset of the Kodiak Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

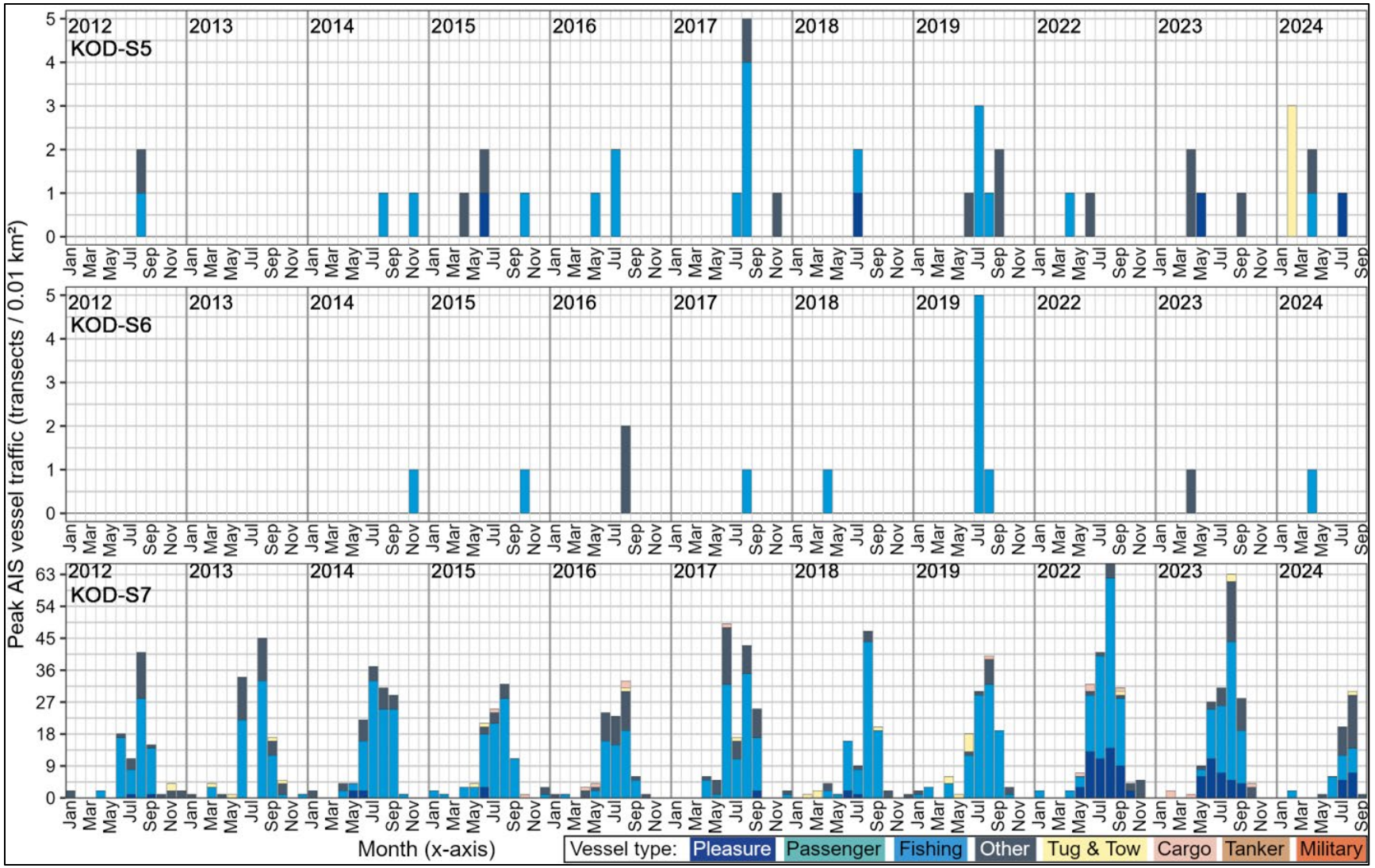


Figure 3.90. Monthly peak vessel traffic activity within options from a subset of the Kodiak Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

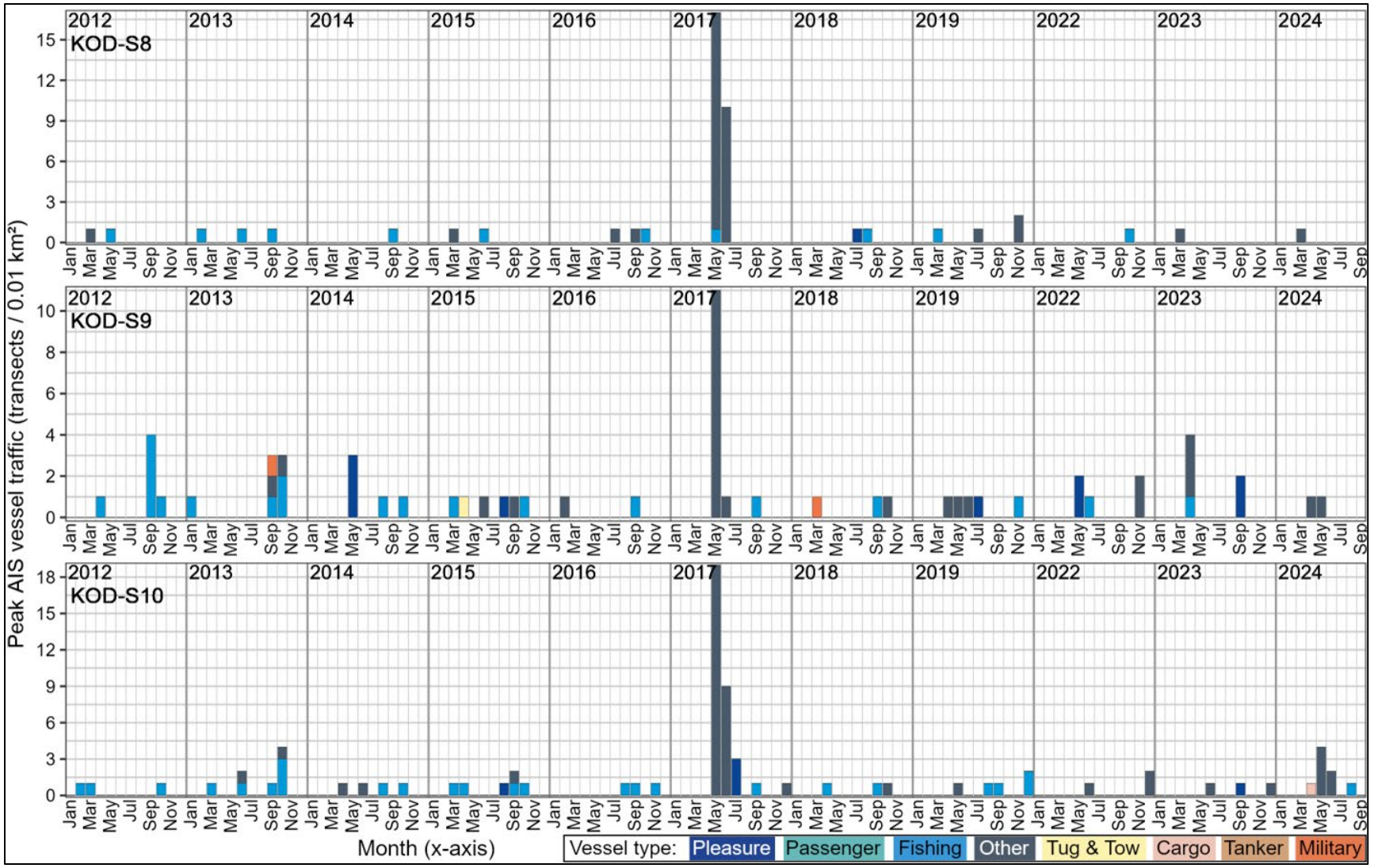


Figure 3.91. Monthly peak vessel traffic activity within options from a subset of the Kodiak Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01 km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

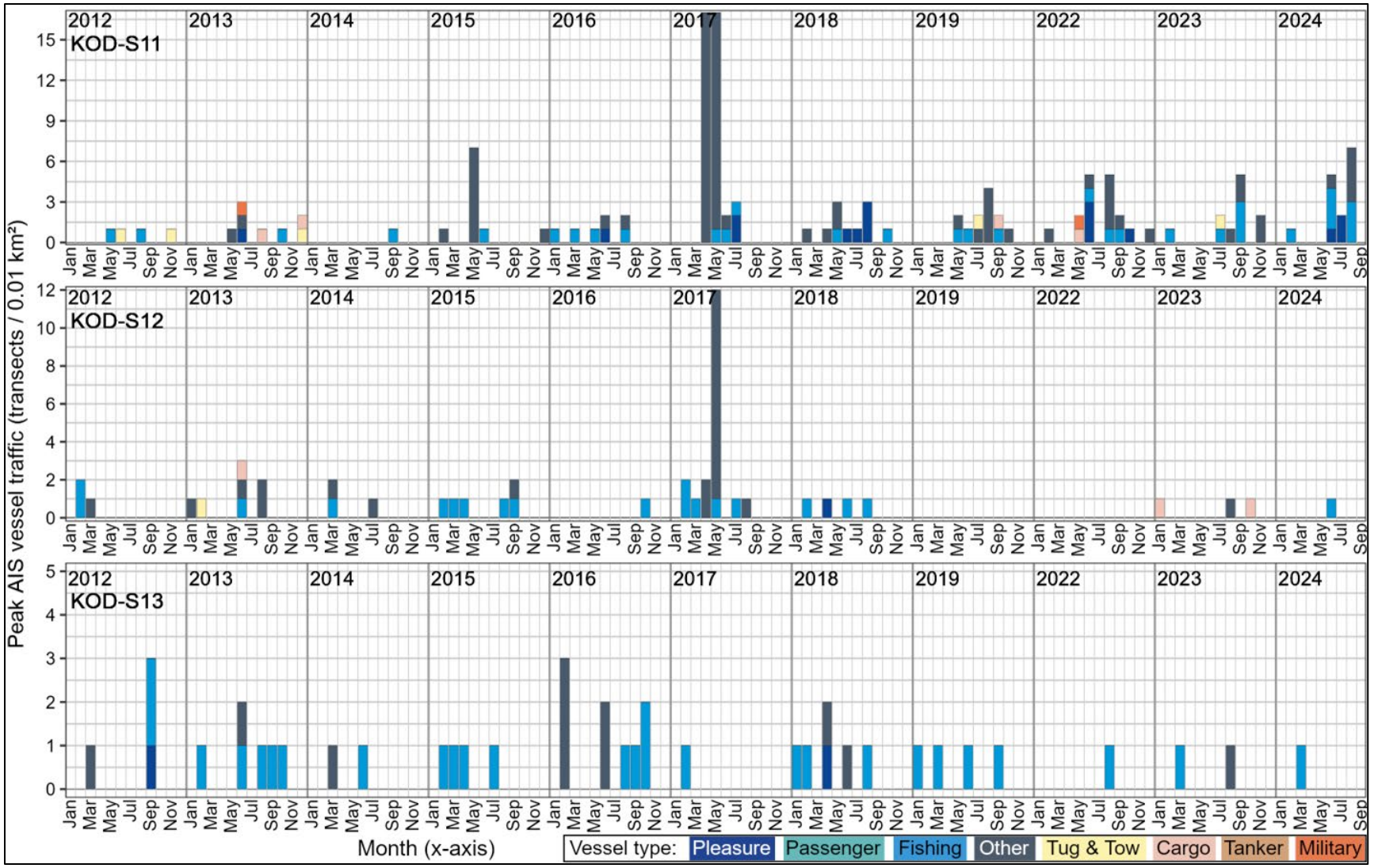


Figure 3.92. Monthly peak vessel traffic activity within options from a subset of the Kodiak Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

KOD-I1

AOA option KOD-I1 is a 52-ac intertidal site within the Southwest extent of the Kodiak Study Area, located 17 km (8.9 nm) from Old Harbor (centroid: 57.0893 N, 153.4838 W). The site is located within subunits GU, Tideland Resource Management Zone (TRMZ) of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 1.4 m (4.5 ft) to 7.7 m (25 ft) with an average depth of 3.9 m (13 ft). At MHW the depth ranges from 4.6 m (15 ft) to 11 m (36 ft) with an average depth of 7.1 m (23 ft). KOD-I1 has an average slope of 1.4° and maximum slope of 4.9°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'gravel flat wide', 'ramp with gravel and sand beach wide', and classifies the biological wave exposure as semi-exposed. The site abuts the Kodiak National Wildlife Refuge, which has jurisdiction over land above the mean high tide line.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.1°C, a minimum daily average of 3.7°C, and a maximum daily average of 12°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-I1 averaged 6.0 m/s, with a minimum of 1.3 m/s and a maximum of 18 m/s. Chlorophyll a concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in April (3.2 mg/m^3) and lowest in July (0.42 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in May (1.7 mg/m^3) and lowest in July (0.21 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.30 m^{-1}) and lowest in February (0.10 m^{-1}).

Industry and National Security Considerations

KOD-I1 is within 5 km of at least one documented ferry route (3.8 km). The site is within ADFG salmon (group code G) statistical units 25853 and 25851 and the groundfish (group code G) statistical unit 535703. KOD-I1 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel transect counts peaking at only one. There is not enough AIS activity observed to identify changes over time or regular patterns from year to year.

Natural Resource Considerations

KOD-I1 is within 5 km of at least one documented location from each of the following natural resources: historically mapped eelgrass sites (1.6 km), fin whale feeding BIA (0.11 km), gray whale feeding BIA (0.11 km), humpback whale feeding BIA (0.11 km), gray whale migratory route BIA (0.11 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (1.8 km). KOD-I1 is in proximity to a seabird colony on John Island. This is a sizeable seabird colony with species prone to nest failure resulting from disturbance. KOD-I1 overlaps the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There is one Alaska Heritage Resources Survey site within approximately 5 km of KOD-I1. This site may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Akhiok, Alutiiq Tribe of Old Harbor, and Kaguyak Village. Given this proximity, cultural resources could be present to an unknown extent.

KOD-I2

AOA option KOD-I2 is a 78-ac intertidal site within the Northwest extent of the Kodiak Study Area, located 20 km (11 nm) from Larson Bay (centroid: 57.4432 N, 153.8296 W). The site is located within subunit GU of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 20 m (67 ft) to 35 m (110 ft) with an average depth of 27 m (89 ft). At MHW the depth ranges from 23 m (77 ft) to 38 m (120 ft) with an average depth of 30 m (99 ft). KOD-I2 has an average slope of 5.1° and maximum slope of 8.1°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'cliff with gravel and sand beach', 'gravel beach narrow', 'sand and gravel flat or fan', 'cliff with gravel beach', 'sand and gravel beach narrow', and classifies the biological wave exposure as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.1°C, a minimum daily average of 3.6°C, and a maximum daily average of 12°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-I2 averaged 4.0 m/s, with a minimum of 0.66 m/s and a maximum of 18 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (1.6 mg/m³) and lowest in August (0.34 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in May (0.59 mg/m³) and lowest in July (0.14 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in September (0.28 m^{-1}) and lowest in February (0.096 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 25421 and the groundfish (group code G) statistical unit 535701. KOD-I2 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at two total transects (April 2016, April 2023). The primary vessel types observed are other and fishing. AIS activity over the most recent five years has decreased by roughly 37% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KOD-I2 is within 5 km of at least one documented location from each of the following natural resources: historically mapped eelgrass sites (0.51 km), harbor seal key haulouts (1.8 km), fin whale feeding BIA (0 km), humpback whale feeding BIA (0 km), gray whale migratory route BIA (0 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (1.4 km). KOD-I2 is in proximity to a seabird colony on Amook Island. This is a sizeable seabird colony with species prone to nest failure resulting from disturbance. KOD-I2 also overlaps the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are seven Alaska Heritage Resources Survey sites within approximately 5 km of KOD-I2. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Karluk, Alutiiq Tribe of Old Harbor, and Native Village of Larsen

Bay. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S1

AOA option KOD-S1 is a 270-ac subtidal site within the Southwest extent of the Kodiak Study Area, located 19 km (10 nm) from Old Harbor (centroid: 57.0591 N, 153.3506 W). The site is located within subunit GU of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 1.6 m (5.1 ft) to 26 m (84 ft) with an average depth of 13 m (41 ft). At MHW the depth ranges from 4.7 m (15 ft) to 29 m (95 ft) with an average depth of 16 m (52 ft). KOD-S1 has an average slope of 2.9° and maximum slope of 5.2°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-exposed, semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.1°C, a minimum daily average of 3.8°C, and a maximum daily average of 11°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-S1 averaged 3.9 m/s, with a minimum of 1.1 m/s and a maximum of 11 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in April (3.3 mg/m³) and lowest in July (0.65 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in April (3.0 mg/m³) and lowest in July (0.42 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.27 m^{-1}) and lowest in March (0.100 m^{-1}).

Industry and National Security Considerations

KOD-S1 is within 5 km of at least one documented ferry route (3.1 km). The site is within ADFG salmon (group code G) statistical unit 25851 and the groundfish (group code G) statistical unit 535703. KOD-S1 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 14 total transects (July 2016). The primary vessel types observed are other and fishing. AIS activity over the most recent five years has decreased by roughly 49% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KOD-S1 is within 5 km of at least one documented location from each of the following natural resources: deep-sea coral observations (3.6 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (0.25 km), fin whale feeding BIA (1.5 km), gray whale feeding BIA (1.5 km), humpback whale feeding BIA (1.5 km), gray whale migratory route BIA (1.5 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (1.6 km). KOD-S1 is in proximity to a small seabird colony and overlaps the Eastern Kodiak Marine IBA and the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are three Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S1. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Akhiok, Alutiiq Tribe of Old Harbor, and Kaguyak Village. Given this

proximity, cultural resources could be present to an unknown extent.

KOD-S2

AOA option KOD-S2 is a 120-ac subtidal site within the Southwest extent of the Kodiak Study Area, located 18 km (9.6 nm) from Old Harbor (centroid: 57.0711 N, 153.3638 W). The site is located within subunit GU of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 2.5 m (8.2 ft) to 16 m (54 ft) with an average depth of 8.5 m (28 ft). At MHW the depth ranges from 5.6 m (19 ft) to 20 m (64 ft) with an average depth of 12 m (38 ft). KOD-S2 has an average slope of 2.6° and maximum slope of 4.9°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected, semi-exposed, exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.1°C, a minimum daily average of 3.8°C, and a maximum daily average of 11°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-S2 averaged 3.6 m/s, with a minimum of 1.2 m/s and a maximum of 11 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (2.5 mg/m³) and lowest in July (0.57 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in April (2.3 mg/m³) and lowest in August (0.39 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in May (0.27 m^{-1}) and lowest in March (0.099 m^{-1}).

Industry and National Security Considerations

KOD-S2 is within 5 km of at least one documented ferry route (2.0 km). The site is within ADFG salmon (group code G) statistical unit 25851 and the groundfish (group code G) statistical unit 535703. KOD-S2 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 4 total transects (July 2016, August 2016). The primary vessel types observed are fishing and other. AIS activity over the most recent five years has decreased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KOD-S2 is within 5 km of at least one documented location from each of the following natural resources: deep-sea coral observations (2.7 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (1.6 km), fin whale feeding BIA (1.1 km), gray whale feeding BIA (1.1 km), humpback whale feeding BIA (1.1 km), gray whale migratory route BIA (1.1 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (0.18 km). KOD-S2 is adjacent to a small seabird colony and overlaps the Eastern Kodiak Marine IBA and the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S2. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Akhiok, Alutiiq Tribe of Old Harbor, and Kaguyak Village. Given this

proximity, cultural resources could be present to an unknown extent.

KOD-S3

AOA option KOD-S3 is a 330-ac subtidal site within the Southwest extent of the Kodiak Study Area, located 12 km (6.4 nm) from Old Harbor (centroid: 57.1086 N, 153.3627 W). The site is located within subunit GU of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 1.6 m (5.3 ft) to 31 m (100 ft) with an average depth of 17 m (56 ft). At MHW the depth ranges from 4.8 m (16 ft) to 34 m (110 ft) with an average depth of 20 m (66 ft). KOD-S3 has an average slope of 1.9° and maximum slope of 5.4°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected, semi-exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.1°C, a minimum daily average of 3.8°C, and a maximum daily average of 11°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-S3 averaged 3.6 m/s, with a minimum of 1.1 m/s and a maximum of 11 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in April (3.6 mg/m³) and lowest in July (0.49 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in April (2.7 mg/m³) and lowest in July (0.32 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in September (0.27 m^{-1}) and lowest in March (0.095 m^{-1}).

Industry and National Security Considerations

KOD-S3 is within 5 km of at least one documented ferry route (0.94 km). The site is within ADFG salmon (group code G) statistical unit 25851 and the groundfish (group code G) statistical unit 535703. KOD-S3 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 52 total transects (August 2015). The primary vessel types observed are other and fishing. AIS activity over the most recent five years has decreased by roughly 29% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

KOD-S3 is within 5 km of at least one documented location from each of the following natural resources: historically mapped eelgrass sites (0 km), fin whale feeding BIA (0 km), gray whale feeding BIA (0 km), humpback whale feeding BIA (0 km), gray whale migratory route BIA (0 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (3.8 km). KOD-S3 is in proximity to a small seabird colony and overlaps the Eastern Kodiak Marine IBA and the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are five Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S3. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Alutiiq Tribe of Old Harbor and Kaguyak Village. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S4

AOA option KOD-S4 is a 57-ac subtidal site within the Northwest extent of the Kodiak Study Area, located 21 km (11 nm) from Larson Bay (centroid: 57.405 N, 153.8351 W). The site is located within subunits GU, TRMZ of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 28 m (91 ft) to 48 m (160 ft) with an average depth of 38 m (120 ft). At MHW the depth ranges from 31 m (100 ft) to 51 m (170 ft) with an average depth of 41 m (130 ft). KOD-S4 has an average slope of 1.6° and maximum slope of 2.0°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (21 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.1°C, a minimum daily average of 3.6°C, and a maximum daily average of 12°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-S4 averaged 3.1 m/s, with a minimum of 0.66 m/s and a maximum of 11 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (1.9 mg/m³) and lowest in March (0.47 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (0.76 mg/m³) and lowest in July (0.29 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.32 m^{-1}) and lowest in March (0.085 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 25421 and the groundfish (group code G) statistical unit 535701. KOD-S4 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at three total transects (April 2023). The primary vessel types observed are fishing and other. AIS activity over the most recent five years has decreased by roughly 16% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KOD-S4 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (4.4 km), historically mapped eelgrass sites (0.083 km), harbor seal key haulouts (0.26 km), fin whale feeding BIA (0 km), humpback whale feeding BIA (0 km), gray whale migratory route BIA (0 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (0 km). KOD-S4 overlaps the Alf Islands seabird colony. This is a sizeable seabird colony with species prone to nest failure resulting from disturbance. This site also overlaps the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are four Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S4. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Karluk, Alutiiq Tribe of Old Harbor, and Native Village of Larsen

Bay. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S5

AOA option KOD-S5 is a 79-ac subtidal site within the Northwest extent of the Kodiak Study Area, located 19 km (10 nm) from Larson Bay (centroid: 57.4184 N, 153.8472 W). The site is located within subunits GU, TRMZ of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 23 m (75 ft) to 47 m (150 ft) with an average depth of 34 m (110 ft). At MHW the depth ranges from 26 m (85 ft) to 50 m (160 ft) with an average depth of 37 m (120 ft). KOD-S5 has an average slope of 3.5° and maximum slope of 5.4°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (73 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.1°C, a minimum daily average of 3.6°C, and a maximum daily average of 12°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-S5 averaged 3.8 m/s, with a minimum of 0.63 m/s and a maximum of 17 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (2.4 mg/m³) and lowest in July (0.48 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (1.2 mg/m³) and lowest in July (0.25 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.37 m^{-1}) and lowest in March (0.085 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 25421 and the groundfish (group code G) statistical unit 535701. KOD-S5 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at five total transects (August 2017). The primary vessel types observed are fishing, other, and pleasure. AIS activity over the most recent five years has increased by roughly 47% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KOD-S5 is within 5 km of at least one documented location from each of the following natural resources: historically mapped eelgrass sites (1.3 km), harbor seal key haulouts (0.13 km), fin whale feeding BIA (0 km), humpback whale feeding BIA (0 km), gray whale migratory route BIA (0 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (0 km). KOD-S5 overlaps the Alf Islands seabird colony. This is a sizeable seabird colony with species prone to nest failure resulting from disturbance. This site also overlaps the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are five Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S5. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Karluk, Alutiiq Tribe of Old Harbor, and Native Village of Larsen Bay. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S6

AOA option KOD-S6 is an 86-ac subtidal site within the Northwest extent of the Kodiak Study Area, located 18 km (9.7 nm) from Larson Bay (centroid: 57.4201 N, 153.8785 W). The site is located within subunits GU, TRMZ of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 18 m (60 ft) to 49 m (160 ft) with an average depth of 32 m (110 ft). At MHW the depth ranges from 22 m (71 ft) to 52 m (170 ft) with an average depth of 35 m (120 ft). KOD-S6 has an average slope of 3.3° and maximum slope of 6.3°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (32 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.1°C, a minimum daily average of 3.6°C, and a maximum daily average of 12°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-S6 averaged 3.8 m/s, with a minimum of 0.53 m/s and a maximum of 14 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in October (2.7 mg/m^3) and lowest in July (0.47 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in May (1.2 mg/m^3) and lowest in July (0.25 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.32 m^{-1}) and lowest in March (0.086 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 25421 and the groundfish (group code G) statistical unit 535701. KOD-S6 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at five total transects (July 2019). The primary vessel types observed are fishing and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KOD-S6 is within 5 km of at least one documented location from each of the following natural resources: historically mapped eelgrass sites (2.6 km), harbor seal key haulouts (1.6 km), fin whale feeding BIA (0 km), humpback whale feeding BIA (0 km), gray whale migratory route BIA (0 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (0 km). KOD-S6 overlaps the Twin Islands seabird colony. This is a sizeable seabird colony with species prone to nest failure resulting from disturbance. This site also overlaps the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are seven Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S6. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Karluk, Alutiiq Tribe of Old Harbor, and Native Village of Larsen Bay. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S7

AOA option KOD-S7 is a 160-ac subtidal site within the Northwest extent of the Kodiak Study Area, located 8.6 km (4.7 nm) from Larson Bay (centroid: 57.6081 N, 153.9654 W). The site is located within subunit GU of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 35 m (120 ft) to 65 m (210 ft) with an average depth of 45 m (150 ft). At MHW the depth ranges from 38 m (130 ft) to 68 m (220 ft) with an average depth of 48 m (160 ft). KOD-S7 has an average slope of 3.5° and maximum slope of 8.6°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (755 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.2°C, a minimum daily average of 3.8°C, and a maximum daily average of 12°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-S7 averaged 5.0 m/s, with a minimum of 0.74 m/s and a maximum of 16 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (3.4 mg/m³) and lowest in July (0.64 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in April (1.5 mg/m³) and lowest in August (0.27 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in May (0.30 m^{-1}) and lowest in March (0.077 m^{-1}).

Industry and National Security Considerations

KOD-S7 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (0.54 km), Navy undersea cable (exact distance undisclosed), wreck and obstruction (2.6 km), and shore fishery lease (0.48 km). The site is within ADFG salmon (group code G) statistical unit 25410 and the groundfish (group code G) statistical unit 535733. KOD-S7 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 66 total transects (August 2022). The primary vessel types observed are fishing, other, and pleasure. AIS activity over the most recent five years has increased by roughly 19% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

KOD-S7 is within 5 km of at least one documented location from each of the following natural resources: deep-sea coral observations (2.8 km), historically mapped eelgrass sites (4.3 km), humpback whale high use areas (0 km), fin whale feeding BIA (0 km), humpback whale feeding BIA (0 km), gray whale migratory route BIA (0 km), Mexico humpback whale NMFS ESA (0 km), and Western North Pacific humpback whale NMFS ESA (0 km).

Cultural Resource Considerations

There is one Alaska Heritage Resources Survey site within approximately 5 km of KOD-S7. This site may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Karluk, and Native Village of Larsen Bay. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S8

AOA option KOD-S8 is a 52-ac subtidal site within the East extent of the Kodiak Study Area, located 18 km (9.6 nm) from Kodiak (centroid: 57.636 N, 152.323 W). The site is located within subunit GU of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 1.8 m (5.8 ft) to 17 m (57 ft) with an average depth of 7.2 m (24 ft). At MHW the depth ranges from 4.2 m (14 ft) to 20 m (65 ft) with an average depth of 9.7 m (32 ft). KOD-S8 has an average slope of 2.0° and maximum slope of 3.2°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (32 m away) as semi-protected, semi-exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.0°C, a minimum daily average of 4.0°C, and a maximum daily average of 11°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at KOD-S8 averaged 5.3 m/s, with a minimum of 1.1 m/s and a maximum of 16 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (3.6 mg/m³) and lowest in July (1.1 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in April (2.4 mg/m³) and lowest in July (0.64 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in September (0.47 m^{-1}) and lowest in February (0.12 m^{-1}).

Industry and National Security Considerations

KOD-S8 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (1.2 km) and munition location (0 km). The site is within ADFG salmon (group code G) statistical units 25924, 25921, and 25927 and the groundfish (group code G) statistical unit 525733. KOD-S8 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 17 total transects (May 2017). The primary vessel types observed are other and fishing. AIS activity over the most recent five years has decreased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KOD-S8 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (1.3 km), historically mapped eelgrass sites (0.92 km), harbor seal key haulouts (0.34 km), harbor seal non-key haulouts (5.0 km), humpback whale high use areas (0.21 km), fin whale feeding BIA (0 km), gray whale feeding BIA (3.1 km), humpback whale feeding BIA (0 km), gray whale migratory route BIA (0 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (0 km). KOD-S8 intersects with four sizeable seabird colonies (Utesistoi Island, Svitlak Island, Kekur Island, Middle Island) and several smaller seabird colonies containing species of increased conservation concern and/or species prone to nest failure through disturbance. KOD-S8 also overlaps the Chiniak Bay IBA and the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are five Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S8. These sites may include cultural resources such as archaeological sites, buildings, structures,

objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Afognak, Native Village of Ouzinkie, Sun'aq Tribe of Kodiak, Tangirnaq Native Village, and Native Village of Port Lions. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S9

AOA option KOD-S9 is a 120-ac subtidal site within the East extent of the Kodiak Study Area, located 14 km (7.3 nm) from Kodiak (centroid: 57.6568 N, 152.3995 W). The site is located within subunit GU of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 3.0 m (10.0 ft) to 31 m (100 ft) with an average depth of 18 m (61 ft). At MHW the depth ranges from 5.5 m (18 ft) to 33 m (110 ft) with an average depth of 21 m (69 ft). KOD-S9 has an average slope of 2.9° and maximum slope of 5.3°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (46 m away) as semi-protected, semi-exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.0°C, a minimum daily average of 4.0°C, and a maximum daily average of 11°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at KOD-S9 averaged 5.5 m/s, with a minimum of 1.2 m/s and a maximum of 17 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (3.4 mg/m³) and lowest in July (1.1 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in October (2.1 mg/m³) and lowest in July (0.65 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in July (0.32 m^{-1}) and lowest in March (0.097 m^{-1}).

Industry and National Security Considerations

KOD-S9 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (0.69 km), submarine cable, fiber optic cable or cable area (0.28 km), hatchery release site (2.0 km), and munition location (0 km). The site is within ADFG salmon (group code G) statistical unit 25924 and the groundfish (group code G) statistical unit 525733. KOD-S9 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 11 total transects (May 2017). The primary vessel types observed are other, fishing, and pleasure. AIS activity over the most recent five years has decreased by roughly 32% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

KOD-S9 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (1.8 km), deep-sea coral observations (3.7 km), historically mapped eelgrass sites (0.24 km), harbor seal key haulouts (1.8 km), harbor seal non-key haulouts (0.15 km), humpback whale high use areas (0.67 km), fin whale feeding BIA (0 km), humpback whale feeding BIA (0 km), gray whale migratory route BIA (0 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (0 km). KOD-S9 intersects with a sizeable seabird colony (Kalsin Island), which contains species of increased conservation concern

and/or species prone to nest failure through disturbance. KOD-S9 also overlaps the Chiniak Bay IBA and the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are three Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S9. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Afognak, Native Village of Ouzinkie, Sun'aq Tribe of Kodiak, Tangirnaq Native Village, and Native Village of Port Lions. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S10

AOA option KOD-S10 is a 130-ac subtidal site within the East extent of the Kodiak Study Area, located 10 km (5.5 nm) from Kodiak (centroid: 57.6906 N, 152.4046 W). The site is located within subunit GU of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 4.4 m (14 ft) to 20 m (66 ft) with an average depth of 14 m (45 ft). At MHW the depth ranges from 6.8 m (22 ft) to 23 m (74 ft) with an average depth of 16 m (53 ft). KOD-S10 has an average slope of 1.4° and maximum slope of 3.4°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (157 m away) as semi-exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.0°C, a minimum daily average of 4.0°C, and a maximum daily average of 11°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at KOD-S10 averaged 5.7 m/s, with a minimum of 1.1 m/s and a maximum of 18 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (3.6 mg/m³) and lowest in February (1.5 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in November (2.4 mg/m³) and lowest in August (0.97 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in July (0.44 m^{-1}) and lowest in February (0.10 m^{-1}).

Industry and National Security Considerations

KOD-S10 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (1.1 km), submarine cable, fiber optic cable or cable area (0.31 km), hatchery release site (3.9 km), and munition location (0 km). The site is within ADFG salmon (group code G) statistical units 25923 and 25927 and the groundfish (group code G) statistical unit 525733. KOD-S10 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 19 total transects (May 2017). The primary vessel types observed are other and fishing. AIS activity over the most recent five years has decreased by more than 50% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

KOD-S10 is within 5 km of at least one documented location from each of the following natural resources: deep-sea coral

observations (4.7 km), historically mapped eelgrass sites (0.61 km), harbor seal non-key haulouts (1.7 km), humpback whale high use areas (0.33 km), fin whale feeding BIA (0 km), gray whale feeding BIA (3.4 km), humpback whale feeding BIA (0 km), gray whale migratory route BIA (0 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (1.2 km). KOD-S10 is in proximity to a sizeable seabird colony (Queer Island), which contains species of increased conservation concern and/or species prone to nest failure through disturbance. KOD-S10 also overlaps the Chiniak Bay IBA and the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S10. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Afognak, Native Village of Ouzinkie, Sun'aq Tribe of Kodiak, Tangirnaq Native Village, and Native Village of Port Lions. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S11

AOA option KOD-S11 is a 370-ac subtidal site within the East extent of the Kodiak Study Area, located 7.2 km (3.9 nm) from Kodiak (centroid: 57.7925 N, 152.3056 W). The site is located within subunits GU, KT-14B of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. Text descriptions for the subunit include reference to community harvest, sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from 4.5 m (15 ft) to 30 m (98 ft) with an average depth of 14 m (46 ft). At MHW the depth ranges from 7.0 m (23 ft) to 32 m (110 ft) with an average depth of 16 m (54 ft). KOD-S11 has an average slope of 1.3° and maximum slope of 3.1°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (392 m away) as semi-exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.0°C, a minimum daily average of 4.2°C, and a maximum daily average of 11°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-S11 averaged 5.4 m/s, with a minimum of 1.0 m/s and a maximum of 16 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in May (4.4 mg/m^3) and lowest in February (1.6 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in May (2.1 mg/m^3) and lowest in March (1.1 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in July (0.34 m^{-1}) and lowest in March (0.096 m^{-1}).

Industry and National Security Considerations

KOD-S11 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (3.9 km), submarine cable, fiber optic cable or cable area (2.5 km), Navy undersea cable (exact distance undisclosed), hatchery release site (0.41 km), ferry route (0.59 km), wreck and obstruction (2.5 km), and munition location (0 km). The site is within ADFG salmon (group code G)

statistical unit 25921 and the groundfish (group code G) statistical unit 525733. KOD-S11 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 17 total transects (April 2017, May 2017). The primary vessel types observed are other, fishing, and pleasure. AIS activity over the most recent five years has increased by roughly 21% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

KOD-S11 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (2.9 km), deep-sea coral observations (1.4 km), historically mapped eelgrass sites (0.70 km), harbor seal key haulouts (3.8 km), humpback whale high use areas (0 km), Steller sea lion major haulouts (4.9 km), fin whale feeding BIA (0 km), gray whale feeding BIA (0 km), humpback whale feeding BIA (0 km), gray whale migratory route BIA (0 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (2.2 km). KOD-S11 is located near several small to large seabird colonies containing birds of increased conservation concern and/or species prone to nest failure through disturbance. KOD-S11 also overlaps the Chiniak Bay IBA and the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are seven Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S11. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Afognak, Native Village of Ouzinkie, Sun'aq Tribe of Kodiak, Tangirnaq Native Village, and Native Village of Port Lions. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S12

AOA option KOD-S12 is a 73-ac subtidal site within the East extent of the Kodiak Study Area, located 15 km (8.1 nm) from Kodiak (centroid: 57.8619 N, 152.4195 W). The site is located within subunit GU of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 1.1 m (3.5 ft) to 21 m (68 ft) with an average depth of 8.4 m (27 ft). At MHW the depth ranges from 3.5 m (12 ft) to 23 m (76 ft) with an average depth of 11 m (36 ft). KOD-S12 has an average slope of 2.3° and maximum slope of 6.2°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-exposed, semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.0°C, a minimum daily average of 4.2°C, and a maximum daily average of 11°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-S12 averaged 5.3 m/s, with a minimum of 1.2 m/s and a maximum of 16 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in May (3.2 mg/m³) and lowest in March (1.1 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in May (1.6 mg/m³) and lowest in August (0.71 mg/m³). The diffuse light coefficient at 490 nanometers,

Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.43 m^{-1}) and lowest in March (0.094 m^{-1}).

Industry and National Security Considerations

KOD-S12 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (4.0 km), submarine cable, fiber optic cable or cable area (1.2 km), Navy undersea cable (exact distance undisclosed), hatchery release site (4.9 km), ferry route (1.3 km), munition location (0 km), and shore fishery lease (4.5 km). The site is within ADFG salmon (group code G) statistical unit 25933 and the groundfish (group code G) statistical unit 525731. KOD-S12 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 12 total transects (May 2017). The primary vessel types observed are other, fishing, and cargo. AIS activity over the most recent five years has decreased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KOD-S12 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (1.8 km), historically mapped eelgrass sites (3.3 km), humpback whale high use areas (1.5 km), fin whale feeding BIA (0.48 km), gray whale feeding BIA (0.48 km), humpback whale feeding BIA (0.48 km), gray whale migratory route BIA (0.48 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (0.76 km). KOD-S12 is in proximity to a sizeable seabird colony (Monashka sea stack) containing species of increased conservation concern and/or species prone to nest failure through disturbance. KOD-S12 also overlaps the Marmot Bay IBA and the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S12. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Afognak, Native Village of Ouzinkie, Sun'aq Tribe of Kodiak, Tangirnaq Native Village, and Native Village of Port Lions. Given this proximity, cultural resources could be present to an unknown extent.

KOD-S13

AOA option KOD-S13 is a 96-ac subtidal site within the East extent of the Kodiak Study Area, located 16 km (8.9 nm) from Kodiak (centroid: 57.8699 N, 152.4396 W). The site is located within subunit GU of the Kodiak Region (Kodiak Island) unit in the Kodiak area plan. The site ranges in depth at MLLW from 4.2 m (14 ft) to 15 m (50 ft) with an average depth of 8.4 m (28 ft). At MHW the depth ranges from 6.6 m (22 ft) to 18 m (58 ft) with an average depth of 11 m (36 ft). KOD-S13 has an average slope of 1.9° and maximum slope of 5.9°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected, semi-exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.0°C, a minimum daily average

of 4.2°C, and a maximum daily average of 11°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at KOD-S13 averaged 5.4 m/s, with a minimum of 1.3 m/s and a maximum of 16 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in May (2.9 mg/m³) and lowest in March (1.1 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in November (1.2 mg/m³) and lowest in August (0.59 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in May (0.39 m^{-1}) and lowest in March (0.093 m^{-1}).

Industry and National Security Considerations

KOD-S13 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (1.4 km), Navy undersea cable (exact distance undisclosed), ferry route (1.5 km), munition location (0 km), and shore fishery lease (3.3 km). The site is within ADFG salmon (group code G) statistical unit 25933 and the groundfish (group code G) statistical unit 525731. KOD-S13 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at three total transects (September 2012, February 2016). The primary vessel types observed are fishing and other. AIS activity over the most recent five years has decreased by roughly 32% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KOD-S13 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.13 km), historically mapped eelgrass sites (3.4 km), humpback whale high use areas (2.7 km), fin whale feeding BIA (0.65 km), gray whale feeding BIA (0.65 km), humpback whale feeding BIA (0.65 km), gray whale migratory route BIA (0.65 km), Mexico humpback whale NMFS ESA (0 km), Western North Pacific humpback whale NMFS ESA (0 km), and seabird colony locations (0.52 km). KOD-S13 is in proximity to a sizeable seabird colony (Nut Triangle) containing species of increased conservation concern and/or species prone to nest failure through disturbance. KOD-S13 also overlaps the Marmot Bay IBA and the Kodiak Archipelago Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of KOD-S13. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Afognak, Native Village of Ouzinkie, Sun'aq Tribe of Kodiak, Tangirnaq Native Village, and Native Village of Port Lions. Given this proximity, cultural resources could be present to an unknown extent.



Southcentral Alaska Study Areas

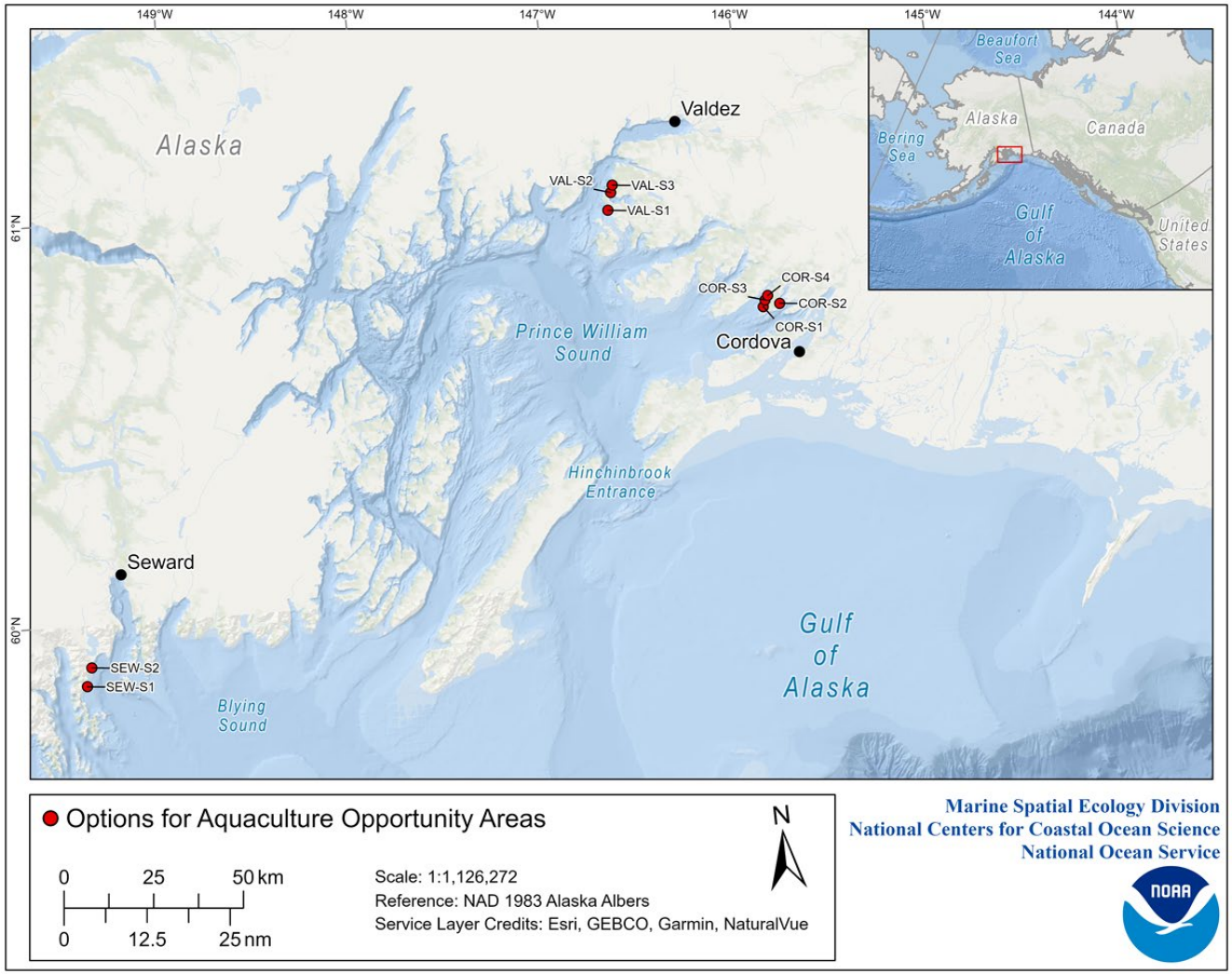


Figure 3.93. Distribution of final AOA options in Alaska State waters for the Southcentral Study Areas. Red circles represent the options but do reflect the size of the options.

Seward Study Area

Final AOA options within the Seward Study Area include two subtidal sites covering 440 ac (Figure 3.94). Options range in size from 200.2 ac to 239.3 ac (Table 3.10; Figures 3.94–3.105). No intertidal options were identified in Seward, which is generally considered a function of the steep shelf within the unconstrained portions of the study area. Several sites within the study area are located near, and may directly overlap with, ecologically sensitive resources. These include historically mapped eelgrass beds, high-use areas for humpback whales, Steller sea lion major haulouts (within a 3-nm protection area), and harbor seal haulouts. Some sites may also overlap, or are near, designated critical habitat of Steller sea lions. Given the proximity to these resources, project planning should account for potential ecological impacts and may require coordination or consultation with appropriate resource agencies.



This study area overlaps with marine bird concentration areas and important habitats including the Kenai Fjords Marine IBA, containing high densities of marine birds. There are four sizeable colonies in this study area, including Cape Resurrection, Hive Island, Rugged Island, and Cheval Island. Additional smaller colonies containing species of increased conservation concern also occur in the study area.



A single comment was submitted identifying the remote nature of the Seward AOA sites and potential challenge that posed for compliance with USACE permit conditions that often require mandatory in-person monitoring visits weekly in winter and biweekly during fall and spring.

Relevant general comments focused on potential overlaps between AOA study areas and documented cultural resource sites. In response, the final model run incorporated additional down-scoring of AHRS data layers, resulting in reduced suitability and, ultimately, the removal of portions of, or entire, draft AOA sites located within 500 m of AHRS-listed locations. Comments also noted potential impacts to subsistence harvest activities from aquaculture development. The degree of potential adverse effect to subsistence harvest activities is highly dependent on the specific harvest activity (e.g., intertidal gathering vs herring roe collection) and the nature of

proposed aquaculture development (e.g., subtidal vs intertidal culture). All aquaculture projects will be subject to further review during the Alaska state leasing and permitting process. Early and ongoing coordination with coastal communities, nearby Alaska Native Villages, Alaska Native Corporations, and other Tribal Associations is strongly recommended to ensure access to common-use resources, cultural resource sites, and that traditional uses are not adversely impacted.

Below are additional characterizations of site-specific details regarding the geographic location and environmental conditions of AOA options within the Seward Study Area, as well as considerations regarding national security, natural resources, navigation and transportation, cultural resources, and various industries including aquaculture and fisheries. These are presented as tables containing location information for each option and proximity to these considerations (Table 3.10). Following these tables are maps that visualize the options along with data used within the suitability model (Figures 3.94–3.99). Next are plots summarizing available time series data to provide additional context on environmental conditions and observed vessel traffic within the options (Figures 3.100–3.105). Following these tables and figures are individual text descriptions for each option summarizing the characteristics observed. These tables, figures, and text summaries were created using many different spatial datasets curated to complement factors considered during the Alaska state aquatic farm lease application and review process, and to assist proponents in the identification of key user groups and resource agencies to engage with during the project design and application process. These data are unlikely to be exhaustive, and there may be additional considerations not captured in this characterization. These different presentation methods are meant not only to communicate site-specific characteristics in multiple ways but also to complement each other. They may also contain unique bits of information not found in the other parts of this characterization.

Table 3.10. Characterization summary for Seward Aquaculture Opportunity Area subtidal options: SEW-S1 and SEW-S2. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km).

Entire extent	SEW-S1	SEW-S2
General characteristics		
Center Coordinates (longitude, latitude)	−149.584, 59.8499	−149.5571, 59.9008
Size (ac)	239.3	200.2
Distance to Coastal Populated Places (nm)	18.5	15.5
Depth (m) (min, max, mean), Average Slope (degrees)	4.31, 38.07, 17.37, 1.98	4.6, 37.41, 19.14, 3.74
Alaska Area Plan Subunit	701	586, 704A

Entire extent	SEW-S1	SEW-S2
Commercial Statistical Areas – Groundfish, Shellfish	495938	495938
Commercial Statistical Areas – Salmon	23135	23135
Constraints		
Anadromous Waters Catalog – Streams (91.5-m Setback)	3.22	0.15
Deep-Sea Coral and Sponge Occurrences (1,000-m Setback)	2.89	-
Ferry Routes (500-m Setback)	-	-
Key Harbor Seal Haul-out Locations (500-m Setback)	-	-
Navy Undersea Cables within 5 km (500-m Setback)*	-	-
Pipelines (500-m Setback)	-	-
Submarine Cable Areas (200-m Setback)	-	-
Wastewater Outfalls (500-m Setback)	-	-
Wrecks and Obstructions (152.5-m Setback)	4.18	-
National Security		
Munitions and Explosives of Concern	-	-
Natural Resources		
Cetacean Biologically Important Areas – Feeding	-	-
Cetacean Biologically Important Areas – Migratory Route	-	-
Humpback Whale High-Use Areas	0	0
NMFS ESA Critical Habitat	-	-
Non-Key Harbor Seal Haulout Locations (500-m Setback)	0	4.77
North Pacific Seabird Data**	-	3.95
ShoreZone Coastal Mapping – Eelgrass Bioband	-	-
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	Rugged/B (9.18)	Rugged/ B (9.37)
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-
Industry, Navigation, and Transportation		
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	-	-
Permitted Log Transfer Facility (500-m Setback)	-	-

Entire extent	SEW-S1	SEW-S2
USFS Recreation Opportunities – Cabin Rentals	-	-
Cultural Resources		
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m setback)*	-	1
Alaska Area Plans (Community Harvest) overlap	-	Yes
Subsistence Search and Harvest Areas within 5 km	-	-
Aquaculture and Fisheries		
Alaska Area Plans (Sport Fishing) overlap	Yes	Yes
Alaska DNR Shore Fishery Lease	-	-
Hatchery Release Sites	-	-
Aquatic Farm Permits	-	-
*Classified data layer; if the option is within the specified distance, a value of “Yes” is shown instead of the travel distance value. **A straight-line distance was used to calculate minimum travel distance.		



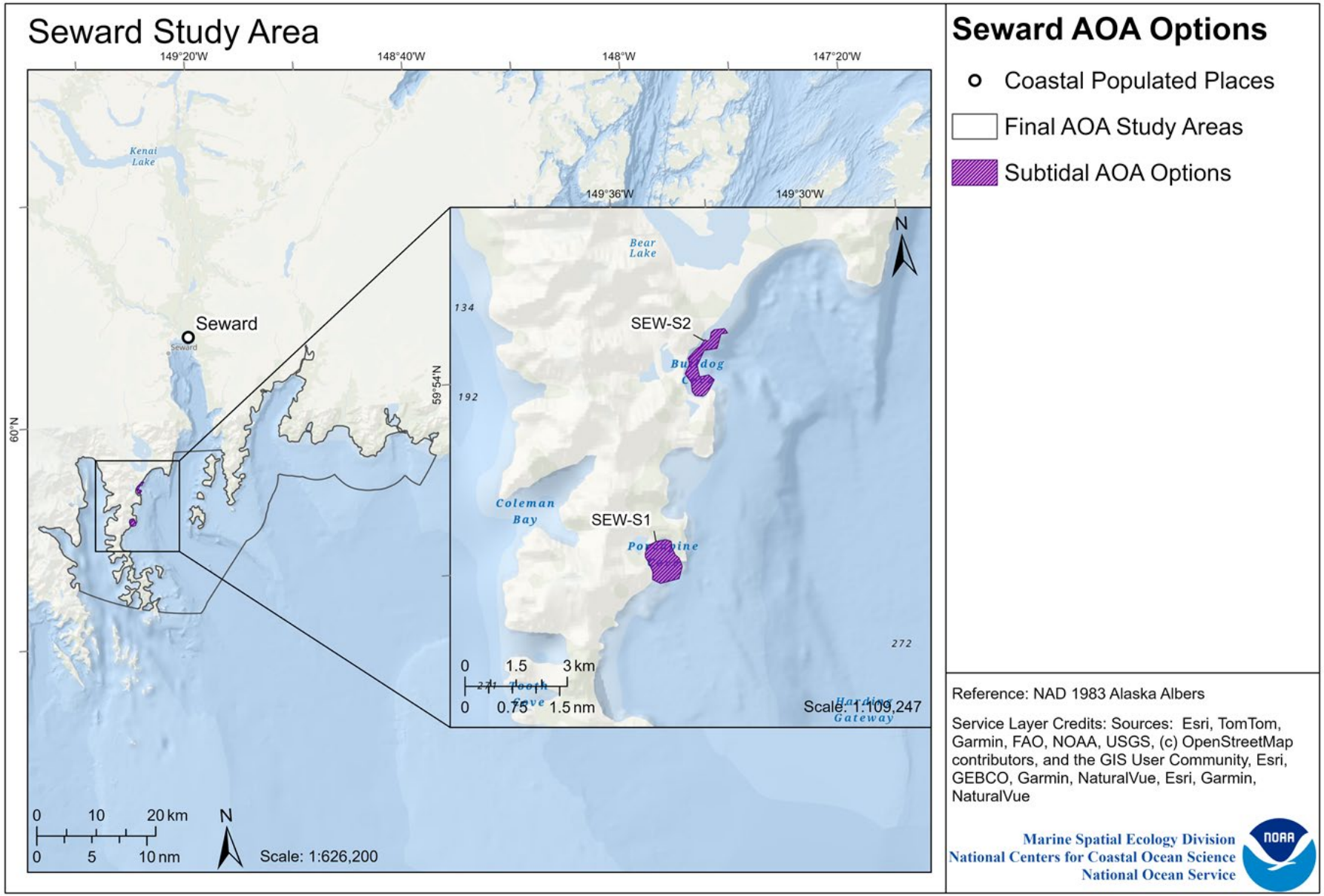


Figure 3.94. Final subtidal AOA options for the Seward Study Area.

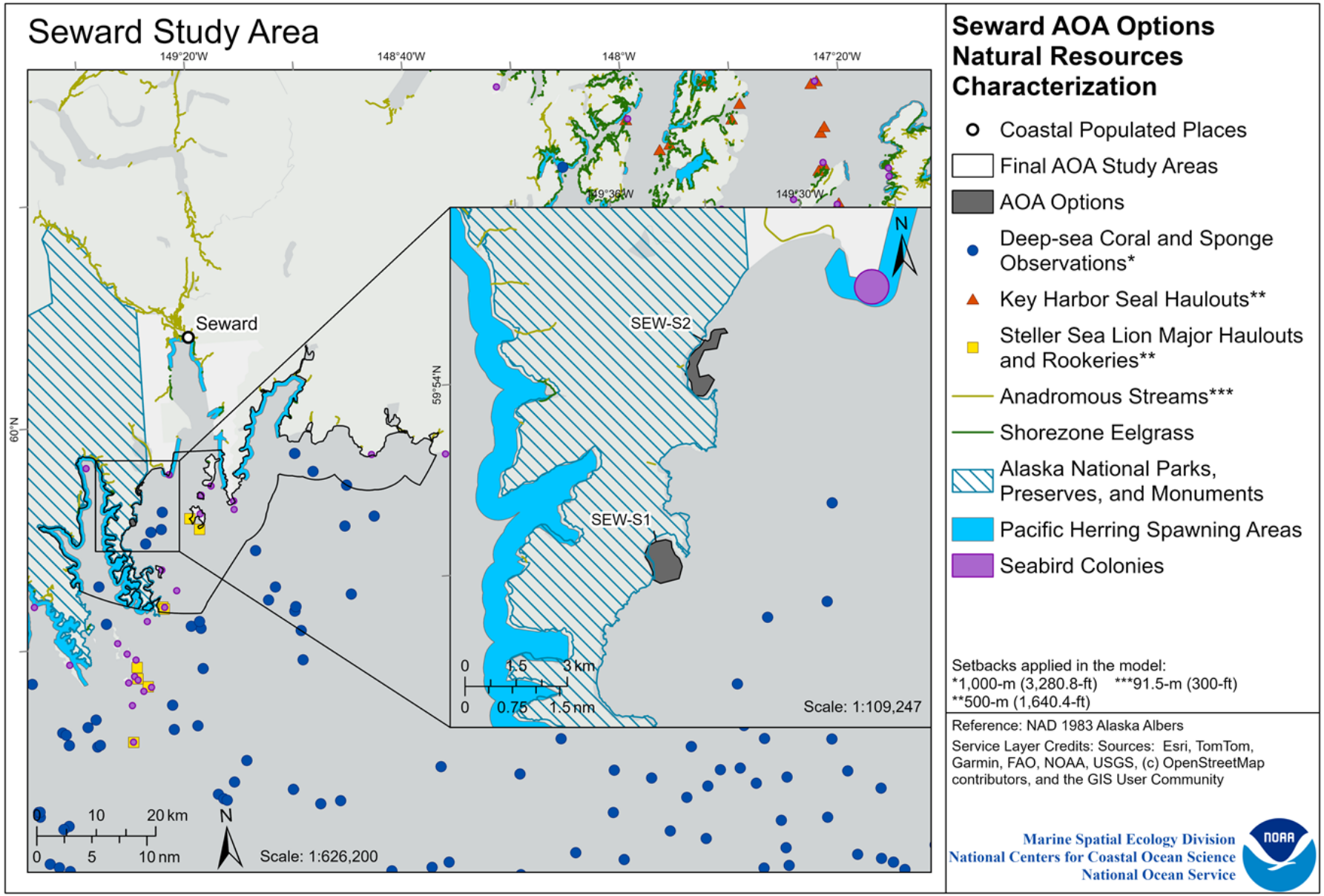


Figure 3.95. Natural resource interactions with the final AOA options in the Seward Study Area.

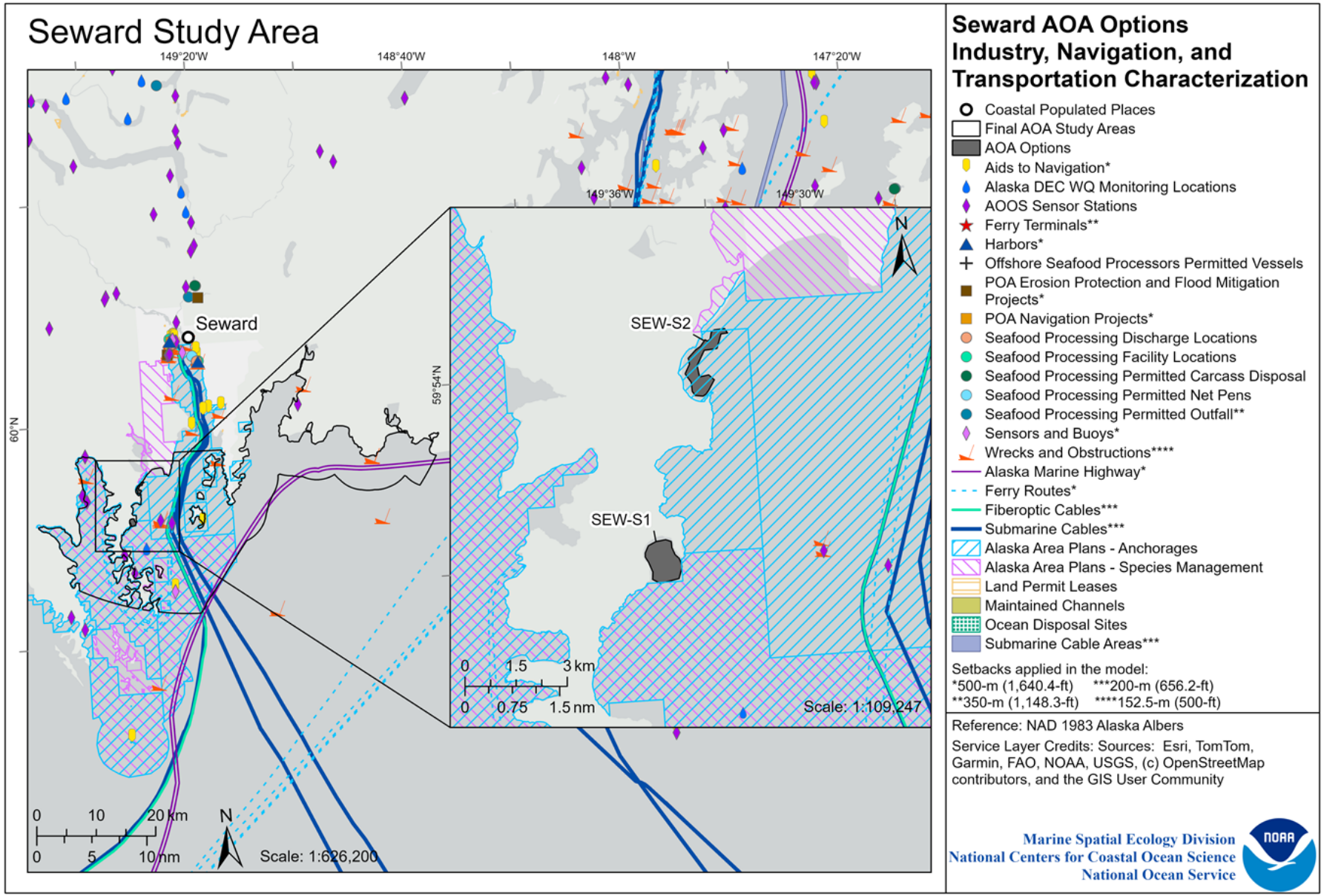


Figure 3.96. Industry, navigation, and transportation interactions with the final AOA options in the Seward Study Area.

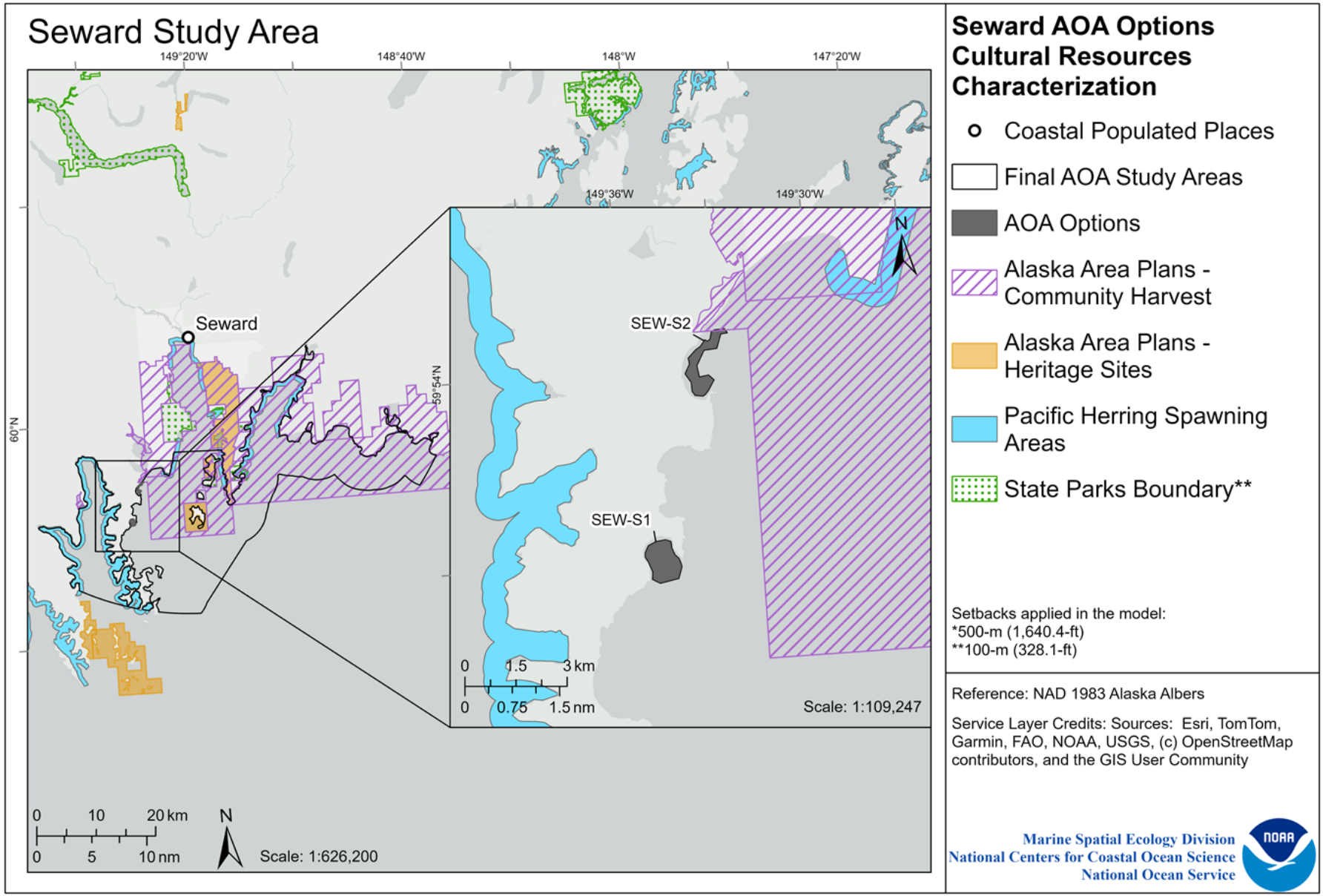


Figure 3.97. Cultural resource interactions with the final AOA options in the Seward Study Area.

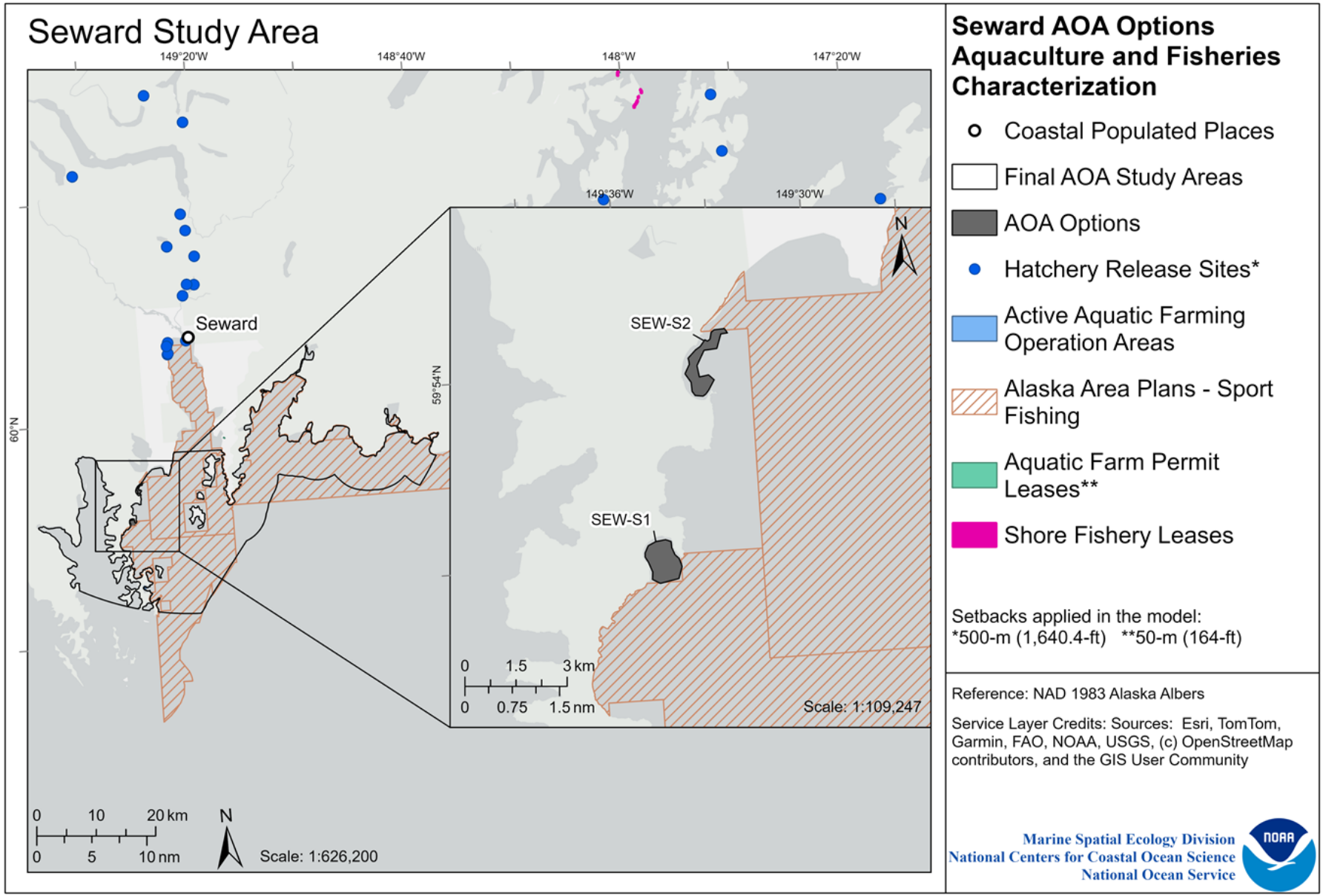


Figure 3.98. Aquaculture and fisheries interactions with the final AOA options in the Seward Study Area.

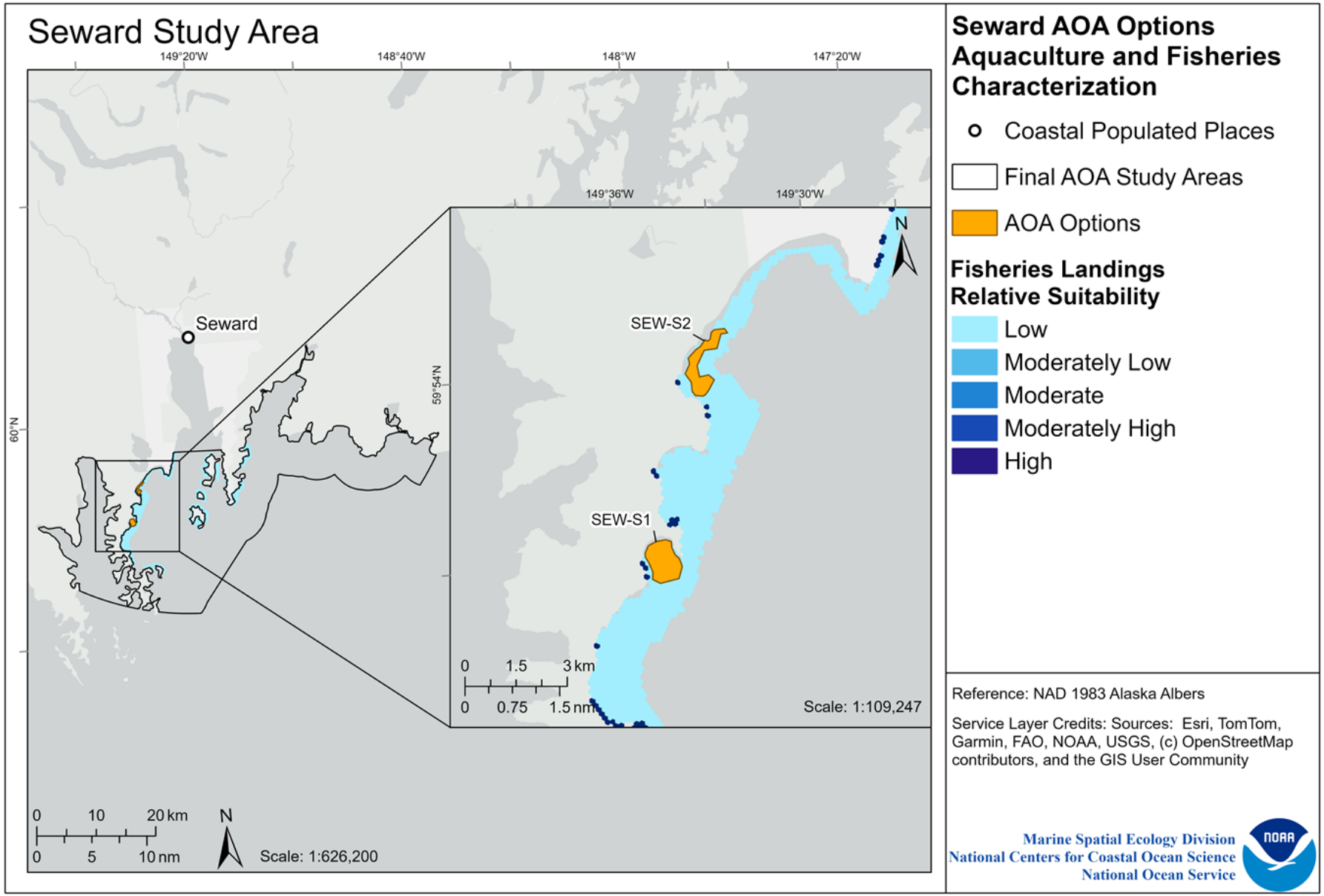


Figure 3.99. Relative suitability of the fishing landings combined data layer in relation to the final AOA options in the Seward Study Area.

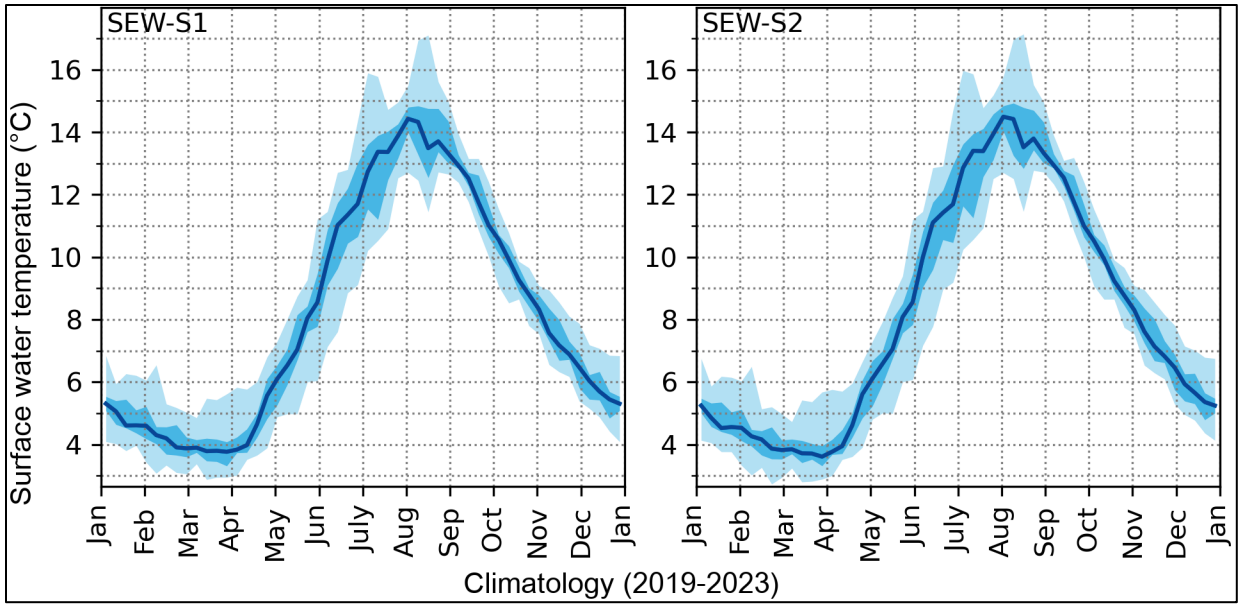


Figure 3.100. Sea surface temperatures for a subset of options from the Seward Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

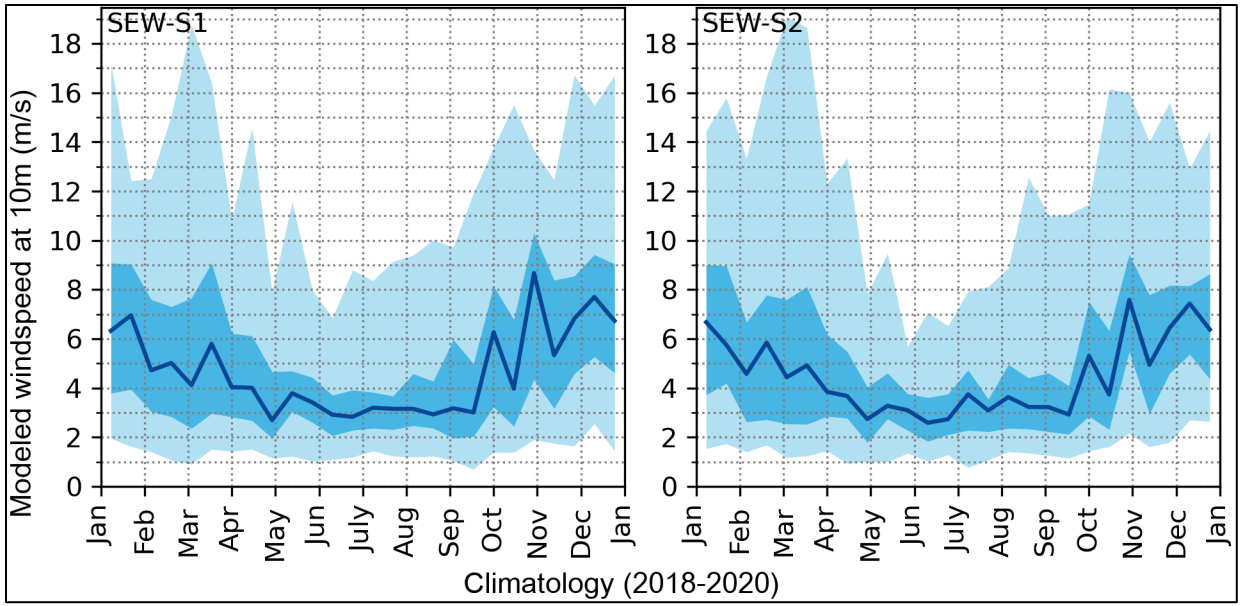


Figure 3.101. Wind speed at 10-m altitude for a subset of options from the Seward Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

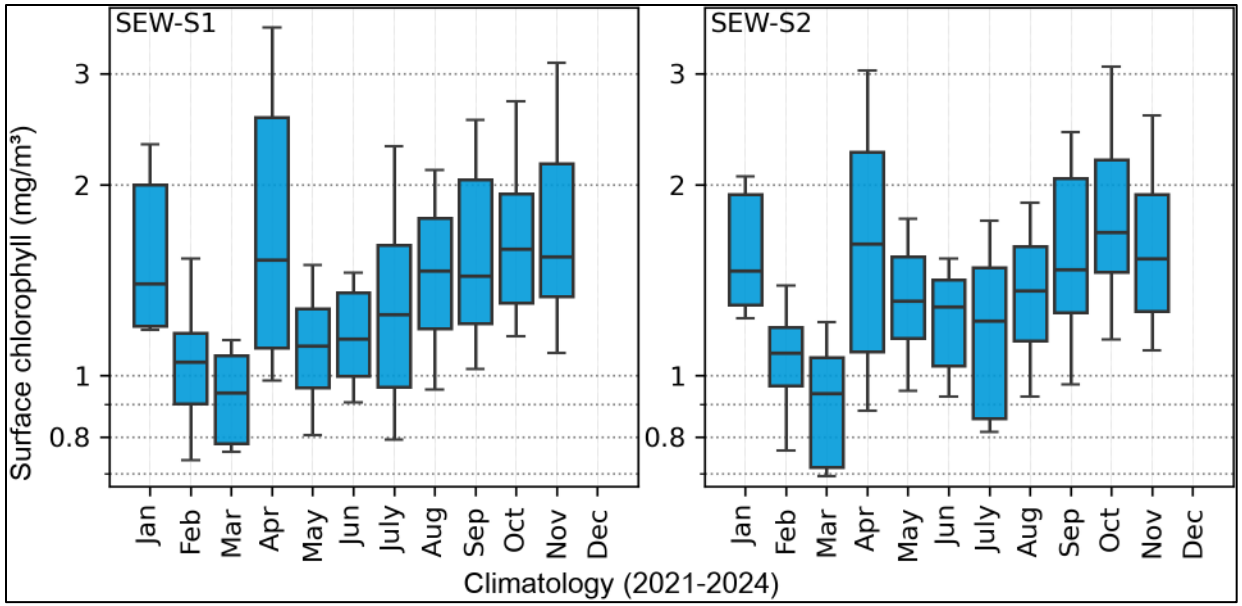


Figure 3.102. Monthly climatological surface chlorophyll *a* for a subset of options from the Seward Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

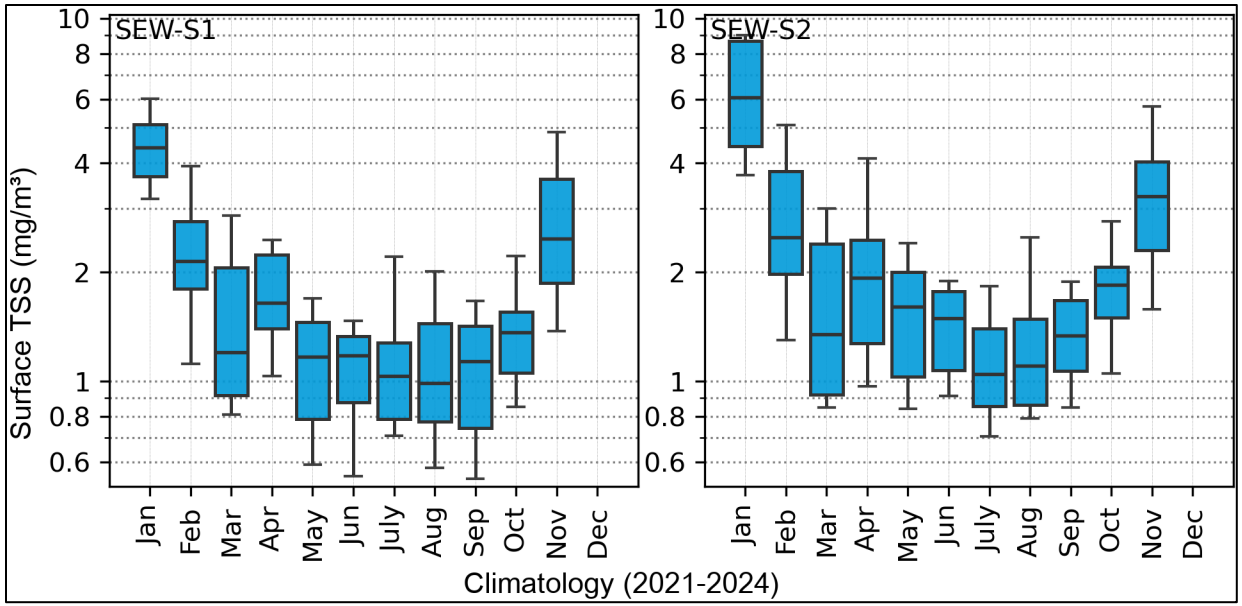


Figure 3.103. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Seward Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

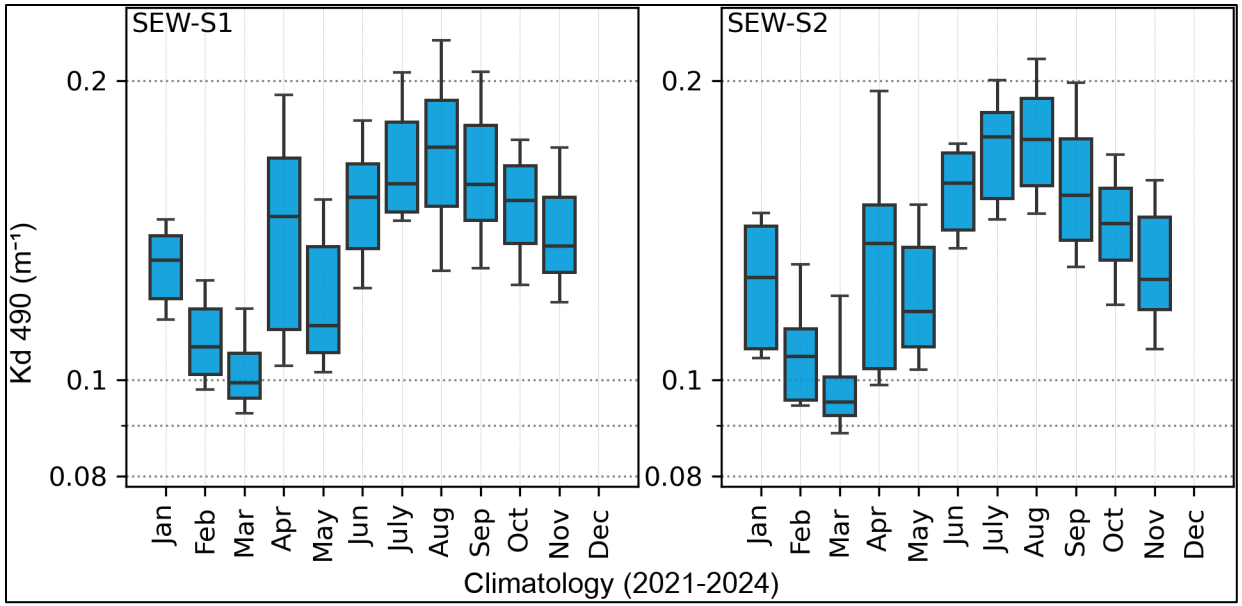


Figure 3.104. Monthly climatological light attenuation, Kd(490) for a subset of options from the Seward Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

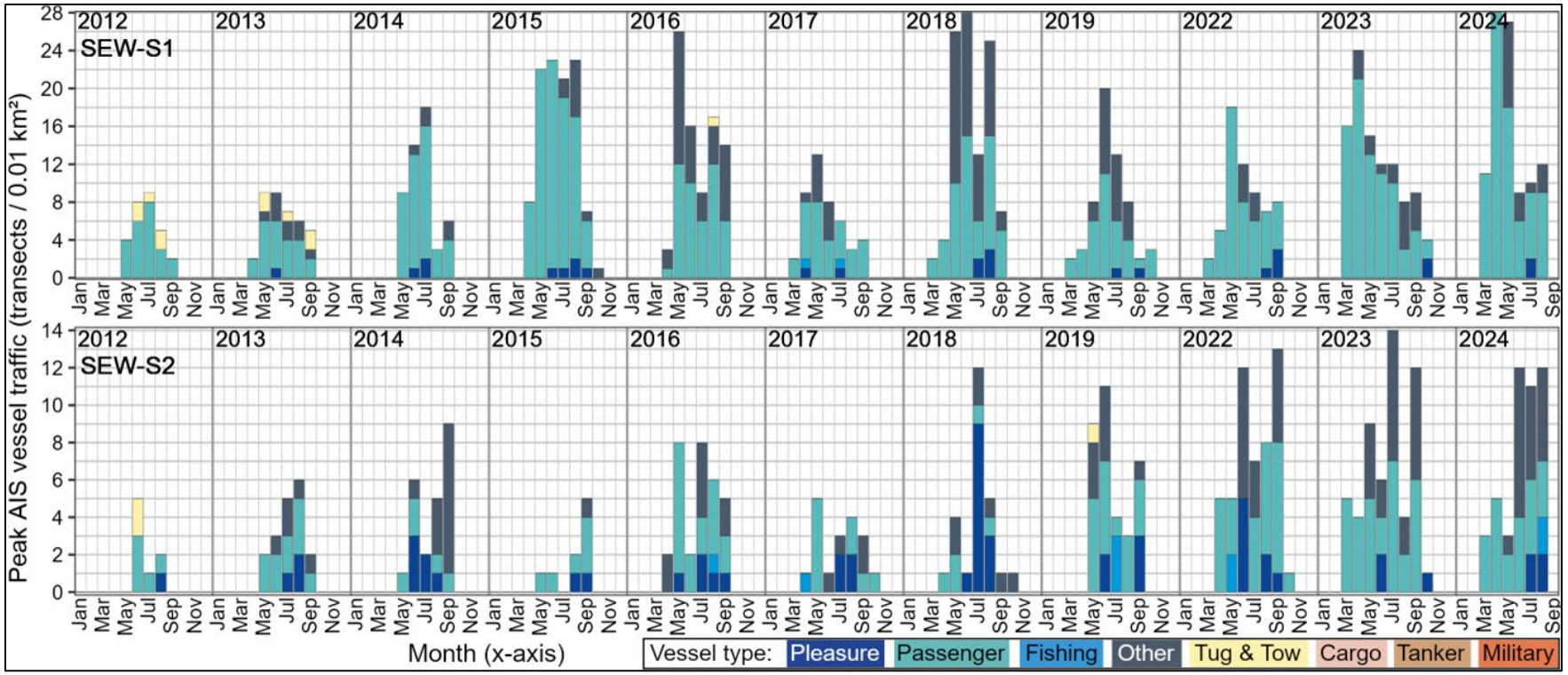


Figure 3.105. Monthly peak vessel traffic activity within options from a subset of the Seward Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

SEW-S1

AOA option SEW-S1 is a 240-ac subtidal site within the Seward Study Area, located 34 km (18 nm) from Seward (centroid: 59.8499 N, 149.5844 W). The site is located within subunits 701 and 703 of the Kenai area plan. Text descriptions for the subunits include reference to anchorages, sport fishing, special management occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from 4.3 m (14 ft) to 38 m (120 ft) with an average depth of 17 m (57 ft). At MHW the depth ranges from 7.7 m (25 ft) to 41 m (140 ft) with an average depth of 21 m (68 ft). SEW-S1 has an average slope of 2.0° and maximum slope of 4.8°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (8 m away) as semi-exposed, exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.0°C, a minimum daily average of 4.2°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at SEW-S1 averaged 5.1 m/s, with a minimum of 0.70 m/s and a maximum of 19 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (1.6 mg/m³) and lowest in February (0.78 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in February (2.0 mg/m³) and lowest in August (0.84 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in August (0.22 m^{-1}) and lowest in March (0.10 m^{-1}).

Industry and National Security Considerations

SEW-S1 is within 5 km of at least one documented wreck and obstruction (4.2 km). The site is within ADFG salmon (group code G) statistical unit 23135 and the groundfish (group code G) statistical unit 495938. SEW-S1 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 28 total transects (June 2018, April 2024). The primary vessel types observed are passenger and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.



Natural Resource Considerations

SEW-S1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (3.2 km), deep-sea coral observations (2.9 km), harbor seal non-key haulouts (0 km), humpback whale high use areas (0 km).

Cultural Resource Considerations

There were no features present in the cultural resource datasets analyzed within 5-km of this site. There are likely to be some resources that are not contained in the datasets we considered.

SEW-S2

AOA option SEW-S2 is a 200-ac subtidal site within the Seward Study Area, located 29 km (16 nm) from Seward (centroid: 59.9008 N, 149.5571 W). The site is located within subunits 586 and 704A of the Kenai area plan. Text descriptions for the subunits include reference to anchorages, community harvest, and sport fishing occurring within the subunit. This does not mean they directly overlap with the site; refer to the area plan for more information. The site ranges in depth at MLLW from 4.6 m (15 ft) to 37 m (120 ft) with an average depth of 19 m (63 ft). At MHW the depth ranges from 7.9 m (26 ft) to 41 m (130 ft) with an average depth of 22 m (74 ft). SEW-S2 has an average slope of 3.7° and maximum slope of 9.3°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (57 m away) as semi-exposed, exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.0°C, a minimum daily average of 4.2°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at SEW-S2 averaged 4.9 m/s, with a minimum of 0.77 m/s and a maximum of 19 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (1.8 mg/m³) and lowest in March (0.77 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in November (2.7 mg/m³) and lowest in July (0.97 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in August (0.21 m^{-1}) and lowest in March (0.094 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 23135 and the groundfish (group code G) statistical unit 495938. SEW-S2 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 14 total transects (July 2023). The primary vessel types observed are passenger, other, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

SEW-S2 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.15 km), harbor seal non-key haulouts (4.8 km), humpback whale high use areas (0 km), and seabird colony locations (3.9 km). SEW-S2 overlaps a small seabird colony and is located within the Kenai Fjords Marine IBA.

Cultural Resource Considerations

There is one Alaska Heritage Resources Survey site within approximately 5 km of SEW-S2. This site may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites.

Valdez Study Area

Final AOA options within the Valdez Study Area include three subtidal sites covering 431 ac (Figure 3.106). Options range in size from 78.9 ac to 260 ac (Table 3.11; Figures 3.106–3.117). No intertidal options were identified in Valdez, which is generally considered a function of the steep shelf within the unconstrained portions of the study area. Several sites within the study area are located near, and may directly overlap with, ecologically sensitive resources. These include historically mapped eelgrass beds, high-use areas for humpback whales and harbor seal haulouts. Some sites may also overlap, or are near, Mexico DPS humpback whale critical habitat and feeding BIAs. Given the proximity to these resources, project planning should account for potential ecological impacts and may require coordination or consultation with appropriate resource agencies.

This study area overlaps marine bird concentration areas and important habitats, specifically the Prince William Sound Marine IBA, containing high densities of marine birds. Within areas identified as suitable for mariculture, there are some seabird colonies containing species that are prone to nest failure through disturbance.

Public comments related to the Valdez draft AOA options included concerns about potential overlap with existing commercial salmon fisheries. Highlighted areas include ADFG salmon statistical areas 221-60 and 221-68. All three Valdez AOA options are located outside these areas, in ADFG salmon statistical area 221-50. This does not necessarily indicate a lack of potential conflict with commercial fisheries, and coordination with fishing groups, such as Cordova District Fishermen United, and ADFG is recommended during the siting of aquaculture operations in areas with active fisheries.

Comments related to potential overlap with the Valdez Marine Terminal and the Ship Escort and Response Vessel System in Prince William Sound were evaluated, and it was determined there is no overlap with the identified vessel areas and the Valdez AOA options.

General comments focused on potential overlaps between AOA study areas and documented cultural resource sites. In response, the final model run incorporated additional down-scoring of AHRS data layers, resulting in reduced suitability and, ultimately, the removal of portions of, or entire, draft AOA sites located within 500 m of AHRS-listed locations. Comments also noted potential impacts to subsistence harvest activities from aquaculture development. The degree of potential adverse effect to subsistence harvest activities is highly dependent on the specific harvest activity (e.g., intertidal gathering vs herring roe collection) and the nature of proposed aquaculture development (e.g., subtidal vs intertidal culture). All aquaculture projects will be subject to further review during the Alaska state leasing and permitting process. Early and ongoing coordination with coastal communities, nearby Alaska Native Villages, Alaska Native Corporations, and other Tribal Associations is strongly recommended to ensure access to common-use resources, cultural resource sites, and that traditional uses are not adversely impacted.

Below are additional characterizations of site-specific details regarding the geographic location and environmental conditions of AOA options within the Valdez Study Area, as well as considerations regarding national security, natural resources, navigation and transportation, cultural resources, and various industries including aquaculture and fisheries. These are presented

as tables containing location information for each option and proximity to these considerations (Table 3.11). Following these tables are maps that visualize the options along with data used within the suitability model (Figures 3.106–3.111). Next are plots summarizing available time series data to provide additional context on environmental conditions and observed vessel traffic within the options (Figures 3.112–3.117). Following these tables and figures are individual text descriptions for each option summarizing the characteristics observed. These tables, figures, and text summaries were created using many different spatial datasets curated to complement factors considered during the Alaska state aquatic farm lease application and review process, and to assist proponents in the identification of key user groups and resource agencies to engage with during the project design and application process. These data are unlikely to be exhaustive, and there may be additional considerations not captured in this characterization.

These different presentation methods are meant not only to communicate site-specific characteristics in multiple ways but also to complement each other. They may also contain unique bits of information not found in the other parts of this characterization.



Table 3.11. Characterization summary for Valdez Aquaculture Opportunity Area subtidal options: VAL-S1, VAL-S2, VAL-S3. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km).

Entire extent	VAL-S1	VAL-S2	VAL-S3
General characteristics			
Center Coordinates (longitude, latitude)	−146.7407, 60.9192	−146.7164, 60.9624	−146.7049, 60.9804
Size (ac)	260	92	78.9
Distance to Coastal Populated Places (nm)	19.4	16.5	15.2
Depth (m) (min, max, mean), Average Slope (degrees)	27.76, 49, 35.25, 1.14	29.69, 57.29, 44.27, 1.73	13.37, 62.03, 32.77, 2.82
Alaska Area Plan Subunit	23K	23C, 23J	23J
Commercial Statistical Areas – Groundfish, Shellfish	466033	466033	466033
Commercial Statistical Areas – Salmon	22150	22150	22150

Entire extent	VAL-S1	VAL-S2	VAL-S3
Constraints			
Anadromous Waters Catalog – Streams (91.5-m Setback)	3.36	-	-
Deep-Sea Coral and Sponge Occurrences (1,000-m Setback)	-	1.14	4.01
Ferry Routes (500-m Setback)	0.89	2.66	2.43
Key Harbor Seal Haulout Locations (500-m Setback)	-	-	-
Navy Undersea Cables within 5 km (500-m Setback)*	Yes	Yes	Yes
Pipelines (500-m Setback)	-	-	-
Submarine Cable Areas (200-m Setback)	4.75	3.13	1.17
Wastewater Outfalls (500-m Setback)	-	-	-
Wrecks and Obstructions (152.5-m Setback)	2.83	-	-
National Security			
Munitions and Explosives of Concern	-	-	-
Natural Resources			
Cetacean Biologically Important Areas – Feeding	Humpback Whale (0)	Humpback Whale (1.02)	Humpback Whale (0.89)
Cetacean Biologically Important Areas – Migratory Route	-	-	-
Humpback Whale High-Use Areas	2.01	-	-
NMFS ESA Critical Habitat	Humpback Whale (Mexico) (0)	Humpback Whale (Mexico) (0.41)	Humpback Whale (Mexico) (0.30)
Non-Key Harbor Seal Haulout Locations (500-m Setback)	-	-	-
North Pacific Seabird Data**	2.27	-	-
ShoreZone Coastal Mapping – Eelgrass Bioband	0.13	0	0
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	-	-	-
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-	-
Industry, Navigation, and Transportation			

Entire extent	VAL-S1	VAL-S2	VAL-S3
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-	-
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	-	-	-
Permitted Log Transfer Facility (500-m Setback)	-	-	-
USFS Recreation Opportunities – Cabin Rentals	-	-	-
Cultural Resources			
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m setback)*	3	-	-
Alaska Area Plans (Community Harvest) overlap	-	Yes	-
Subsistence Search and Harvest Areas within 5 km	-	-	-
Aquaculture and Fisheries			
Alaska Area Plans (Sport Fishing) overlap	-	-	-
Alaska DNR Shore Fishery Lease	-	-	-
Hatchery Release Sites	-	-	-
Aquatic Farm Permits	-	-	-
*Classified data layer; if the option is within the specified distance, a value of “Yes” is shown instead of the travel distance value. **A straight-line distance was used to calculate minimum travel distance.			



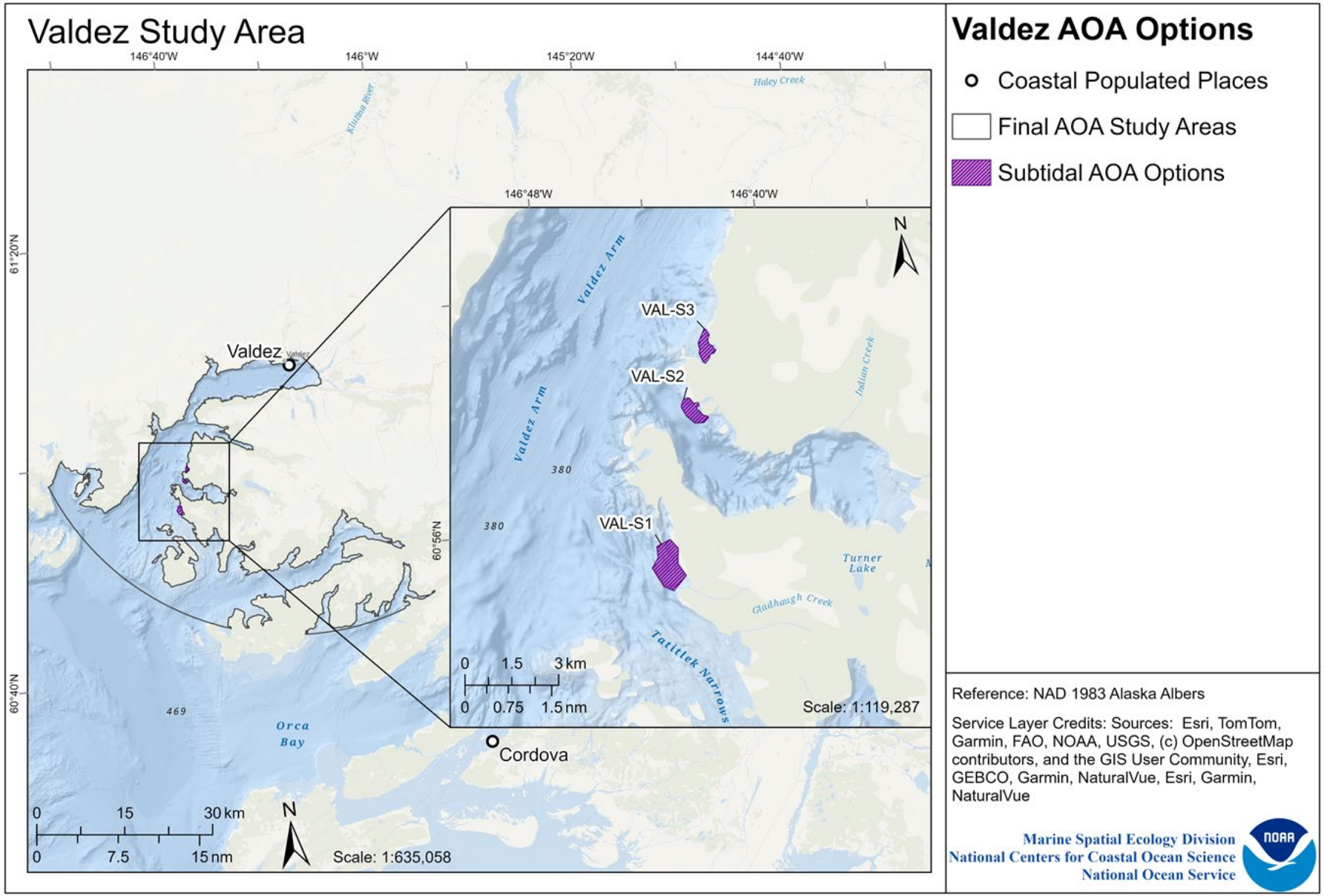


Figure 3.106. Final subtidal AOA options for the Valdez Study Area.

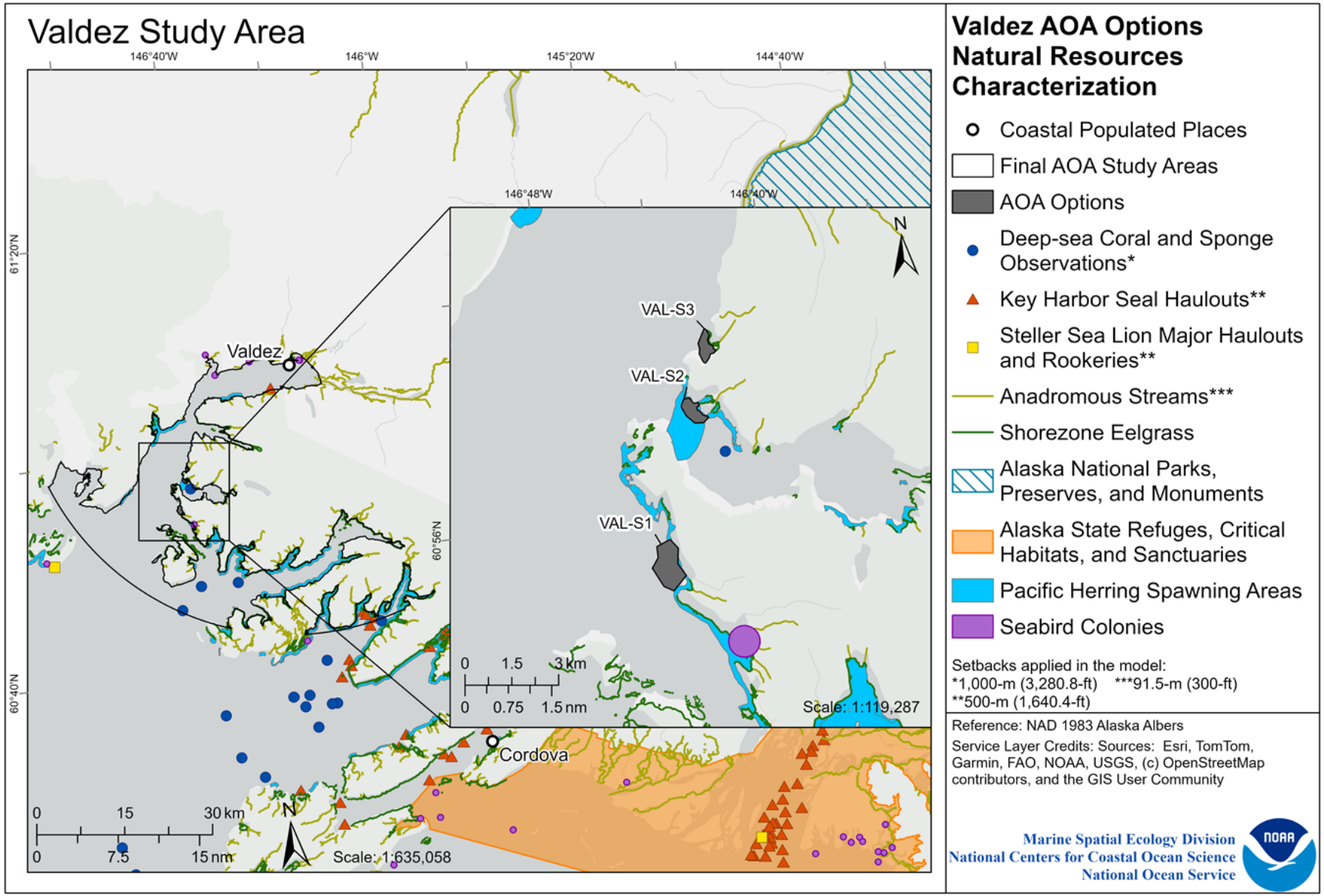


Figure 3.107. Natural resource interactions with the final AOA options in the Valdez Study Area.

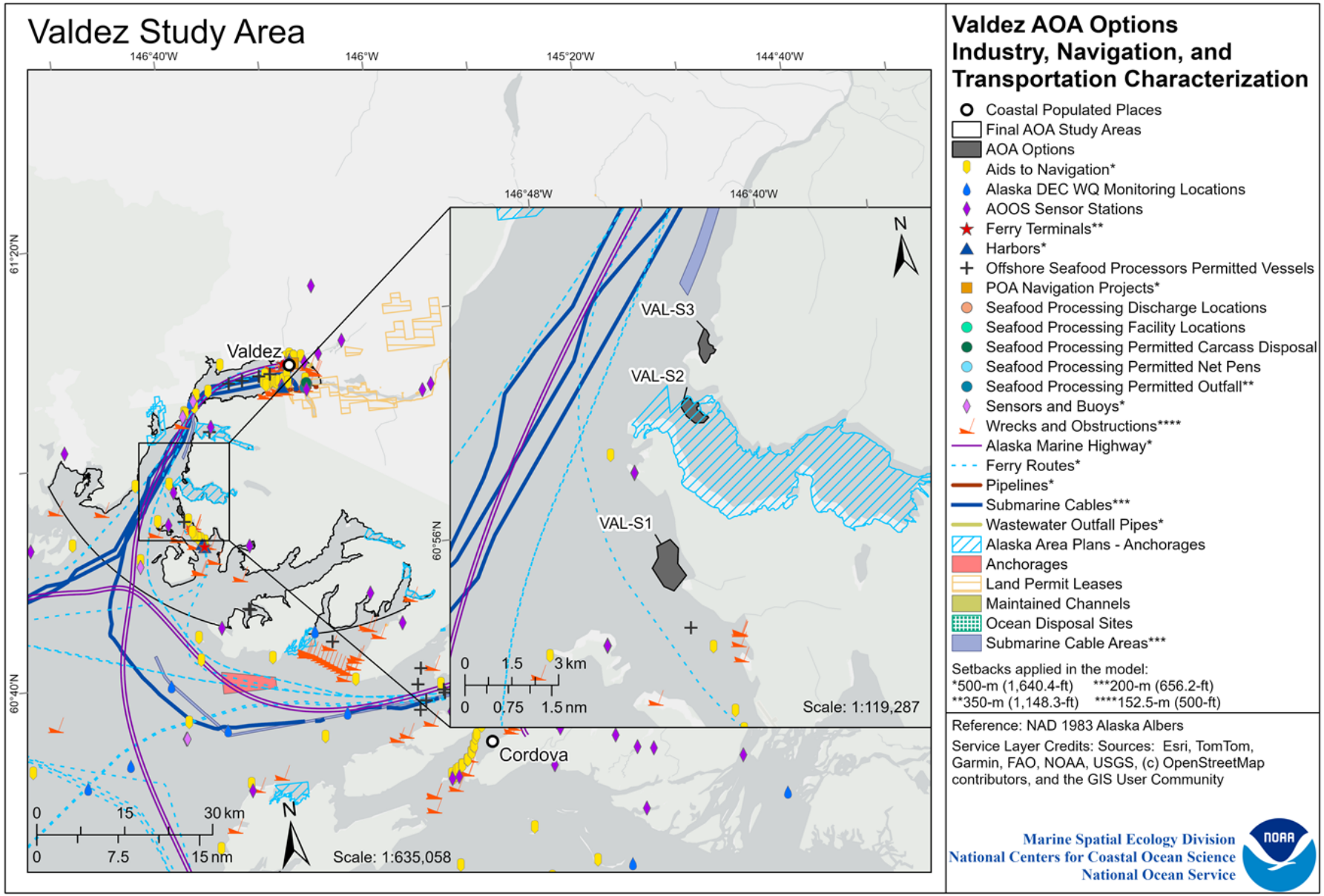


Figure 3.108. Industry, navigation, and transportation interactions with the final AOA options in the Valdez Study Area.

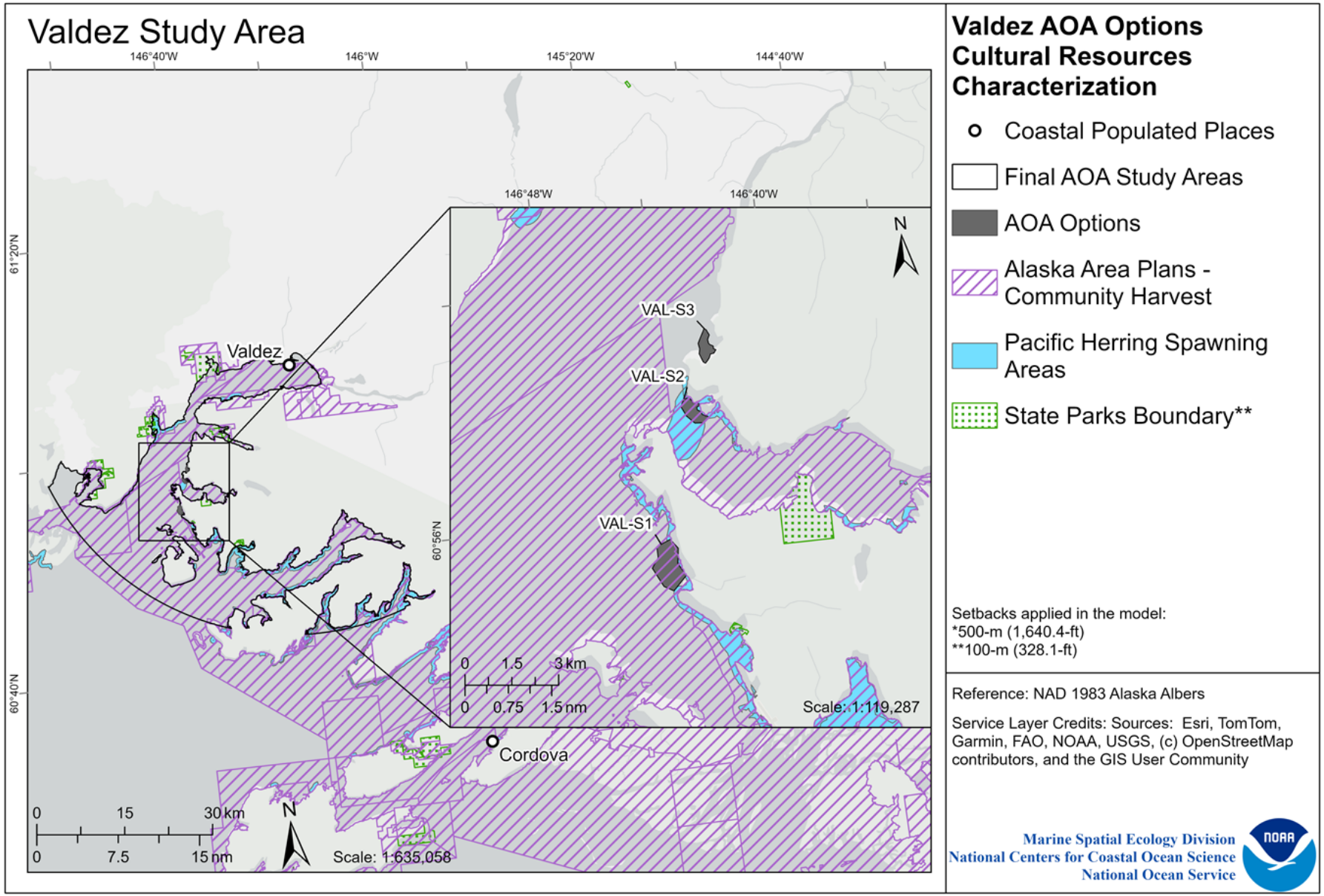


Figure 3.109. Cultural resource interactions with the final AOA options in the Valdez Study Area.

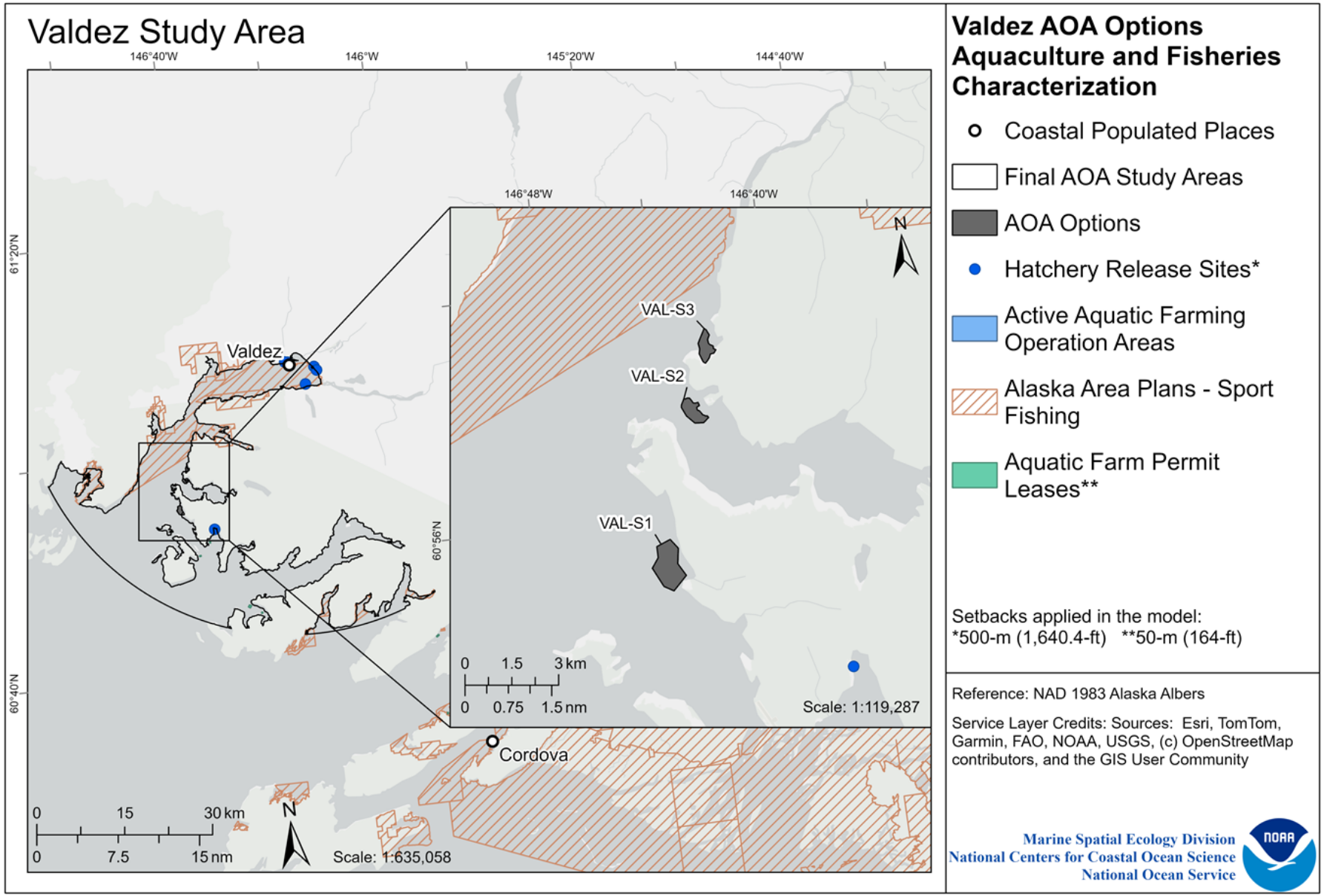


Figure 3.110. Aquaculture and fisheries interactions with the final AOA options in the Valdez Study Area.

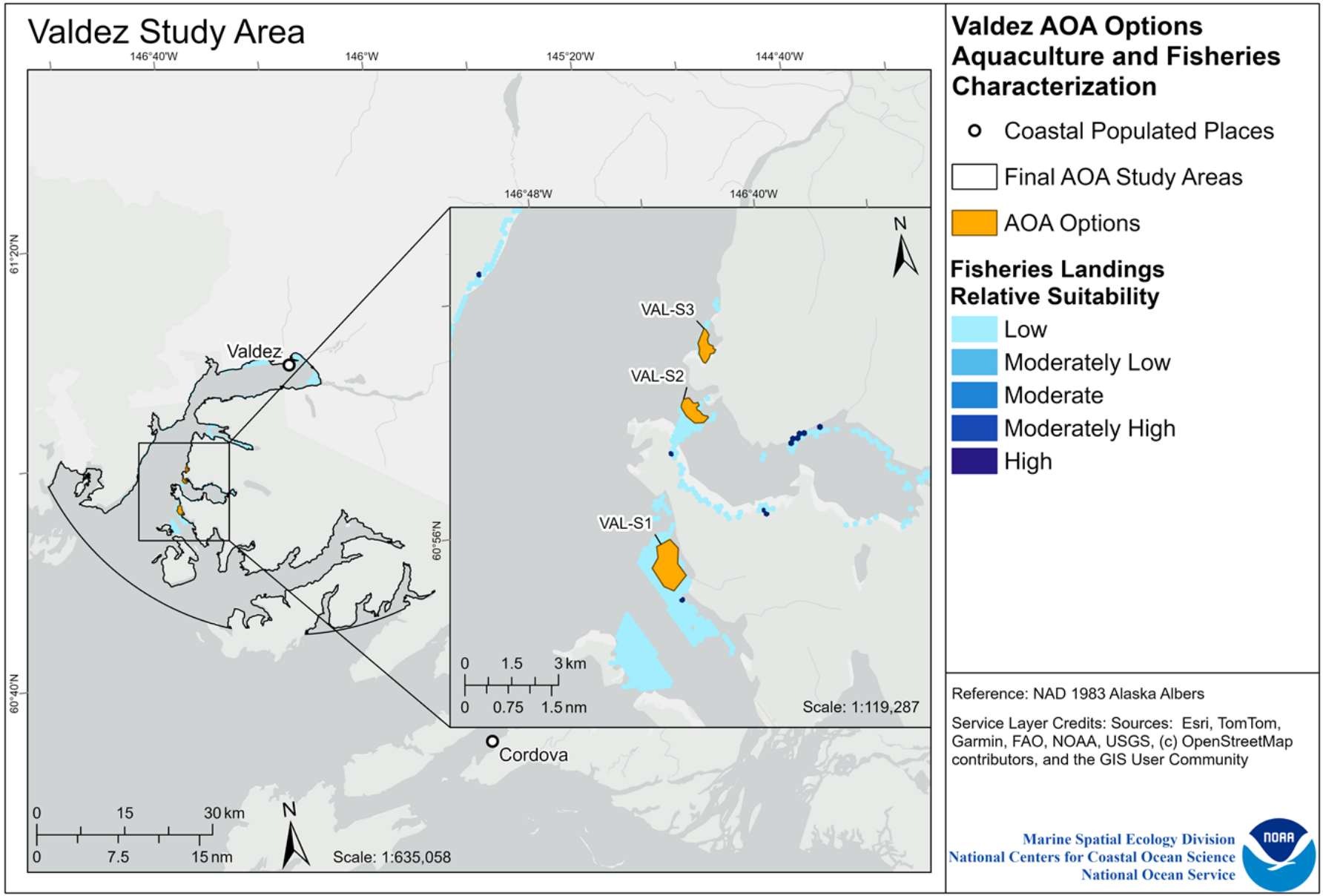


Figure 3.111. Relative suitability of the fishing landings combined data layer in relation to the final AOA options in the Valdez Study Area.

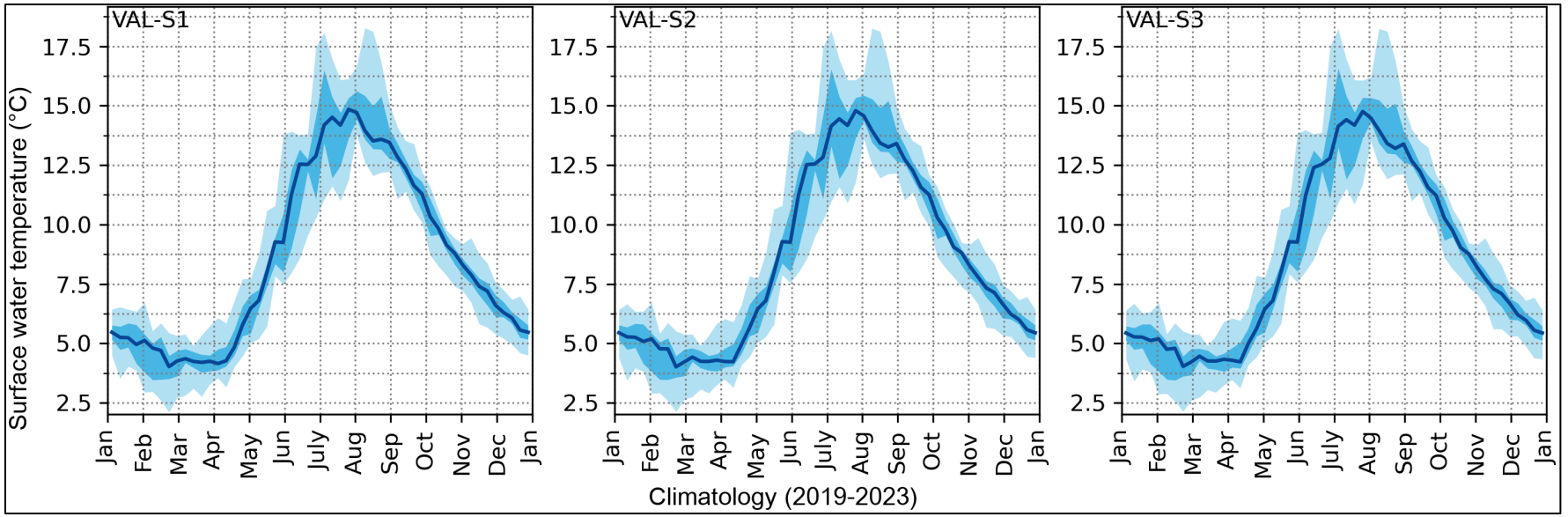


Figure 3.112. Sea surface temperatures for a subset of options from the Valdez Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

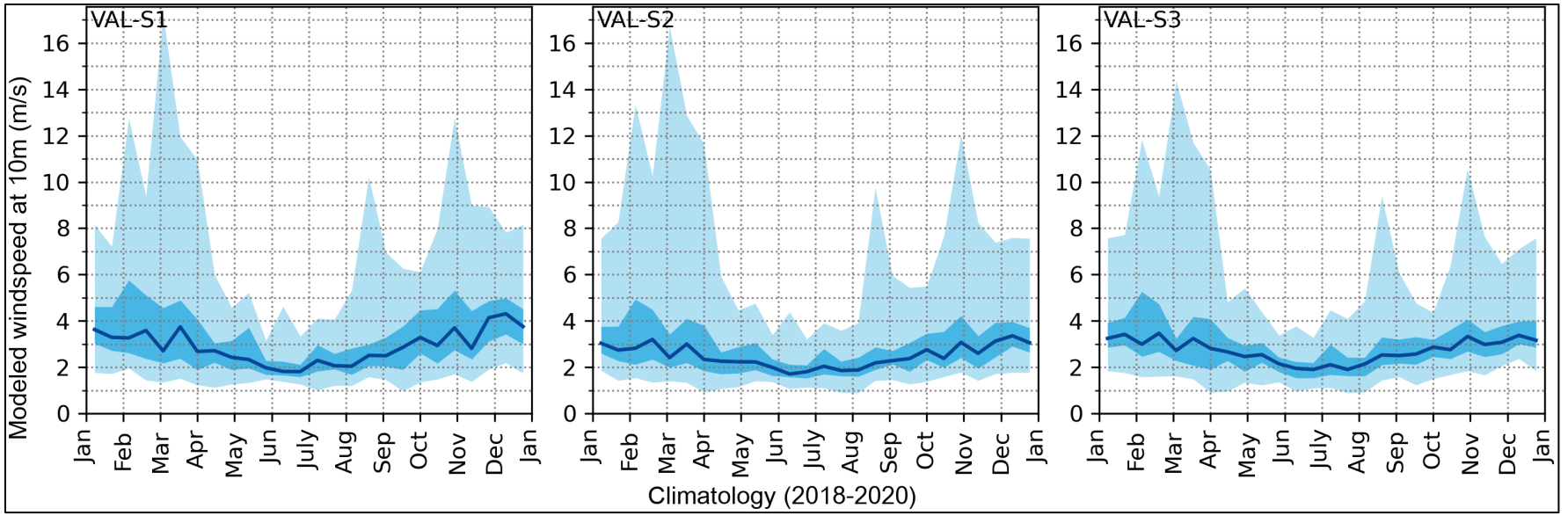


Figure 3.113. Wind speed at 10-m altitude for a subset of options from the Valdez Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

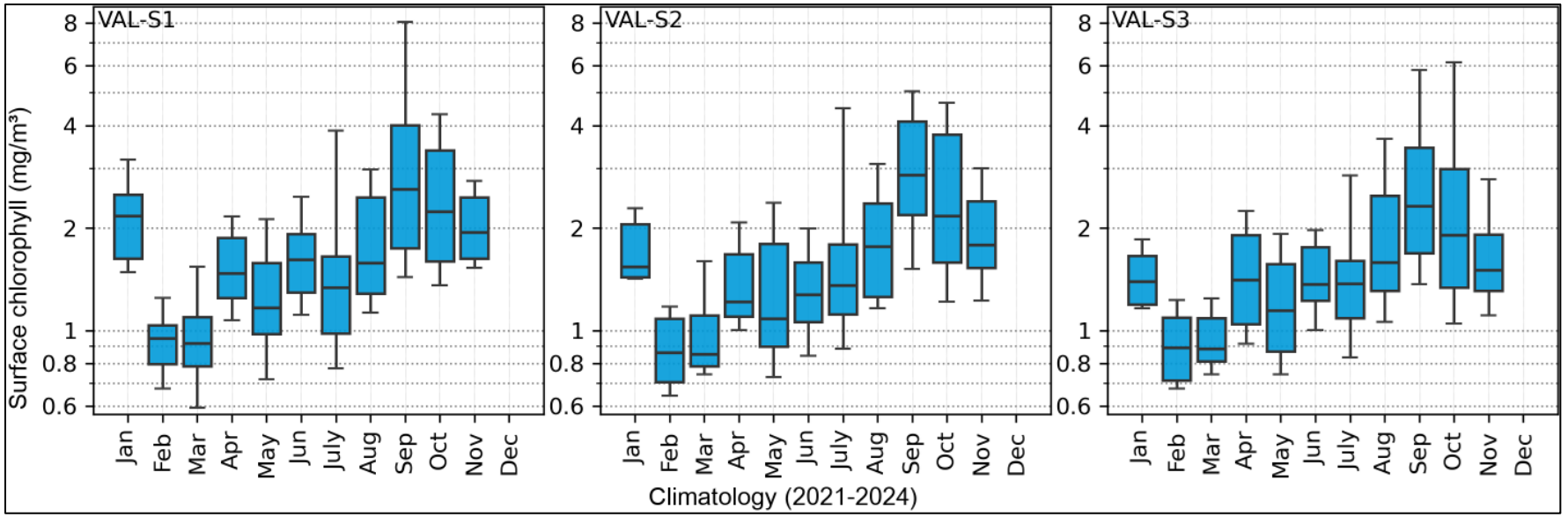


Figure 3.114. Monthly climatological surface chlorophyll *a* for a subset of options from the Valdez Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

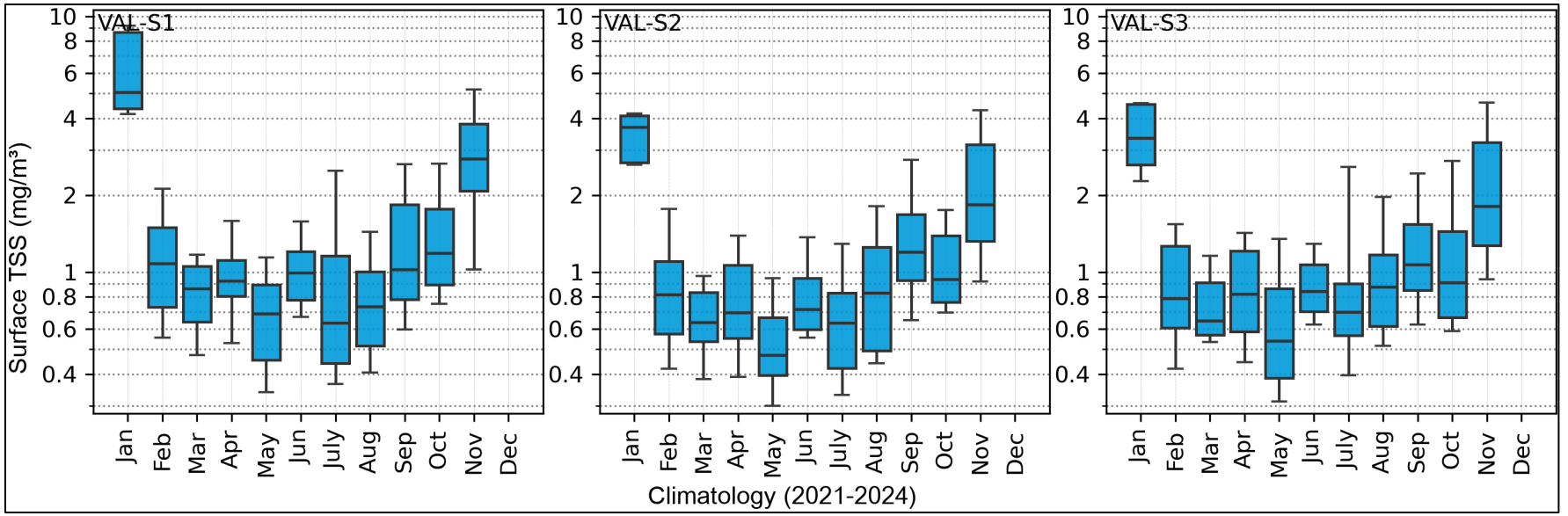


Figure 3.115. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Valdez Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

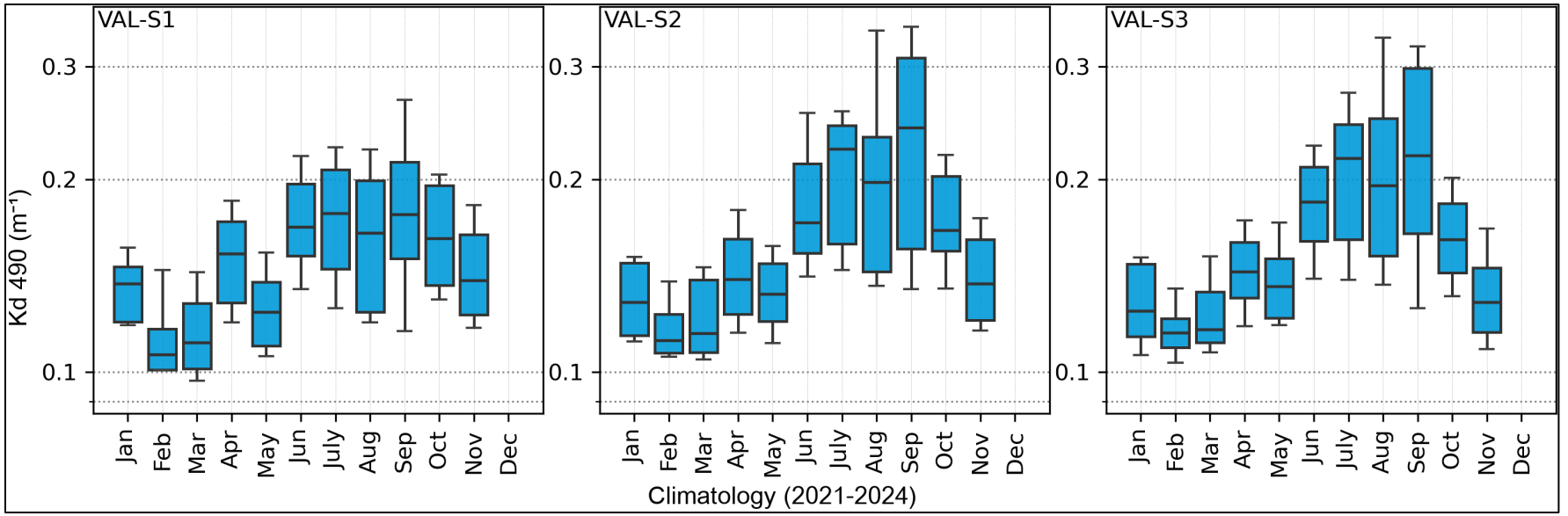


Figure 3.116. Monthly climatological light attenuation, Kd(490), for a subset of options from the Valdez Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

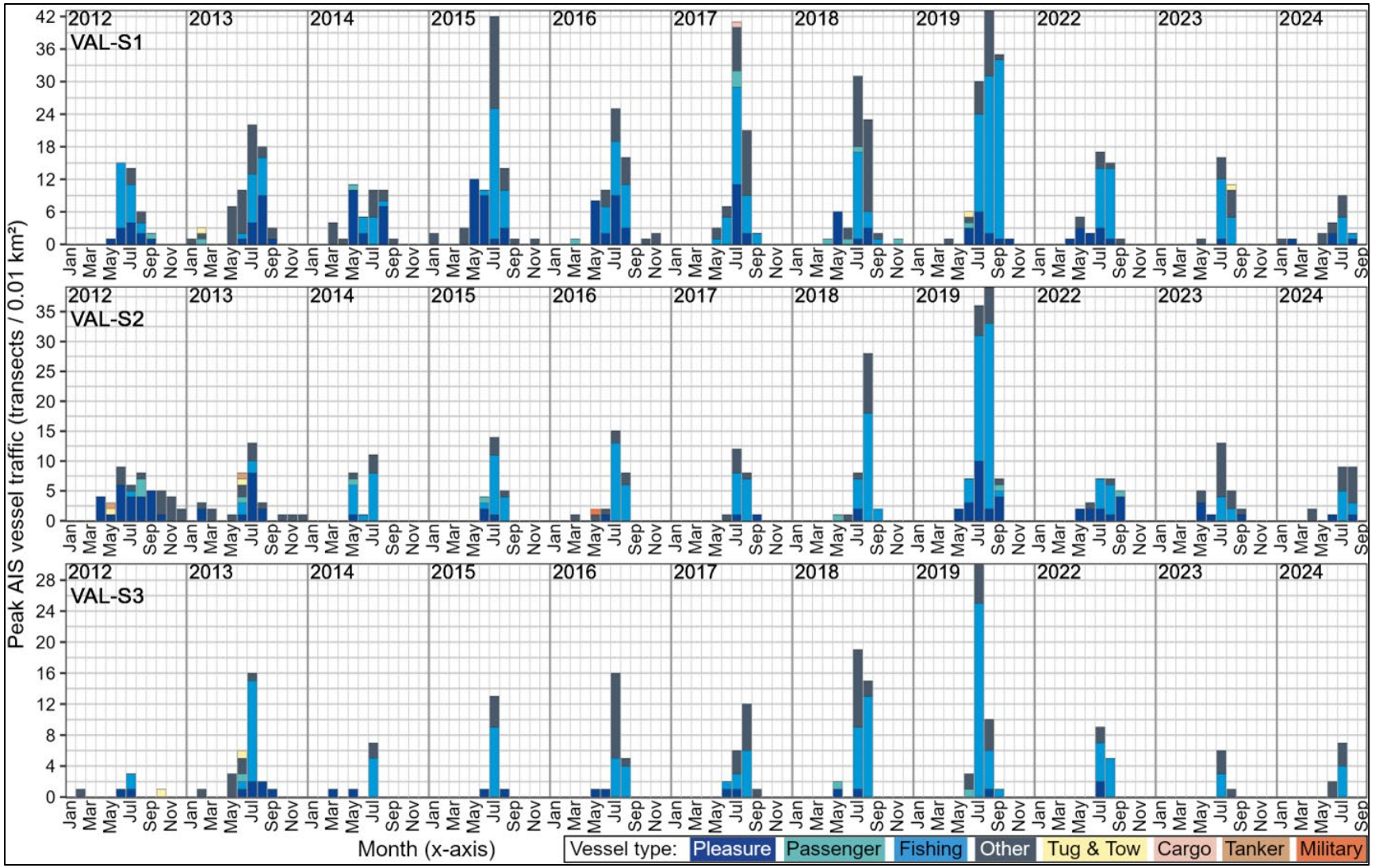


Figure 3.117. Monthly peak vessel traffic activity within options from a subset of the Valdez Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

VAL-S1

AOA option VAL-S1 is a 260-ac subtidal site within the Valdez Study Area, located 36 km (19 nm) from Valdez (centroid: 60.9192 N, 146.7407 W). The site is located within subunit 23K of the Prince William Sound area plan. Text descriptions for the subunit includes reference to community harvest occurring within the subunit. This does not mean they directly overlap with the site; refer to the area plan for more information. The site ranges in depth at MLLW from 28 m (91 ft) to 49 m (160 ft) with an average depth of 35 m (120 ft). At MHW the depth ranges from 33 m (110 ft) to 54 m (180 ft) with an average depth of 40 m (130 ft). VAL-S1 has an average slope of 1.1° and maximum slope of 4.6°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.4°C, a minimum daily average of 4.5°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at VAL-S1 averaged 3.3 m/s, with a minimum of 0.97 m/s and a maximum of 17 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (2.8 mg/m³) and lowest in February (0.48 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in November (1.6 mg/m³) and lowest in March (0.41 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in September (0.28 m^{-1}) and lowest in March (0.10 m^{-1}).

Industry and National Security Considerations

VAL-S1 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (4.8 km), Navy undersea cable (exact distance undisclosed), ferry route (0.89 km), and wreck and obstruction (2.8 km). The site is within ADFG salmon (group code G) statistical unit 22150 and the groundfish (group code G) statistical unit 466033. VAL-S1 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 43 total transects (August 2019). The primary vessel types observed are fishing, other, and pleasure. Overall levels of AIS activity have remained relatively constant over time. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

VAL-S1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (3.4 km), historically mapped eelgrass sites (0.13 km), humpback whale high use areas (2.0 km), humpback whale feeding BIA (0 km), Mexico humpback whale NMFS ESA (0 km), and seabird colony locations (2.3 km). VAL-S1 is in proximity to a sizeable seabird colony (Old Ellamar Dock) containing species prone to nest failure resulting from disturbance. VAL-S1 also overlaps the Prince William Sound Marine IBA.

Cultural Resource Considerations

There are three Alaska Heritage Resources Survey sites within approximately 5 km of VAL-S1. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages

or Tribal Associations within 50 km include the Native Village of Tatitlek. Given this proximity, cultural resources could be present to an unknown extent.

VAL-S2

AOA option VAL-S2 is a 92-ac subtidal site within the Valdez Study Area, located 31 km (17 nm) from Valdez (centroid: 60.9624 N, 146.7164 W). The site is located within subunits 23C and 23J of the Fidalgo unit in the Prince William Sound area plan. Text descriptions for the subunits include reference to anchorages and community harvest occurring within the subunit. This does not mean they directly overlap with the site; refer to the area plan for more information. The site ranges in depth at MLLW from 30 m (97 ft) to 57 m (190 ft) with an average depth of 44 m (150 ft). At MHW the depth ranges from 35 m (110 ft) to 62 m (200 ft) with an average depth of 49 m (160 ft). VAL-S2 has an average slope of 1.7° and maximum slope of 2.1°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected, semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.3°C, a minimum daily average of 4.5°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at VAL-S2 averaged 2.9 m/s, with a minimum of 0.89 m/s and a maximum of 17 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (2.9 mg/m³) and lowest in February (0.39 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (1.6 mg/m³) and lowest in February (0.36 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in September (0.38 m^{-1}) and lowest in March (0.095 m^{-1}).

Industry and National Security Considerations

VAL-S2 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (3.1 km), Navy undersea cable (exact distance undisclosed), and ferry route (2.7 km). The site is within ADFG salmon (group code G) statistical unit 22150 and the groundfish (group code G) statistical unit 466033. VAL-S2 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 39 total transects (August 2019). The primary vessel types observed are fishing, other, and pleasure. AIS activity over the most recent five years has increased by roughly 48% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

VAL-S2 is within 5 km of at least one documented location from each of the following natural resources: deep-sea coral observations (1.1 km), historically mapped eelgrass sites (0 km), humpback whale feeding BIA (1.0 km), and Mexico humpback whale NMFS ESA (0.41 km).

Cultural Resource Considerations

Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Tatitlek. Given this proximity, cultural resources could be present to an unknown extent.

VAL-S3

AOA option VAL-S3 is a 78-ac subtidal site within the Valdez Study Area, located 28 km (15 nm) from Valdez (centroid: 60.9804 N, 146.7049 W). The site is located within subunit 23J of the Fidalgo unit in the Prince William Sound area plan. The site ranges in depth at MLLW from 13 m (44 ft) to 62 m (200 ft) with an average depth of 33 m (110 ft). At MHW the depth ranges from 18 m (61 ft) to 67 m (220 ft) with an average depth of 38 m (120 ft). VAL-S3 has an average slope of 2.8° and maximum slope of 3.7°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (1 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.3°C, a minimum daily average of 4.5°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at VAL-S3 averaged 3.0 m/s, with a minimum of 0.89 m/s and a maximum of 14 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (1.8 mg/m³) and lowest in February (0.37 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in June (1.8 mg/m³) and lowest in February (0.42 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in September (0.41 m^{-1}) and lowest in February (0.10 m^{-1}).

Industry and National Security Considerations

VAL-S3 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (1.2 km), Navy undersea cable (exact distance undisclosed), and ferry route (2.4 km). The site is within ADFG salmon (group code G) statistical unit 22150 and the groundfish (group code G) statistical unit 466033. VAL-S3 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 30 total transects (July 2019). The primary vessel types observed are fishing, other, and pleasure. AIS activity over the most recent five years has increased by roughly 35% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

VAL-S3 is within 5 km of at least one documented location from each of the following natural resources: deep-sea coral observations (4.0 km), historically mapped eelgrass sites (0 km), humpback whale feeding BIA (0.89 km), and Mexico humpback whale NMFS ESA (0.30 km). VAL-S3 overlaps a small seabird colony containing species prone to nest failure resulting from disturbance. VAL-S3 also overlaps the Prince William Sound Marine IBA.

Cultural Resource Considerations

Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Tatitlek. Given this proximity, cultural resources could be present to an unknown extent.

Cordova Study Area

Final AOA options within the Cordova Study Area include four subtidal sites spanning 629 ac (Figure 3.118). Options range in size from 131.1 ac to 168.1 ac (Table 3.12; Figures 3.118–3.130). No intertidal options were identified in Cordova, which is generally considered a function of the steep shelf within the unconstrained portions of the study area. Several sites within the study area are located near, and may directly overlap with, ecologically sensitive resources. These include historically mapped eelgrass beds, feeding BIAs and high-use areas for humpback whales, and both key and non-key harbor seal haulouts. Some sites may also overlap, or are near, Mexico humpback whale critical habitat and Steller sea lion critical habitat. Given the proximity to these resources, project planning should account for potential ecological impacts and may require coordination or consultation with appropriate resource agencies.

This study area overlaps marine bird concentration areas and important habitats, specifically the Prince William Sound Marine IBA, containing high densities of marine birds. Within areas identified as suitable for mariculture, there are some small seabird colonies containing species that are prone to nest failure through disturbance.



Public comments related to the Cordova draft AOA options included concerns about potential overlap with existing commercial salmon fisheries. Overlap with salmon fishing was noted for the final AOA options COR-S1, S3, and S4 in Sheep Bay. Locations outside the Double Bay/Hawkins Cutoff area were also identified as active fishing grounds; no AOA options were identified in this location. To minimize conflict and ensure equitable resource access, coordination with fishing groups, such as Cordova District Fishermen United, SEAFA, and ADFG is recommended during the siting of aquaculture operations in areas with active fisheries. An additional comment also noted that the final AOA option COR-S2 in Simpson Bay overlapped with high densities of sea otters, which may present difficulties for Mariculture.

General comments focused on potential overlaps between AOA study areas and documented cultural resource sites. In response, the final model run incorporated additional down-scoring of AHRS data layers, resulting in reduced suitability and, ultimately, the removal of portions of, or entire, draft AOA sites located within 500 m of AHRS-listed locations. Comments also noted potential impacts to subsistence harvest activities from aquaculture development. The degree of possible adverse effect to subsistence harvest activities is highly dependent on the specific harvest activity (e.g., intertidal gathering vs herring roe collection) and the nature of proposed aquaculture development (e.g., subtidal vs intertidal culture). All aquaculture projects will be subject to further review during the Alaska state leasing and permitting process. Early and ongoing coordination with coastal communities, nearby Alaska Native Villages, Alaska Native Corporations, and other Tribal Associations is strongly recommended to ensure access to common-use resources, cultural resource sites, and that traditional uses are not adversely impacted.

Below are additional characterizations of site-specific details regarding the geographic location and environmental conditions of AOA options within the Cordova Study Area, as well as considerations regarding national security, natural resources, navigation and transportation, cultural resources, and various industries including aquaculture and fisheries. These are presented as tables containing location information for each option and proximity to these considerations (Table 3.12). Following these tables are maps that visualize the options along with data used within the suitability model (Figures 3.118–3.123). Next are plots summarizing available time series data to provide additional context on environmental conditions and observed vessel traffic within the options (Figures 3.124–3.130). Following these tables and figures are individual text descriptions for each option summarizing the characteristics observed. These tables, figures, and text summaries were created using many different spatial datasets curated to complement factors considered during the Alaska state aquatic farm lease application and review process, and to assist proponents in the identification of key user groups and resource agencies to engage with during the project design and application process. These data are unlikely to be exhaustive, and there may be additional considerations not captured in this characterization. These different presentation methods are meant not only to communicate site-specific characteristics in multiple ways but also to complement each other. They may also contain unique bits of information not found in the other parts of this characterization.

Table 3.12. Characterization summary for Cordova Aquaculture Opportunity Area subtidal options COR-S1, COR-S2, COR-S3, and COR-S4. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km).

Entire extent	COR-S1	COR-S2	COR-S3	COR-S4
General characteristics				
Center Coordinates (longitude, latitude)	-146.0048, 60.6364	-145.9206, 60.6403	-145.9922, 60.6521	-145.9753, 60.6625
Size (ac)	131.1	162.5	168.1	166.8
Distance to Coastal Populated Places (nm)	15.3	12.7	16.2	17.1
Depth (m) (min, max, mean), Average Slope (degrees)	19.3, 25.64, 22.45, 0.64	22.4, 24.49, 23.35, 0.14	24.08, 27.21, 25.46, 0.25	21.29, 24.61, 22.78, 0.18
Alaska Area Plan Subunit	23K	23I	23K	23K
Commercial Statistical Areas – Groundfish, Shellfish	466031	456031	466031	466031
Commercial Statistical Areas – Salmon	22120	22120	22120	22120

Entire extent	COR-S1	COR-S2	COR-S3	COR-S4
Constraints				
Anadromous Waters Catalog – Streams (91.5-m setback)	0.19	1.01	0.19	0.61
Deep-Sea Coral and Sponge Occurrences (1,000-m Setback)	-	-	-	-
Ferry Routes (500-m setback)	3.97	4.36	-	-
Key Harbor Seal Haulout Locations (500-m Setback)	2.66	-	1.13	1
Navy Undersea Cables within 5 km (500-m Setback)	Yes	Yes	-	-
Pipelines (500-m Setback)	-	-	-	-
Submarine Cable Areas (200-m Setback)	4.48	4.34	-	-
Wastewater Outfalls (500-m Setback)	-	-	-	-
Wrecks and Obstructions (152.5-m Setback)	0.26	0.23	0.6	2.34
National Security				
Munitions and Explosives of Concern	-	-	-	-
Natural Resources				
Cetacean Biologically Important Areas – Feeding	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (1.21)	Humpback Whale (2.68)
Cetacean Biologically Important Areas – Migratory Route	-	-	-	-
Humpback Whale High-Use Areas	0	2.22	0.52	2.1
NMFS ESA Critical Habitat	Humpback Whale (Mexico) (0)	Humpback Whale (Mexico) (0)	Humpback Whale (Mexico) (0.87)	Humpback Whale (Mexico) (2.12)
Non-Key Harbor Seal Haulout Locations (500-m Setback)	1.23	0.89	3.05	4.76
North Pacific Seabird Data**	-	-	-	-
ShoreZone Coastal Mapping – Eelgrass Bioband	0	0	0	0
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	-	-	-	-

Entire extent	COR-S1	COR-S2	COR-S3	COR-S4
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-	-	-
Industry, Navigation, and Transportation				
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-	-	-
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	-	-	-	-
Permitted Log Transfer Facility (500-m Setback)	-	-	-	-
USFS Recreation Opportunities – Cabin Rentals	-	-	-	-
Cultural Resources				
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m setback)*	2	-	2	2
Alaska Area Plans (Community Harvest) overlap	-	-	-	-
Subsistence Search and Harvest Areas within 5 km	-	-	-	-
Aquaculture and Fisheries				
Alaska Area Plans (Sport Fishing) overlap	-	-	-	-
Alaska DNR Shore Fishery Lease	-	-	-	-
Hatchery Release Sites	-	-	-	-
Aquatic Farm Permits	4.81	0.6	2.87	1.71
*Classified data layer; if the option is within the specified distance, a value of “Yes” is shown instead of the travel distance value. **A straight-line distance was used to calculate minimum travel distance.				

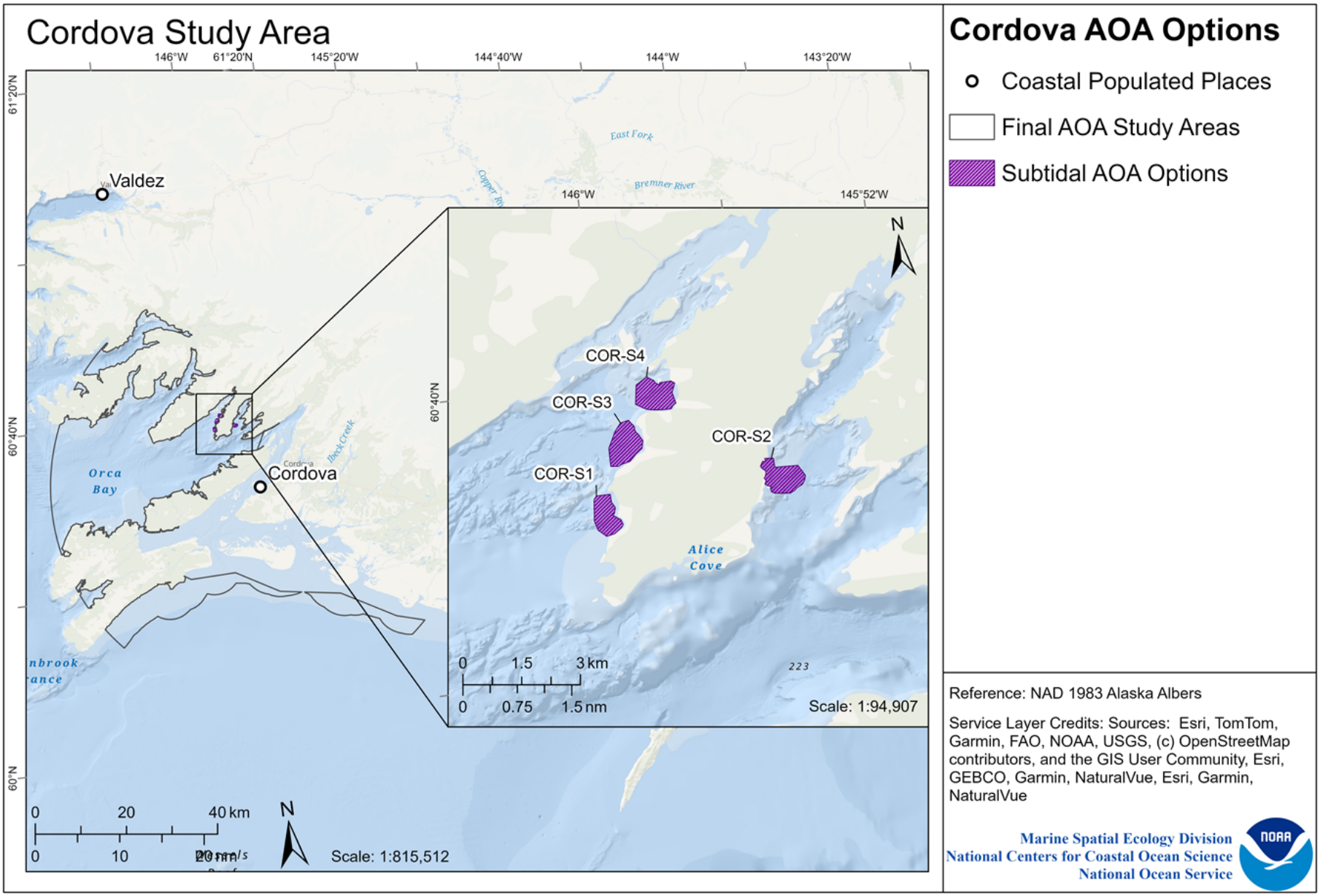


Figure 3.118. Final AOA subtidal options for the Cordova Study Area.

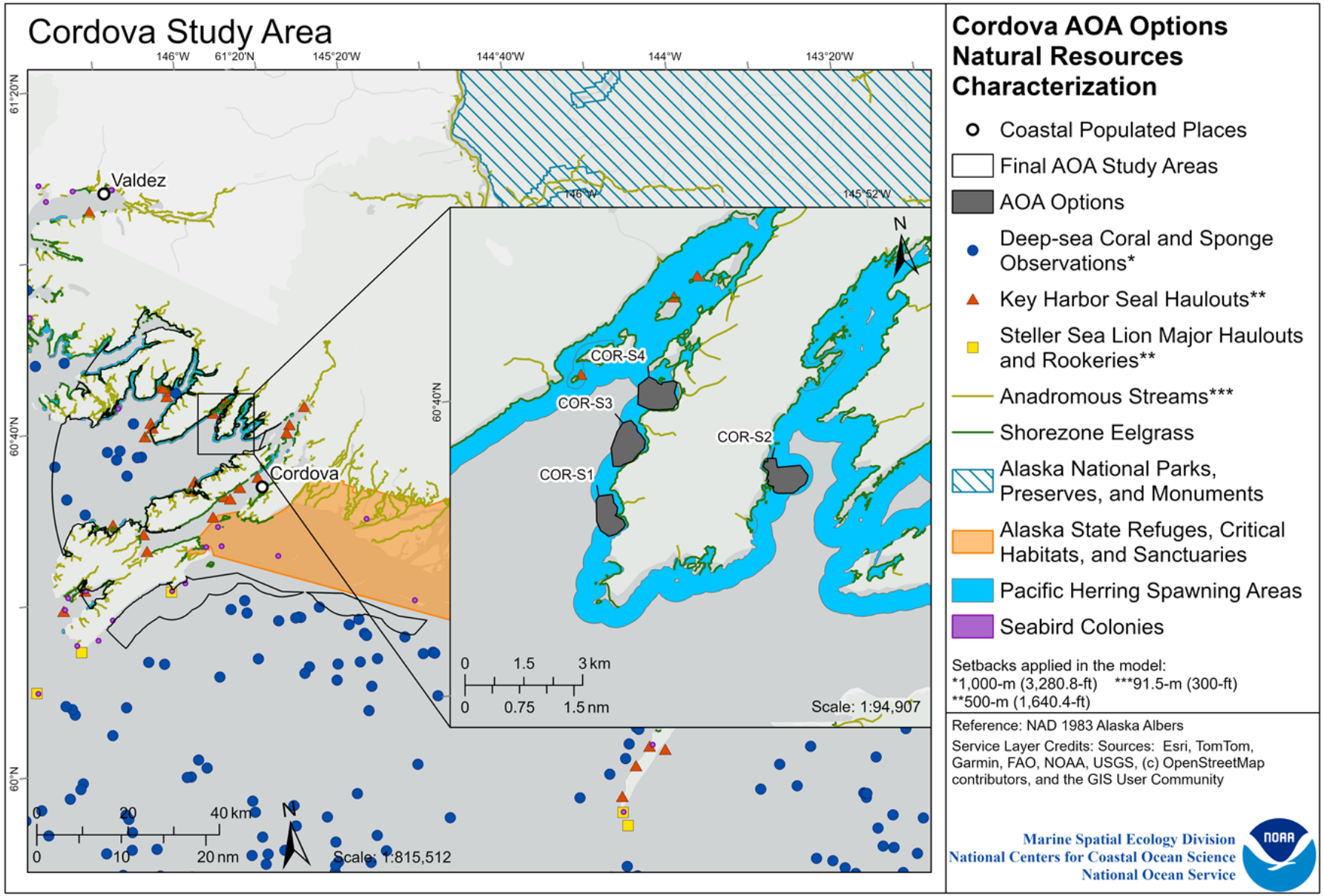


Figure 3.119. Natural resource interactions with the final AOA options in the Cordova Study Area.

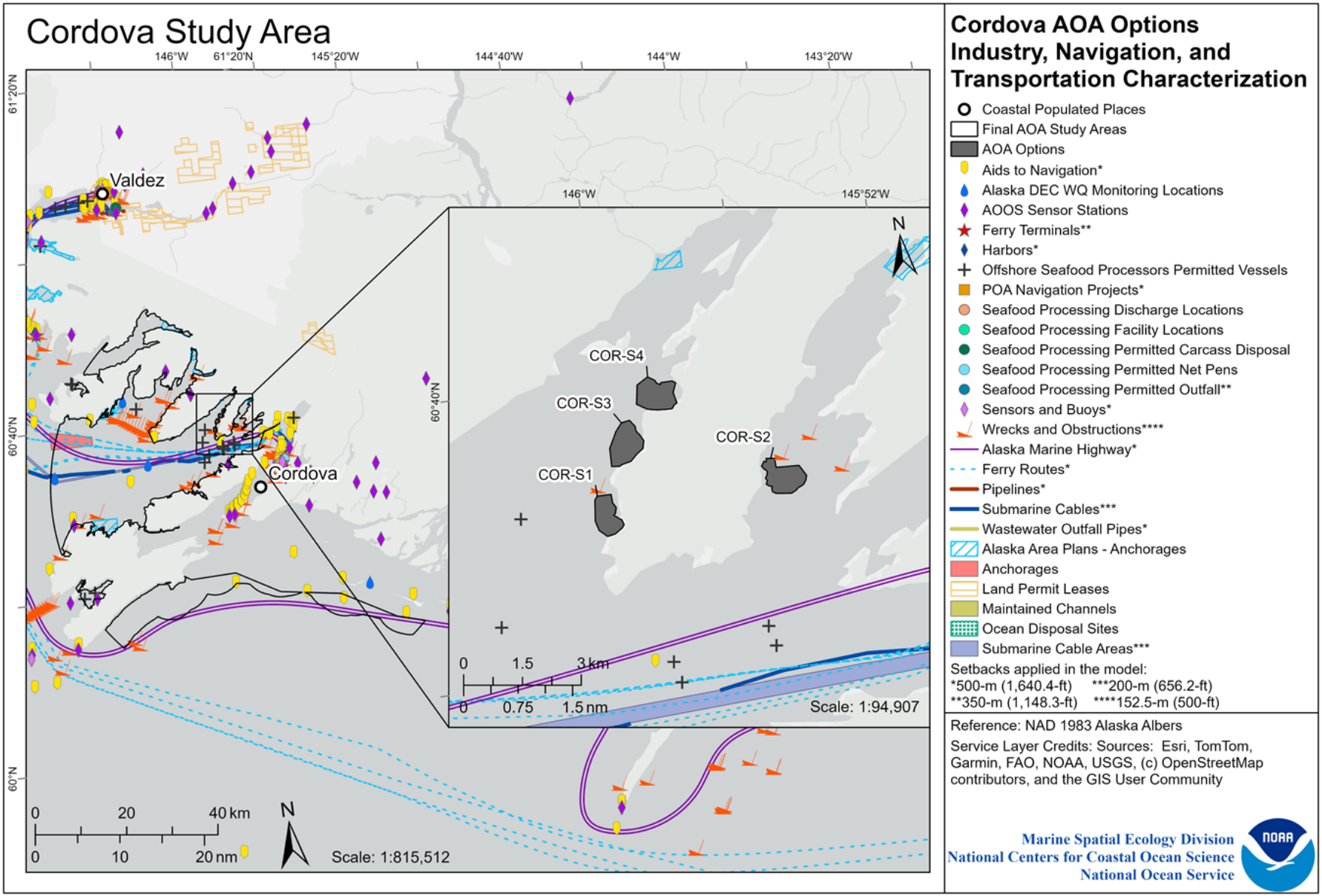


Figure 3.120. Industry, navigation, and transportation interactions with the final AOA options in the Cordova Study Area.

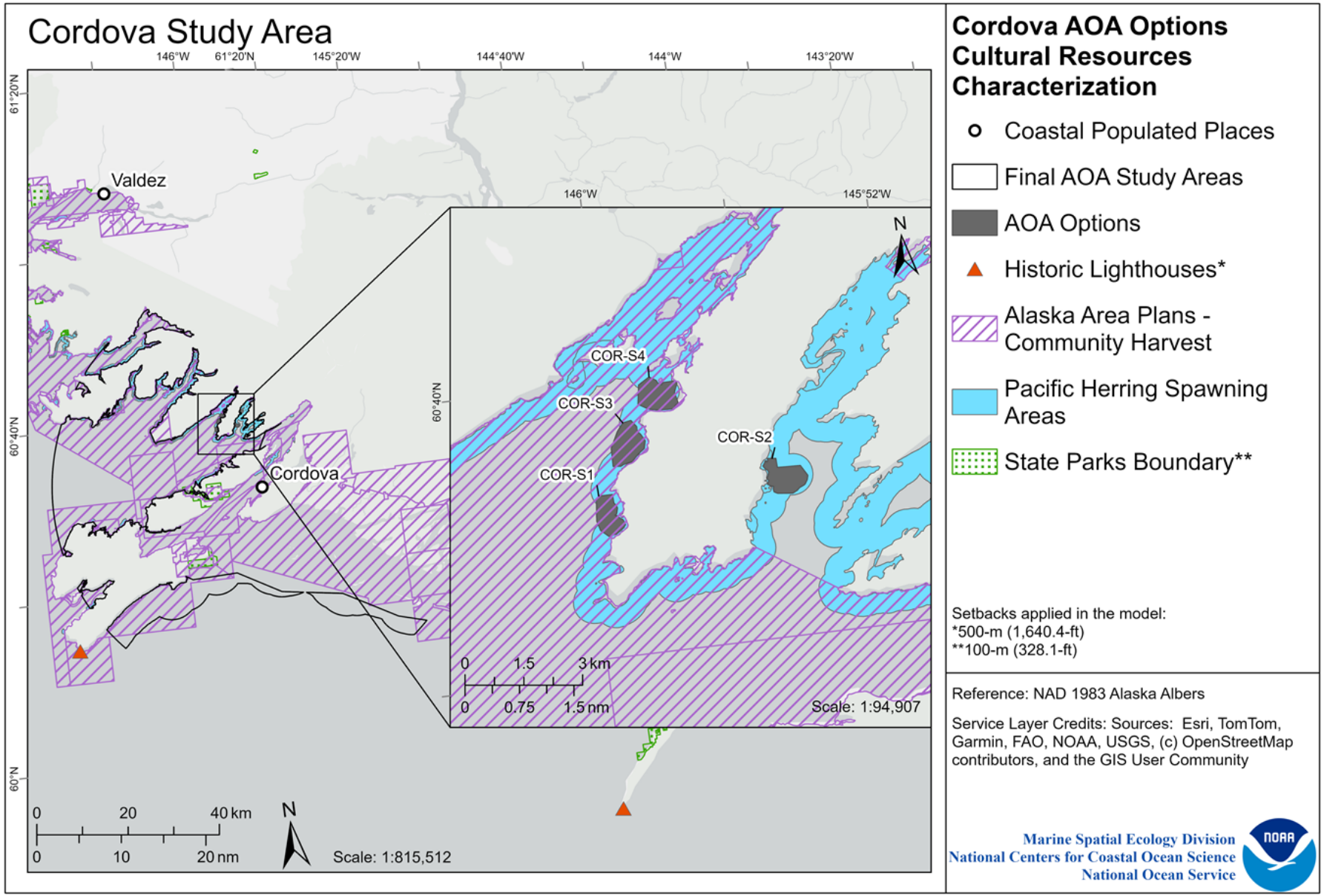


Figure 3.121. Cultural resource interactions with the final AOA options in the Cordova Study Area.

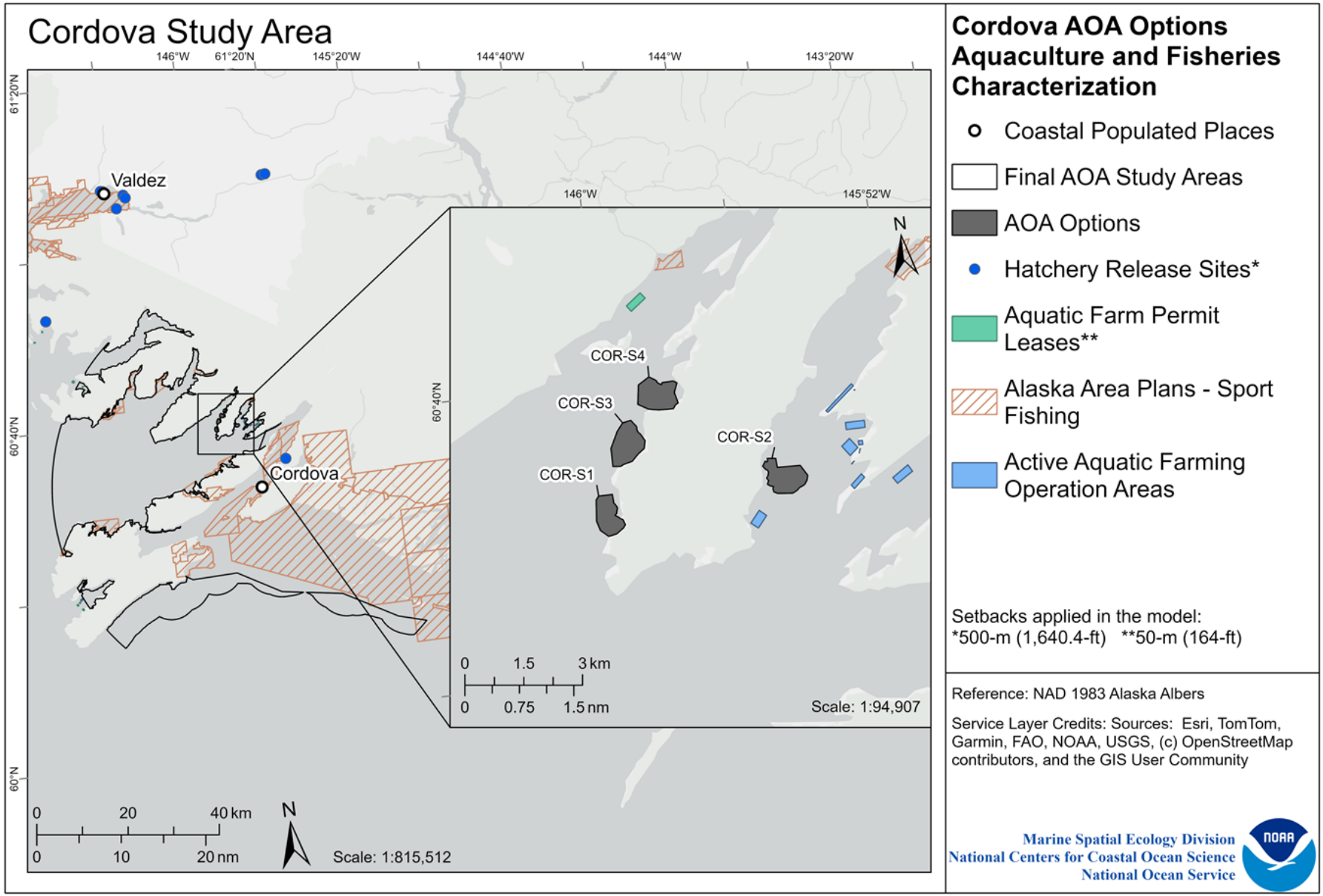


Figure 3.122. Aquaculture and fisheries interactions with the final AOA options in the Cordova Study Area.

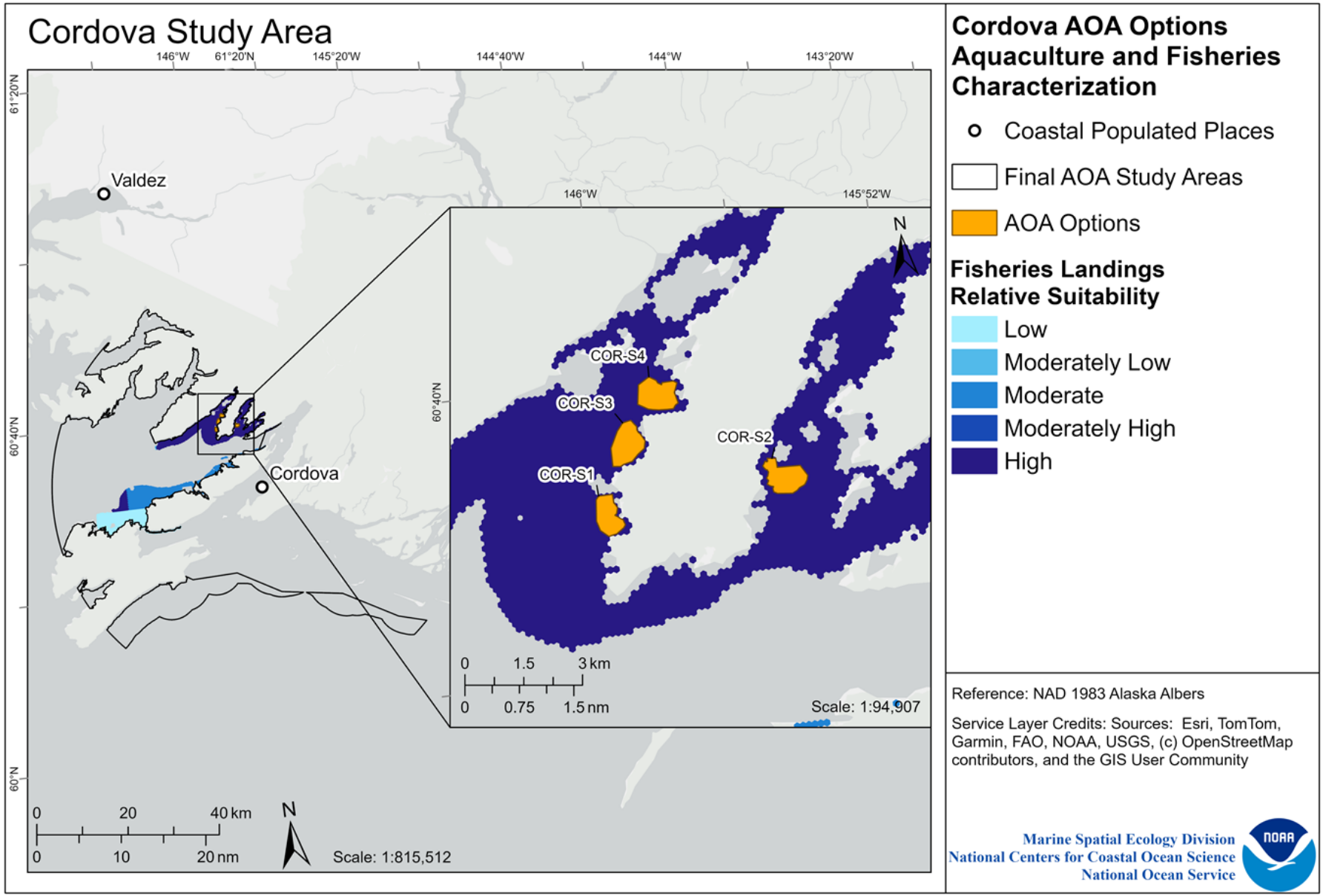


Figure 3.123. Relative suitability of the fishing landings combined data layer in relation to the final AOA options in the Cordova Study Area.

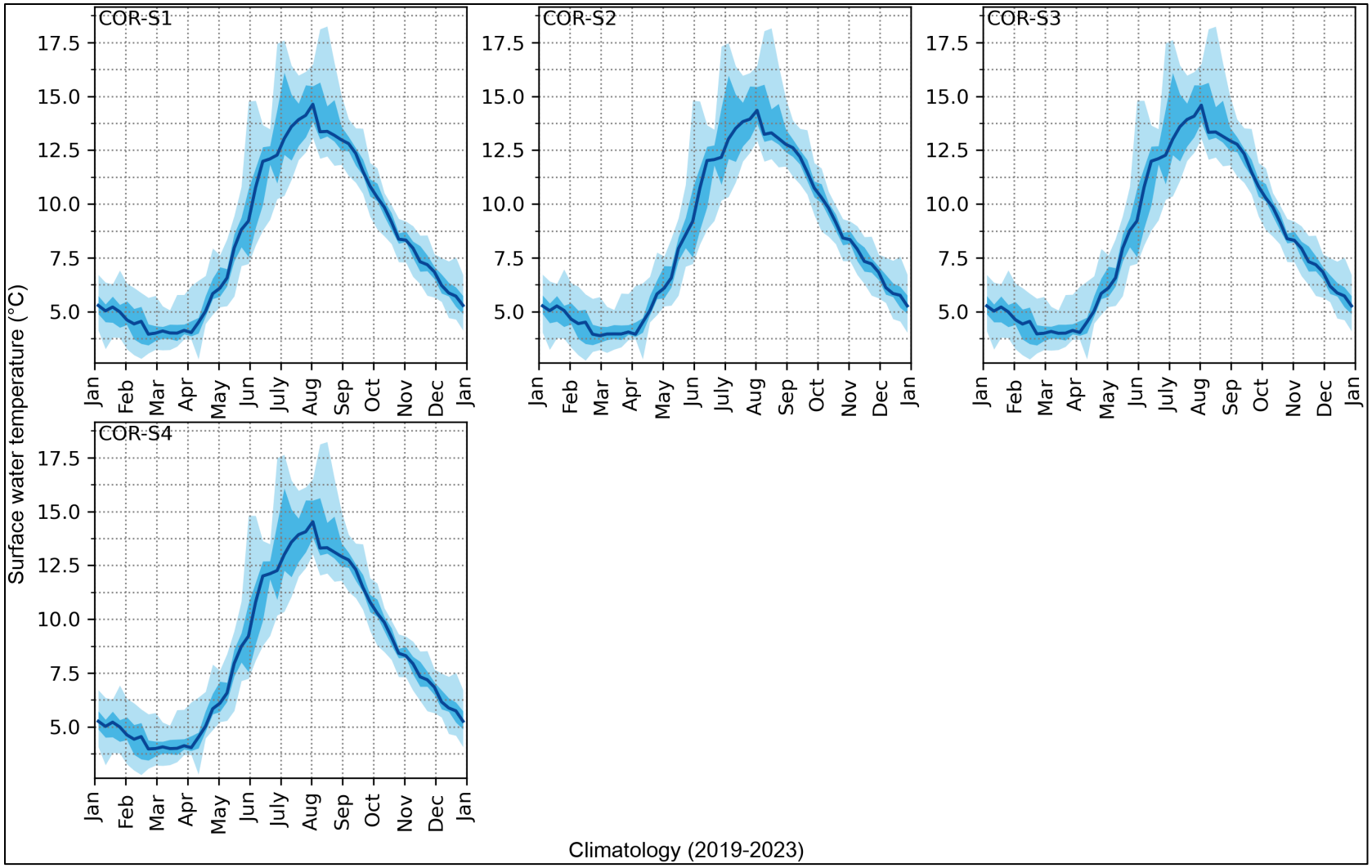


Figure 3.124. Sea surface temperatures for a subset of options from the Cordova Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

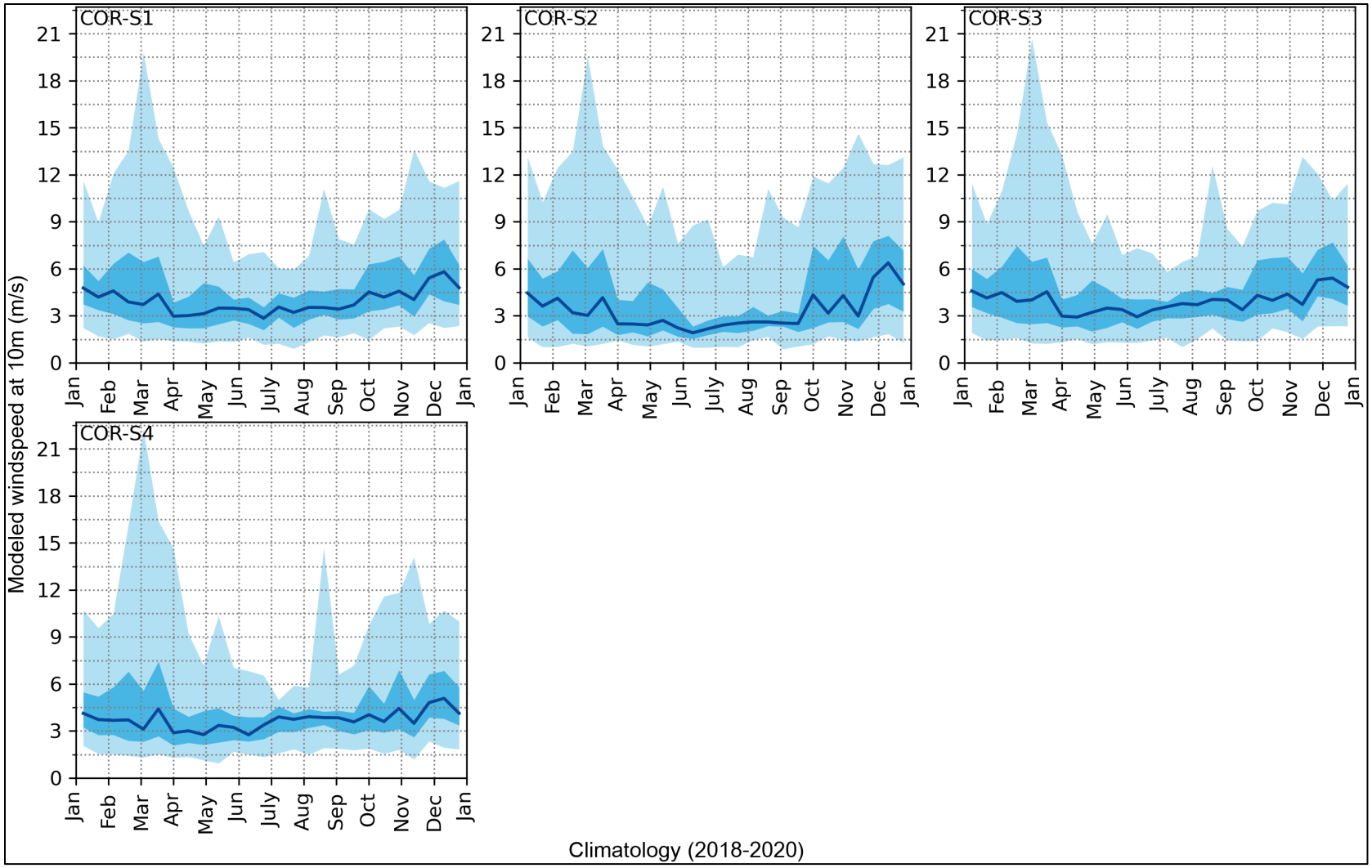


Figure 3.125. Wind speed at 10-m altitude for a subset of options from the Cordova Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

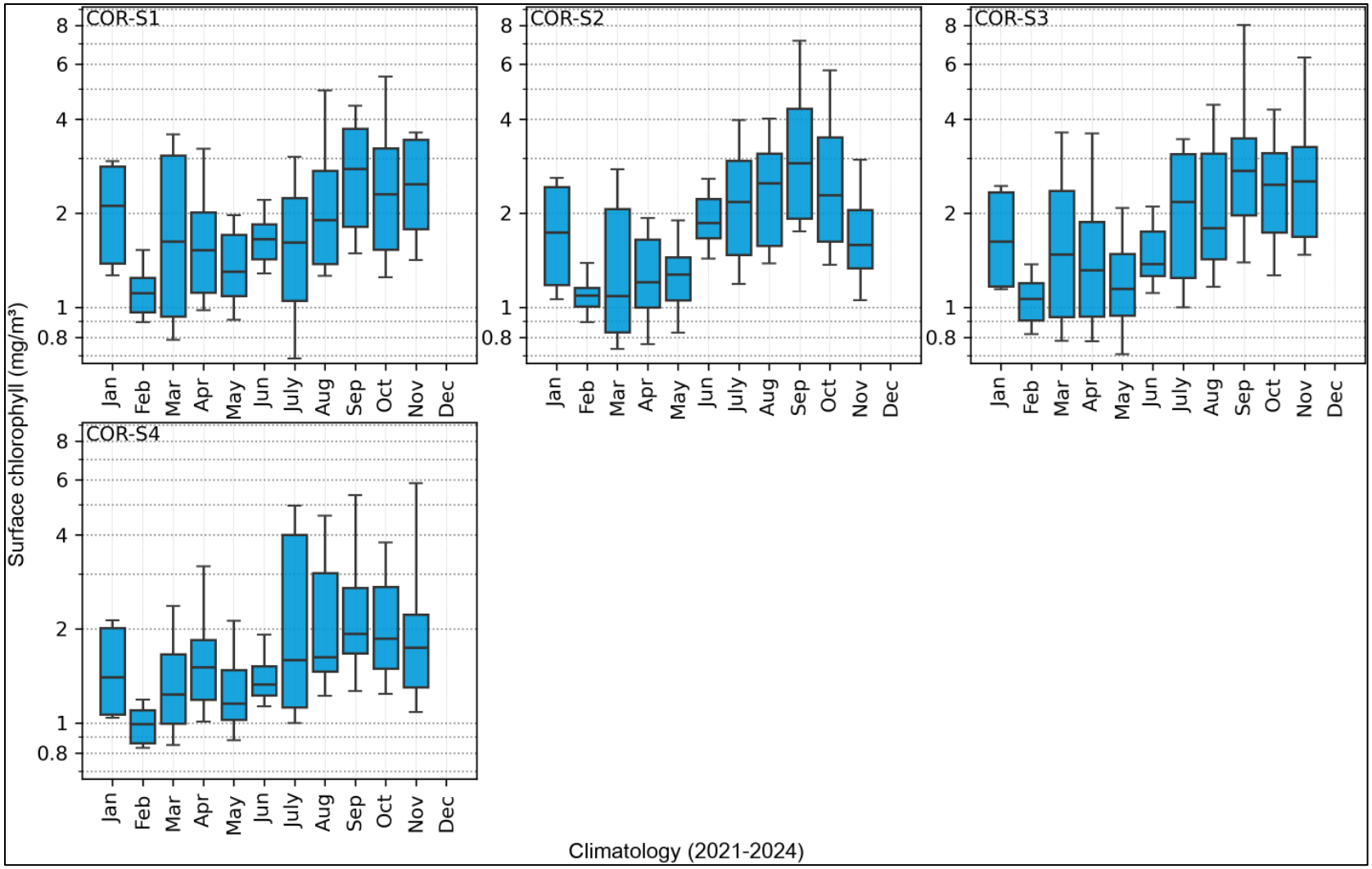


Figure 3.126. Monthly climatological surface chlorophyll *a* for a subset of options from the Cordova Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

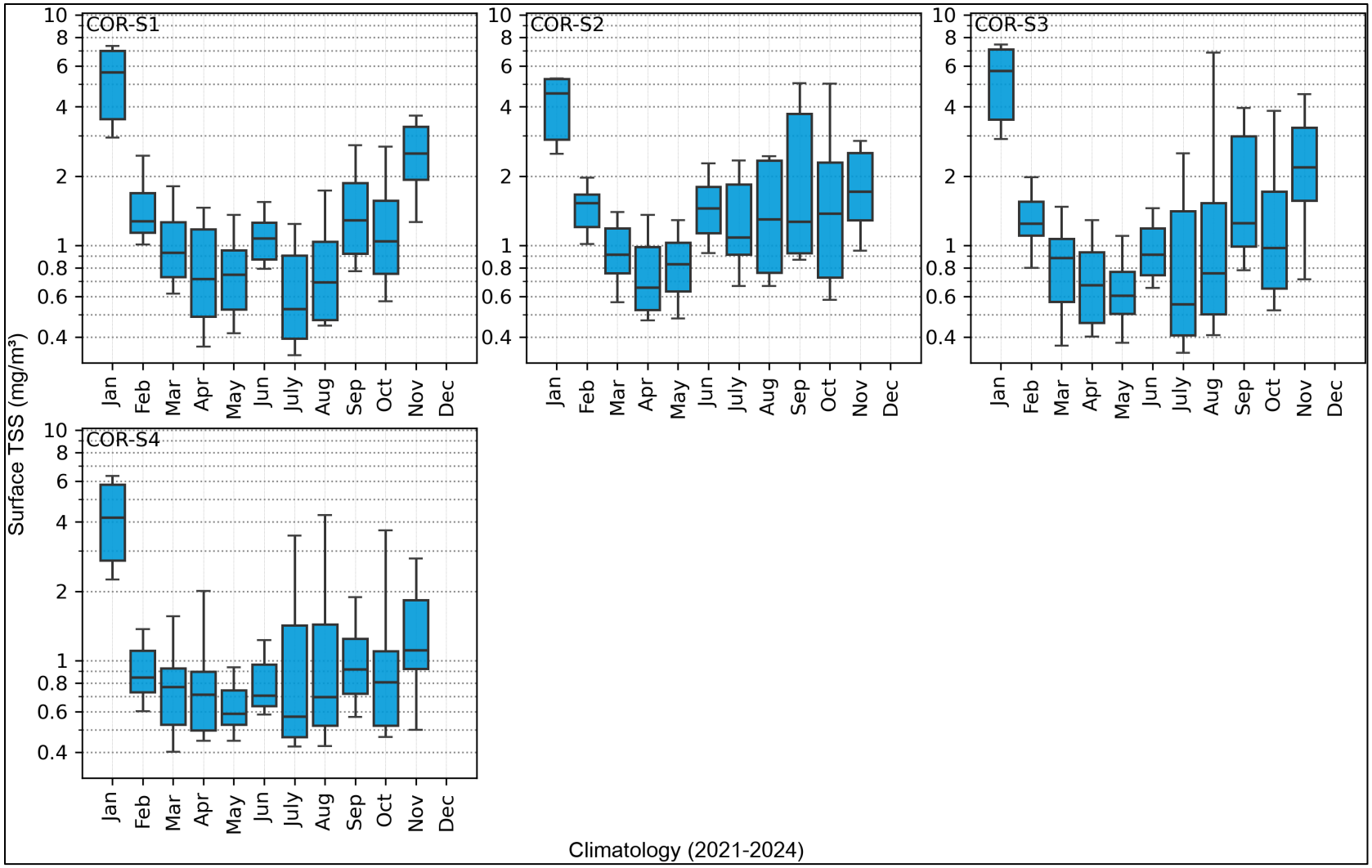


Figure 3.127. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Cordova Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

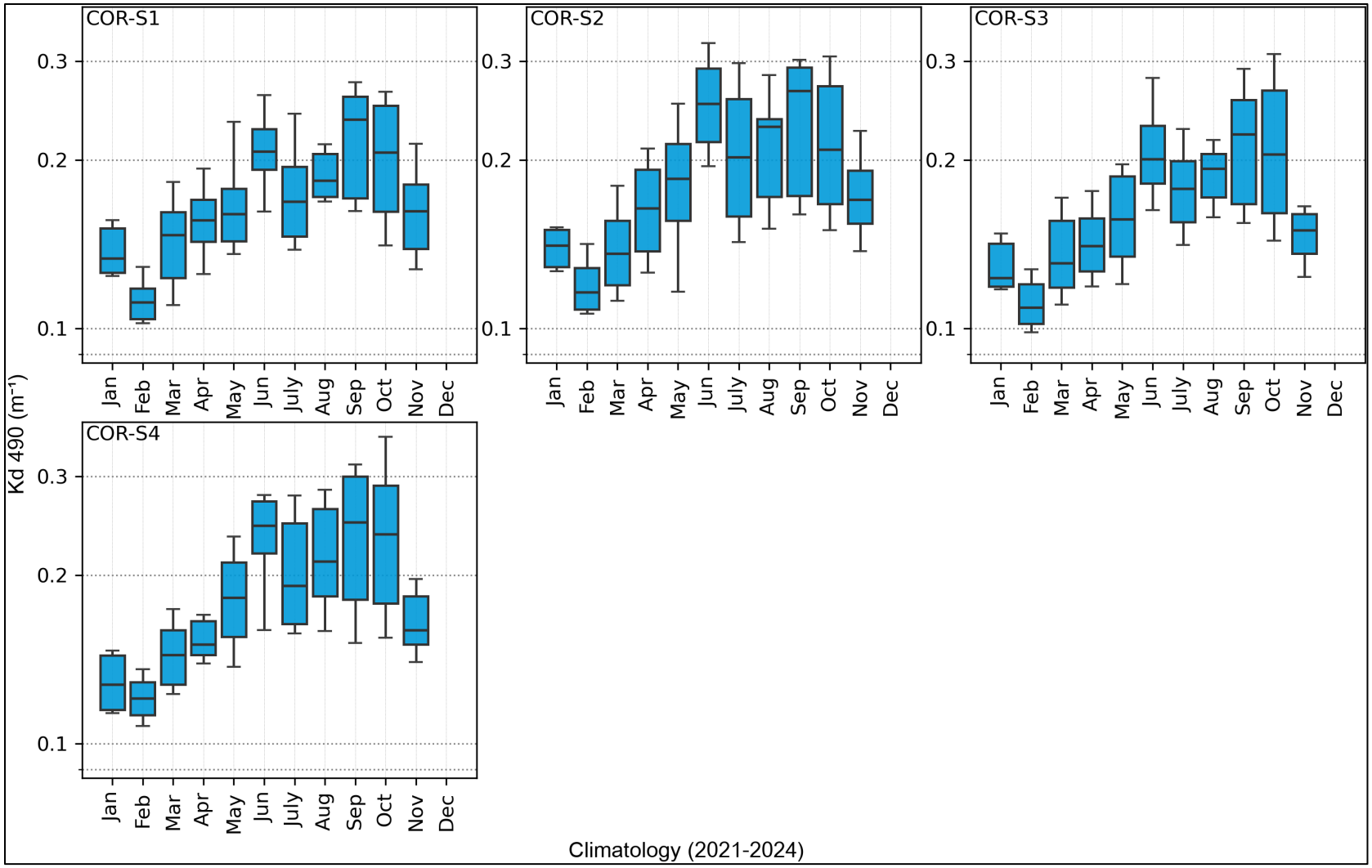


Figure 3.128. Monthly climatological light attenuation, Kd(490), for a subset of options from the Cordova Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

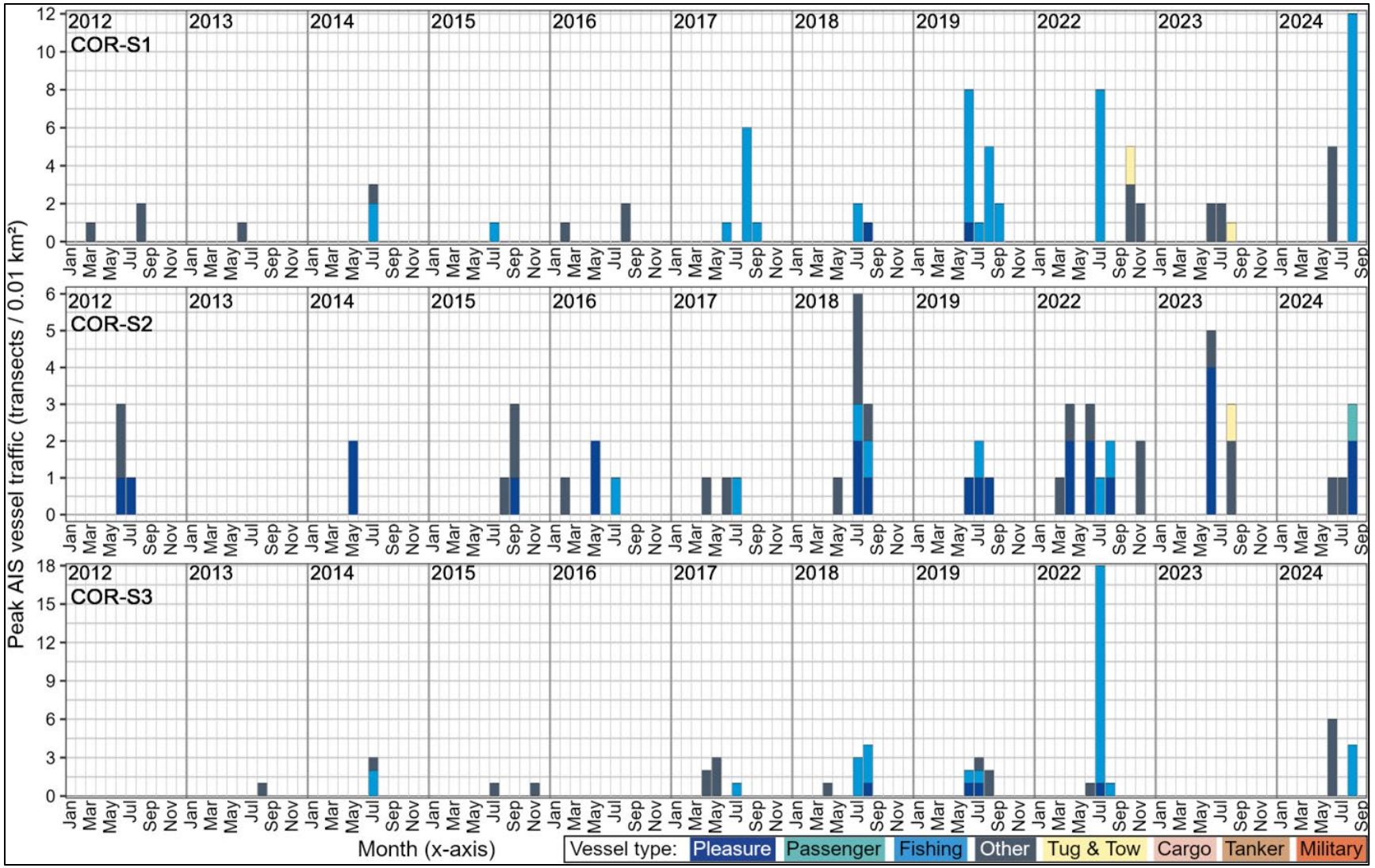


Figure 3.129. Monthly peak vessel traffic activity within options from a subset of the Cordova Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

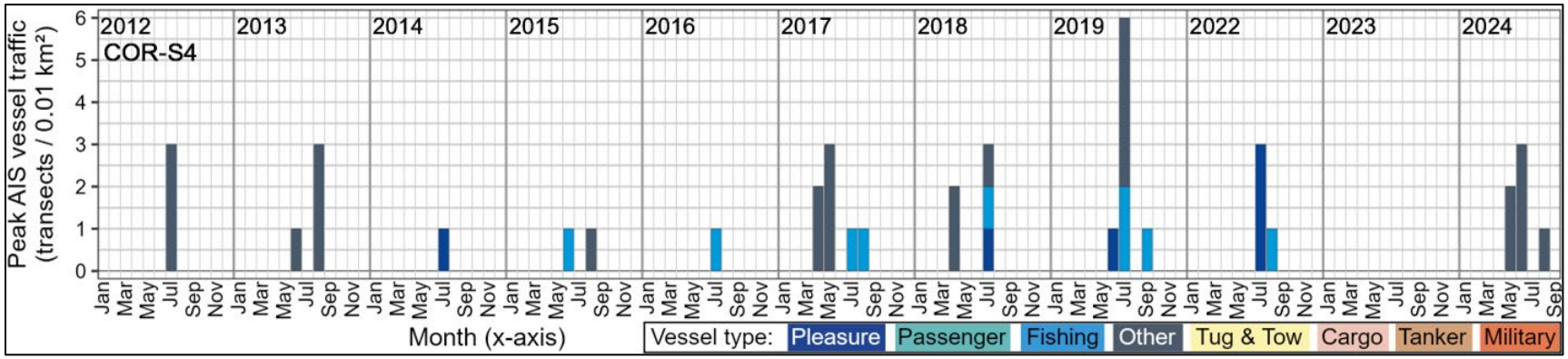


Figure 3.130. Monthly peak vessel traffic activity within options from a subset of the Cordova Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

COR-S1

AOA option COR-S1 is a 130-ac subtidal site within the Cordova Study Area, located 28 km (15 nm) from Cordova (centroid: 60.6364 N, 146.0048 W). The site is located within subunit 23K of the Prince William Sound area plan. Text descriptions for the subunit include reference to community harvest occurring within the subunit. This does not mean they directly overlap with the site; refer to the area plan for more information. The site ranges in depth at MLLW from 19 m (63 ft) to 26 m (84 ft) with an average depth of 22 m (74 ft). At MHW the depth ranges from 24 m (79 ft) to 30 m (100 ft) with an average depth of 27 m (89 ft). COR-S1 has an average slope of 0.64° and maximum slope of 0.89°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (6 m away) as semi-protected, protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.3°C, a minimum daily average of 4.4°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at COR-S1 averaged 4.4 m/s, with a minimum of 0.91 m/s and a maximum of 20 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (2.9 mg/m³) and lowest in February (0.80 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in November (2.2 mg/m³) and lowest in July (0.65 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in September (0.31 m^{-1}) and lowest in February (0.11 m^{-1}).

Industry and National Security Considerations

COR-S1 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (4.8 km), submarine cable, fiber optic cable or cable area (4.5 km), Navy undersea cable (exact distance undisclosed), ferry route (4.0 km), and wreck and obstruction (0.26 km). The site is within ADFG salmon (group code G) statistical unit 22120 and the groundfish (group code G) statistical unit 466031. COR-S1 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 12 total transects (August 2024). The primary vessel types observed are fishing and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

COR-S1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.19 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (2.7 km), harbor seal non-key haulouts (1.2 km), humpback whale high use areas (0 km), humpback whale feeding BIA (0 km), and Mexico humpback whale NMFS ESA (0 km). COR-S1 is in proximity to a small seabird colony and overlaps the Prince William Sound Marine IBA.

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of COR-S1. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages

or Tribal Associations within 50 km include the Native Village of Tatitlek and Native Village of Eyak. Given this proximity, cultural resources could be present to an unknown extent.

COR-S2

AOA option COR-S2 is a 160-ac subtidal site within the Cordova Study Area, located 23 km (13 nm) from Cordova (centroid: 60.6403 N, 145.9206 W). The site is located within subunit 23I of the Fidalgo unit in the Prince William Sound area plan. The site ranges in depth at MLLW from 22 m (73 ft) to 24 m (80 ft) with an average depth of 23 m (77 ft). At MHW the depth ranges from 27 m (89 ft) to 29 m (96 ft) with an average depth of 28 m (92 ft). COR-S2 has an average slope of 0.14° and maximum slope of 0.21°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected, protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.2°C, a minimum daily average of 4.4°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at COR-S2 averaged 4.1 m/s, with a minimum of 0.88 m/s and a maximum of 20 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (4.2 mg/m³) and lowest in February (1.1 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (3.1 mg/m³) and lowest in April (0.73 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in September (0.36 m^{-1}) and lowest in February (0.12 m^{-1}).

Industry and National Security Considerations

COR-S2 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (0.60 km), submarine cable, fiber optic cable or cable area (4.3 km), Navy undersea cable (exact distance undisclosed), ferry route (4.4 km), and wreck and obstruction (0.23 km). The site is within ADFG salmon (group code G) statistical unit 22120 and the groundfish (group code G) statistical unit 456031. COR-S2 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at six total transects (July 2018). The primary vessel types observed are pleasure, other, and fishing. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

COR-S2 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (1.0 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (0.89 km), humpback whale high use areas (2.2 km), humpback whale feeding BIA (0 km), and Mexico humpback whale NMFS ESA (0 km). nan

Cultural Resource Considerations

Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Tatitlek and Native Village of Eyak. Given this proximity, cultural resources could be present to an unknown extent.

COR-S3

AOA option COR-S3 is a 170-ac subtidal site within the Cordova Study Area, located 30 km (16 nm) from Cordova (centroid: 60.6521 N, 145.9922 W). The site is located within subunit 23K of the Prince William Sound area plan. Text descriptions for the subunit include reference to community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from 24 m (79 ft) to 27 m (89 ft) with an average depth of 25 m (84 ft). At MHW the depth ranges from 29 m (94 ft) to 32 m (100 ft) with an average depth of 30 m (99 ft). COR-S3 has an average slope of 0.25° and maximum slope of 0.37°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.2°C, a minimum daily average of 4.4°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at COR-S3 averaged 4.4 m/s, with a minimum of 1.0 m/s and a maximum of 21 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in July (3.3 mg/m³) and lowest in February (0.75 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (2.1 mg/m³) and lowest in March (0.55 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in October (0.33 m^{-1}) and lowest in February (0.10 m^{-1}).

Industry and National Security Considerations

COR-S3 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (2.9 km) and wreck and obstruction (0.60 km). The site is within ADFG salmon (group code G) statistical unit 22120 and the groundfish (group code G) statistical unit 466031. COR-S3 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 18 total transects (July 2022). The primary vessel types observed are fishing and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a regular pattern from year to year, concentrated to a few months, usually peaking around June.

Natural Resource Considerations

COR-S3 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.19 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (1.1 km), harbor seal non-key haulouts (3.0 km), humpback whale high use areas (0.52 km), humpback whale feeding BIA (1.2 km), and Mexico humpback whale NMFS ESA (0.87 km).

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of COR-S3. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Tatitlek and Native Village of Eyak. Given this proximity, cultural resources could be present to an unknown extent.

COR-S4

AOA option COR-S4 is a 170-ac subtidal site within the Cordova Study Area, located 32 km (17 nm) from Cordova (centroid: 60.6625 N, 145.9753 W). The site is located within subunit 23K of the Prince William Sound area plan. Text descriptions for the subunit include reference to community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from 21 m (70 ft) to 25 m (81 ft) with an average depth of 23 m (75 ft). At MHW the depth ranges from 26 m (85 ft) to 29 m (96 ft) with an average depth of 27 m (90 ft). COR-S4 has an average slope of 0.18° and maximum slope of 0.27°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.2°C, a minimum daily average of 4.4°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at COR-S4 averaged 4.2 m/s, with a minimum of 0.94 m/s and a maximum of 22 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in July (2.6 mg/m³) and lowest in February (0.53 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in August (2.7 mg/m³) and lowest in February (0.65 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in October (0.45 m^{-1}) and lowest in February (0.10 m^{-1}).

Industry and National Security Considerations

COR-S4 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (1.7 km) and wreck and obstruction (2.3 km). The site is within ADFG salmon (group code G) statistical unit 22120 and the groundfish (group code G) statistical unit 466031. COR-S4 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at six total transects (July 2019). The primary vessel types observed are other, fishing, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

COR-S4 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.61 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (1.0 km), harbor seal non-key haulouts (4.8 km), humpback whale high use areas (2.1 km), humpback whale feeding BIA (2.7 km), and Mexico humpback whale NMFS ESA (2.1 km).

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of COR-S4. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Native Village of Tatitlek and Native Village of Eyak. Given this proximity, cultural resources could be present to an unknown extent.



Southeast Alaska Study Areas

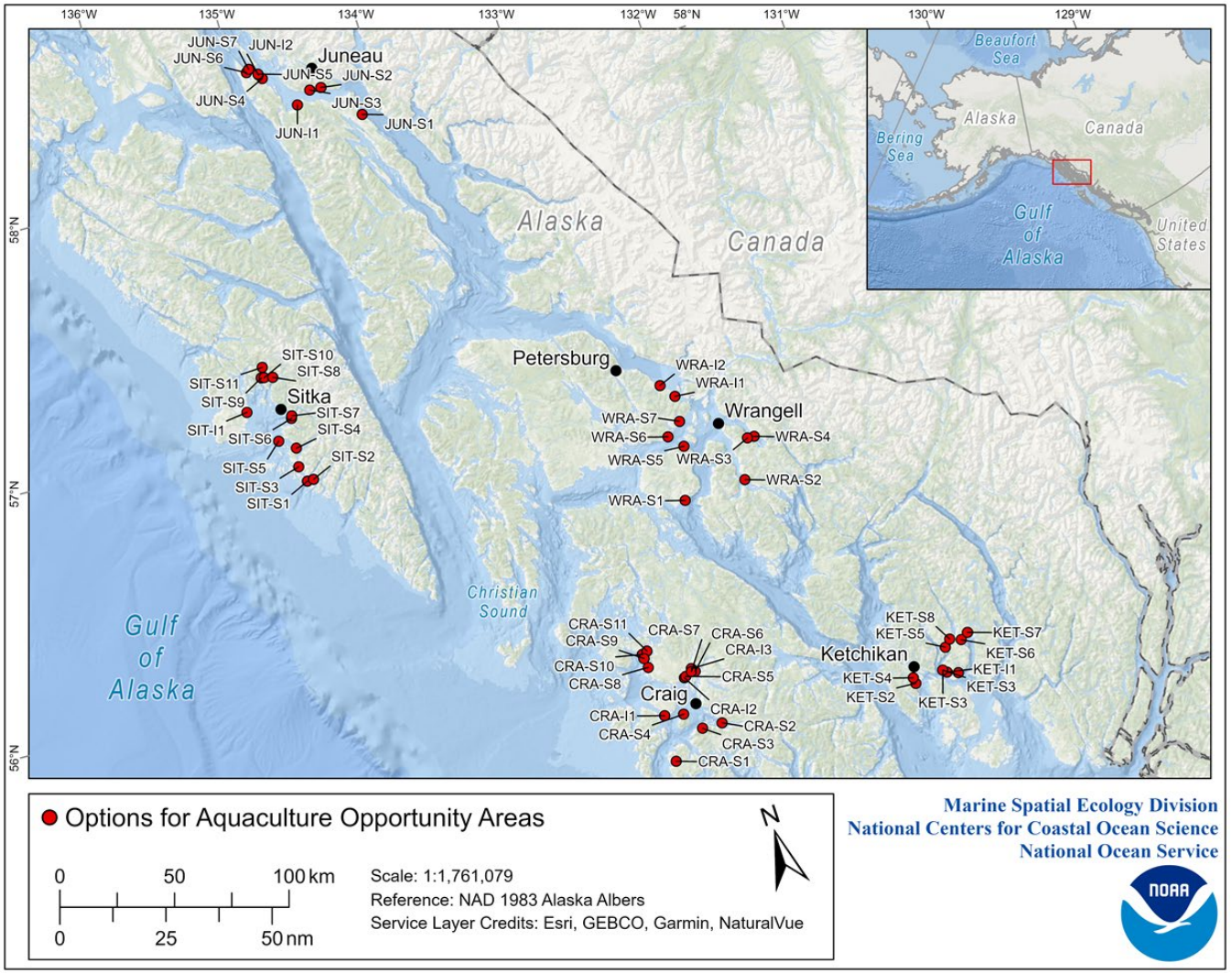


Figure 3.131. Distribution of final AOA options in Alaska State waters for the Southeast Alaska Study Areas. Red circles represent the locations of the options but do not reflect the size of the options.

Juneau Study Area

Final AOA options within the Juneau Study Area include seven subtidal sites totaling 1,277 ac and two intertidal sites totaling 172 ac (Figure 3.132). Options range from 63.2 ac to 371.7 ac and are distributed across the study area (Table 3.13; Figures 3.132–3.150). Several sites within the study area are located near, and may directly overlap with, ecologically sensitive resources. These include historically mapped eelgrass beds, high-use areas and feeding BIAs for humpback whales, major haulouts for Steller sea lions (within a 3-nm protection area), and harbor seal haulouts. Given the proximity to these resources, project planning should account for potential ecological impacts and may require coordination or consultation with appropriate resource agencies.

This study area overlaps with the Mendenhall Wetlands Coastal IBA, Stephens Passage IBA, and Lynn Canal-Frederick Sound Sea Duck Key Habitat Site. However, the final suitability model did not result in any suitable sites within or adjacent to the Mendenhall Wetland IBA, and no suitable sites were identified in Port Snettisham, a BIA of the Stephens Passage IBA. Although suitable sites are identified within the Lynn Canal-Frederick Sound Sea Duck Key Habitat Site, and selected sites also overlap this area, down-scoring of herring spawning sites also benefited sea ducks in this area.

Public comments submitted on the Juneau draft AOA options included concerns about potential overlap with existing dive fisheries. A primary issue raised by dive fishery participants was the risk of diver air supply lines becoming entangled with aquaculture infrastructure, creating safety hazards and limiting access to common-use resources. The Southeast Alaska Regional Dive Fisheries Association (SARDFA) plays a central role in coordinating industry activities and represents divers, processors, and coastal communities within the Southeast study areas. To minimize conflict and ensure equitable resource access, coordination with SARDFA and ADFG is recommended during the siting of aquaculture operations in areas with active dive fisheries.



Additional comments addressed potential overlap between draft AOA options and commercial fisheries, including salmon, crab, and shrimp, as well as anchorages used by fishery participants and other marine users. Comments specifically identified commercial Dungeness crab and tanner crab grounds that may intersect with final AOA options JUN-I1, S1, S2, and S3. Draft AOA options JUN-I4 and I3 were flagged for overlap with commercial crab grounds and gillnet drag fisheries; these options were ultimately not selected as final AOA options. The area surrounding final AOA option JUN-S1, located outside Doty's Cove, was noted for potential gillnetting conflicts. To reduce conflict and support equitable access,

coordination with the fishing community, Southeast Alaska Commercial Fishing Alliance (SEAFA), and ADFG is recommended during aquaculture siting in areas with active commercial fisheries.

General comments were submitted that focused on potential overlap between AOA study areas and documented cultural resource sites and subsistence harvest locations. In response, the final model run incorporated additional down-scoring of AHRS data layers, resulting in reduced suitability and, ultimately, the removal of portions of, or entire, draft AOA options located within 500-m of AHRS-listed locations. Comments also noted potential impacts to subsistence harvest activities, and characterization revealed overlap with large land mammals, marine invertebrates, salmon, non-salmon fish, and large mammal subsistence search and harvest areas. The degree of possible adverse effect will vary depending on the type of cultural resource or harvest activity and the nature of proposed aquaculture development. All aquaculture projects will be subject to further review during the Alaska state leasing and permitting process. Early and ongoing coordination with coastal communities, nearby Alaska Native Villages, Alaska Native Corporations, and other Tribal Associations is strongly recommended.

Below are additional characterizations of site-specific details regarding the geographic location and environmental conditions of AOA options within the Juneau Study Area, as well as considerations regarding national security, natural resources, navigation and transportation, cultural resources, and various industries including aquaculture and fisheries. These are presented as tables containing location information for each option and proximity to these considerations (Table 3.13). Following these tables are maps that visualize the options along with data used within the suitability model (Figures 3.132–3.137). Next are plots summarizing available time series data to provide additional context on environmental conditions and observed vessel traffic within the options (Figures 3.138–3.150). Following these tables and figures are individual text descriptions for each option summarizing the characteristics observed. These tables, figures, and text summaries were created using many different spatial datasets curated to complement factors considered during the Alaska state aquatic farm lease application and review process, and to assist proponents in the identification of key user groups and resource agencies to engage with during the project design and application process. These data are unlikely to be exhaustive, and there may be additional considerations not captured in this characterization. These different presentation methods are meant not only to communicate site-specific characteristics in multiple ways but also to complement each other. They may also contain unique bits of information not found in the other parts of this characterization.



Table 3.13. Characterization summary for Juneau Aquaculture Opportunity Area subtidal and intertidal options in the southern extent: JUN-S1; central extent: JUN-I1, JUN-S2, JUN-S3; and the northern extent: JUN-I2, JUN-S4, JUN-S5, JUN-S6, JUN-S7. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km).

	Southern Extent	Central Extent			Northern Extent				
	JUN-S1	JUN-I1	JUN-S2	JUN-S3	JUN-I2	JUN-S4	JUN-S5	JUN-S6	JUN-S7
General characteristics									
Center Coordinates (longitude, latitude)	−134.1701, 58.0721	−134.6070, 58.1746	−134.4009, 58.2145	−134.4843, 58.2171	−134.8205, 58.3332	−134.7982, 58.3137	−134.8207, 58.3350	−134.8996, 58.3516	−134.8773, 58.3634
Size (ac)	371.7	63.2	228	168.9	108.6	103.9	219.5	70.2	115
Distance to Coastal Populated Places (nm)	15.8	18.4	12.5	15.3	13.4	13.1	13.3	17.6	15.3
Depth (m) (min, max, mean), Average Slope (degrees)	−22.27, 64.91, 15.77, 10.85	−14.55, 17.2, 4.33, 5.35	8.95, 58.33, 43.08, 5.5	5.43, 33.06, 26.13, 1.49	−6.51, 29.96, 7.21, 6.13	−2.3, 58.19, 25.3, 7.55	−1.64, 44.55, 19.71, 5.96	0.14, 91.4, 38.52, 19.54	−2.52, 57.56, 29.5, 9.59
Alaska Area Plan Subunit	GU	13a14, 13a52, 13a8	10b14	10b11, 10b13, 10b14, 10b15, 10b23	GU	AT05, GU	AT04, GU	GU	GU
Commercial Statistical Areas – Groundfish	345801	345801	345801	345801	345801	345801	345801	345801	345801
Commercial Statistical Areas – Salmon, Shellfish	11131	11141	11140	11140	11150	11150	11150	11150	11150
Constraints									
Anadromous Waters Catalog – Streams (91.5-m Setback)	-	0.16	4.62	0.14	1.07	0.31	0.97	2.82	2.3
Deep-Sea Coral and Sponge Occurrences (1,000-m Setback)	-	-	-	-	-	-	-	-	-

	Southern Extent	Central Extent			Northern Extent				
	JUN-S1	JUN-I1	JUN-S2	JUN-S3	JUN-I2	JUN-S4	JUN-S5	JUN-S6	JUN-S7
Ferry Routes (500-m Setback)	4.3	4.75	1.95	1.07	1.04	1.64	0.75	3.2	0.59
Key Harbor Seal Locations (500-m Setback)	-	3.37	-	-	-	-	-	-	-
Navy Undersea Cables within 5 km (500-m Setback)*	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pipelines (500-m Setback)	-	-	-	-	-	-	-	-	-
Submarine Cable Areas (200-m Setback)	0.83	3.54	3.11	1.38	1.49	2.1	1.21	3.5	0.63
Wastewater Outfalls (500-m Setback)	-	-	-	-	-	-	-	-	-
Wrecks and Obstructions (152.5-m Setback)	-	4.9	-	-	-	-	-	4.57	2.25
National Security									
Munitions and Explosives of Concern	-	-	-	-	-	-	-	-	-
Natural Resources									
Cetacean Biologically Important Areas – Feeding	Humpback Whale (0.26)	Humpback Whale (0)	-	Humpback Whale (1.19)	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (1.22)	Humpback Whale (0)
Cetacean Biologically Important Areas – Migratory Route	-	-	-	-	-	-	-	-	-
Humpback Whale High-Use Areas	-	-	-	-	0	0	0	0	0
NMFS ESA Critical Habitat	-	-	-	-	-	-	-	-	-

	Southern Extent	Central Extent			Northern Extent				
	JUN-S1	JUN-I1	JUN-S2	JUN-S3	JUN-I2	JUN-S4	JUN-S5	JUN-S6	JUN-S7
Non-Key Harbor Seal Haulout Locations (500-m Setback)	2.19	-	-	-	4.52	-	4.27	0	1.54
North Pacific Seabird Data**	-	-	-	-	-	-	-	-	-
ShoreZone Coastal Mapping – Eelgrass Bioband	-	0.31	4.89	4.54	-	-	-	2.52	-
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	Circle Point (1.56)	-	-	-	-	-	-	-	-
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-	-	-	-	-	-	-	-
Industry, Navigation, and Transportation									
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-	-	-	-	-	-	-	-
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	-	-	-	-	-	-	-	-	-
Permitted Log Transfer Facility (500-m Setback)	-	-	-	-	-	-	-	-	-
USFS Recreation Opportunities – Cabin Rentals	-	2.27	-	-	-	-	-	-	-

	Southern Extent	Central Extent			Northern Extent				
	JUN-S1	JUN-I1	JUN-S2	JUN-S3	JUN-I2	JUN-S4	JUN-S5	JUN-S6	JUN-S7
Cultural Resources									
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m setback)*	-	1	-	-	-	-	-	-	-
Alaska Area Plans (Community Harvest) overlap	-	-	-	Yes	-	-	-	-	-
Subsistence Search and Harvest Areas within 5 km	large land mammals, marine inverts, salmon	large land mammals, non-salmon fish, salmon	large land mammals, salmon	large land mammals, non-salmon fish, salmon	large land mammals, marine inverts, non-salmon fish, salmon	large land mammals, marine inverts, non-salmon fish, salmon	large land mammals, marine inverts, non-salmon fish, salmon	large land mammals, non-salmon fish, salmon	large land mammals, non-salmon fish, salmon
Aquaculture and Fisheries									
Alaska Area Plans (Sport Fishing) overlap	-	Yes	-	Yes	-	Yes	Yes	-	-
Alaska DNR Shore Fishery Lease	-	-	-	-	-	-	-	-	-
Hatchery Release Sites	-	-	-	-	-	-	-	-	-
Aquatic Farm Permits	-	-	-	-	3.47	1.03	3.44	-	-
*Classified data layer, will denote a value of “Yes” if within 5 km of an option instead of a distance value. **A straight-line distance was used to calculate minimum travel distance.									

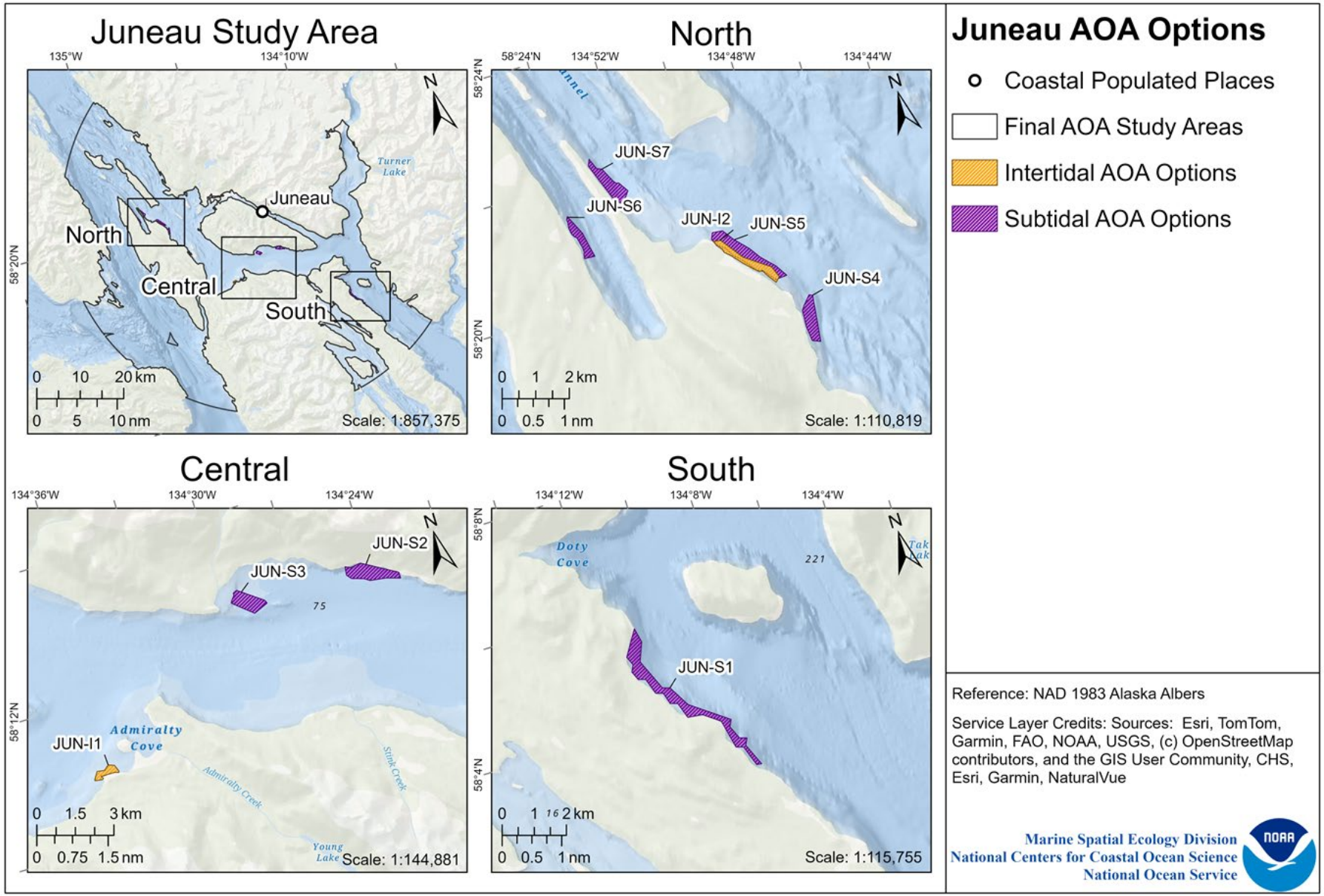


Figure 3.132. Final intertidal and subtidal AOA options for the Juneau Study Area.

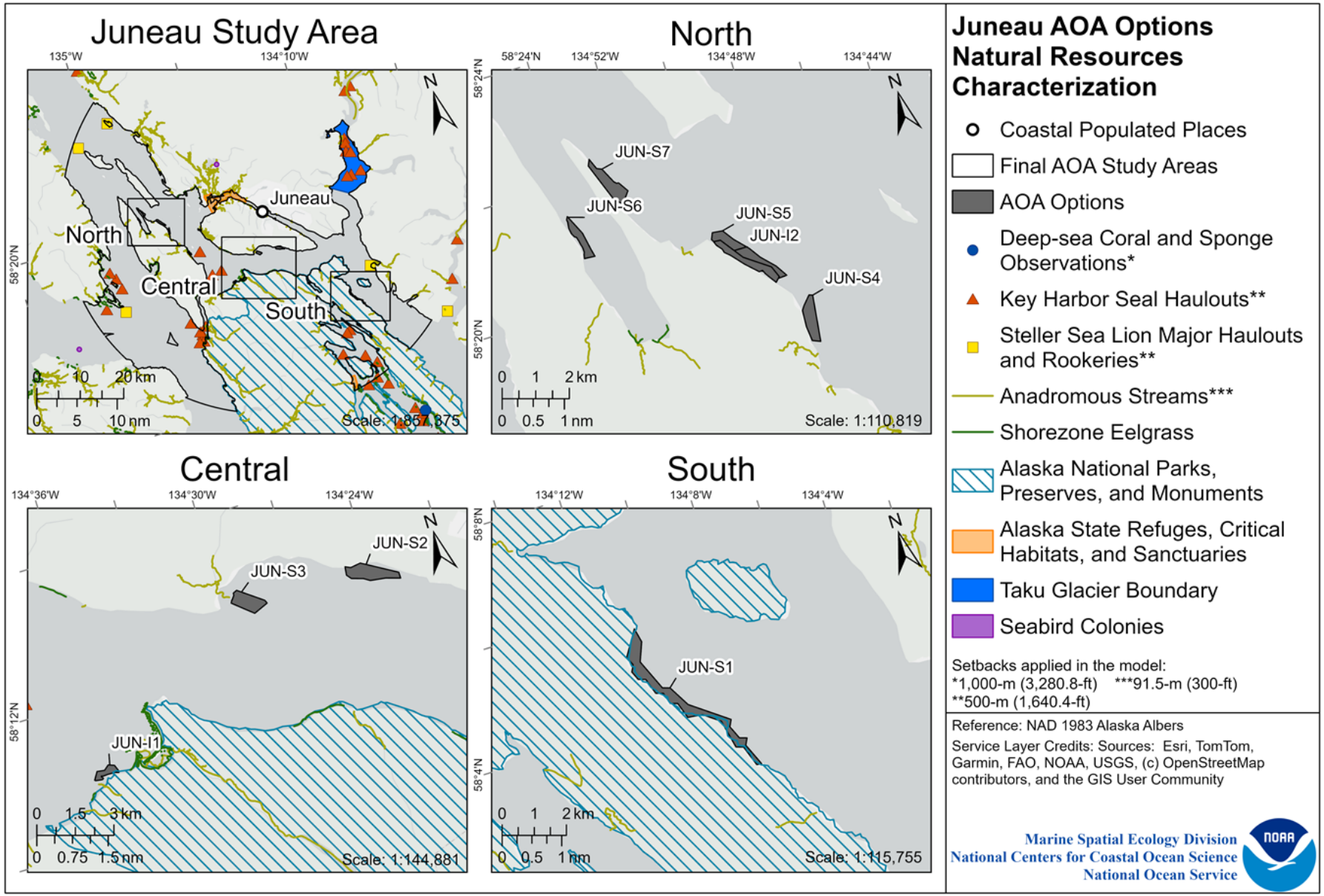


Figure 3.133. Natural resource interactions with the final AOA options in the Juneau Study Area.

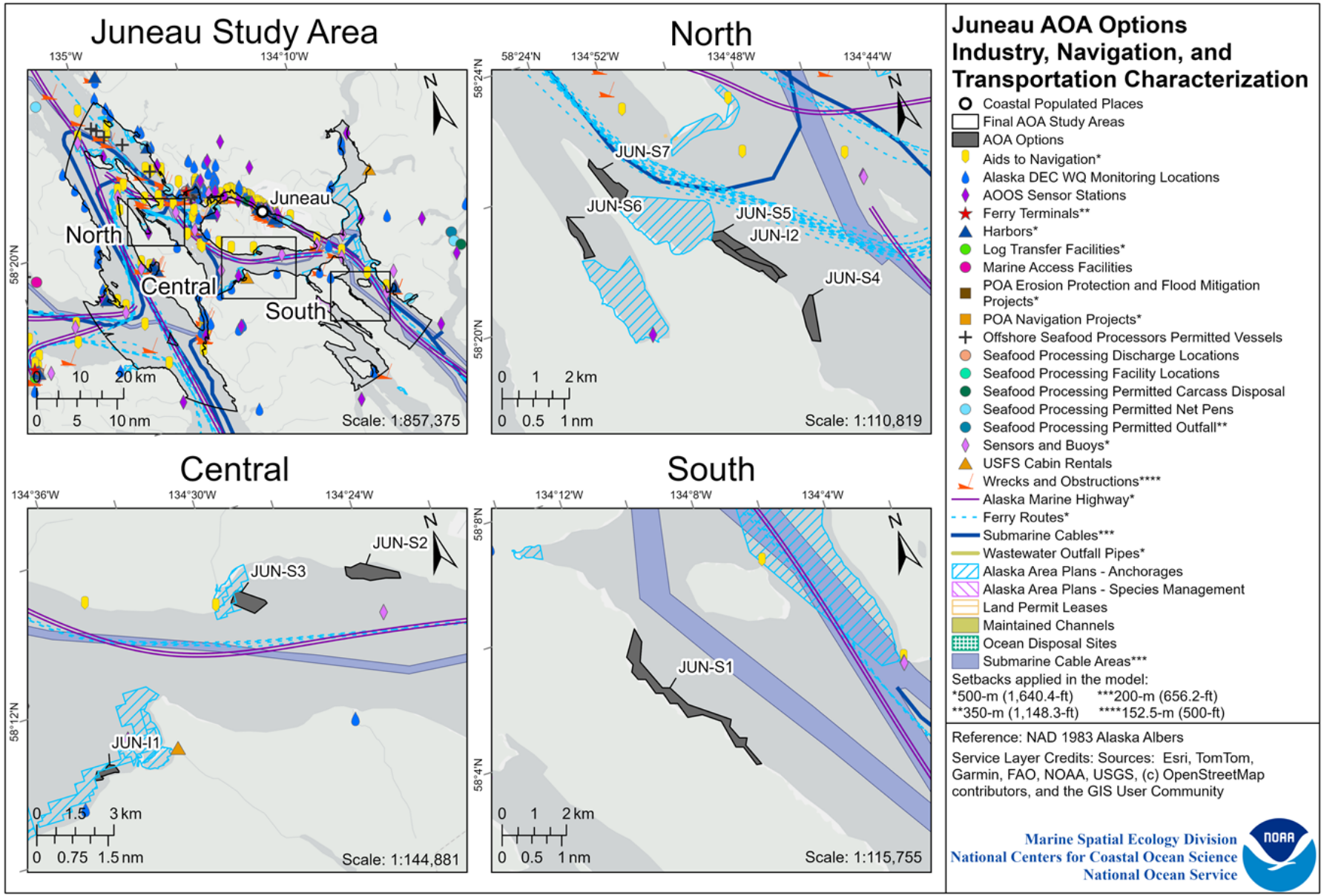


Figure 3.134. Industry, navigation, and transportation interactions with the final AOA options in the Juneau Study Area.

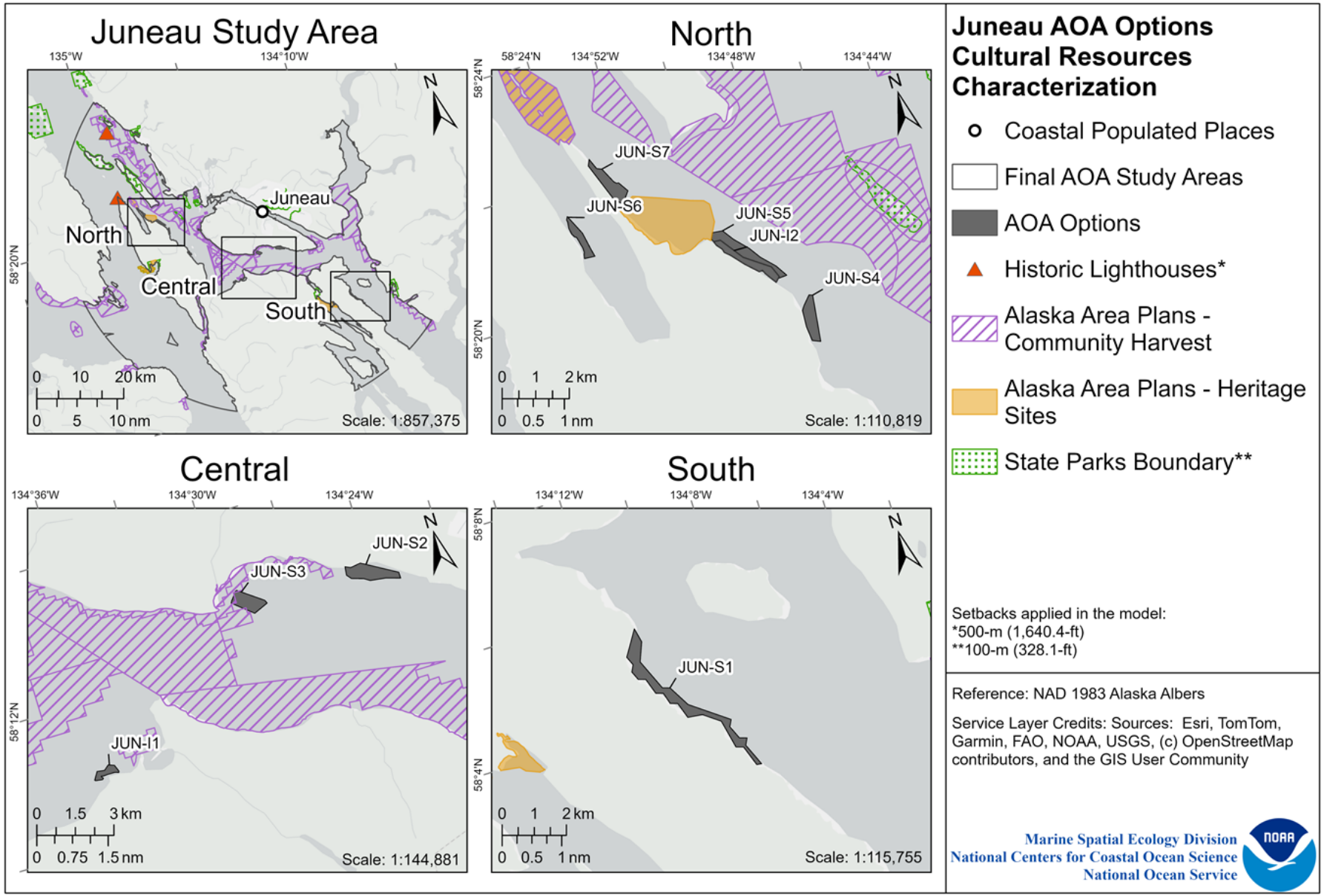


Figure 3.135. Cultural resource interactions with the final AOA options in the Juneau Study Area.

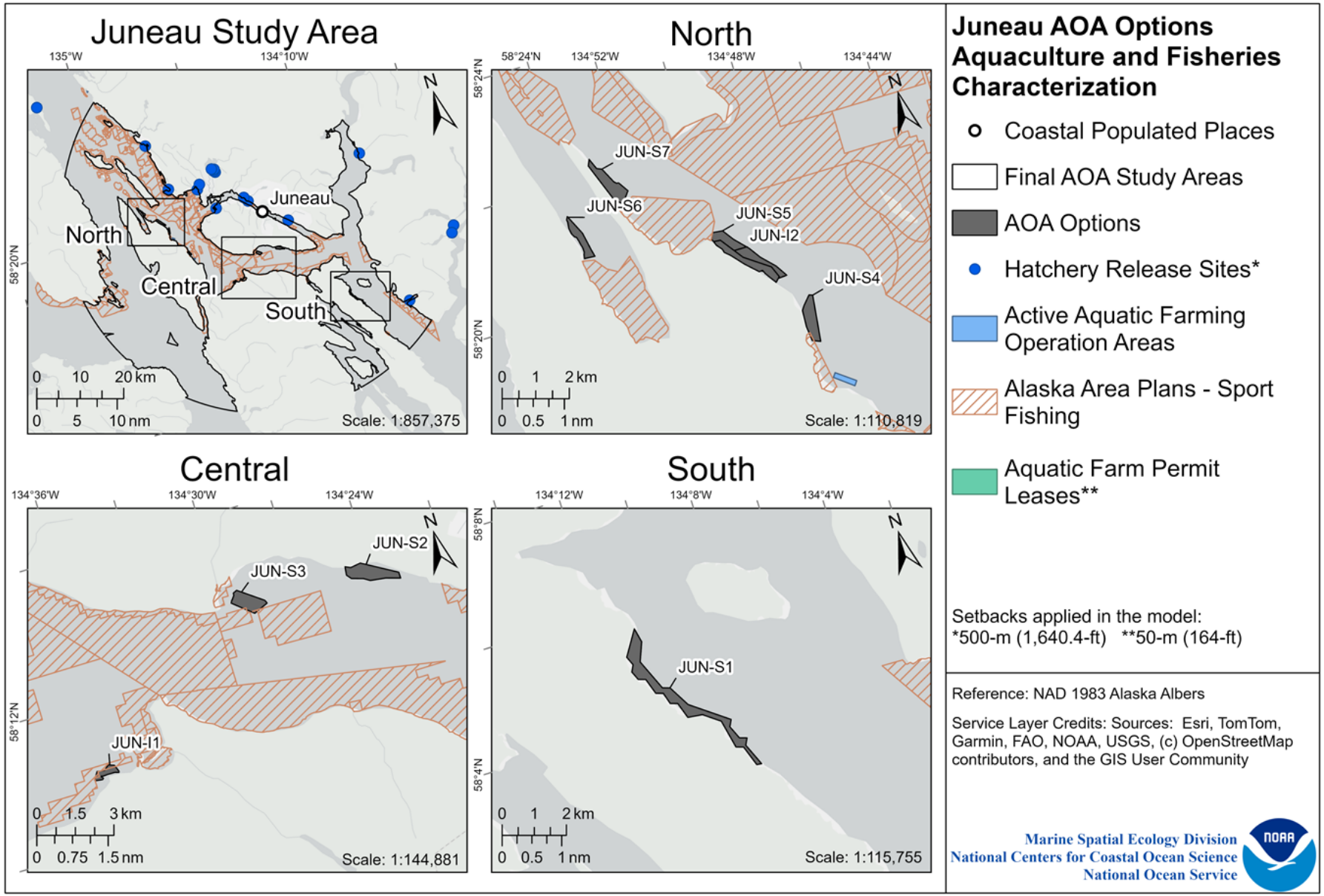


Figure 3.136. Aquaculture and fisheries interactions with the final AOA options in the Juneau Study Area.

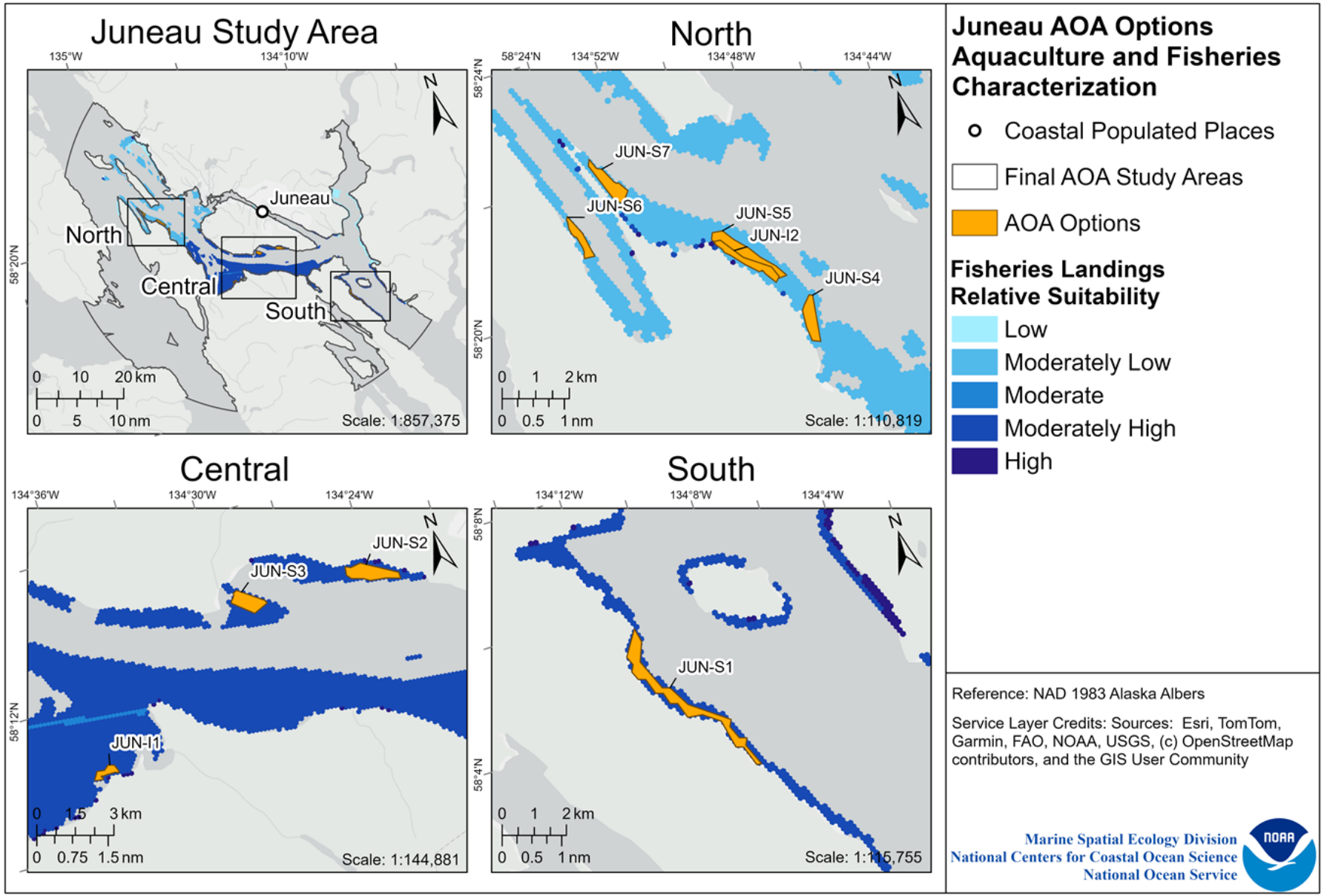


Figure 3.137. Relative suitability of the fishing landings combined data layer in relation to the final AOA options in the Juneau Study Area.

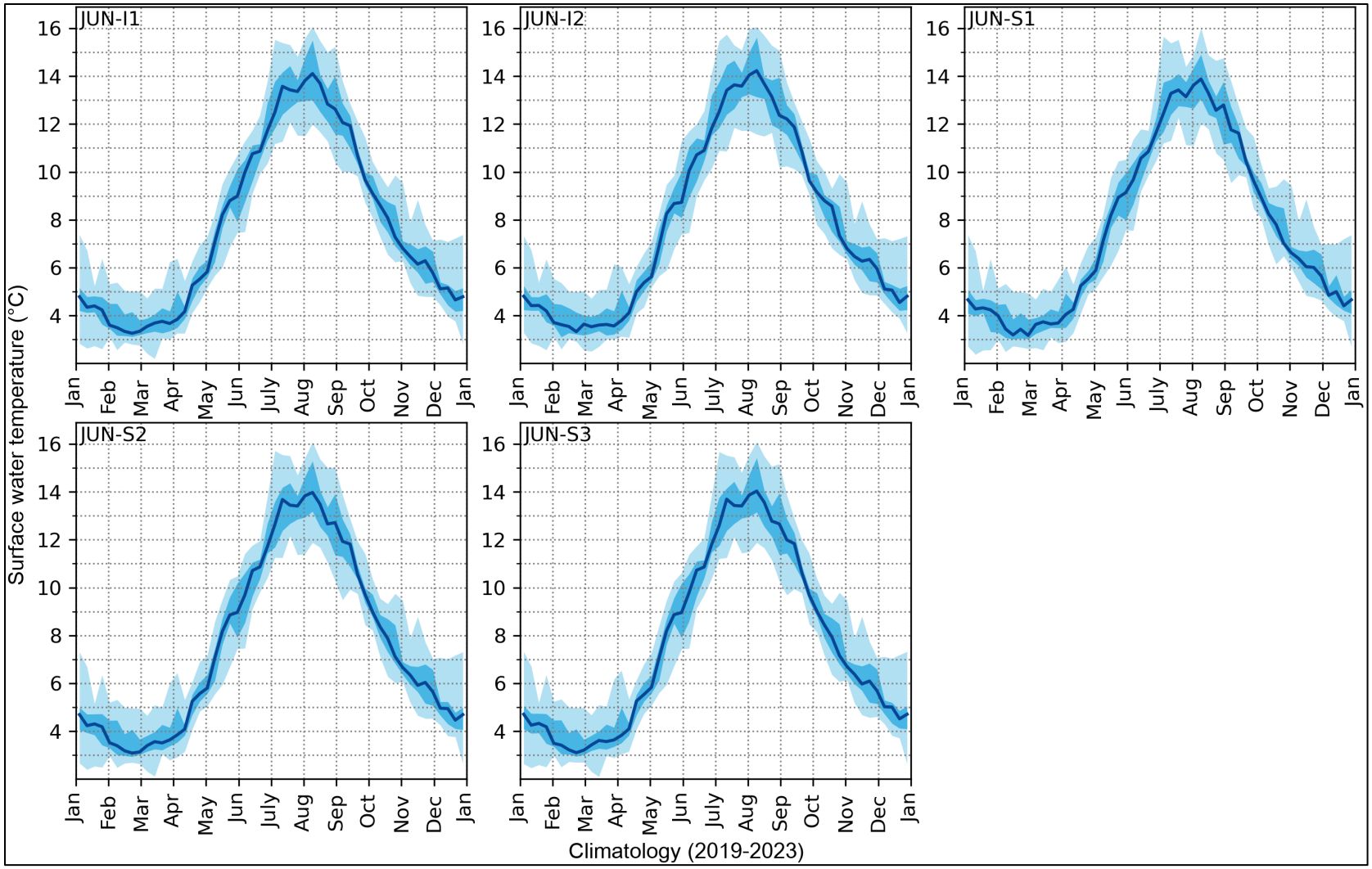


Figure 3.138. Sea surface temperatures for a subset of options from the Juneau Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

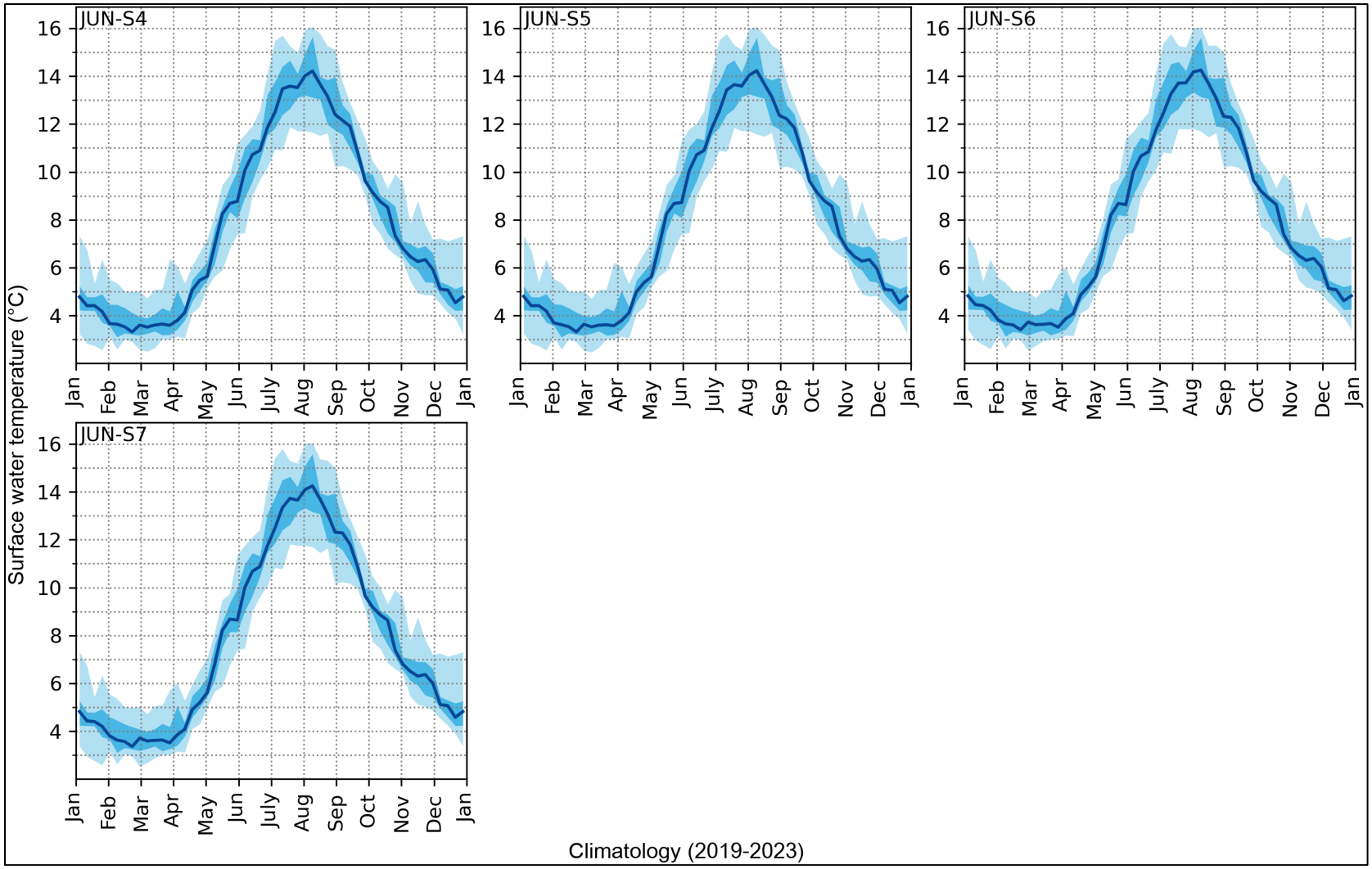


Figure 3.139. Sea surface temperatures for a subset of options from the Juneau Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

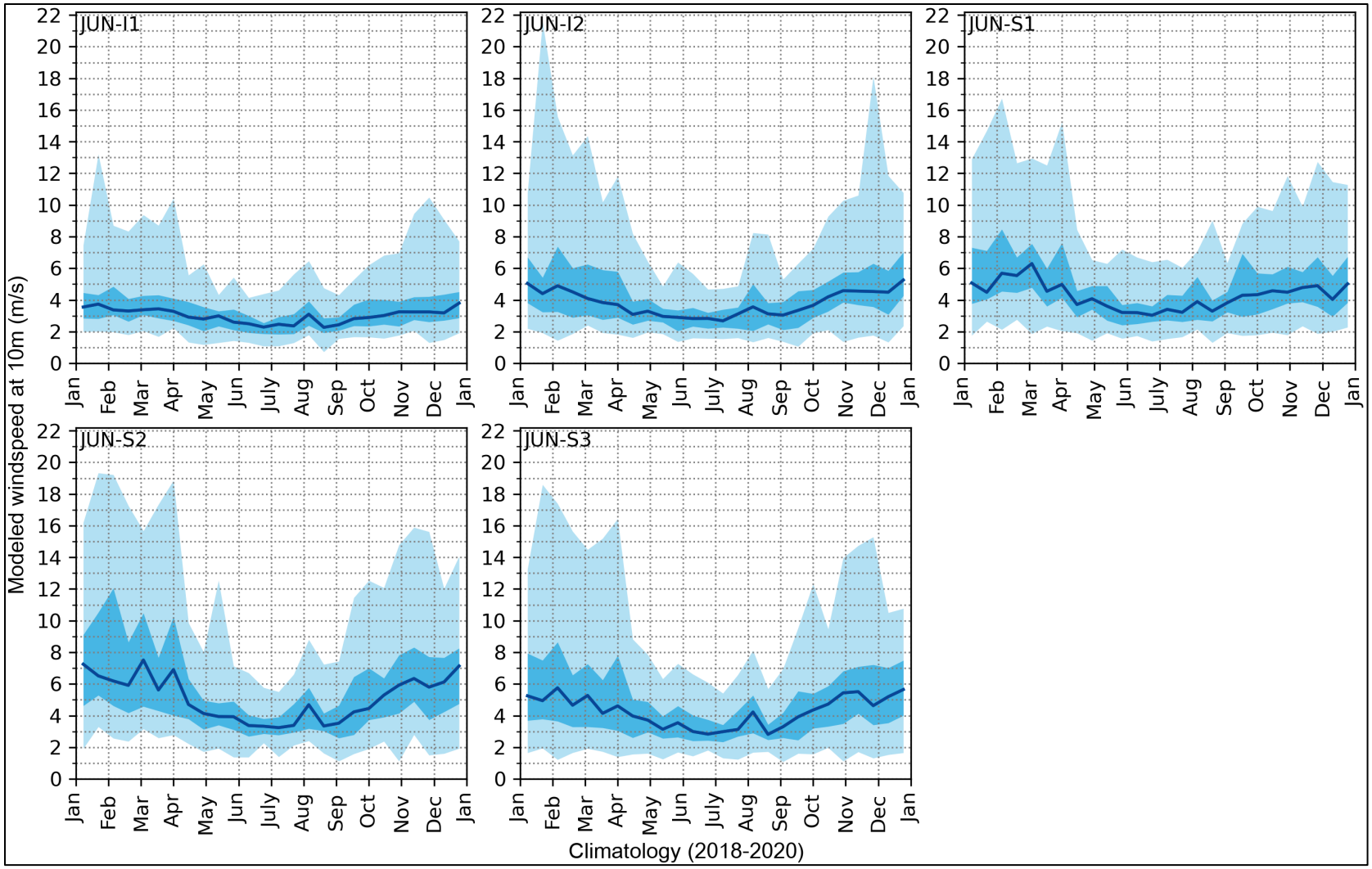


Figure 3.140. Wind speed at 10-m altitude for a subset of options from the Juneau Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per 2-week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

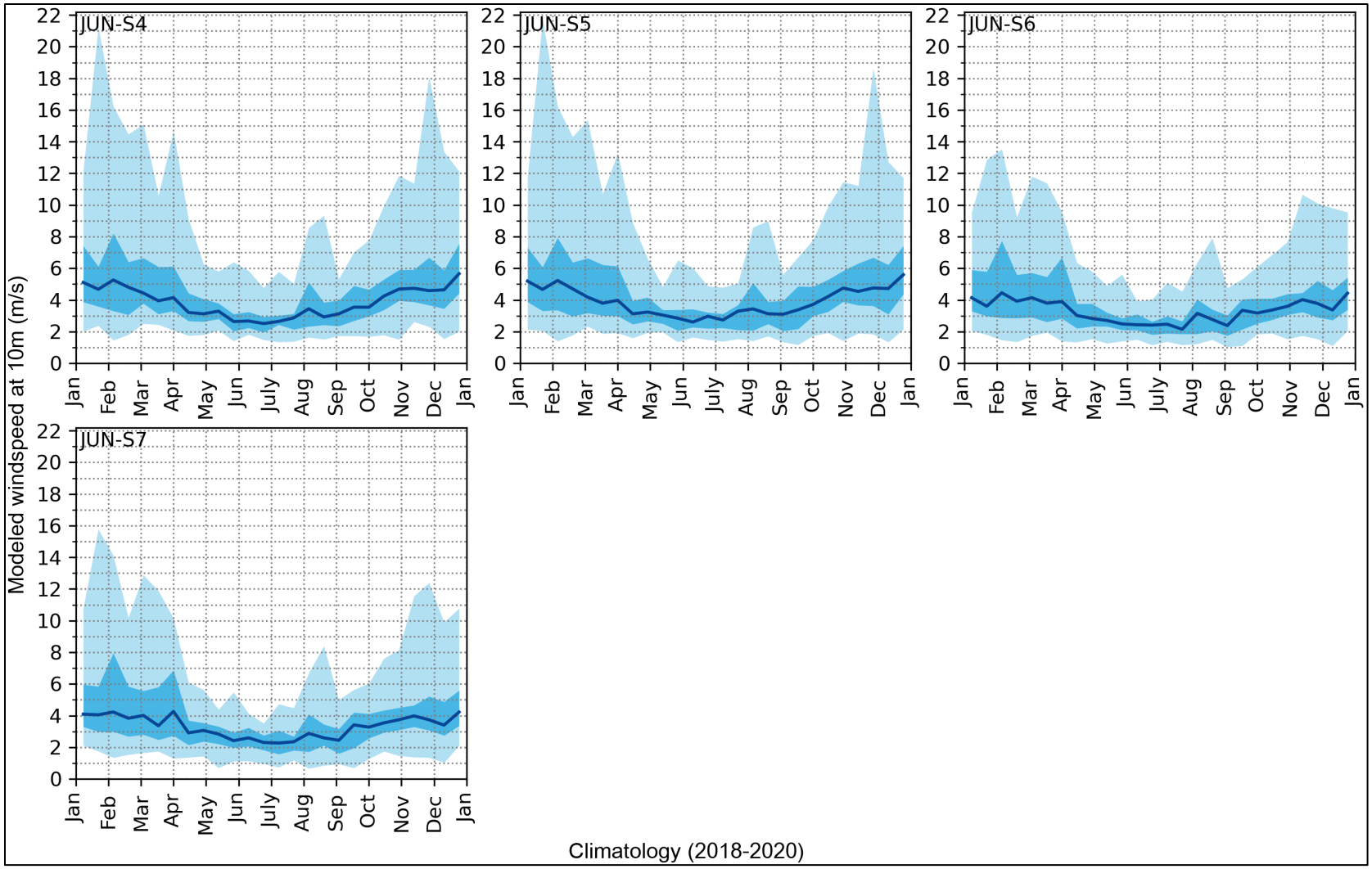


Figure 3.141. Wind speed at 10-m altitude for a subset of options from the Juneau Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per 2-week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

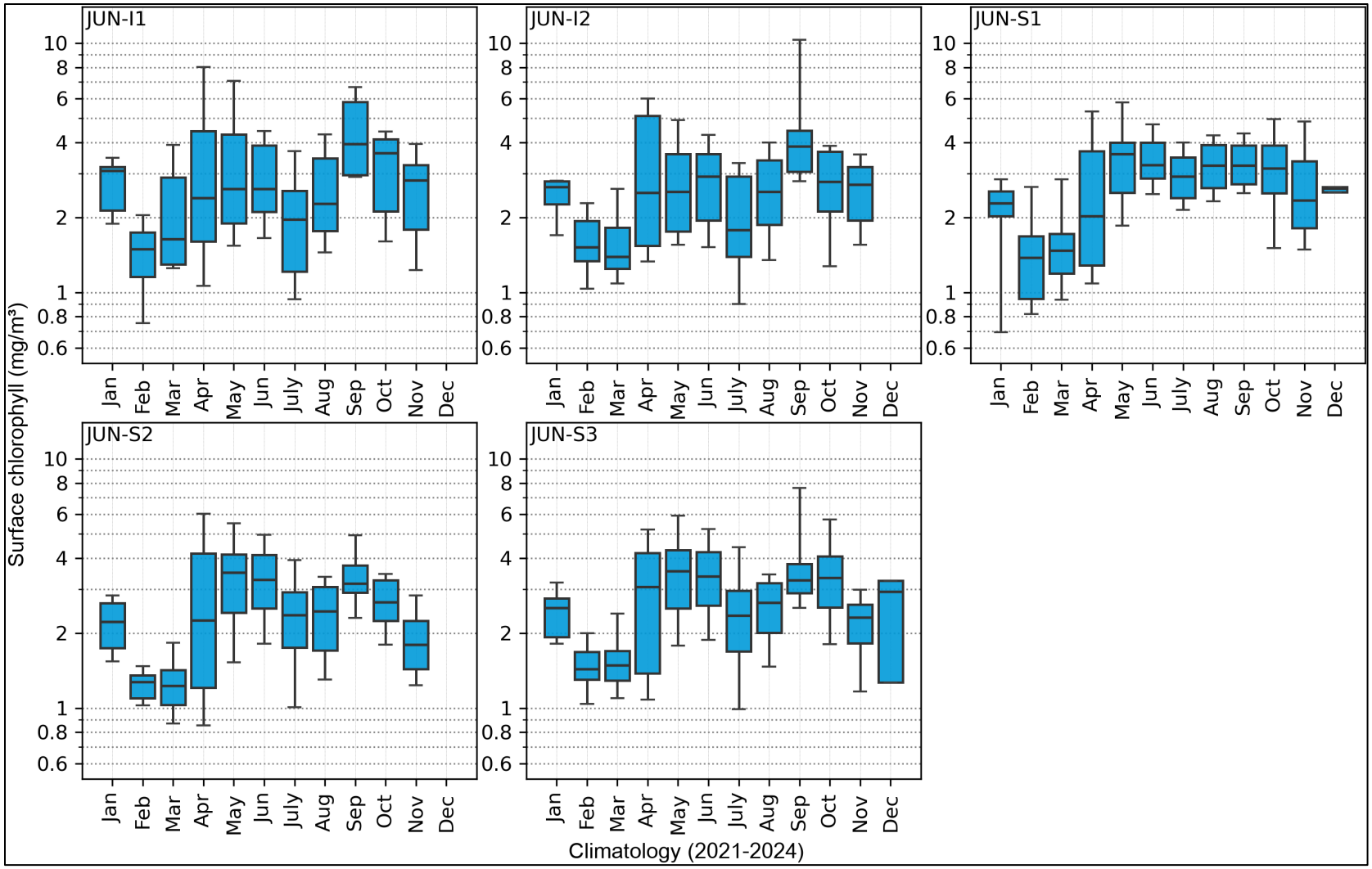


Figure 3.142. Monthly climatological surface chlorophyll *a* for a subset of options from the Juneau Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

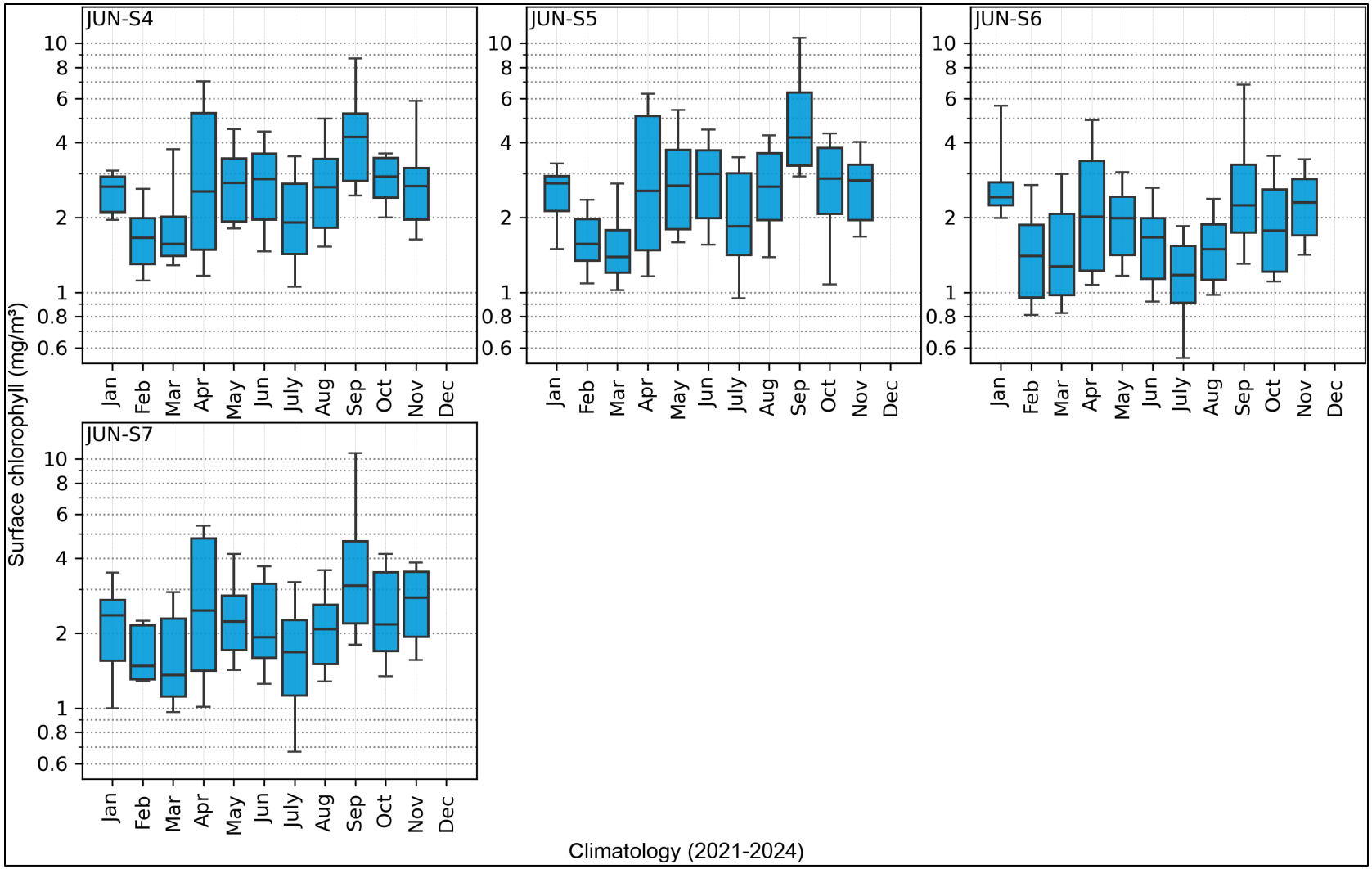


Figure 3.143. Monthly climatological surface chlorophyll *a* for a subset of options from the Juneau Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

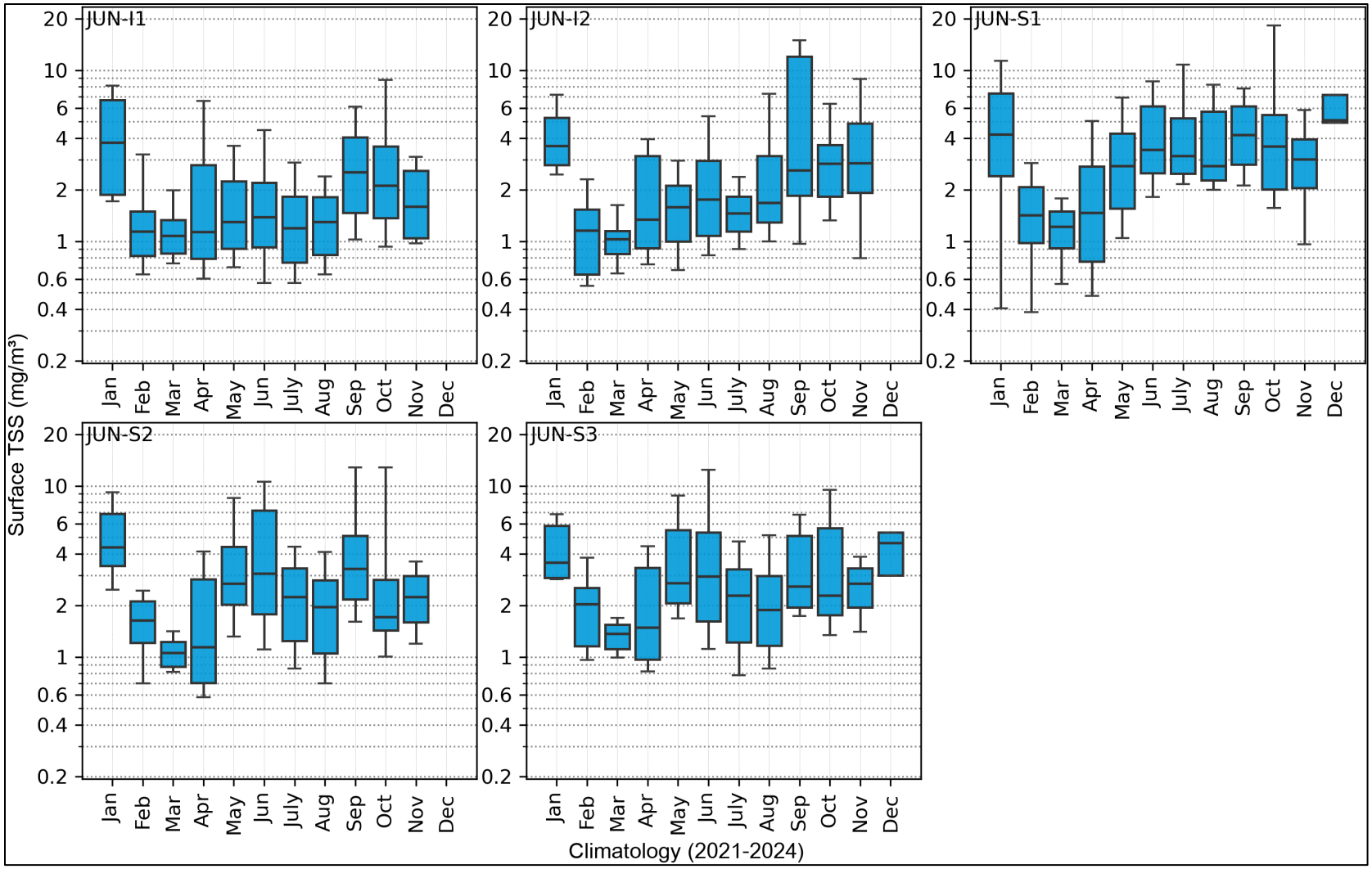


Figure 3.144. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Juneau Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

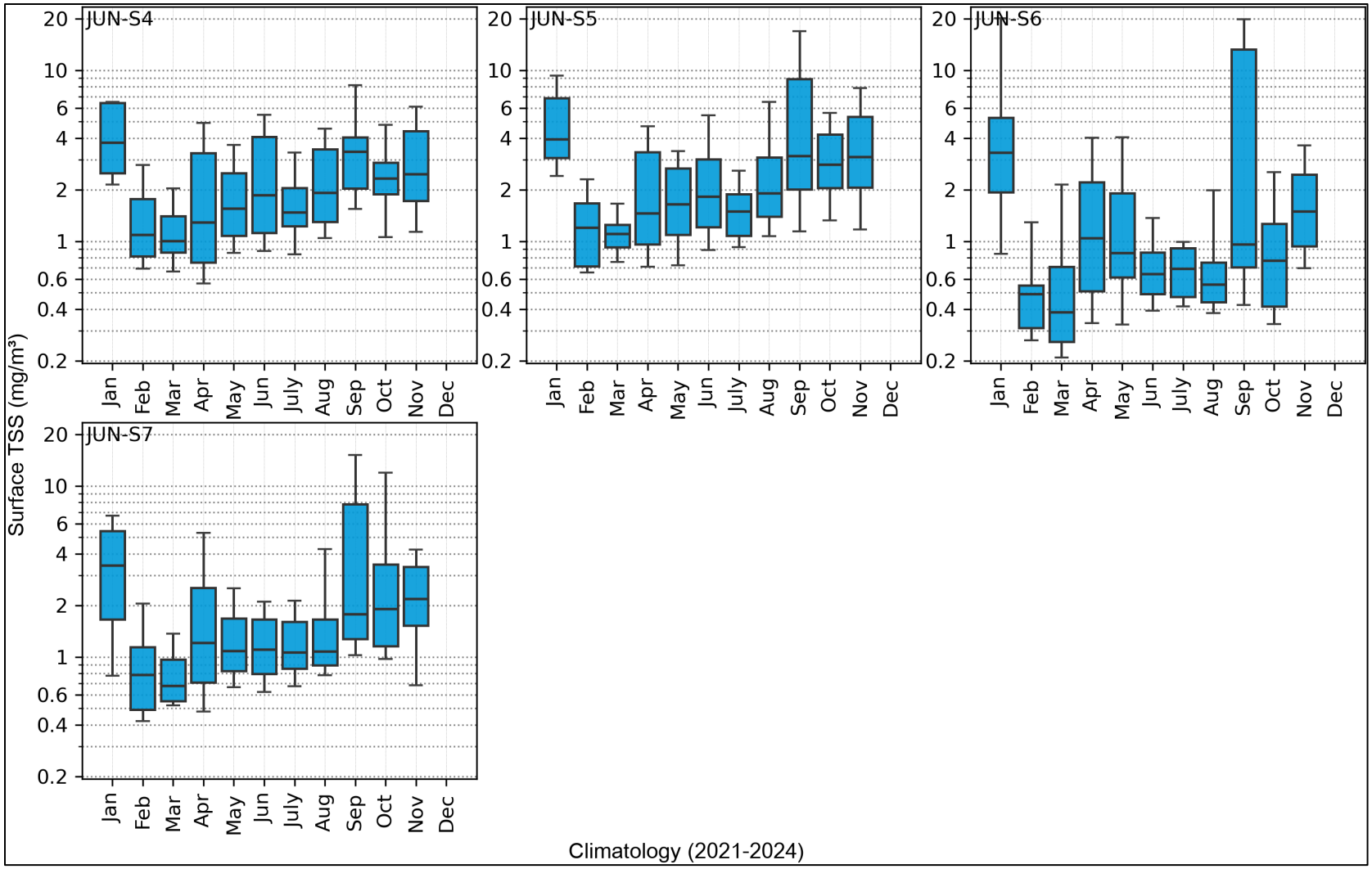


Figure 3.145. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Juneau Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

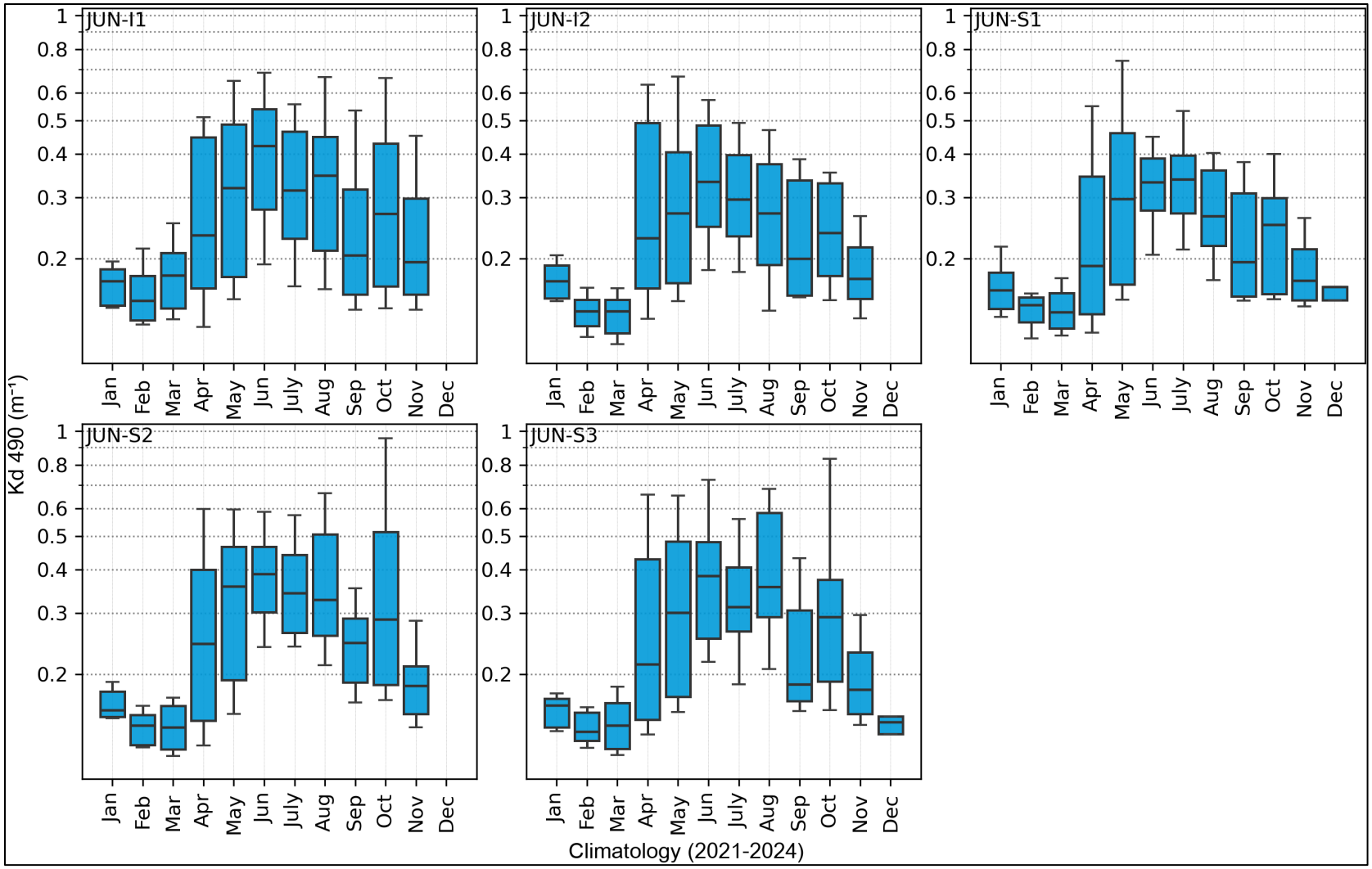


Figure 3.146. Monthly climatological light attenuation, Kd(490) for a subset of options from the Juneau Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

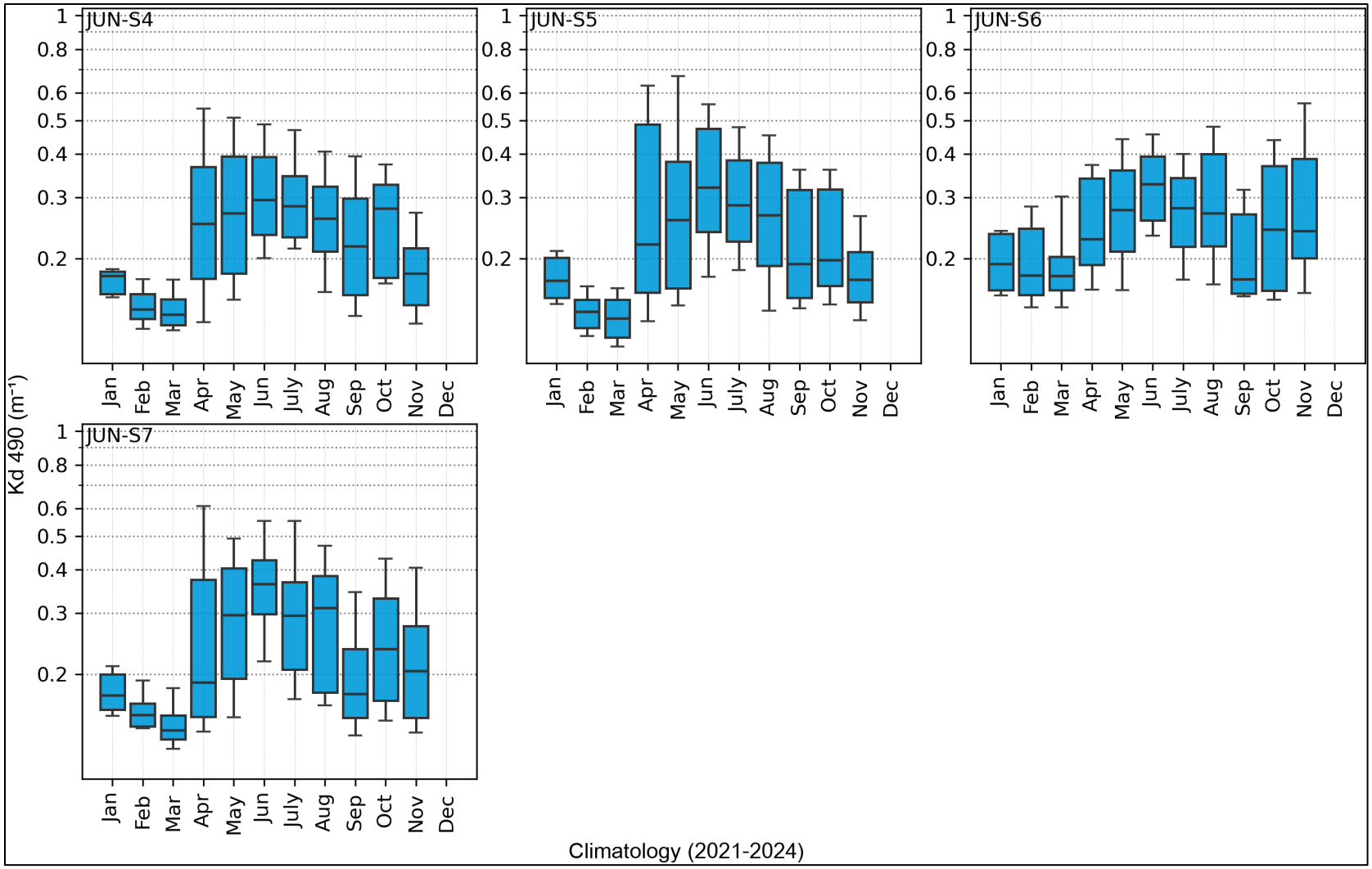


Figure 3.147. Monthly climatological light attenuation, Kd(490), for a subset of options from the Juneau Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

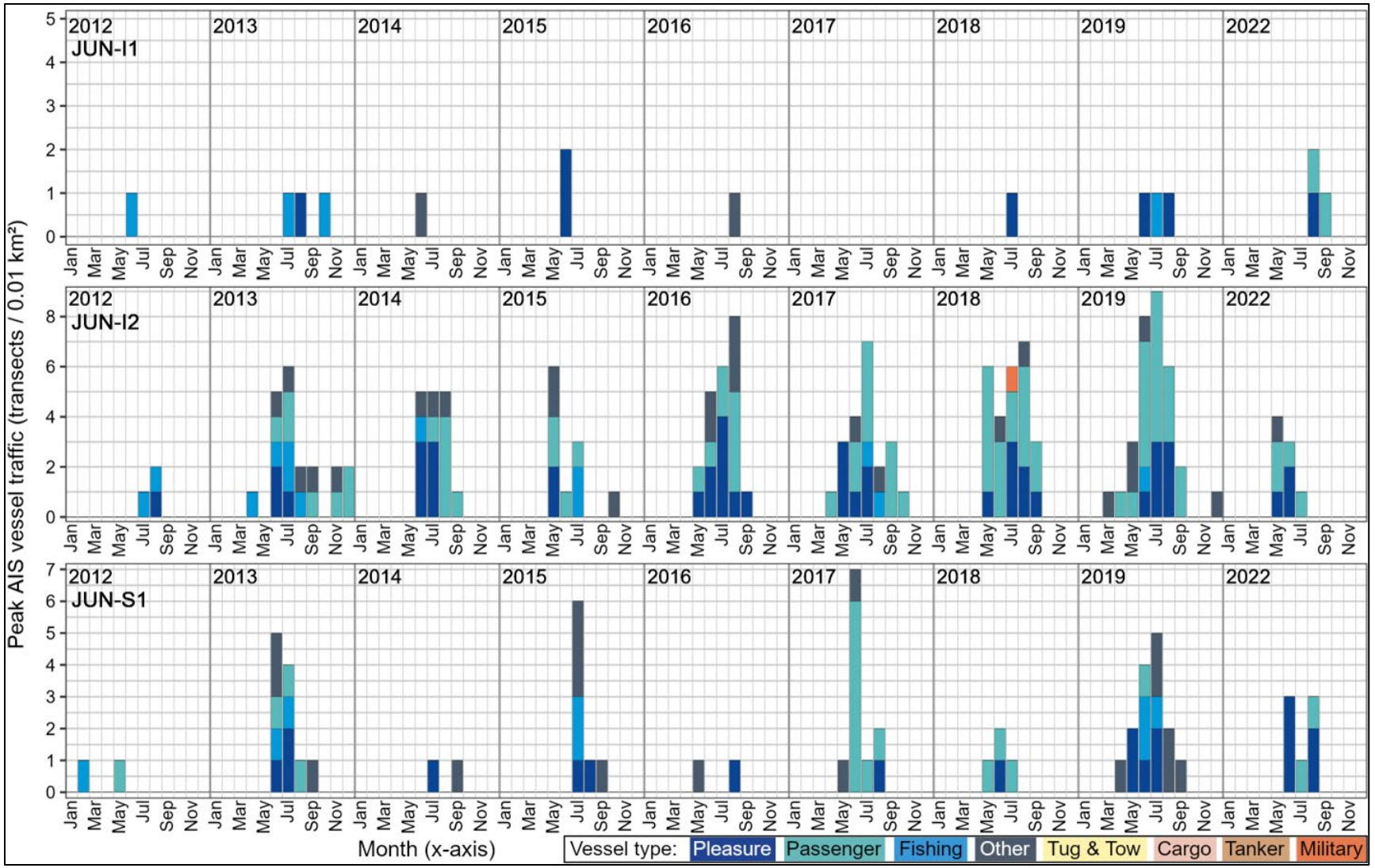


Figure 3.148. Monthly peak vessel traffic activity within options from a subset of the Juneau Study Area by vessel type for years 2012–2022 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

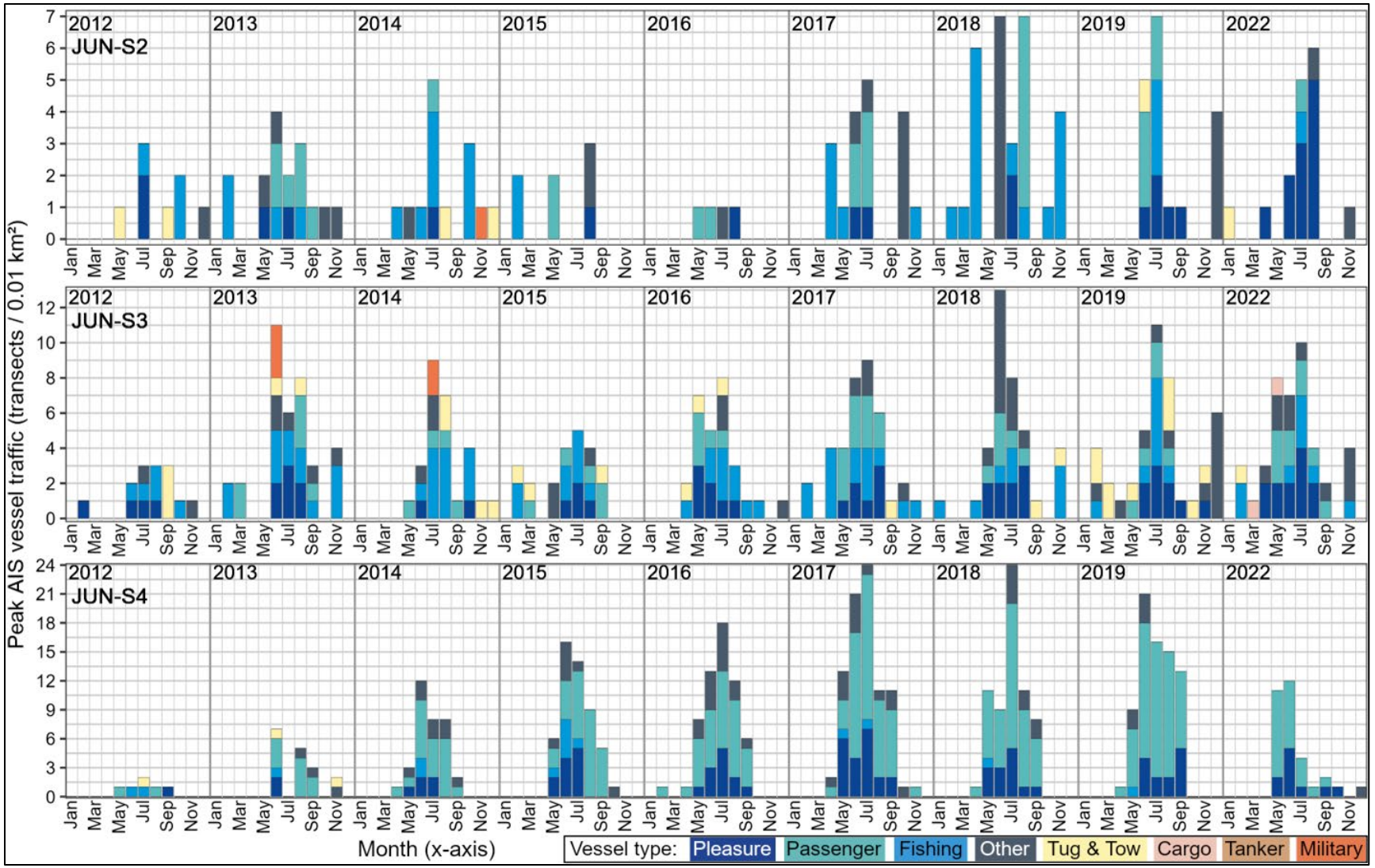


Figure 3.149. Monthly peak vessel traffic activity within options from a subset of the Juneau Study Area by vessel type for years 2012–2022 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

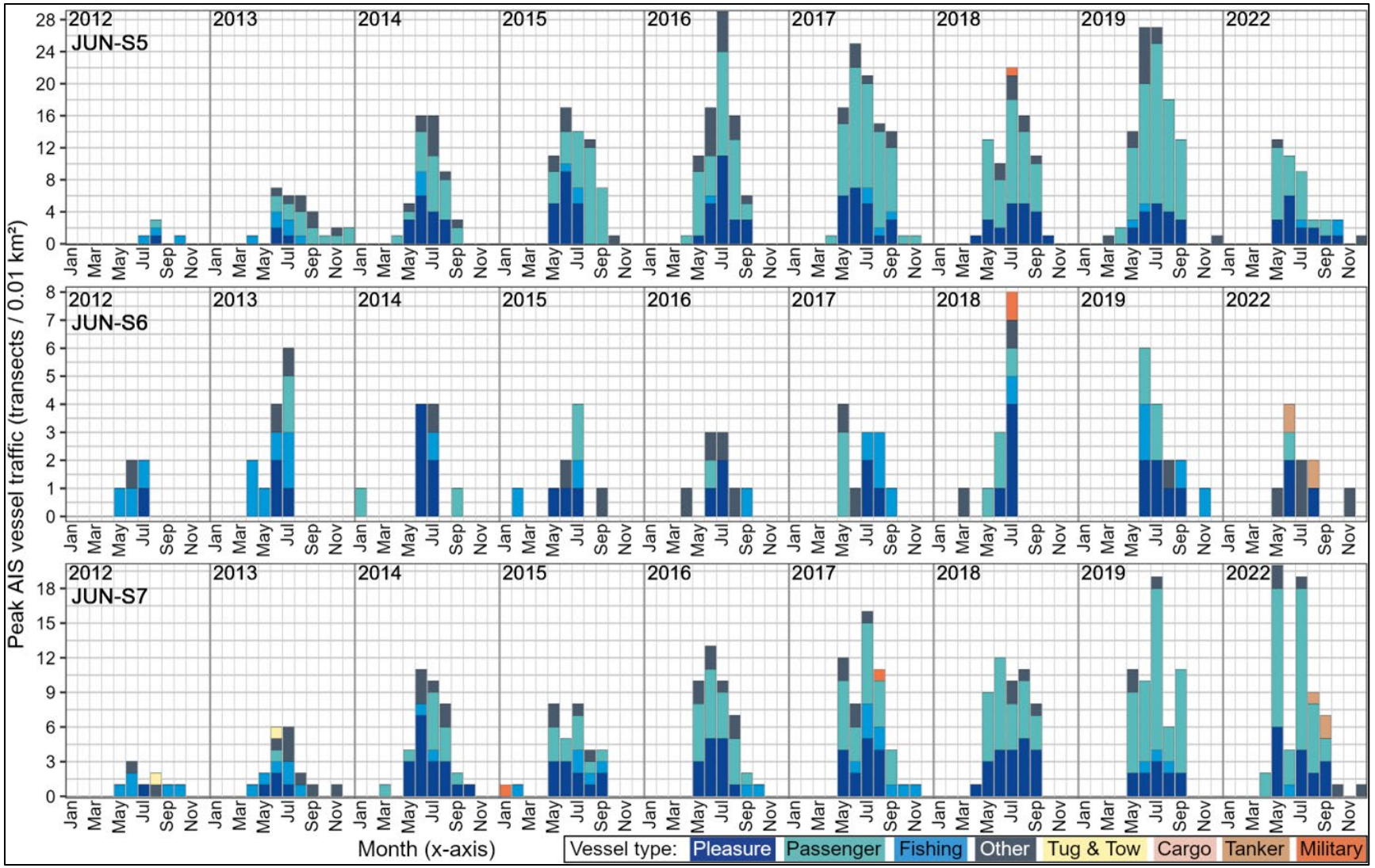


Figure 3.150. Monthly peak vessel traffic activity within options from a subset of the Juneau Study Area by vessel type for years 2012–2022 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

JUN-I1

AOA option JUN-I1 is a 63-ac intertidal site within the Central extent of the Juneau Study Area, located 34 km (18 nm) from Juneau (centroid: 58.1746 N, 134.607 W). The site is located within subunits 13a14, 13a52, and 13a8 of the Admiralty Island Region unit in the Juneau State Land area plan. Text descriptions for the subunits include reference to anchorages and sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -15 m (-48 ft) to 17 m (56 ft) with an average depth of 4.3 m (14 ft). At MHW the depth ranges from -9.9 m (-33 ft) to 22 m (72 ft) with an average depth of 9.0 m (29 ft). JUN-I1 has an average slope of 5.3° and maximum slope of 22°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'ramp with gravel and sand beach wide', 'sand and gravel flat or fan', and classifies the biological wave exposure as semi-protected, protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.6°C, a minimum daily average of 3.9°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in March. Wind velocity at JUN-I1 averaged 3.3 m/s, with a minimum of 0.72 m/s and a maximum of 13 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (4.2 mg/m³) and lowest in February (1.2 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (3.0 mg/m³) and lowest in February (0.74 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.57 m^{-1}) and lowest in February (0.16 m^{-1}).

Industry and National Security Considerations

JUN-I1 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (3.5 km), Navy undersea cable (exact distance undisclosed), USFS cabin rental (2.3 km), ferry route (4.8 km), and wreck and obstruction (4.9 km). The site is within ADFG salmon (group code G) statistical unit 11141 and the groundfish (group code G) statistical unit 345801. JUN-I1 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at two total transects (June 2015, August 2022). The primary vessel types observed are pleasure, fishing, passenger, and other. Overall levels of AIS activity have remained relatively constant over time. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

JUN-I1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.16 km), historically mapped eelgrass sites (0.31 km), harbor seal key haulouts (3.4 km), and humpback whale feeding BIA (0 km). JUN-I1 overlaps the Stephens Passage IBA and the Lynn Canal Sea Duck Key Habitat Site, which support large numbers of seabirds and sea ducks.

Cultural Resource Considerations

There is one Alaska Heritage Resources Survey site within approximately 5 km of JUN-I1. This site may include cultural resources such as archaeological sites, buildings, structures,

objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Douglas Indian Association, Central Council of the Tlingit and Haida Indian Tribes of Alaska, and Hoonah Indian Association. Given this proximity, cultural resources could be present to an unknown extent.

JUN-I2

AOA option JUN-I2 is a 110-ac intertidal site within the North extent of the Juneau Study Area, located 25 km (13 nm) from Juneau (centroid: 58.3332 N, 134.8205 W). The site is located within subunit GU of the Northern Southeast area plan. The site ranges in depth at MLLW from -6.5 m (-21 ft) to 30 m (98 ft) with an average depth of 7.2 m (24 ft). At MHW the depth ranges from -1.9 m (-6.4 ft) to 35 m (110 ft) with an average depth of 12 m (39 ft). JUN-I2 has an average slope of 6.1° and maximum slope of 9.5°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'ramp with gravel and sand beach wide', 'ramp with gravel beach wide', 'platform with gravel beach wide', and classifies the biological wave exposure as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.6°C, a minimum daily average of 4.0°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at JUN-I2 averaged 4.1 m/s, with a minimum of 1.1 m/s and a maximum of 22 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (5.7 mg/m³) and lowest in February (1.4 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (4.7 mg/m³) and lowest in March (1.0 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.43 m^{-1}) and lowest in February (0.13 m^{-1}).

Industry and National Security Considerations

JUN-I2 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (3.5 km), submarine cable, fiber optic cable, or cable area (1.5 km), Navy undersea cable (exact distance undisclosed), and ferry route (1.0 km). The site is within ADFG salmon (group code G) statistical unit 11150 and the groundfish (group code G) statistical unit 345801. JUN-I2 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 9 total transects (July 2019). The primary vessel types observed are passenger, pleasure, and other. AIS activity over the most recent five years has increased by roughly 49% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

JUN-I2 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (1.1 km), harbor seal non-key haulouts (4.5 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, marine invertebrates, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Douglas Indian Association, Central Council of the Tlingit and Haida Indian Tribes of Alaska, and Hoonah Indian Association. Given this proximity, cultural resources could be present to an unknown extent.

JUN-S1

AOA option JUN-S1 is a 370-ac subtidal site within the South extent of the Juneau Study Area, located 29 km (16 nm) from Juneau (centroid: 58.0721 N, 134.1701 W). The site is located within subunit GU of the Northern Southeast area plan. The site ranges in depth at MLLW from -22 m (-73 ft) to 65 m (210 ft) with an average depth of 16 m (52 ft). At MHW the depth ranges from -18 m (-58 ft) to 69 m (230 ft) with an average depth of 20 m (67 ft). JUN-S1 has an average slope of 11° and maximum slope of 32°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.5°C, a minimum daily average of 3.9°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in March. Wind velocity at JUN-S1 averaged 4.7 m/s, with a minimum of 1.3 m/s and a maximum of 17 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (4.8 mg/m³) and lowest in February (1.0 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (5.0 mg/m³) and lowest in February (0.95 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in July (0.38 m^{-1}) and lowest in February (0.14 m^{-1}).

Industry and National Security Considerations

JUN-S1 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (0.83 km), Navy undersea cable (exact distance undisclosed), and ferry route (4.3 km). The site is within ADFG salmon (group code G) statistical unit 11131 and the groundfish (group code G) statistical unit 345801. JUN-S1 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at seven total transects (June 2017). The primary vessel types observed are pleasure, passenger, other, and fishing. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

JUN-S1 is within 5 km of at least one documented location from each of the following natural resources: harbor seal non-key haulouts (2.2 km) and humpback whale feeding BIA (0.26 km). JUN-S1 overlaps the Stephens Passage IBA and the Lynn Canal Sea Duck Key Habitat Site, which support large numbers of seabirds and sea ducks.

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Douglas Indian Association and Central Council of the Tlingit and Haida Indian Tribes of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

JUN-S2

AOA option JUN-S2 is a 230-ac subtidal site within the Central extent of the Juneau Study Area, located 23 km (12 nm) from Juneau (centroid: 58.2145 N, 134.4009 W). The site is located within subunit 10b14 of the West Douglas Region unit in the Juneau State Land area plan. The site ranges in depth at MLLW from 8.9 m (29 ft) to 58 m (190 ft) with an average depth of 43 m (140 ft). At MHW the depth ranges from 14 m (45 ft) to 63 m (210 ft) with an average depth of 48 m (160 ft). JUN-S2 has an average slope of 5.5° and maximum slope of 21°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.5°C, a minimum daily average of 3.8°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in March. Wind velocity at JUN-S2 averaged 5.6 m/s, with a minimum of 1.1 m/s and a maximum of 19 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in June (2.5 mg/m³) and lowest in February (0.91 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (3.3 mg/m³) and lowest in March (0.81 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.47 m^{-1}) and lowest in February (0.14 m^{-1}).

Industry and National Security Considerations

JUN-S2 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (3.1 km), Navy undersea cable (exact distance undisclosed), and ferry route (1.9 km). The site is within ADFG salmon (group code G) statistical unit 11140 and the groundfish (group code G) statistical unit 345801. JUN-S2 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at seven total transects (June 2018, August 2018, July 2019). The primary vessel types observed are fishing, passenger, other, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

JUN-S2 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (4.6 km) and historically mapped eelgrass sites (4.9 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Douglas Indian Association and Central Council of

the Tlingit and Haida Indian Tribes of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

JUN-S3

AOA option JUN-S3 is a 170-ac subtidal site within the Central extent of the Juneau Study Area, located 28 km (15 nm) from Juneau (centroid: 58.2171 N, 134.4843 W). The site is located within subunits 10b11, 10b13, 10b14, 10b15, and 10b23 of the West Douglas Region unit in the Juneau State Land area plan. Text descriptions for the subunits include reference to anchorages, community harvest, and sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from 5.4 m (18 ft) to 33 m (110 ft) with an average depth of 26 m (86 ft). At MHW the depth ranges from 10 m (33 ft) to 38 m (120 ft) with an average depth of 31 m (100 ft). JUN-S3 has an average slope of 1.5° and maximum slope of 7.6°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (533 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.5°C, a minimum daily average of 3.8°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in March. Wind velocity at JUN-S3 averaged 4.7 m/s, with a minimum of 1.1 m/s and a maximum of 19 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (5.0 mg/m³) and lowest in February (1.6 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (6.7 mg/m³) and lowest in March (1.8 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in August (0.53 m^{-1}) and lowest in February (0.14 m^{-1}).

Industry and National Security Considerations

JUN-S3 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (1.4 km), Navy undersea cable (exact distance undisclosed), and ferry route (1.1 km). The site is within ADFG salmon (group code G) statistical unit 11140 and the groundfish (group code G) statistical unit 345801. JUN-S3 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 13 total transects (June 2018). The primary vessel types observed are fishing, pleasure, other, passenger, and tug/tow. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

JUN-S3 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.14 km), historically mapped eelgrass sites (4.5 km), and humpback whale feeding BIA (1.2 km). JUN-S3 overlaps the Stephens Passage IBA and the Lynn Canal Sea Duck Key Habitat Site, which support large numbers of seabirds and sea ducks.

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, and salmon. Federally recognized Alaska Native Villages or Tribal

Associations within 50 km include the Douglas Indian Association and Central Council of the Tlingit and Haida Indian Tribes of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

JUN-S4

AOA option JUN-S4 is a 100-ac subtidal site within the North extent of the Juneau Study Area, located 24 km (13 nm) from Juneau (centroid: 58.3137 N, 134.7982 W). The site is located within subunit AT-05, GU of the Admiralty Island Area unit in the Northern Southeast area plan. Text description for the subunit includes reference to sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -2.3 m (-7.5 ft) to 58 m (190 ft) with an average depth of 25 m (83 ft). At MHW the depth ranges from 2.3 m (7.5 ft) to 63 m (210 ft) with an average depth of 30 m (98 ft). JUN-S4 has an average slope of 7.6° and maximum slope of 17°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (20 m away) as protected, semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.6°C, a minimum daily average of 4.0°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at JUN-S4 averaged 4.3 m/s, with a minimum of 1.3 m/s and a maximum of 21 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (4.0 mg/m³) and lowest in February (1.3 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (2.8 mg/m³) and lowest in February (0.63 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in May (0.42 m^{-1}) and lowest in February (0.15 m^{-1}).

Industry and National Security Considerations

JUN-S4 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (1.0 km), submarine cable, fiber optic cable or cable area (2.1 km), Navy undersea cable (exact distance undisclosed), and ferry route (1.6 km). The site is within ADFG salmon (group code G) statistical unit 11150 and the groundfish (group code G) statistical unit 345801. JUN-S4 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 24 total transects (July 2017, July 2018). The primary vessel types observed are passenger, pleasure, and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

JUN-S4 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.31 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, marine invertebrates, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Douglas

Indian Association, Central Council of the Tlingit and Haida Indian Tribes of Alaska, and Hoonah Indian Association. Given this proximity, cultural resources could be present to an unknown extent.

JUN-S5

AOA option JUN-S5 is a 220-ac subtidal site within the North extent of the Juneau Study Area, located 25 km (13 nm) from Juneau (centroid: 58.335 N, 134.8207 W). The site is located within subunits AT-04, GU of the Admiralty Island Area unit in the Northern Southeast area plan. Text description for the subunit includes reference to anchorages, sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -1.6 m (-5.4 ft) to 45 m (150 ft) with an average depth of 20 m (65 ft). At MHW the depth ranges from 2.9 m (9.6 ft) to 49 m (160 ft) with an average depth of 24 m (80 ft). JUN-S5 has an average slope of 6.0° and maximum slope of 9.8°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.6°C, a minimum daily average of 4.0°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at JUN-S5 averaged 4.2 m/s, with a minimum of 1.2 m/s and a maximum of 22 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (6.3 mg/m³) and lowest in July (1.7 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (4.7 mg/m³) and lowest in July (1.3 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.41 m^{-1}) and lowest in February (0.13 m^{-1}).

Industry and National Security Considerations

JUN-S5 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (3.4 km), submarine cable, fiber optic cable or cable area (1.2 km), Navy undersea cable (exact distance undisclosed), and ferry route (0.75 km). The site is within ADFG salmon (group code G) statistical unit 11150 and the groundfish (group code G) statistical unit 345801. JUN-S5 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 29 total transects (July 2016). The primary vessel types observed are passenger, pleasure, and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.



Natural Resource Considerations

JUN-S5 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.97 km), harbor seal non-key haulouts (4.3 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, marine invertebrates, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Douglas Indian Association, Central Council of the Tlingit and Haida Indian Tribes of Alaska, and Hoonah Indian Association. Given this proximity, cultural resources could be present to an unknown extent.

JUN-S6

AOA option JUN-S6 is a 70-ac subtidal site within the North extent of the Juneau Study Area, located 33 km (18 nm) from Juneau (centroid: 58.3516 N, 134.8996 W). The site is located within subunit GU of the Northern Southeast area plan. The site ranges in depth at MLLW from 0.14 m (0.47 ft) to 91 m (300 ft) with an average depth of 39 m (130 ft). At MHW the depth ranges from 4.6 m (15 ft) to 96 m (310 ft) with an average depth of 43 m (140 ft). JUN-S6 has an average slope of 20° and maximum slope of 28°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (55 m away) as protected, semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.6°C, a minimum daily average of 4.0°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at JUN-S6 averaged 3.6 m/s, with a minimum of 1.0 m/s and a maximum of 14 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in September (4.6 mg/m^3) and lowest in February (0.96 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in September (3.9 mg/m^3) and lowest in February (0.34 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.46 m^{-1}) and lowest in February (0.18 m^{-1}).

Industry and National Security Considerations

JUN-S6 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (3.5 km), Navy undersea cable (exact distance undisclosed), ferry route (3.2 km), and wreck and obstruction (4.6 km). The site is within ADFG salmon (group code G) statistical unit 11150 and the groundfish (group code G) statistical unit 345801. JUN-S6 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at eight total transects (July 2018). The primary vessel types observed are pleasure, fishing, passenger, and other. AIS activity over the most recent five years has increased by roughly 36% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

JUN-S6 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (2.8

km), historically mapped eelgrass sites (2.5 km), harbor seal non-key haulouts (0 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (1.2 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Douglas Indian Association, Central Council of the Tlingit and Haida Indian Tribes of Alaska, and Hoonah Indian Association. Given this proximity, cultural resources could be present to an unknown extent.

JUN-S7

AOA option JUN-S7 is a 120-ac subtidal site within the North extent of the Juneau Study Area, located 28 km (15 nm) from Juneau (centroid: 58.3634 N, 134.8773 W). The site is located within subunit GU of the Northern Southeast area plan. The site ranges in depth at MLLW from -2.5 m (-8.3 ft) to 58 m (190 ft) with an average depth of 29 m (97 ft). At MHW the depth ranges from 2.0 m (6.6 ft) to 62 m (200 ft) with an average depth of 34 m (110 ft). JUN-S7 has an average slope of 9.6° and maximum slope of 18°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 7.6°C, a minimum daily average of 4.0°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at JUN-S7 averaged 3.6 m/s, with a minimum of 0.66 m/s and a maximum of 16 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in September (3.5 mg/m^3) and lowest in February (1.2 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in September (2.7 mg/m^3) and lowest in February (0.67 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.47 m^{-1}) and lowest in March (0.14 m^{-1}).

Industry and National Security Considerations

JUN-S7 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (0.63 km), Navy undersea cable (exact distance undisclosed), ferry route (0.59 km), and wreck and obstruction (2.3 km). The site is within ADFG salmon (group code G) statistical unit 11150 and the groundfish (group code G) statistical unit 345801. JUN-S7 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 20 total transects (May 2022). The primary vessel types observed are passenger, pleasure, other, and fishing. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

JUN-S7 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (2.3 km), harbor seal non-key haulouts (1.5 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, and salmon.

Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Douglas Indian Association, Central Council of the Tlingit and Haida Indian Tribes of Alaska, and Hoonah Indian Association. Given this proximity, cultural resources could be present to an unknown extent.



Sitka Study Area

Final AOA options within the Sitka Study Area include 11 subtidal sites across 1,631 ac and one intertidal site totaling 112 ac (Figure 3.151). Options range from 57.6 ac to 368.7 ac and are distributed across the study area (Tables 3.14 and 3.15; Figures 3.151–3.170). Several sites within the study area are located near, and may directly overlap with, ecologically sensitive resources. These include historically mapped eelgrass beds, feeding BIAs and high-use areas for humpback whales, feeding and migratory BIAs for gray whales, Steller sea lion rookeries and major haulouts (within a 3-nm protection area), and harbor seal haulouts. Some sites also overlap, or are in proximity to, a gray whale feeding BIA. Given the proximity to these resources, project planning should account for potential ecological impacts and may require coordination or consultation with appropriate resource agencies.

This study area overlaps with marine bird concentration areas and important habitats, including the St. Lazaria Colony IBA, the Sitka Sound Marine IBA, and the Eastern Chichagof Island and Lynn Canal-Frederick Sound Sea Duck Key Habitat Sites. No AOA options overlap the sea duck key habitat areas. There are seven sizeable seabird colonies in the Sitka Study Area, including St. Lazaria Island, Kaiuchuli Rock, Rogers Island and associated Urilof Island and John Rock, the islets east of Rachek Island (2.39 km from SIT-S1), and Biali Rocks. These colonies are notable due to the total number of nesting birds and because they contain species of increased conservation concern and/or species prone to nest failure resulting from disturbance.

Public comments related to the Sitka draft AOA options included concerns about potential overlap with existing dive fisheries. A primary issue raised by dive fishery participants was the risk of diver air supply lines becoming entangled with aquaculture infrastructure, creating safety hazards and limiting access to common-use resources. SARDFA plays a central role in coordinating industry activities and represents divers, processors, and coastal communities within the Southeast study areas. To minimize conflict and ensure equitable resource access, coordination with SARDFA and ADFG is recommended during the siting of aquaculture operations in areas with active dive fisheries.

Additional comments addressed potential overlap between draft AOA options and other commercial fisheries. In particular, concerns related to impacts to commercial troll drag fisheries (power trolling), a USFS cabin, and wave exposure referenced for draft AOA option SIT-I1. This option was modified prior to adoption as a final AOA option to address exposure concerns, and USFS data layers for cabins were added to the final model run. Additional comments identified final AOA options SIT-S7 and S6 as troll drag areas, and S3 as a recreational area. To minimize conflict and ensure equitable resource access, coordination with SEAFA and ADFG is recommended during the siting of aquaculture operations in areas with active fisheries.

Additional comments focused on potential overlaps between AOA study areas and documented cultural resource sites. In response, the final model run incorporated additional down-scoring of AHRS data layers, resulting in reduced suitability and, ultimately, the removal of portions of, or entire, draft AOA options located within 500 m of AHRS-listed locations, except final AOA option SIT-S8. SIT-S8 is within 500 m of an upland cultural resource site, which may result in additional review requirements. Comments also noted potential impacts to subsistence harvest activities from aquaculture development, and characterization revealed overlap with large land mammals, marine invertebrates, non-salmon fish, vegetation,

wood, birds and eggs, marine mammals, salmon, and small land mammal subsistence search and harvest areas. The degree of potential adverse effect to subsistence harvest activities is highly dependent on the specific harvest activity (e.g., intertidal gathering vs herring roe collection) and the nature of proposed aquaculture development (e.g., subtidal vs intertidal culture). The Sitka Tribal Association commented on the potential for interactions with marine mammals in the Sitka area and areas that border privately owned uplands. All aquaculture projects will be subject to further review during the Alaska state leasing and permitting process. Early and ongoing coordination with coastal communities, nearby Alaska Native Villages, Alaska Native Corporations, and other Tribal Associations is strongly recommended to ensure access to common-use resources, cultural resource sites, and that traditional uses are not adversely impacted. Additional comments were received related to adverse site conditions at draft AOA options SIT-I1, I3, S1, and S7. Following the final model run, SIT-I1 and S1 were modified, and I3 and S7 were removed due to changes in scoring of the exposure layers.

Below are additional characterizations of site-specific details regarding the geographic location and environmental conditions of AOA options within the Sitka Study Area, as well as considerations regarding national security, natural resources, navigation and transportation, cultural resources, and various industries including aquaculture and fisheries. These are presented as tables containing location information for each option and proximity to these considerations (Tables 3.14–3.15). Following these tables are maps that visualize the options along with data used within the suitability model (Figures 3.151–3.156). Next are plots summarizing available time series data to provide additional context on environmental conditions and observed vessel traffic within the options (Figures 3.157–3.170). Following these tables and figures are individual text descriptions for each option summarizing the characteristics observed. These tables, figures, and text summaries were created using many different spatial datasets curated to complement factors considered during the Alaska state aquatic farm lease application and review process, and to assist proponents in the identification of key user groups and resource agencies to engage with during the project design and application process. These data are unlikely to be exhaustive, and there may be additional considerations not captured in this characterization. These different presentation methods are meant not only to communicate site-specific characteristics in multiple ways but also to complement each other. They may also contain unique bits of information not found in the other parts of this characterization.



Table 3.14. Characterization summary for Sitka Aquaculture Opportunity Area subtidal and intertidal options in the southern extent: SIT-S1, SIT-S2, SIT-S3, SIT-S4, SIT-S5. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km).

	Southern extent				
	SIT-S1	SIT-S2	SIT-S3	SIT-S4	SIT-S5
General characteristics					
Center Coordinates (longitude, latitude)	−135.3101, 56.7541	−135.2582, 56.7551	−135.3395, 56.8168	−135.3197, 56.8899	−135.4287, 56.9357
Size (ac)	231.4	331.4	368.7	83.2	90.8
Distance to Coastal Populated Places (nm)	19.2	20.3	15.5	10.9	7.4
Depth (m) (min, max, mean), Average Slope (degrees)	−3.91, 67.76, 24.82, 8.28	1.09, 49.88, 28.8, 4.92	−0.18, 38.78, 18.04, 4.93	−13.21, 49.44, 33.09, 9.15	−3.76, 30.35, 12.94, 3.53
Alaska Area Plan Subunit	GU	GU, BT-041	GU, BT-030	TRMZ	Sitka TRMZ
Commercial Statistical Areas – Groundfish	355633	355633	355633	355635	355635
Commercial Statistical Areas – Salmon, Shellfish	11331	11331	11331	11341	11341
Constraints					
Anadromous Waters Catalog – Streams (91.5-m Setback)	3.65	0.39	1.05	1.13	4.15
Deep-Sea Coral and Sponge Occurrences (1,000-m Setback)	-	-	-	-	-
Ferry Routes (500-m Setback)	-	-	-	-	-
Key Harbor Seal Locations (500-m Setback)	-	-	-	-	-
Navy Undersea Cables within 5 km (500-m Setback)*	-	-	-	-	-
Pipelines (500-m Setback)	-	-	-	-	-
Submarine Cable Areas (200-m Setback)	-	-	-	-	-
Wastewater Outfalls (500-m Setback)	-	-	-	-	-
Wrecks and Obstructions (152.5-m Setback)	3.48	-	0.6	2.67	3.14
National Security					

	Southern extent				
	SIT-S1	SIT-S2	SIT-S3	SIT-S4	SIT-S5
Munitions and Explosives of Concern	-	-	-	-	-
Natural Resources					
Cetacean Biologically Important Areas – Feeding	Gray Whale (0)	Gray Whale (0)	Gray Whale (0) Humpback Whale (2.58)	Gray and Humpback Whale (2.21)	Gray and Humpback Whale (0)
Cetacean Biologically Important Areas – Migratory Route	Gray Whale (0)	Gray Whale (0)	Gray Whale (0)	Gray Whale (2.21)	Gray Whale (0)
Humpback Whale High-Use Areas	-	-	-	0	0
NMFS ESA Critical Habitat	-	-	-	-	-
Non-Key Harbor Seal Haulout Locations (500-m Setback)	2.74	4.08	1.91	3.91	0
North Pacific Seabird Data**	2.39	-	-	-	-
ShoreZone Coastal Mapping – Eelgrass Bioband	0	0	0	0	0
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	-	-	Jacob Rock (8.78)	-	-
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-	-	-	-
Industry, Navigation, and Transportation					
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-	-	-	-
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	-	-	-	2.59	-
Permitted Log Transfer Facility (500-m Setback)	-	-	-	-	-
USFS Recreation Opportunities – Cabin Rentals	-	-	-	-	-
Cultural Resources					
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m setback)*	-	-	2	2	2
Alaska Area Plans (Community Harvest) overlap	-	-	-	-	-

	Southern extent				
	SIT-S1	SIT-S2	SIT-S3	SIT-S4	SIT-S5
Subsistence Search and Harvest Areas within 5 km	large land mammals, marine inverts, non-salmon fish, vegetation, wood	large land mammals, marine inverts, non-salmon fish, wood	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation, wood	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation
Aquaculture and Fisheries					
Alaska Area Plans (Sport Fishing) overlap	-	-	-	-	-
Alaska DNR Shore Fishery Lease	-	-	-	-	-
Hatchery Release Sites	-	-	-	-	-
Aquatic Farm Permits	-	-	-	-	-
*Classified data layer; if the option is within the specified distance, a value of "Yes" is shown instead of the travel distance value. **A straight-line distance was used to calculate minimum travel distance.					

Table 3.15. Characterization summary for Sitka Aquaculture Opportunity Area subtidal and intertidal options in the northern extent SIT-I1, SIT-S6, SIT-S7, SIT-S8, SIT-S9, SIT-S10, SIT-S11. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km).

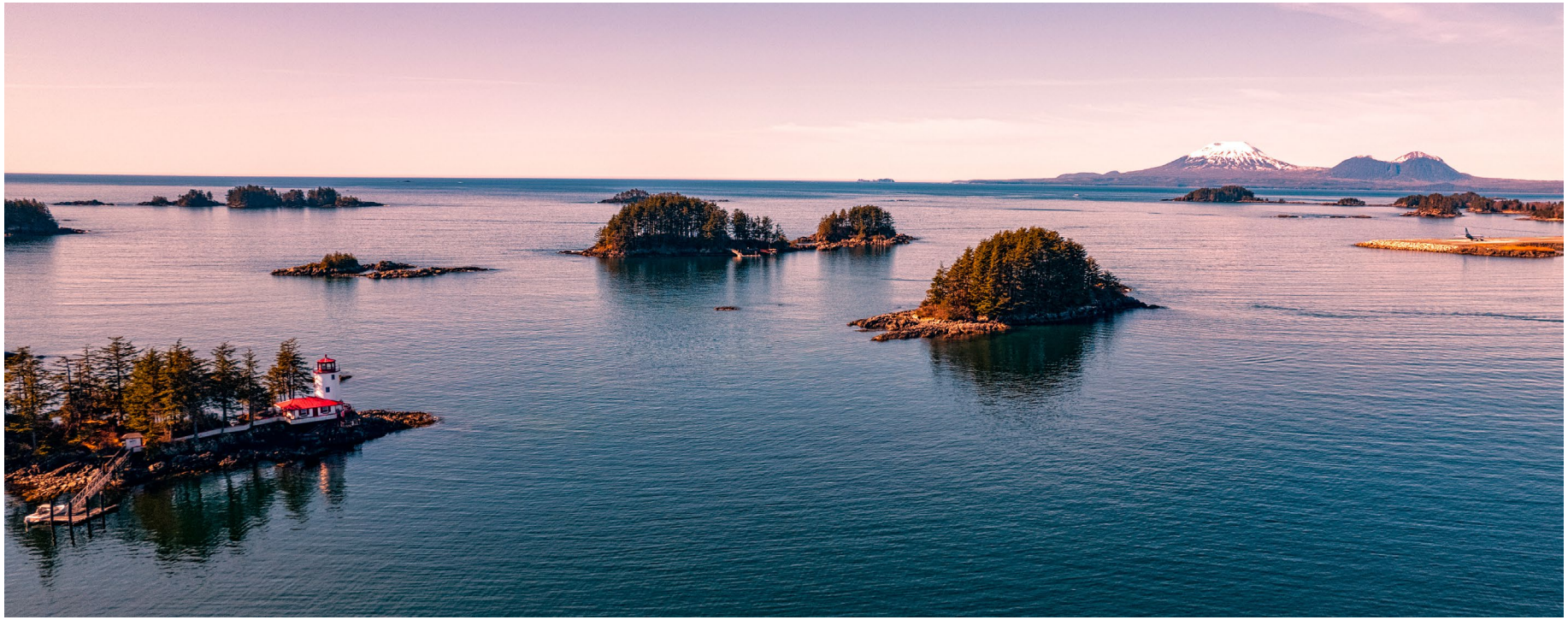
	Northern extent						
	SIT-I1	SIT-S6	SIT-S7	SIT-S8	SIT-S9	SIT-S10	SIT-S11
General characteristics							
Center Coordinates (longitude, latitude)	−135.5909, 57.0778	−135.2936, 57.0075	−135.2867, 57.0167	−135.3423, 57.1821	−135.4273, 57.1881	−135.4032, 57.1898	−135.3955, 57.2309
Size (ac)	111.7	57.2	98.5	92.7	143.4	57.6	75.6
Distance to Coastal Populated Places (nm)	7.8	3.2	2.8	8.8	8.6	9.1	11.5
Depth (m) (min, max, mean), Average Slope (degrees)	−5.65, 7.36, 1.31, 2.43	−0.14, 33.07, 18.59, 4.68	7.69, 67.69, 44.98, 8.13	−7.14, 61.38, 28.04, 8.8	−28.36, 76.07, 33.63, 15.28	−10.54, 90.98, 43.16, 12.53	−8.63, 57, 23.18, 11.22
Alaska Area Plan Subunit	TRMZ	Sitka TRMZ	Sitka TRMZ	Sitka TRMZ	TRMZ	TRMZ	TRMZ

	Northern extent						
	SIT-I1	SIT-S6	SIT-S7	SIT-S8	SIT-S9	SIT-S10	SIT-S11
Commercial Statistical Areas – Groundfish	355705	355635	355705	355706	355706	355706	355706
Commercial Statistical Areas – Salmon, Shellfish	11341	11341	11341	11344	11343	11343	11343
Constraints							
Anadromous Waters Catalog – Streams (91.5-m Setback)	0.97	3.93	2.35	1.8	-	-	2.27
Deep-Sea Coral and Sponge Occurrences (1,000-m Setback)	3.08	-	-	-	-	-	-
Ferry Routes (500-m Setback)	-	-	-	-	0.98	2.53	-
Key Harbor Seal Locations (500-m Setback)	-	-	-	-	-	-	-
Navy Undersea Cables within 5 km (500-m Setback)*	-	Yes	Yes	-	Yes	Yes	-
Pipelines (500-m Setback)	-	-	-	-	-	-	-
Submarine Cable Areas (200-m Setback)	-	2.74	2.31	-	-	-	-
Wastewater Outfalls (500-m Setback)	-	4.63	4	-	-	-	-
Wrecks and Obstructions (152.5-m Setback)	-	0.19	1.56	0.18	2.56	1.36	1.97
National Security							
Munitions and Explosives of Concern	-	-	-	-	-	-	-
Natural Resources							
Cetacean Biologically Important Areas – Feeding	Gray and Humpback Whale (0.78)	Gray and Humpback Whale (3.41)	Gray and Humpback Whale (3.58)	Gray Whale (1.84) Humpback Whale (2.01)	Gray and Humpback Whale (0)	Gray and Humpback Whale (0)	Gray and Humpback Whale (2.53)
Cetacean Biologically Important Areas – Migratory	Gray Whale (0.78)	Gray Whale (3.41)	Gray Whale (3.58)	Gray Whale (1.20)	Gray Whale (0)	Gray Whale (0)	Gray Whale (0)
Humpback Whale High-Use Areas	0	0	0	3.95	0.64	1.48	-
NMFS ESA Critical Habitat	-	-	-	-	-	-	-
Non-Key Harbor Seal Haulout Locations (500-m Setback)	-	-	-	-	-	-	-

	Northern extent						
	SIT-I1	SIT-S6	SIT-S7	SIT-S8	SIT-S9	SIT-S10	SIT-S11
North Pacific Seabird Data**	-	-	-	-	-	-	-
ShoreZone Coastal Mapping – Eelgrass Bioband	-	0	0	0	1.03	0	0
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	-	-	-	-	-	-	-
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-	-	-	-	-	-
Industry, Navigation, and Transportation							
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	4.59	3.73	-	-	-	2.08
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	-	-	-	-	-	-	-
Permitted Log Transfer Facility (500-m Setback)	-	-	-	-	3.66	3.02	2.14
USFS Recreation Opportunities – Cabin Rentals	-	4.45	-	-	-	-	-
Cultural Resources							
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m setback)*	-	3	3	2	5	5	10
Alaska Area Plans (Community Harvest) overlap	-	-	-	-	-	-	-
Subsistence Search and Harvest Areas within 5 km	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation, wood	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, small land mammals, vegetation, wood	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, small land mammals, vegetation, wood	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation, wood	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation, wood	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, small land mammals,

	Northern extent						
	SIT-I1	SIT-S6	SIT-S7	SIT-S8	SIT-S9	SIT-S10	SIT-S11
							vegetation, wood
Aquaculture and Fisheries							
Alaska Area Plans (Sport Fishing) overlap	-	-	-	-	-	-	-
Alaska DNR Shore Fishery Lease	-	-	-	-	-	-	-
Hatchery Release Sites	-	4.67	3.8	-	-	-	-
Aquatic Farm Permits	-	-	-	-	2.92	3.75	-

*Classified data layer; if the option is within the specified distance, a value of “Yes” is shown instead of the travel distance value.
**A straight-line distance was used to calculate minimum travel distance.



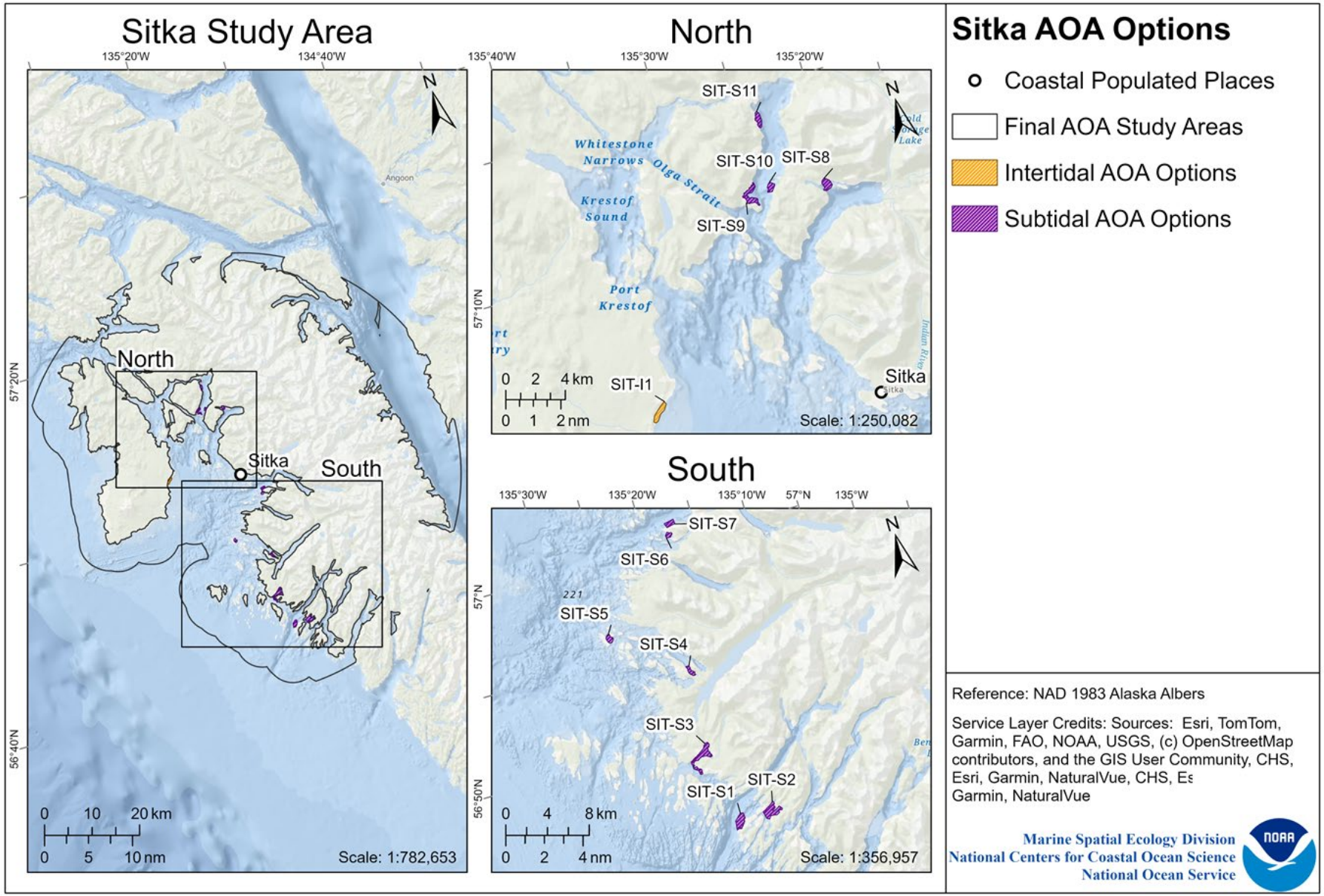


Figure 3.151. Final intertidal and subtidal AOA options for the Sitka Study Area.

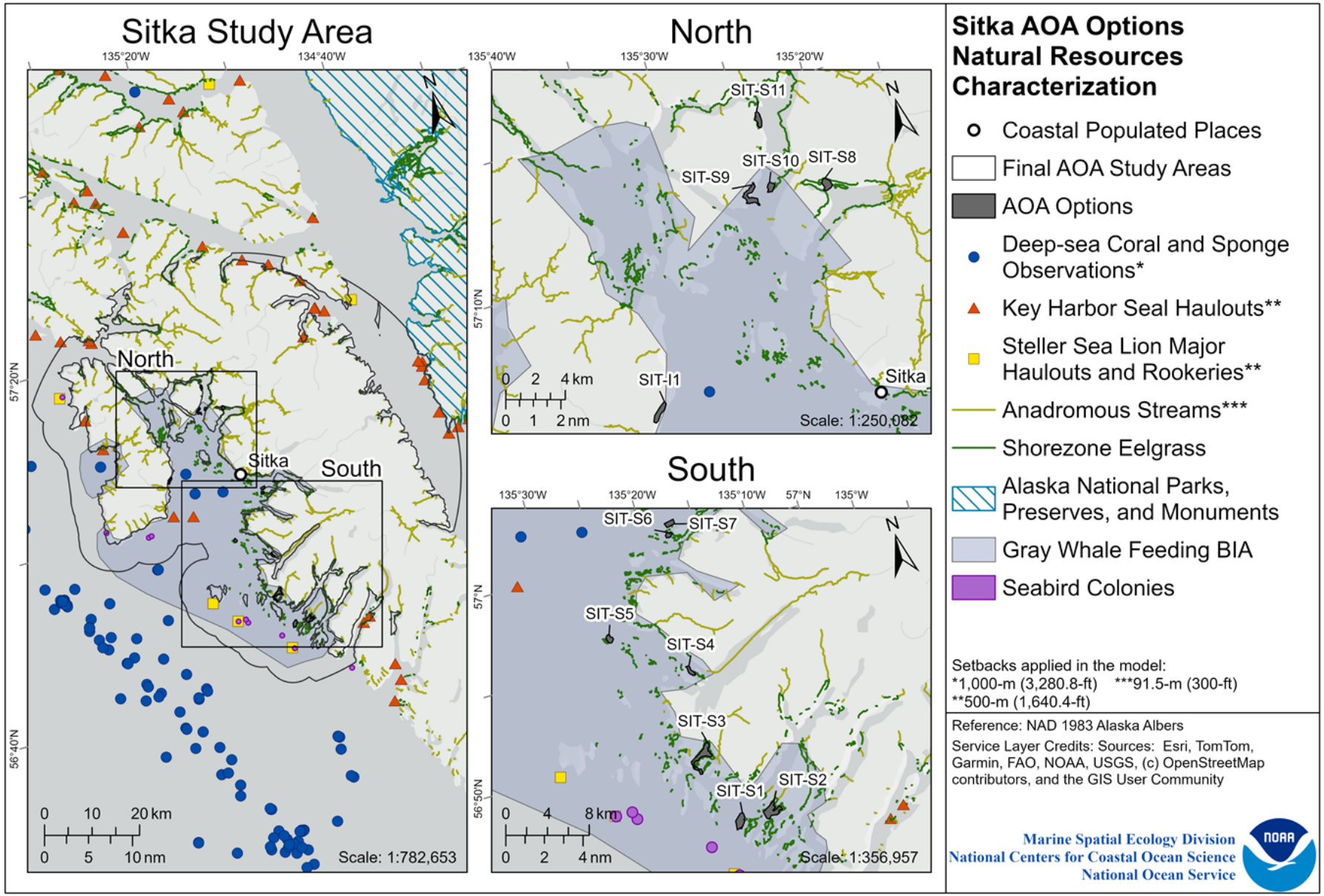


Figure 3.152. Natural resource interactions with the final AOA options in the Sitka Study Area.

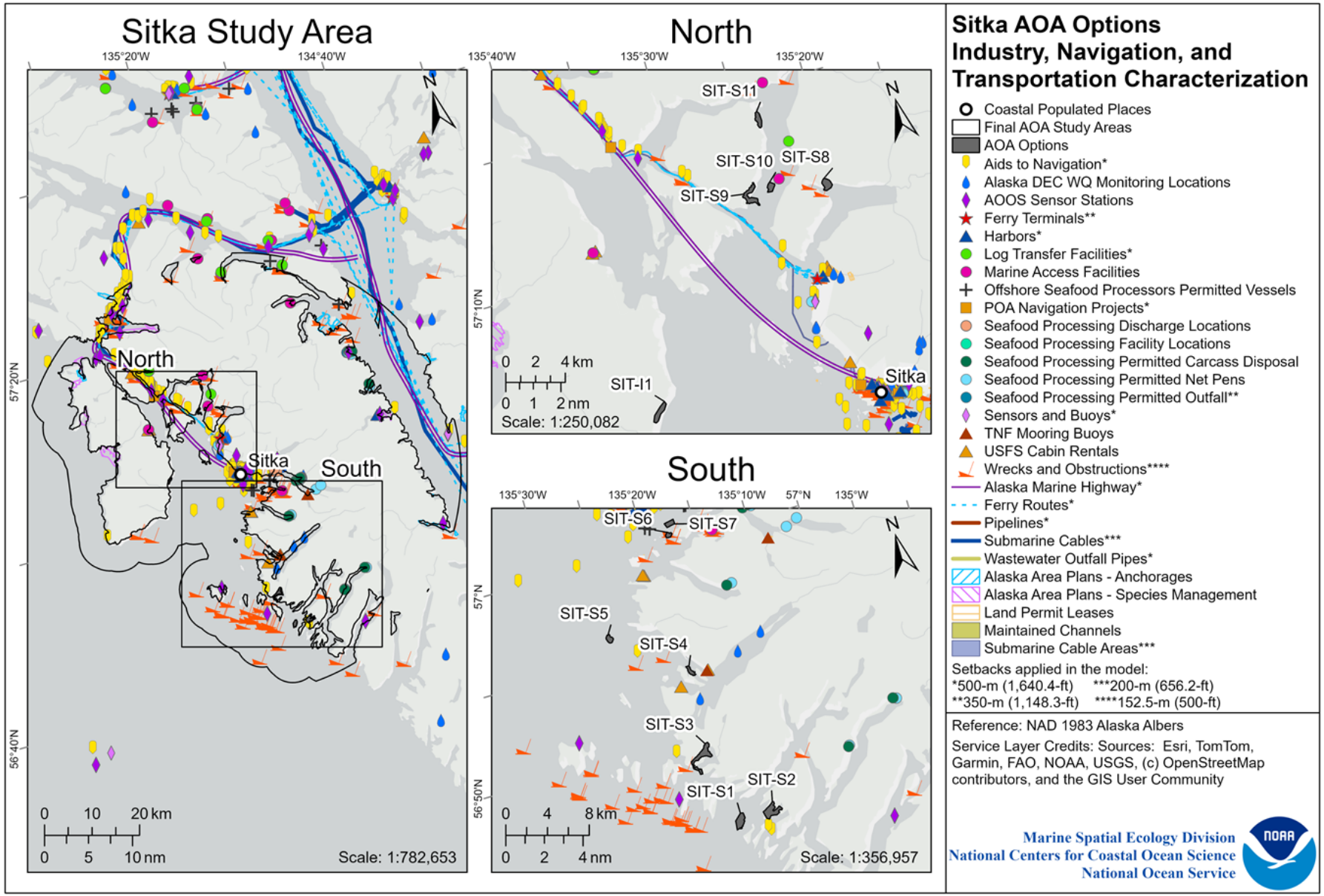


Figure 3.153. Industry, navigation, and transportation interactions with the final AOA options in the Sitka Study Area.

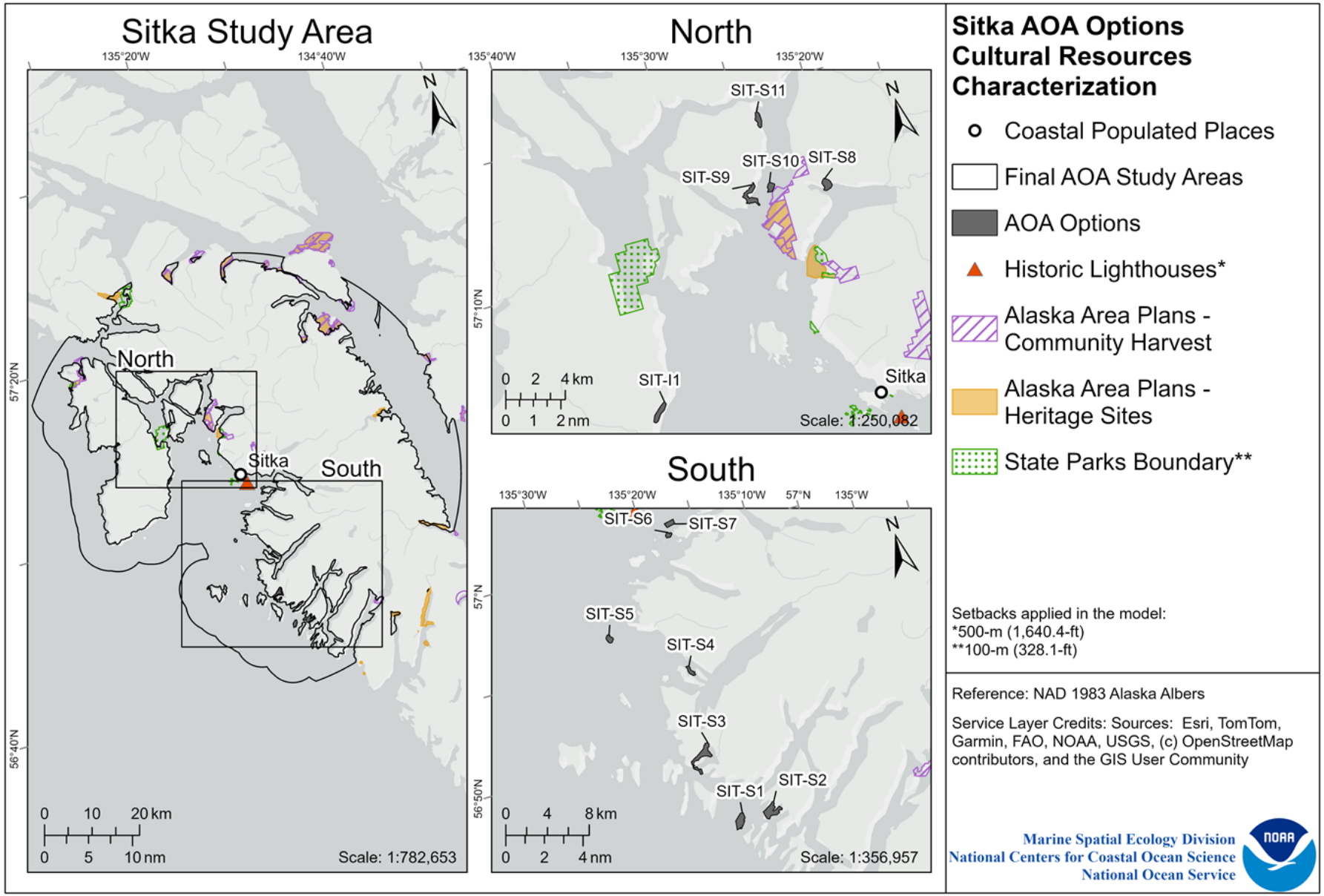


Figure 3.154. Cultural resource interactions with the final AOA options in the Sitka Study Area.

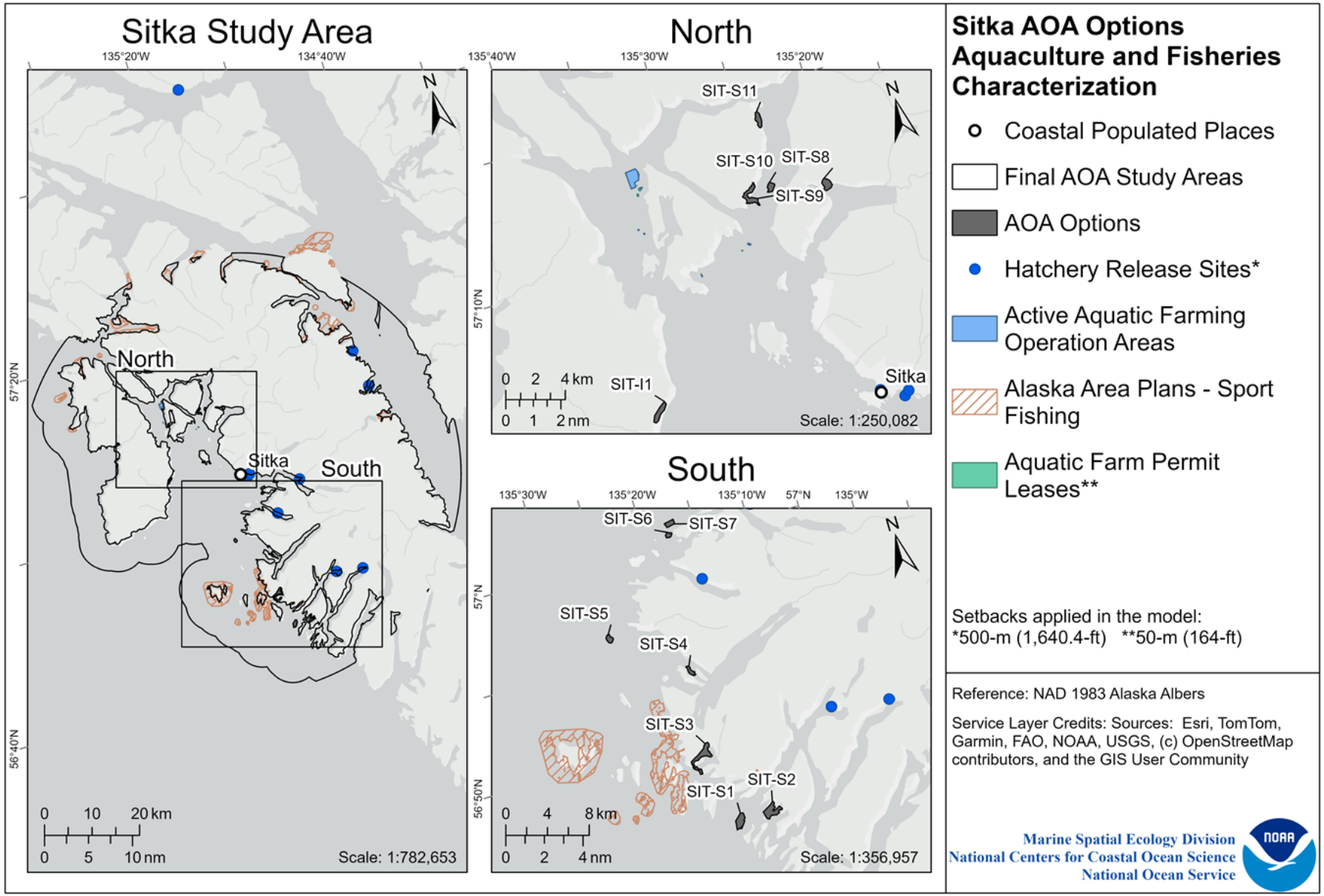


Figure 3.155. Aquaculture and fisheries interactions with the final AOA options in the Sitka Study Area.

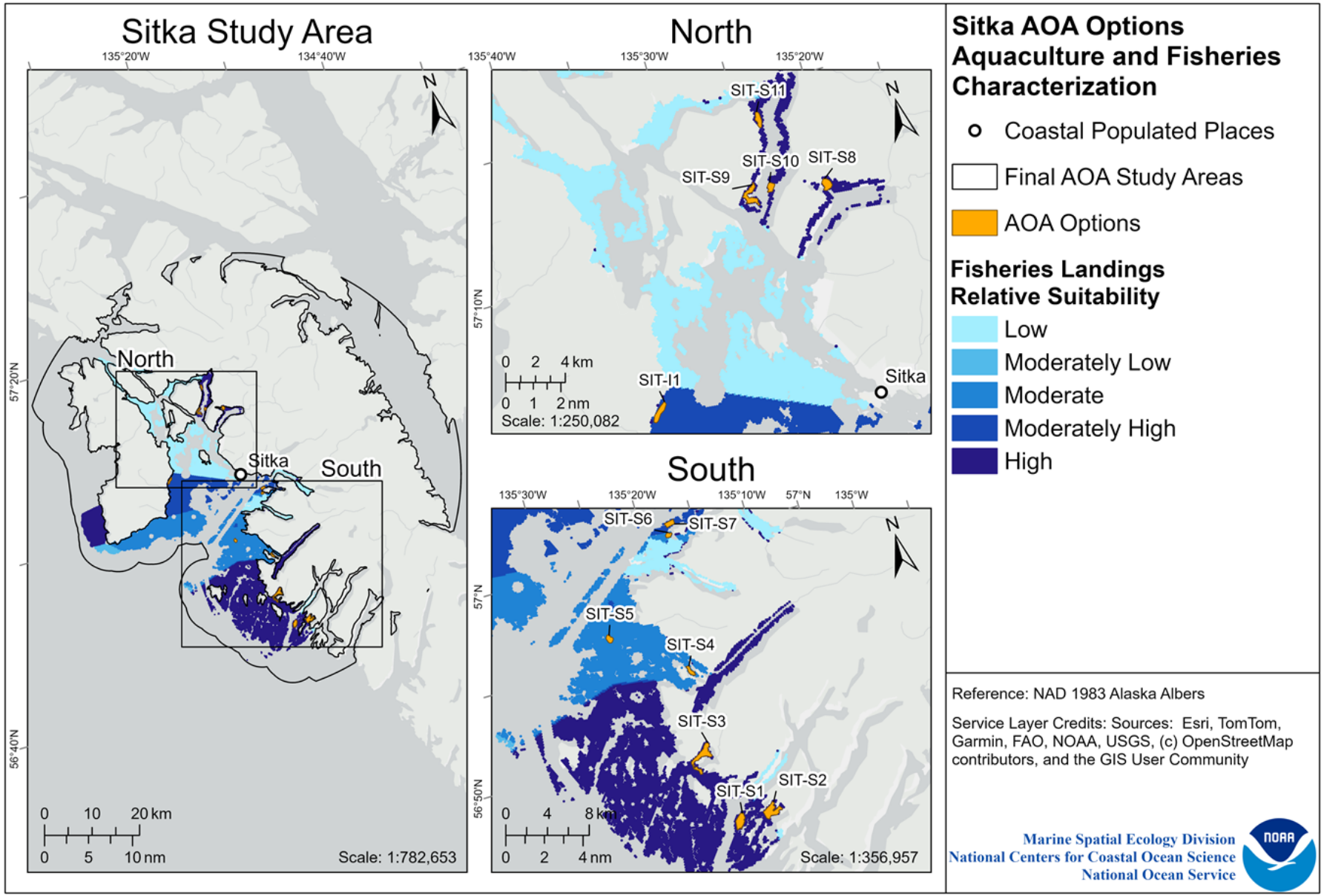


Figure 3.156. Relative suitability of the fishing landings combined data layer in relation to the final AOA options in the Sitka Study Area.

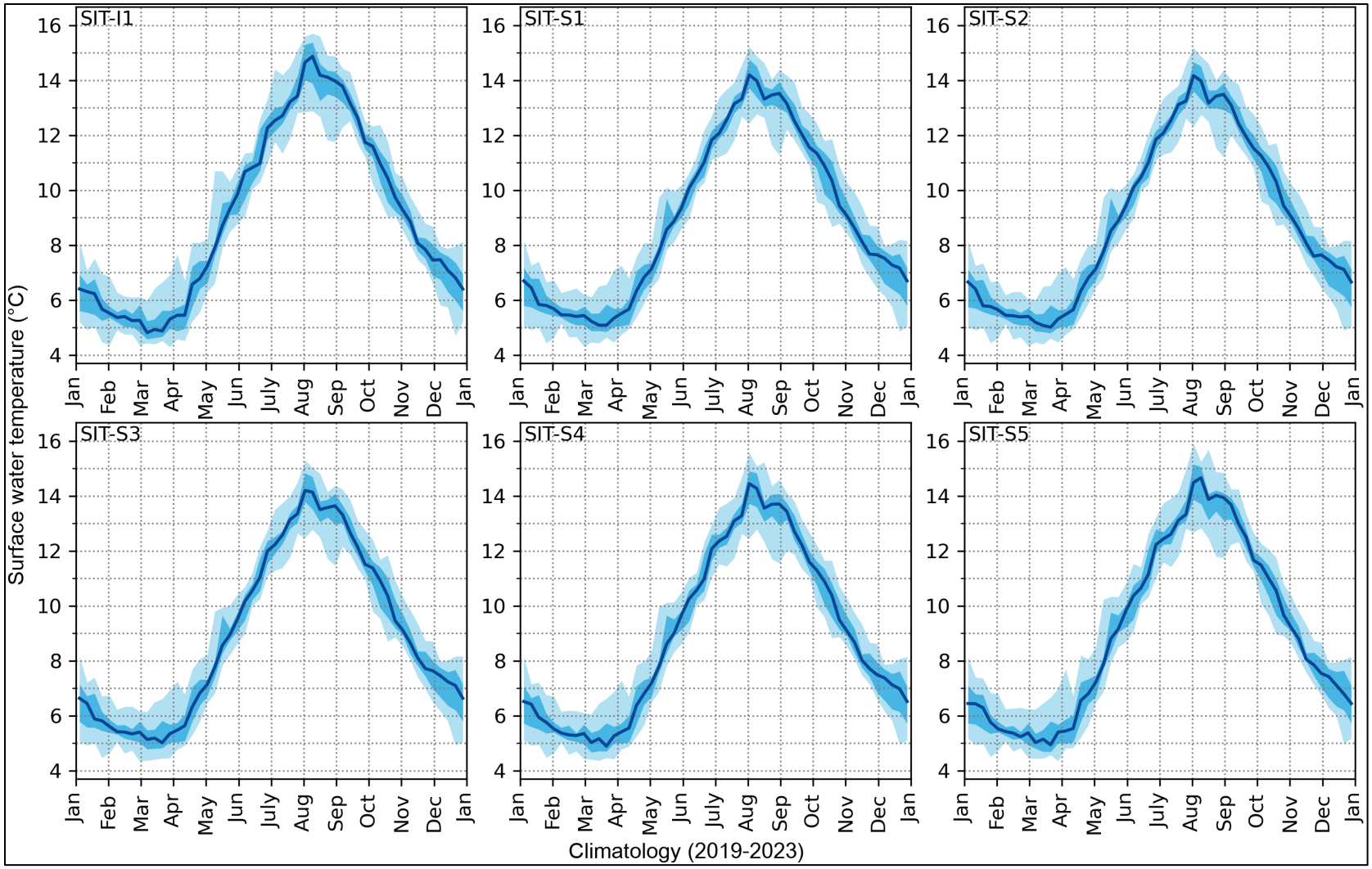


Figure 3.157. Sea surface temperatures for a subset of options from the Sitka Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

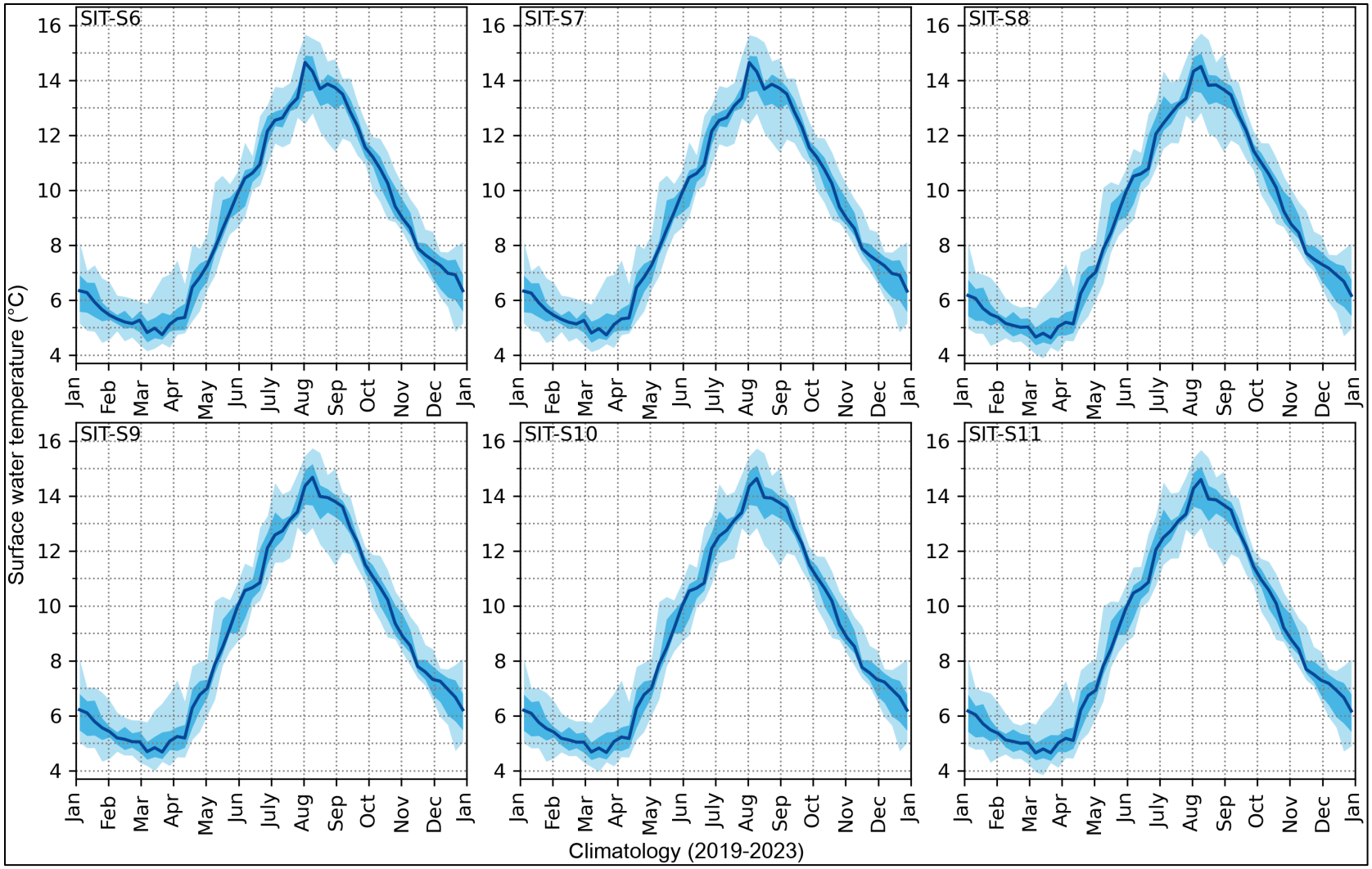


Figure 3.158. Sea surface temperatures for a subset of options from the Sitka Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

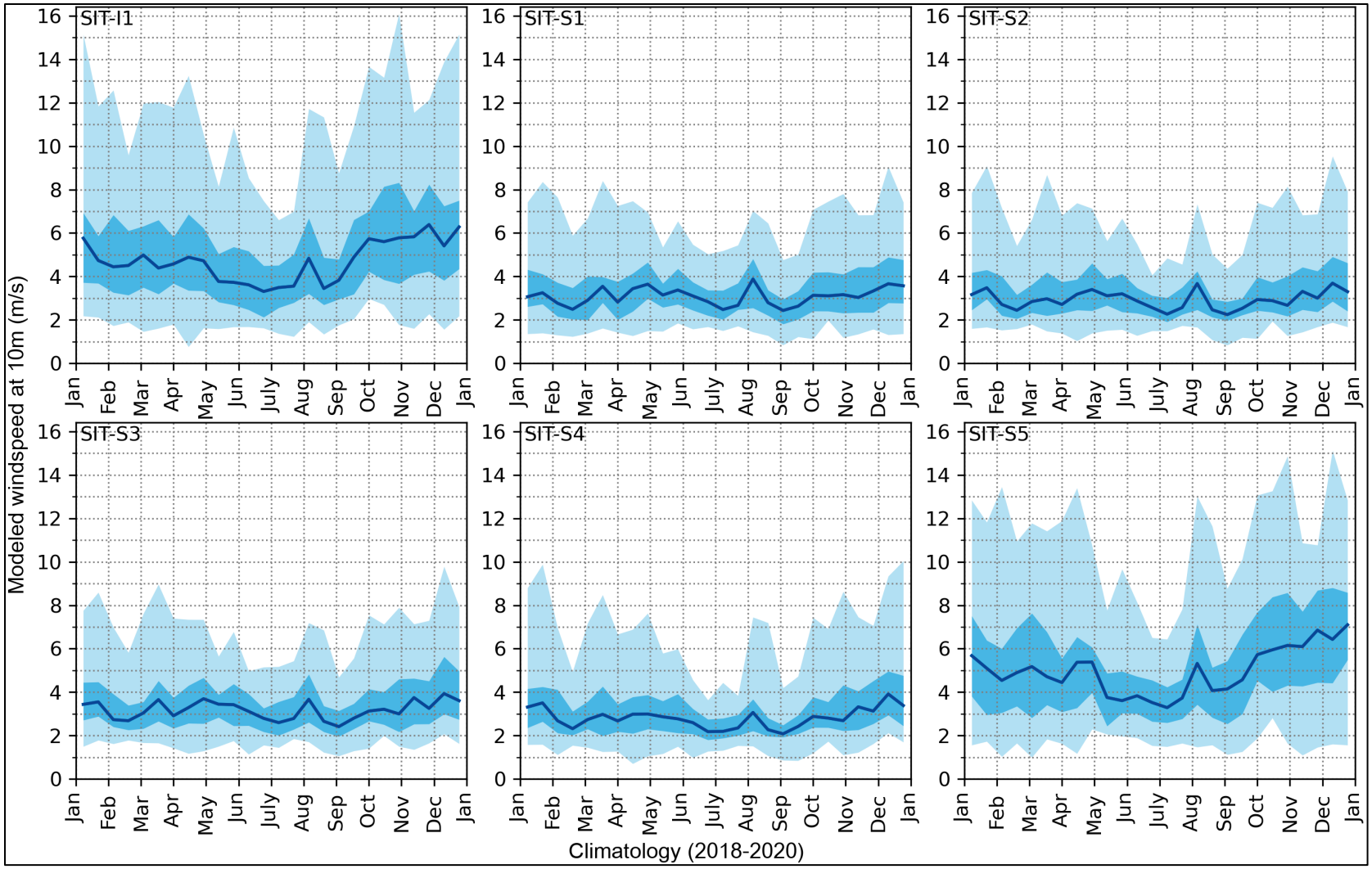


Figure 3.159. Wind speed at 10-m altitude for a subset of options from the Sitka Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

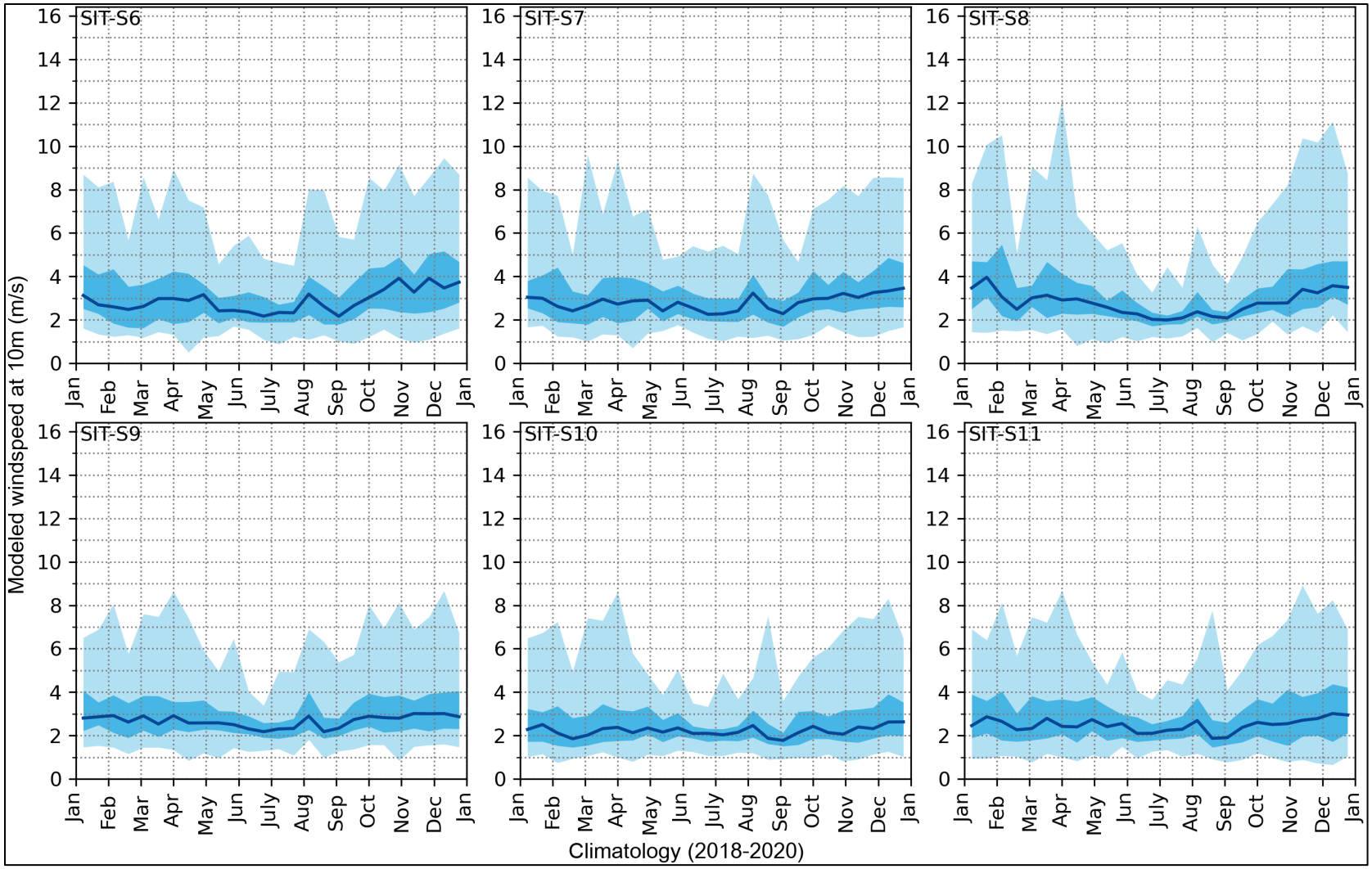


Figure 3.160. Wind speed at 10-m altitude for a subset of options from the Sitka Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

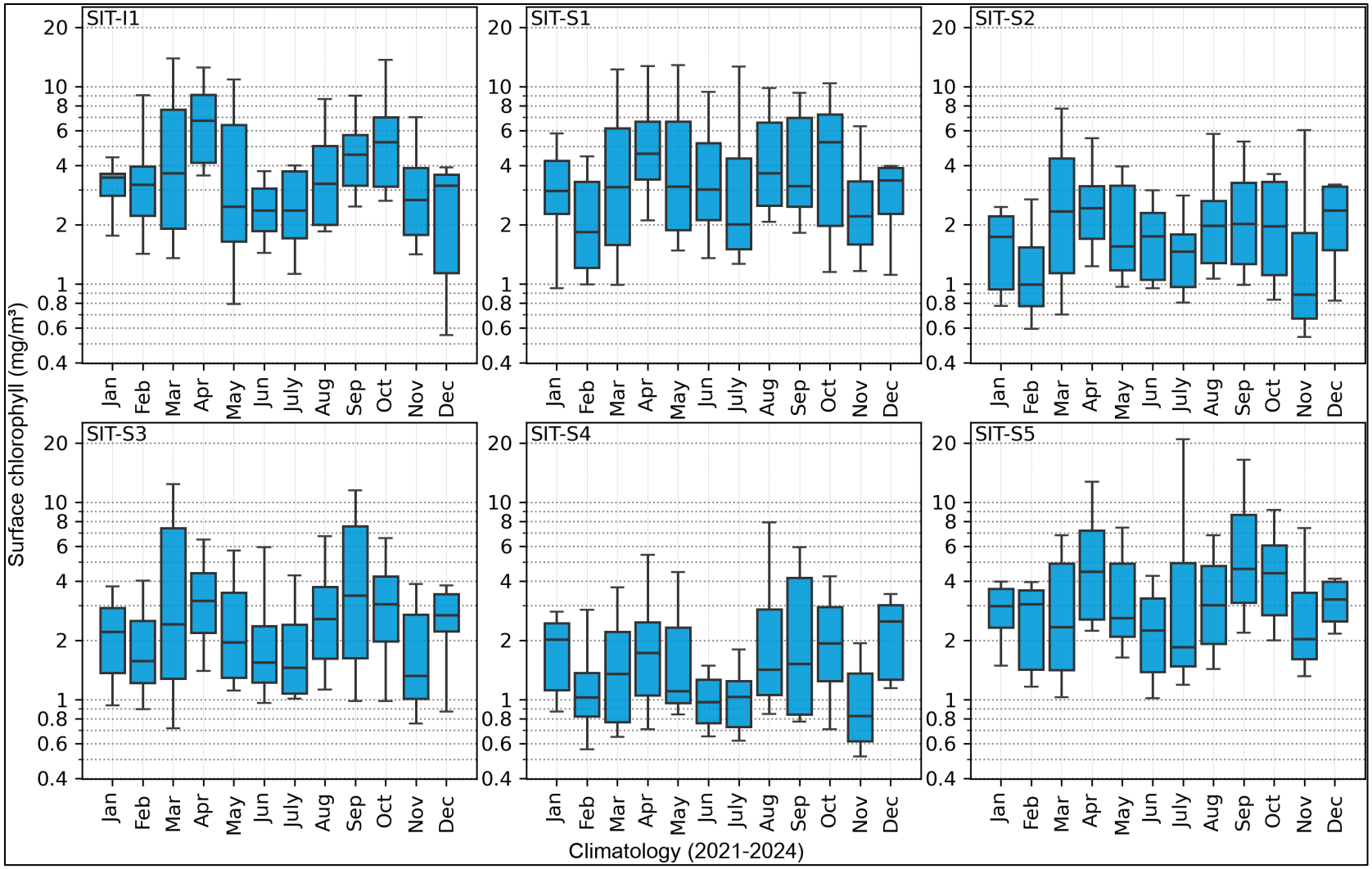


Figure 3.161. Monthly climatological surface chlorophyll *a* for a subset of options from the Sitka Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

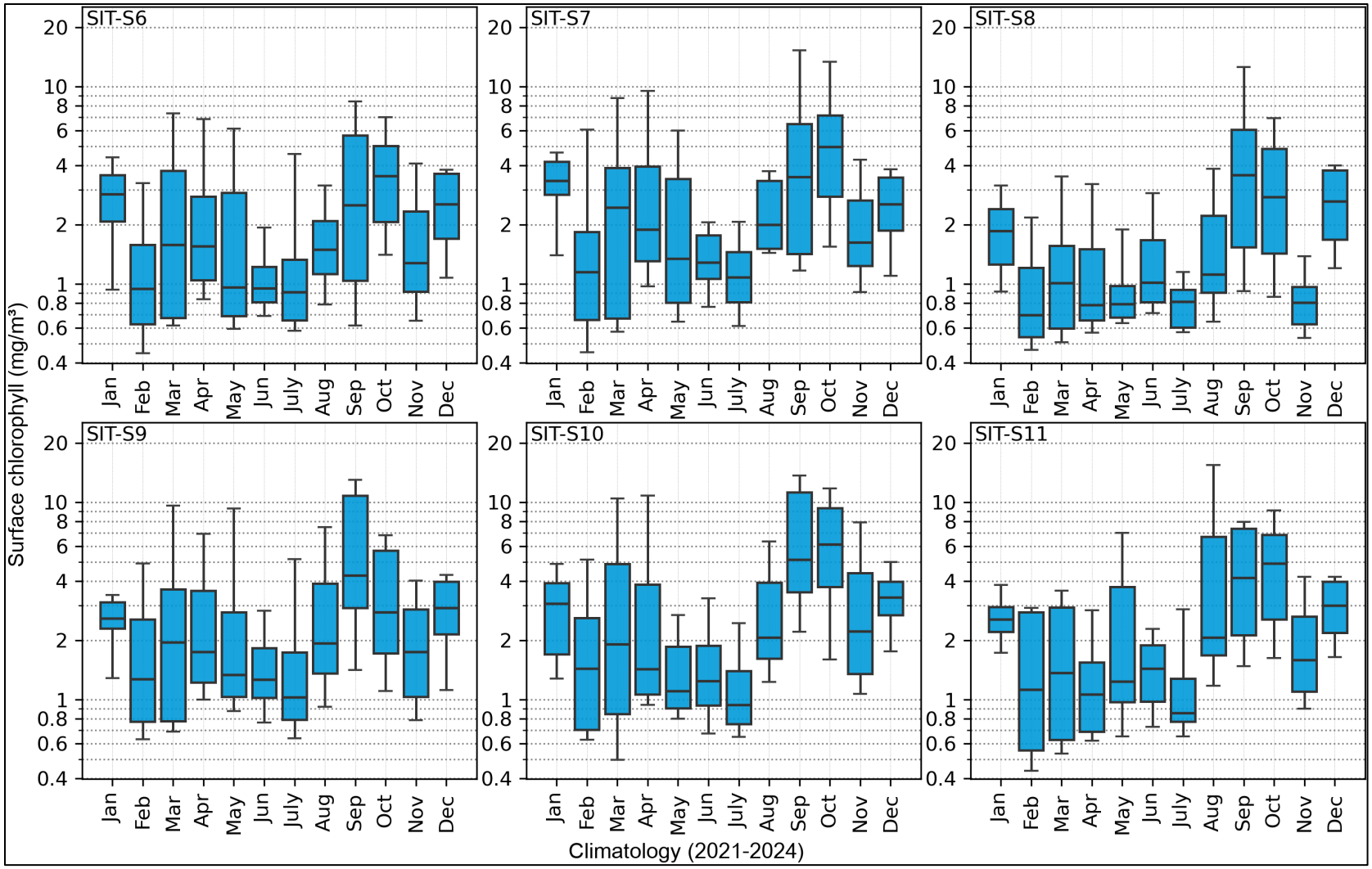


Figure 3.162. Monthly climatological surface chlorophyll *a* for a subset of options from the Sitka Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

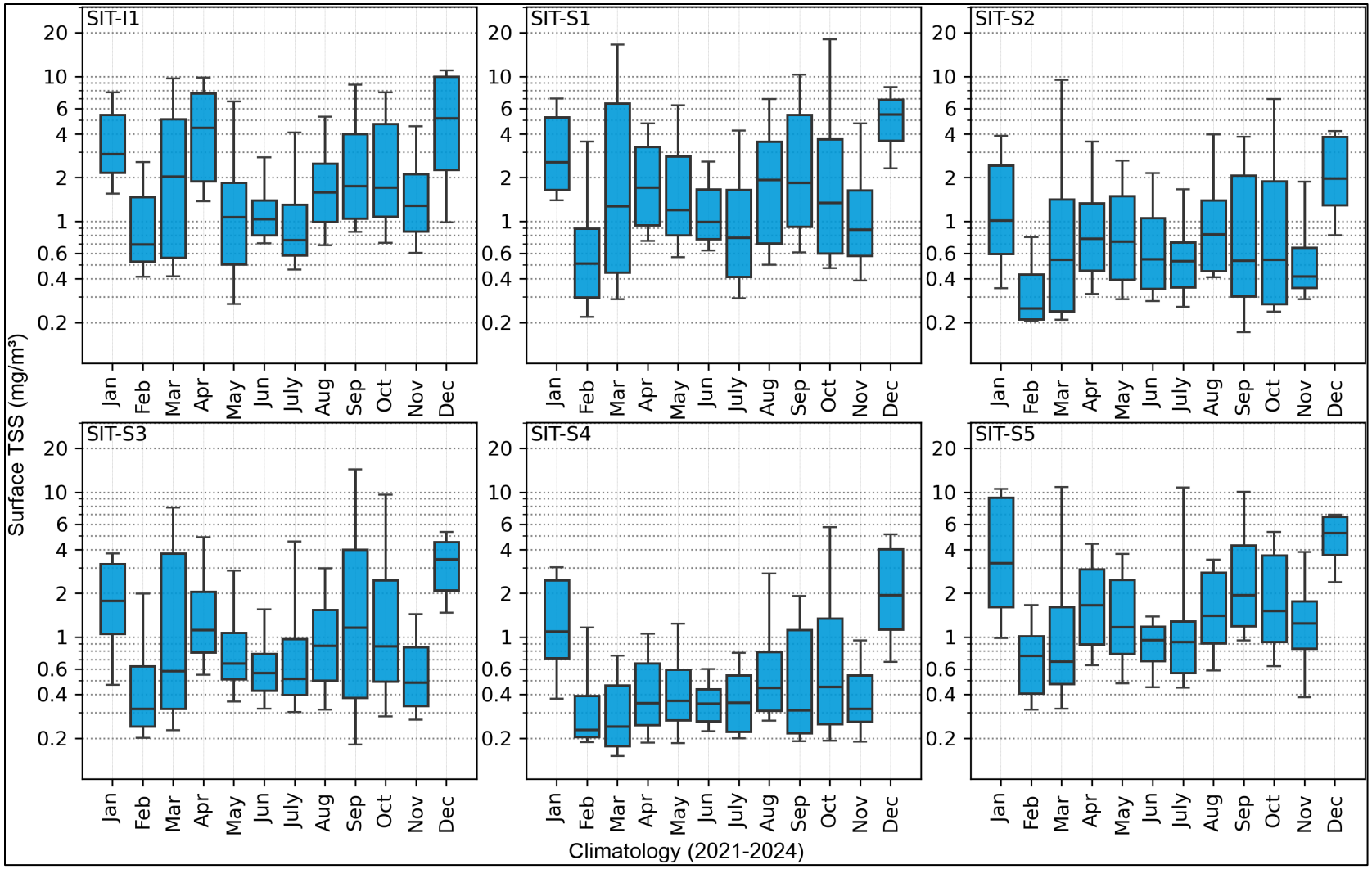


Figure 3.163. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Sitka Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

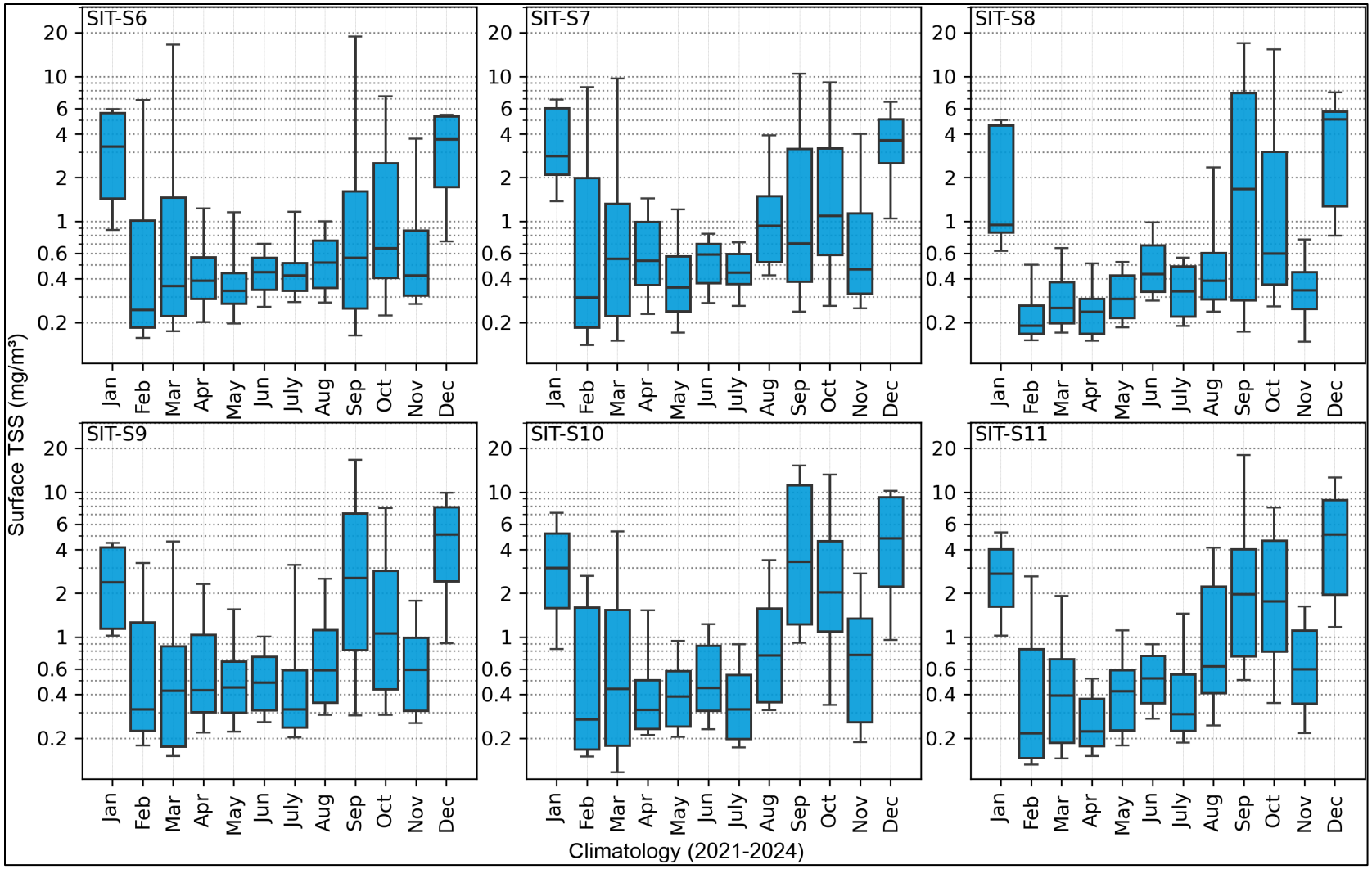


Figure 3.164. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Sitka Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

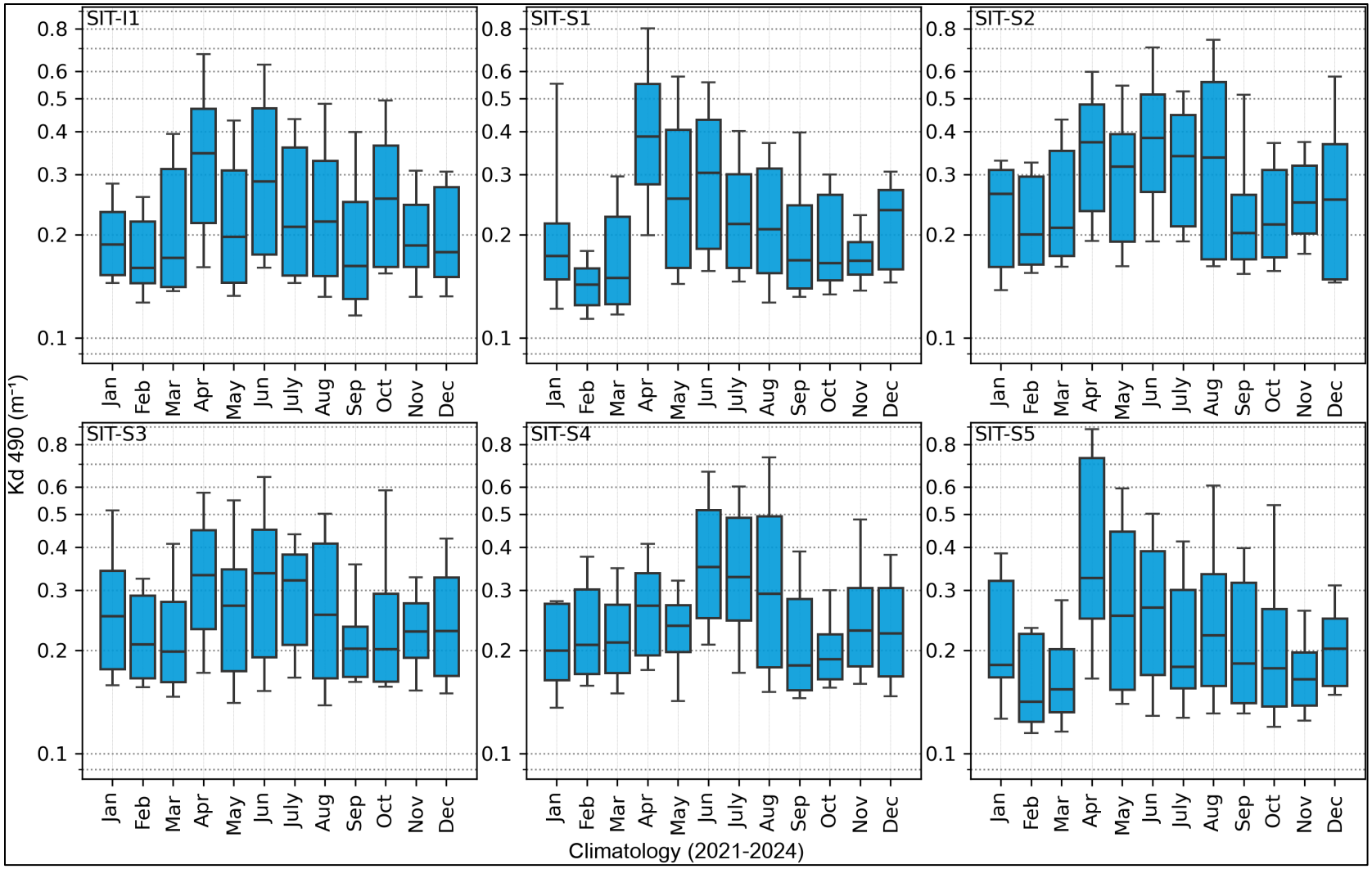


Figure 3.165. Monthly climatological light attenuation, Kd(490), for a subset of options from the Sitka Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

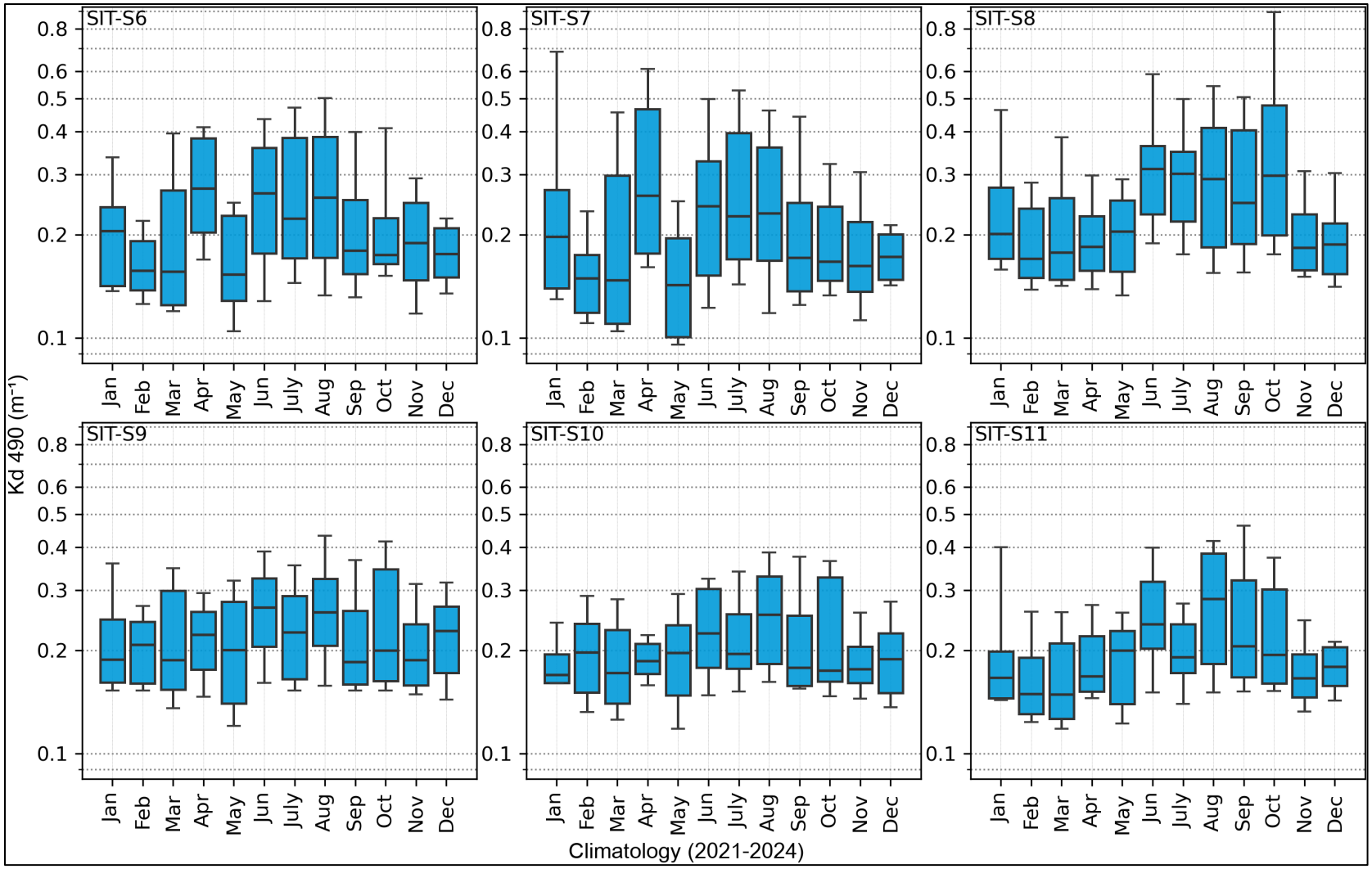


Figure 3.166. Monthly climatological light attenuation, Kd(490), for a subset of options from the Sitka Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

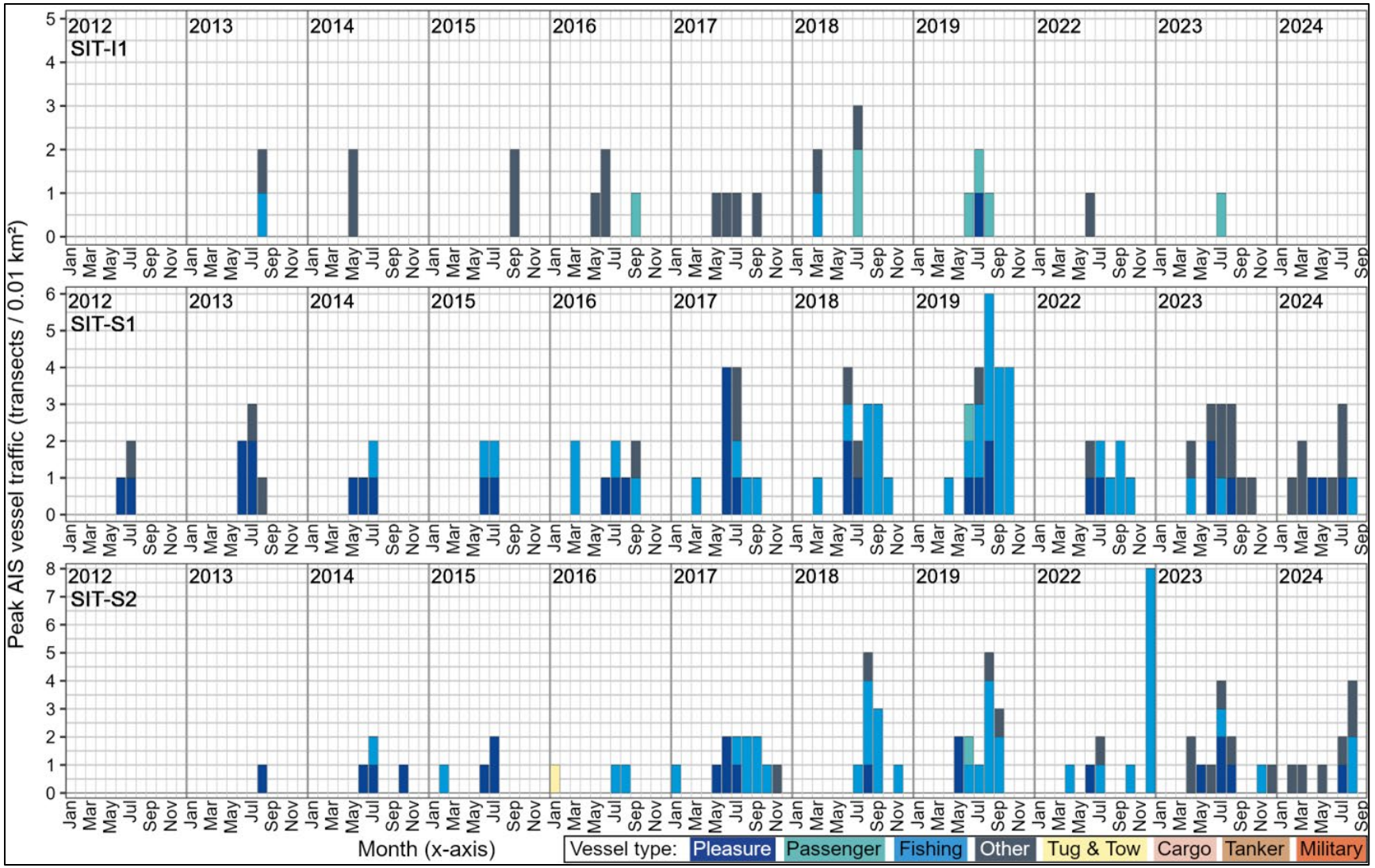


Figure 3.167. Monthly peak vessel traffic activity within options from a subset of the Sitka Study Area by vessel type for years 2012-2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

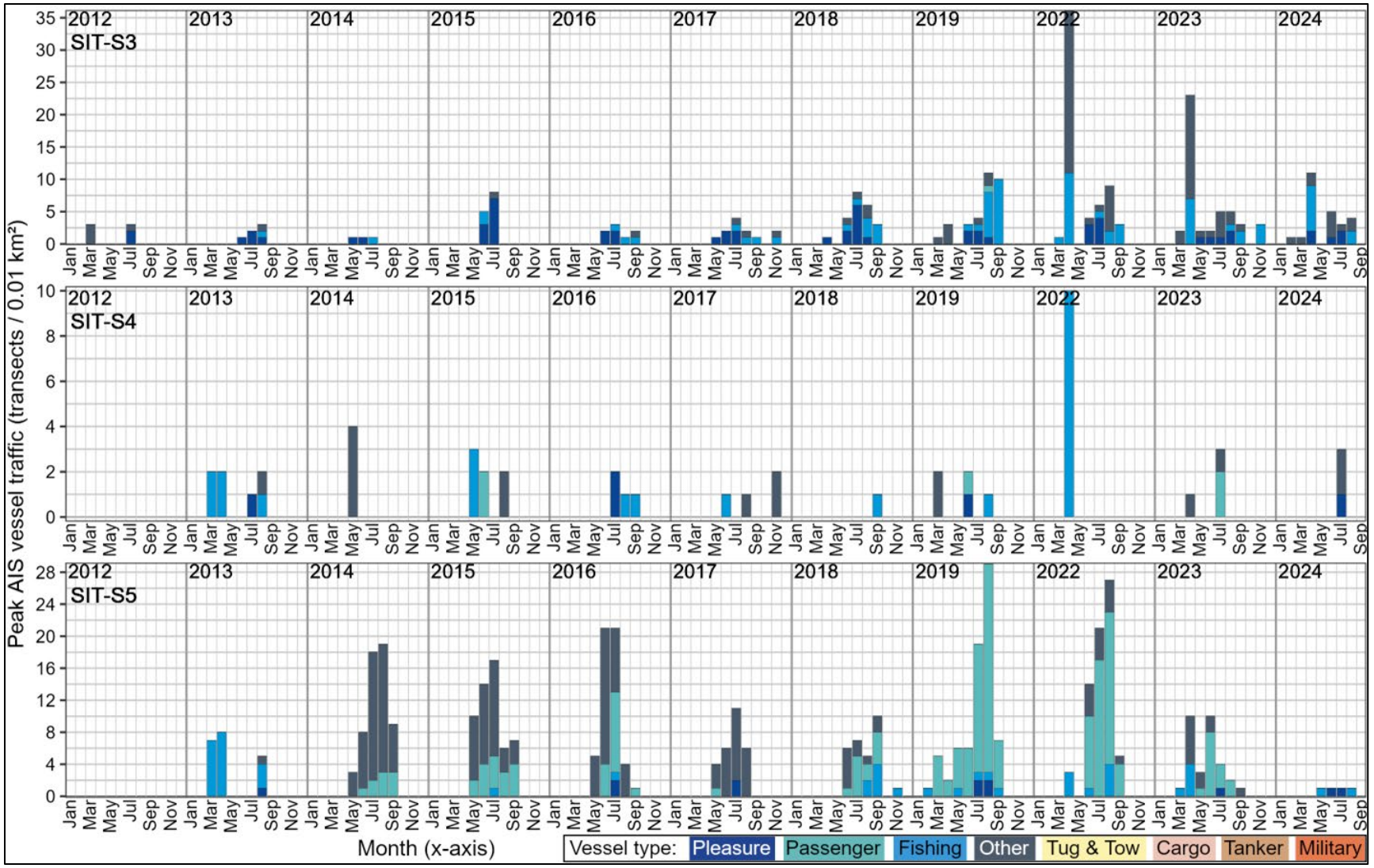


Figure 3.168. Monthly peak vessel traffic activity within options from a subset of the Sitka Study Area by vessel type for years 2012-2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

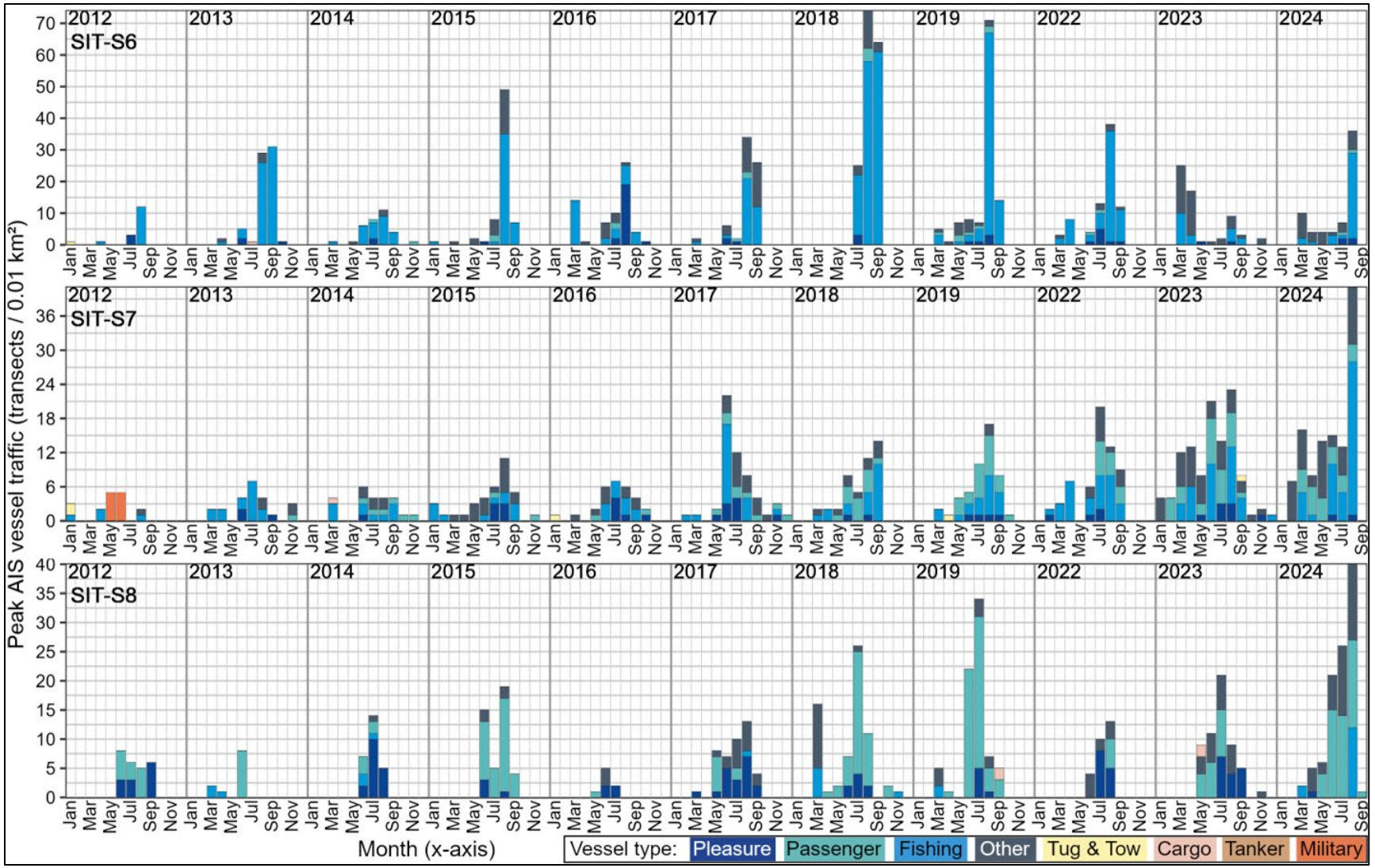


Figure 3.169. Monthly peak vessel traffic activity within options from a subset of the Sitka Study Area by vessel type for years 2012-2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

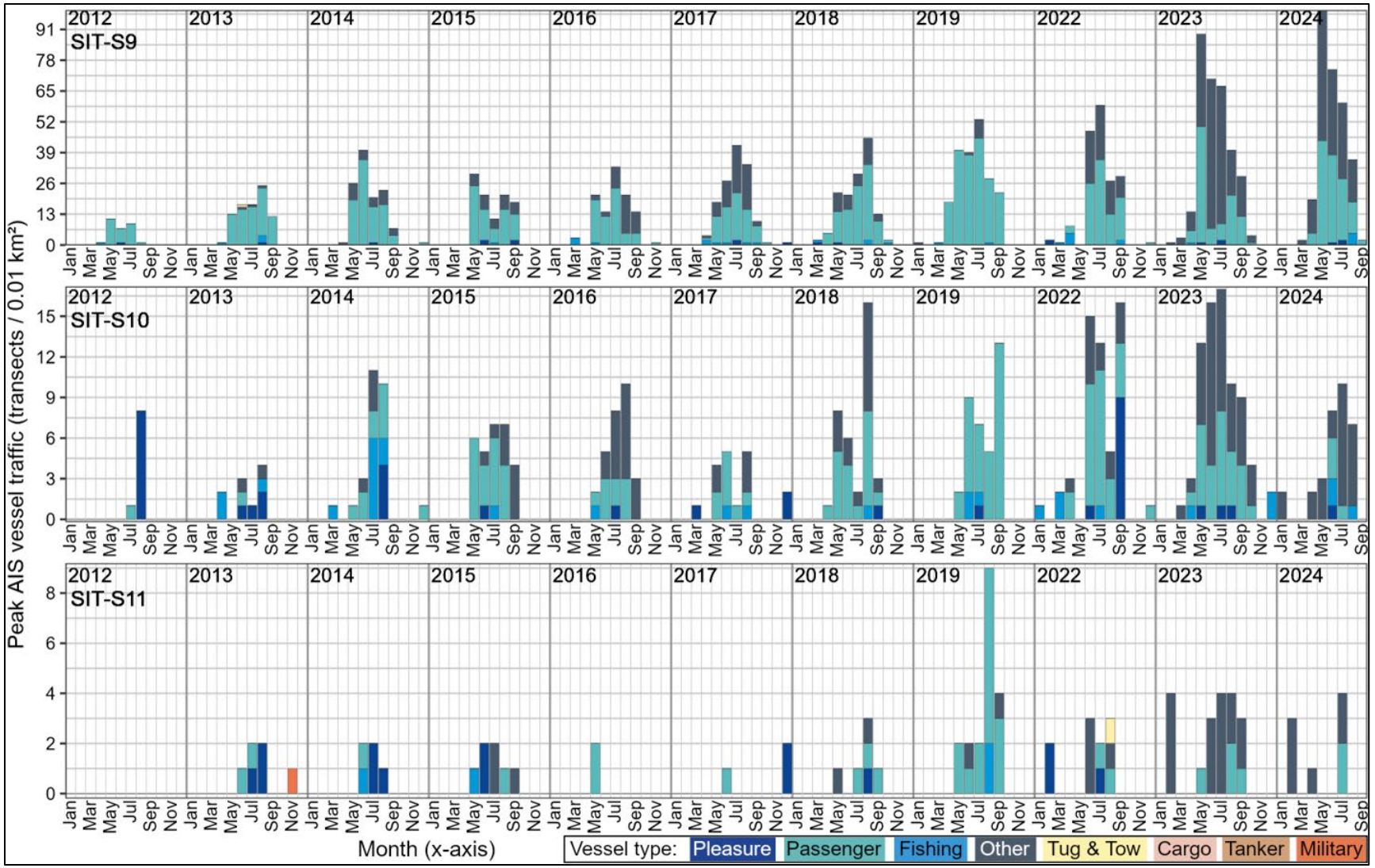


Figure 3.170. Monthly peak vessel traffic activity within options from a subset of the Sitka Study Area by vessel type for years 2012-2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

SIT-I1

AOA option SIT-I1 is a 110-ac intertidal site within the North extent of the Sitka Study Area, located 14 km (7.8 nm) from Sitka (centroid: 57.0778 N, 135.5909 W). The site is located within subunit TRMZ of the Northern Southeast area plan. The site ranges in depth at MLLW from -5.7 m (-19 ft) to 7.4 m (24 ft) with an average depth of 1.3 m (4.3 ft). At MHW the depth ranges from -1.8 m (-5.9 ft) to 11 m (37 ft) with an average depth of 5.2 m (17 ft). SIT-I1 has an average slope of 2.4° and maximum slope of 11°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'platform with gravel beach wide', 'platform with gravel and sand beach wide', 'cliff with sand beach', and classifies the biological wave exposure as semi-exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.9°C, a minimum daily average of 5.5°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-I1 averaged 5.1 m/s, with a minimum of 0.76 m/s and a maximum of 16 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (4.0 mg/m³) and lowest in May (1.9 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in April (5.3 mg/m³) and lowest in June (1.3 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in April (0.53 m^{-1}) and lowest in February (0.21 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 11341 and the groundfish (group code G) statistical unit 355705. SIT-I1 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at three total transects (July 2018). The primary vessel types observed are other, passenger, and fishing. Overall levels of AIS activity have remained relatively constant over time. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

SIT-I1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.97 km), deep-sea coral observations (3.1 km), humpback whale high use areas (0 km), gray whale feeding BIA (0.78 km), humpback whale feeding BIA (0.78 km), and gray whale migratory route BIA (0.78 km). SIT-I1 overlaps the St. Lazaria Colony IBA and the Sitka Sound Marine IBA.

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, vegetation, and wood. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S1

AOA option SIT-S1 is a 230-ac subtidal site within the South extent of the Sitka Study Area, located 36 km (19 nm) from Sitka (centroid: 56.7541 N, 135.3101 W). The site is located within subunit GU of the Northern Southeast area plan. The site ranges in depth at

MLLW from -3.9 m (-13 ft) to 68 m (220 ft) with an average depth of 25 m (81 ft). At MHW the depth ranges from 0.022 m (0.073 ft) to 72 m (240 ft) with an average depth of 29 m (94 ft). SIT-S1 has an average slope of 8.3° and maximum slope of 20°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected, semi-exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.8°C, a minimum daily average of 5.6°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S1 averaged 3.3 m/s, with a minimum of 0.84 m/s and a maximum of 9.1 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in August (6.0 mg/m^3) and lowest in November (2.0 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in September (3.9 mg/m^3) and lowest in November (1.0 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in April (0.93 m^{-1}) and lowest in February (0.13 m^{-1}).

Industry and National Security Considerations

SIT-S1 is within 5 km of at least one documented wreck and obstruction (3.5 km). The site is within ADFG salmon (group code G) statistical unit 11331 and the groundfish (group code G) statistical unit 355633. SIT-S1 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at six total transects (August 2019). The primary vessel types observed are fishing, pleasure, and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

SIT-S1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (3.6 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (2.7 km), gray whale feeding BIA (0 km), gray whale migratory route BIA (0 km), and seabird colony locations (2.4 km). SIT-S1 is in proximity to a seabird colony on the islets east of Rachek Island, a sizeable seabird colony with species prone to nest failure resulting from disturbance.

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, marine invertebrates, vegetation, and wood. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S2

AOA option SIT-S2 is a 330-ac subtidal site within the South extent of the Sitka Study Area, located 38 km (20 nm) from Sitka (centroid: 56.7551 N, 135.2582 W). The site is located within subunits GU, BT-041 of the Baranof Island Area unit in the Northern Southeast area plan. The site ranges in depth at MLLW from 1.1 m (3.6 ft) to 50 m (160 ft) with an average depth of 29 m (94 ft). At MHW the depth ranges from 5.0 m (17 ft) to 54 m (180 ft) with an average depth of 33 m (110 ft). SIT-S2 has an average slope of 4.9° and maximum slope of 17°. The Alaska ShoreZone mapping dataset

categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected, semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.8°C, a minimum daily average of 5.5°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S2 averaged 3.2 m/s, with a minimum of 0.84 m/s and a maximum of 9.5 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in April (2.2 mg/m³) and lowest in February (1.1 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in March (2.2 mg/m³) and lowest in February (0.64 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in April (0.58 m^{-1}) and lowest in March (0.27 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 11331 and the groundfish (group code G) statistical unit 355633. SIT-S2 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at eight total transects (December 2022). The primary vessel types observed are fishing, pleasure, and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

SIT-S2 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.39 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (4.1 km), gray whale feeding BIA (0 km), and gray whale migratory route BIA (0 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, marine invertebrates, and wood. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S3

AOA option SIT-S3 is a 370-ac subtidal site within the South extent of the Sitka Study Area, located 29 km (16 nm) from Sitka (centroid: 56.8168 N, 135.3395 W). The site is located within subunits GU, BT-030 of the Baranof Island Area unit in the Northern Southeast area plan. The site ranges in depth at MLLW from -0.18 m (-0.60 ft) to 39 m (130 ft) with an average depth of 18 m (59 ft). At MHW the depth ranges from 3.7 m (12 ft) to 43 m (140 ft) with an average depth of 22 m (72 ft). SIT-S3 has an average slope of 4.9° and maximum slope of 14°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected, protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.8°C, a minimum daily average of 5.5°C, and a maximum daily average of 13°C between 2019 and

2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S3 averaged 3.4 m/s, with a minimum of 1.1 m/s and a maximum of 9.8 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in April (2.4 mg/m³) and lowest in November (0.89 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (3.1 mg/m³) and lowest in June (0.67 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.57 m^{-1}) and lowest in September (0.26 m^{-1}).

Industry and National Security Considerations

SIT-S3 is within 5 km of at least one documented wreck and obstruction (0.60 km). The site is within ADFG salmon (group code G) statistical unit 11331 and the groundfish (group code G) statistical unit 355633. SIT-S3 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 36 total transects (April 2022). The primary vessel types observed are other, fishing, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

SIT-S3 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (1.0 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (1.9 km), gray whale feeding BIA (0 km), humpback whale feeding BIA (2.6 km), and gray whale migratory route BIA (0 km).

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of SIT-S3. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, non-salmon fish, large land mammals, marine invertebrates, marine mammals, salmon, vegetation, and wood. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S4

AOA option SIT-S4 is an 83-ac subtidal site within the South extent of the Sitka Study Area, located 20 km (11 nm) from Sitka (centroid: 56.8899 N, 135.3197 W). The site is located within subunit TRMZ of the Northern Southeast area plan. The site ranges in depth at MLLW from -13 m (-43 ft) to 49 m (160 ft) with an average depth of 33 m (110 ft). At MHW the depth ranges from -9.3 m (-30 ft) to 53 m (180 ft) with an average depth of 37 m (120 ft). SIT-S4 has an average slope of 9.1° and maximum slope of 36°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.8°C, a minimum daily average of 5.5°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S4

averaged 3.1 m/s, with a minimum of 0.70 m/s and a maximum of 10 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (1.5 mg/m³) and lowest in November (0.59 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in August (1.5 mg/m³) and lowest in February (0.32 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.91 m^{-1}) and lowest in October (0.20 m^{-1}).

Industry and National Security Considerations

SIT-S4 is within 5 km of at least one documented location from each of the following: USFS mooring buoy (2.6 km) and wreck and obstruction (2.7 km). The site is within ADFG salmon (group code G) statistical unit 11341 and the groundfish (group code G) statistical unit 355635. SIT-S4 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 10 total transects (April 2022). The primary vessel types observed are fishing, other, passenger, and pleasure. AIS activity over the most recent five years has increased by roughly 12% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

SIT-S4 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (1.1 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (3.9 km), humpback whale high use areas (0 km), gray whale feeding BIA (2.2 km), humpback whale feeding BIA (2.2 km), and gray whale migratory route BIA (2.2 km). SIT-S4 overlaps the Sitka Sound Marine IB, which provides foraging habitat for high concentrations of marine birds.

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of SIT-S4. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, marine invertebrates, marine mammals, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S5

AOA option SIT-S5 is a 90-ac subtidal site within the South extent of the Sitka Study Area, located 14 km (7.4 nm) from Sitka (centroid: 56.9357 N, 135.4287 W). The site is located within subunit Sitka TRMZ of the Northern Southeast area plan. The site ranges in depth at MLLW from -3.8 m (-12 ft) to 30 m (100 ft) with an average depth of 13 m (42 ft). At MHW the depth ranges from 0.14 m (0.46 ft) to 34 m (110 ft) with an average depth of 17 m (55 ft). SIT-S5 has an average slope of 3.5° and maximum slope of 11°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (11 m away) as semi-protected, semi-exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.9°C, a minimum daily average of 5.5°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S5 averaged 5.2 m/s, with a minimum of 0.99 m/s and a maximum of 15 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (7.2 mg/m³) and lowest in February (1.6 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (6.8 mg/m³) and lowest in February (0.72 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in April (0.68 m^{-1}) and lowest in February (0.19 m^{-1}).

Industry and National Security Considerations

SIT-S5 is within 5 km of at least one documented wreck and obstruction (3.1 km). The site is within ADFG salmon (group code G) statistical unit 11341 and the groundfish (group code G) statistical unit 355635. SIT-S5 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 29 total transects (August 2019). The primary vessel types observed are passenger, other, and fishing. AIS activity over the most recent five years has increased by roughly 26% compared to the previous five years. AIS activity exhibits a regular pattern from year to year, concentrated to a few months, usually peaking around June.

Natural Resource Considerations

SIT-S5 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (4.2 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (0 km), humpback whale high use areas (0 km), gray whale feeding BIA (0 km), humpback whale feeding BIA (0 km), and gray whale migratory route BIA (0 km). SIT-S5 overlaps the Sitka Sound Marine IB, which provides foraging habitat for high concentrations of marine birds.

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of SIT-S5. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, marine invertebrates, marine mammals, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S6

AOA option SIT-S6 is a 57-ac subtidal site within the North extent of the Sitka Study Area, located 6.0 km (3.2 nm) from Sitka (centroid: 57.0075 N, 135.2936 W). The site is located within subunit Sitka TRMZ of the Northern Southeast area plan. The site ranges in depth at MLLW from -0.14 m (-0.46 ft) to 33 m (110 ft) with an average depth of 19 m (61 ft). At MHW the depth ranges from 3.8 m (12 ft) to 37 m (120 ft) with an average depth of 23 m (74 ft). SIT-S6 has an average slope of 4.7° and maximum slope of 9.9°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected, protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.8°C, a minimum daily average of 5.4°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S6 averaged 3.2 m/s, with a minimum of 0.50 m/s and a maximum of 9.4 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (1.9 mg/m³) and lowest in June (0.85 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (1.2 mg/m³) and lowest in May (0.34 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.47 m^{-1}) and lowest in May (0.23 m^{-1}).

Industry and National Security Considerations

SIT-S6 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (2.7 km), Navy undersea cable (exact distance undisclosed), USFS marine access facility (4.6 km), USFS cabin rental (4.5 km), hatchery release site (4.7 km), wastewater outfall pipe (4.6 km), and wreck and obstruction (0.19 km). The site is within ADFG salmon (group code G) statistical unit 11341 and the groundfish (group code G) statistical unit 355635. SIT-S6 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 74 total transects (August 2018). The primary vessel types observed are fishing, other, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a regular pattern from year to year, concentrated to a few months, usually peaking around July.

Natural Resource Considerations

SIT-S6 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (3.9 km), historically mapped eelgrass sites (0 km), humpback whale high use areas (0 km), gray whale feeding BIA (3.4 km), humpback whale feeding BIA (3.4 km), and gray whale migratory route BIA (3.4 km).

Cultural Resource Considerations

There are three Alaska Heritage Resources Survey sites within approximately 5 km of SIT-S6. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, small land mammals, vegetation, and wood. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S7

AOA option SIT-S7 is a 98-ac subtidal site within the North extent of the Sitka Study Area, located 5.3 km (2.8 nm) from Sitka (centroid: 57.0167 N, 135.2867 W). The site is located within subunit Sitka TRMZ of the Northern Southeast area plan. The site ranges in depth at MLLW from 7.7 m (25 ft) to 68 m (220 ft) with an average depth of 45 m (150 ft). At MHW the depth ranges from 12 m (38 ft) to 72 m (230 ft) with an average depth of 49 m (160 ft). SIT-S7 has an average slope of 8.1° and maximum slope of 23°. The Alaska ShoreZone mapping dataset categorizes the biological

wave exposure of the shore nearest to this site (0 m away) as semi-exposed, semi-protected, protected.



Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.8°C, a minimum daily average of 5.4°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S7 averaged 3.1 m/s, with a minimum of 0.71 m/s and a maximum of 9.6 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (4.9 mg/m³) and lowest in June (1.2 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in October (2.2 mg/m³) and lowest in June (0.49 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in April (0.48 m^{-1}) and lowest in May (0.15 m^{-1}).

Industry and National Security Considerations

SIT-S7 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (2.3 km), Navy undersea cable (exact distance undisclosed), USFS marine access facility (3.7 km), hatchery release site (3.8 km), wastewater outfall pipe (4.0 km), and wreck and obstruction (1.6 km). The site is within ADFG salmon (group code G) statistical unit 11341 and the groundfish (group code G) statistical unit 355705. SIT-S7 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 41 total transects (August 2024). The primary vessel types observed are fishing, other, passenger, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

SIT-S7 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (2.4 km), historically mapped eelgrass sites (0 km), humpback whale high use areas (0 km), gray whale feeding BIA (3.6 km), humpback whale feeding BIA (3.6 km), and gray whale migratory route BIA (3.6 km).

Cultural Resource Considerations

There are three Alaska Heritage Resources Survey sites within approximately 5 km of SIT-S7. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, small land mammals, vegetation, and wood. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S8

AOA option SIT-S8 is a 92-ac subtidal site within the North extent of the Sitka Study Area, located 16 km (8.8 nm) from Sitka (centroid: 57.1821 N, 135.3423 W). The site is located within subunit Sitka TRMZ of the Northern Southeast area plan. The site ranges in depth at MLLW from -7.1 m (-23 ft) to 61 m (200 ft) with an average depth of 28 m (92 ft). At MHW the depth ranges from -3.2 m (-11 ft) to 65 m (210 ft) with an average depth of 32 m (100 ft). SIT-S8 has an average slope of 8.8° and maximum slope of 28°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected, very protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.7°C, a minimum daily average of 5.2°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S8 averaged 3.1 m/s, with a minimum of 0.81 m/s and a maximum of 12 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in September (1.8 mg/m^3) and lowest in November (0.44 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in September (2.8 mg/m^3) and lowest in February (0.38 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.62 m^{-1}) and lowest in March (0.24 m^{-1}).

Industry and National Security Considerations

SIT-S8 is within 5 km of at least one documented wreck and obstruction (0.18 km). The site is within ADFG salmon (group code G) statistical unit 11344 and the groundfish (group code G) statistical unit 355706. SIT-S8 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 40 total transects (August 2024). The primary vessel types observed are passenger, other, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

SIT-S8 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (1.8 km), historically mapped eelgrass sites (0 km), humpback whale high use areas (4.0 km), gray whale feeding BIA (1.8 km), humpback whale feeding BIA (2.0 km), and gray whale migratory route BIA (1.2 km).

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of SIT-S8. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S9

AOA option SIT-S9 is a 140-ac subtidal site within the North extent of the Sitka Study Area, located 16 km (8.6 nm) from Sitka (centroid: 57.1881 N, 135.4273 W). The site is located within subunit TRMZ of the Northern Southeast area plan. The site ranges in depth at MLLW from -28 m (-93 ft) to 76 m (250 ft) with an average depth of 34 m (110 ft). At MHW the depth ranges from -24 m (-80 ft) to 80 m (260 ft) with an average depth of 38 m (120 ft). SIT-S9 has an average slope of 15° and maximum slope of 41°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected, very protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.7°C, a minimum daily average of 5.3°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S9 averaged 2.9 m/s, with a minimum of 0.84 m/s and a maximum of 8.7 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in September (3.1 mg/m^3) and lowest in July (0.94 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in September (4.5 mg/m^3) and lowest in July (0.27 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in October (0.47 m^{-1}) and lowest in March (0.25 m^{-1}).

Industry and National Security Considerations

SIT-S9 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (2.9 km), Navy undersea cable (exact distance undisclosed), log transfer facility (3.7 km), ferry route (0.98 km), and wreck and obstruction (2.6 km). The site is within ADFG salmon (group code G) statistical unit 11343 and the groundfish (group code G) statistical unit 355706. SIT-S9 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 99 total transects (May 2024). The primary vessel types observed are passenger and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

SIT-S9 is within 5 km of at least one documented location from each of the following natural resources: historically mapped eelgrass sites (1.0 km), humpback whale high use areas (0.64 km), gray whale feeding BIA (0 km), humpback whale feeding BIA (0 km), and gray whale migratory route BIA (0 km).

Cultural Resource Considerations

There are five Alaska Heritage Resources Survey sites within approximately 5 km of SIT-S9. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, vegetation, and wood. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S10

AOA option SIT-S10 is a 57-ac subtidal site within the North extent of the Sitka Study Area, located 17 km (9.1 nm) from Sitka (centroid: 57.1898 N, 135.4032 W). The site is located within subunit B-07, TRMZ of the Baranof Island Area unit in the Northern Southeast area plan. Text descriptions for the subunit include reference to community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -11 m (-35 ft) to 91 m (300 ft) with an average depth of 43 m (140 ft). At MHW the depth ranges from -6.7 m (-22 ft) to 95 m (310 ft) with an average depth of 47 m (150 ft). SIT-S10 has an average slope of 13° and maximum slope of 30°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.7°C, a minimum daily average of 5.3°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S10 averaged 2.5 m/s, with a minimum of 0.74 m/s and a maximum of 8.6 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (4.8 mg/m³) and lowest in July (0.79 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (6.5 mg/m³) and lowest in July (0.27 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in October (0.35 m^{-1}) and lowest in March (0.18 m^{-1}).

Industry and National Security Considerations

SIT-S10 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (3.8 km), Navy undersea cable (exact distance undisclosed), log transfer facility (3.0 km), ferry route (2.5 km), and wreck and obstruction (1.4 km). The site is within ADFG salmon (group code G) statistical unit 11343 and the groundfish (group code G) statistical unit 355706. SIT-S10 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 17 total transects (July 2023). The primary vessel types observed are passenger, other, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the

previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

SIT-S10 is within 5 km of at least one documented location from each of the following natural resources: historically mapped eelgrass sites (0 km), humpback whale high use areas (1.5 km), gray whale feeding BIA (0 km), humpback whale feeding BIA (0 km), and gray whale migratory route BIA (0 km).

Cultural Resource Considerations

There are five Alaska Heritage Resources Survey sites within approximately 5 km of SIT-S10. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, vegetation, and wood. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

SIT-S11

AOA option SIT-S11 is a 75-ac subtidal site within the North extent of the Sitka Study Area, located 21 km (12 nm) from Sitka (centroid: 57.2309 N, 135.3955 W). The site is located within subunit TRMZ of the Northern Southeast area plan. The site ranges in depth at MLLW from -8.6 m (-28 ft) to 57 m (190 ft) with an average depth of 23 m (76 ft). At MHW the depth ranges from -4.7 m (-16 ft) to 61 m (200 ft) with an average depth of 27 m (89 ft). SIT-S11 has an average slope of 11° and maximum slope of 25°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (10 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.7°C, a minimum daily average of 5.2°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at SIT-S11 averaged 2.8 m/s, with a minimum of 0.65 m/s and a maximum of 8.9 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (3.6 mg/m³) and lowest in July (0.84 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (2.4 mg/m³) and lowest in February (0.27 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in August (0.35 m^{-1}) and lowest in February (0.17 m^{-1}).

Industry and National Security Considerations

SIT-S11 is within 5 km of at least one documented location from each of the following: log transfer facility (2.1 km), USFS marine access facility (2.1 km), and wreck and obstruction (2.0 km). The site is within ADFG salmon (group code G) statistical unit 11343 and the groundfish (group code G) statistical unit 355706. SIT-S11 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at nine total transects (August 2019). The primary vessel types observed are passenger, other, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

SIT-S11 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (2.3 km), historically mapped eelgrass sites (0 km), gray whale feeding BIA (2.5 km), humpback whale feeding BIA (2.5 km), and gray whale migratory route BIA (0 km).

Cultural Resource Considerations

There are 10 Alaska Heritage Resources Survey sites within approximately 5 km of SIT-S11. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, small land mammals, vegetation, wood. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Sitka Tribe of Alaska. Given this proximity, cultural resources could be present to an unknown extent.

Wrangell/Petersburg Study Area

The final AOA options within the combined Wrangell/Petersburg Study Area include seven subtidal sites totaling 2,500 ac and two intertidal sites spanning 189 ac (Figure 3.171). Options range from 58.3 ac to 495.6 ac and are distributed across the study area (Table 3.16; Figures 3.171–3.190). Several sites within the study area are located near, and may directly overlap with, ecologically sensitive resources. These include historically mapped eelgrass beds, high-use areas and feeding BIAs for humpback whales and both key and non-key harbor seal haulouts. Given the proximity to these resources, project planning should account for potential ecological impacts and may require coordination or consultation with appropriate resource agencies.



This study area overlaps with marine bird concentration areas and important habitats, including the Frederick Sound to Duncan Canal Coastal IBA, Stikine River Coastal IBA, Sumner Strait Marine IBA, and Lynn Canal-Frederick Sound Sea Duck Key Habitat Site. Some of the options (WRA-I1, WRA-S7) fall within the boundaries of one or more of these areas. Down-scoring herring spawning sites benefit sea ducks using the sea duck key habitat site.

Public comments related to the Wrangell/Petersburg draft AOA options included concerns about potential overlap with existing dive fisheries. A primary issue raised by dive fishery participants was the risk of diver air supply lines becoming entangled with aquaculture infrastructure, creating safety hazards and limiting access to common-use resources. SARDFA plays a central role in coordinating industry activities and represents divers, processors, and coastal communities within the Southeast study areas. To

minimize conflict and ensure equitable resource access, coordination with SARDFA and ADFG is recommended during the siting of aquaculture operations in areas with active dive fisheries.

Additional comments highlighted potential overlap between final AOA options WRA-I1 and sporting fishing and commercial crab fisheries, WRA-S5 due to conflict with gillnet fisheries, and WRA-S7 and commercial crab fisheries, recreational fishing, boat launches, and campsites. Comments were also made regarding draft AOA option WRA-S2 and sport fishing and hand troll drag fisheries. WRA-S2 was down-scored in the final model run and not retained as an AOA option. To minimize conflict and ensure equitable resource access, coordination with ADFG and the fishing communities is recommended during the siting of aquaculture operations in the remaining areas.

General comments focused on potential overlaps between AOA study areas and documented cultural resource sites. In response, the final model run incorporated additional down-scoring of AHRS data layers, resulting in reduced suitability and, ultimately, the removal of portions of, or entire, draft AOA options located within 500-m of AHRS-listed locations. Comments also noted potential impacts to subsistence harvest activities from aquaculture development, and characterization revealed overlap with birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, other mammals, and vegetation subsistence search and harvest areas. The degree of potential adverse effect to subsistence harvest activities is highly dependent on the specific harvest activity (e.g., intertidal gathering vs herring roe collection) and the nature of proposed aquaculture development (e.g., subtidal vs intertidal culture). All aquaculture projects will be subject to further review during the Alaska state leasing and permitting process. Early and ongoing coordination with coastal communities, nearby Alaska Native Villages, Alaska Native Corporations, and other Tribal Associations is strongly recommended to ensure access to common-use resources, cultural resource sites, and that traditional uses are not adversely impacted.

Below are additional characterizations of site-specific details regarding the geographic location and environmental conditions of AOA options within the Wrangell/Petersburg Study Area, as well as considerations regarding national security, natural resources, navigation and transportation, cultural resources, and various industries including aquaculture and fisheries. These are presented as tables containing location information for each option and proximity to these considerations (Table 3.16). Following these tables are maps that visualize the options along with data used within the suitability model (Figures 3.171–3.177). Next are plots summarizing available time series data to provide additional context on environmental conditions and observed vessel traffic within the options (Figures 3.178–3.190). Following these tables and figures are individual text descriptions for each option summarizing the characteristics observed. These tables, figures, and text summaries were created using many different spatial datasets curated to complement factors considered during the Alaska state aquatic farm lease application and review process, and to assist proponents in the identification of key user groups and resource agencies to engage with during the project design and application process. These data are unlikely to be exhaustive, and there may be additional considerations not captured in this characterization. These different presentation methods are meant not only to communicate site-specific characteristics in multiple ways but also to complement each other. They may also contain unique bits of information not found in the other parts of this characterization.

Table 3.16. Characterization summary for Wrangell-Petersburg Aquaculture Opportunity Area subtidal and intertidal options in the southern extent: WRA-S1, WRA-S2, WRA-S3, WRA-S4, WRA-S5; and the northern extent: WRA-I1, WRA-12, WRA-S6, WRA-S7. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km). SMA = Special Management Area.

	Southern extent					Northern extent			
	WRA-S1	**WRA-S2**	**WRA-S3**	**WRA-S4**	**WRA-S5**	**WRA-I1**	**WRA-I2**	**WRA-S6**	**WRA-S7**
General characteristics									
Center Coordinates (longitude, latitude)	−132.7890, 56.2450	−132.3450, 56.2451	−132.2320, 56.4012	−132.1900, 56.4039	−132.6770, 56.4479	−132.6250, 56.2450	−132.6980, 56.2451	−132.7630, 56.5016	−132.6510, 56.5456
Size (ac)	495.6	234.2	167.4	436.1	401.6	58.3	130.6	383.9	381.4
Distance to Coastal Populated Places (nm)	20.3	14.9	7.8	7.3	9.1	12.2	16.5	11.6	8.7
Depth (m) (min, max, mean), Average Slope (degrees)	−3.51, 82.37, 36.71, 4.9	27.18, 63.83, 45.36, 2.52	-9.57, 80.25, 34.33, 11.18	−4.38, 93.14, 36.02, 13.03	2.06, 91.78, 39.21, 7.72	−12.34, 0.29, -2.93, 2.07	−30.51, 11.89, -4.11, 4.92	−3.86, 76.62, 25.06, 5.68	−3.47, 32.19, 17.98, 2.05
Alaska Area Plan Subunit	GU	GU	GU	GU, WT37	GU	Dry straits tideland SMA	GU	P-27	GU
Commercial Statistical Areas – Groundfish	325602	325603	325604	325604	325601	325631	325631	325601	325601
Commercial Statistical Areas – Salmon, Shellfish	10630	10730	10745	10745	10840	10841	10850	10830	10840
Constraints									
Anadromous Waters Catalog – Streams (91.5-m Setback)	0.23	0.23	0.31	3.01	0.19	0.15	0.26	0.425	0.16
Deep-Sea Coral and Sponge Occurrences (1,000-m Setback)	-	-	-	-	-	-	-	-	-

	Southern extent					Northern extent			
	WRA-S1	WRA-S2	WRA-S3	WRA-S4	WRA-S5	WRA-I1	WRA-I2	WRA-S6	WRA-S7
Ferry Routes (500-m Setback)	2.83	-	-	-	0.71	-	-	1.74	-
Key Harbor Seal Haulout Locations (500-m Setback)	4	2.17	-	-	-	3.69	2.63	-	-
Navy Undersea Cables within 5 km (500-m Setback)	Yes	-	-	-	Yes	Yes	Yes	Yes	Yes
Pipelines (500-m Setback)	-	-	-	-	-	-	-	-	-
Submarine Cable Areas (200-m Setback)	2.5	-	-	-	1.4	0.29	0.34	2.34	0.27
Wastewater Outfalls (500-m Setback)	-	-	-	-	-	-	-	-	-
Wrecks and Obstructions (152.5-m Setback)	1.55	-	4.64	1.93	3.7	3.12	2.66	-	-
National Security									
Munitions and Explosives of Concern	-	-	-	-	-	-	-	-	-
Natural Resources									
Cetacean Biologically Important Areas – Feeding	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (0.46)	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (0.3)	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (0.8)
Cetacean Biologically Important Areas – Migratory Route	-	-	-	-	-	-	-	-	-
Humpback Whale High-Use Areas	0	0	-	-	0	0	0	2.41	-
NMFS ESA Critical Habitat	-	-	-	-	-	-	-	-	-

	Southern extent					Northern extent			
	WRA-S1	WRA-S2	WRA-S3	WRA-S4	WRA-S5	WRA-I1	WRA-I2	WRA-S6	WRA-S7
Non-Key Harbor Seal Haulout Locations (500-m Setback)	-	-	2.07	0	-	-	-	0.05	-
North Pacific Seabird Data**	-	-	-	-	-	-	-	-	-
ShoreZone Coastal Mapping – Eelgrass Bioband	-	0.14	-	-	-	4.88	1.16	-	-
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	-	-	-	-	-	-	-	-	-
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-	-	-	-	-	-	-	-
Industry, Navigation, and Transportation									
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-	-	-	-	-	-	3.09	-
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	-	-	-	-	-	-	-	-	-
Permitted Log Transfer Facility (500-m Setback)	-	-	-	-	-	-	-	3.01	4.74
USFS Recreation Opportunities – Cabin Rentals	-	-	-	-	-	-	-	-	-

	Southern extent					Northern extent			
	WRA-S1	WRA-S2	WRA-S3	WRA-S4	WRA-S5	WRA-I1	WRA-I2	WRA-S6	WRA-S7
Cultural Resources									
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m setback)*	-	7	2	2	-	2	4	-	-
Alaska Area Plans (Community Harvest) overlap	-	-	-	-	-	-	-	-	-
Subsistence Search and Harvest Areas within 5 km	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, other mammals, salmon	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, other mammals, salmon	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, other mammals, salmon	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, other mammals, salmon, vegetation	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, other mammals, salmon, vegetation	birds and eggs, large land mammals, marine invert, marine mammals, non-salmon fish, other mammals, salmon, vegetation	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, other mammals, salmon, vegetation
Aquaculture and Fisheries									
Area Plans (Sport Fishing) overlap	-	-	-	-	-	-	-	-	-
Alaska DNR Shore Fishery Lease	-	-	-	-	-	-	-	-	-
Hatchery Release Sites	-	-	-	-	-	-	-	-	-
Aquatic Farm Permits	-	-	-	-	-	-	-	-	-

*Classified data layer; if the option is within the specified distance, a value of “Yes” is shown instead of the travel distance value.
**A straight-line distance was used to calculate minimum travel distance.

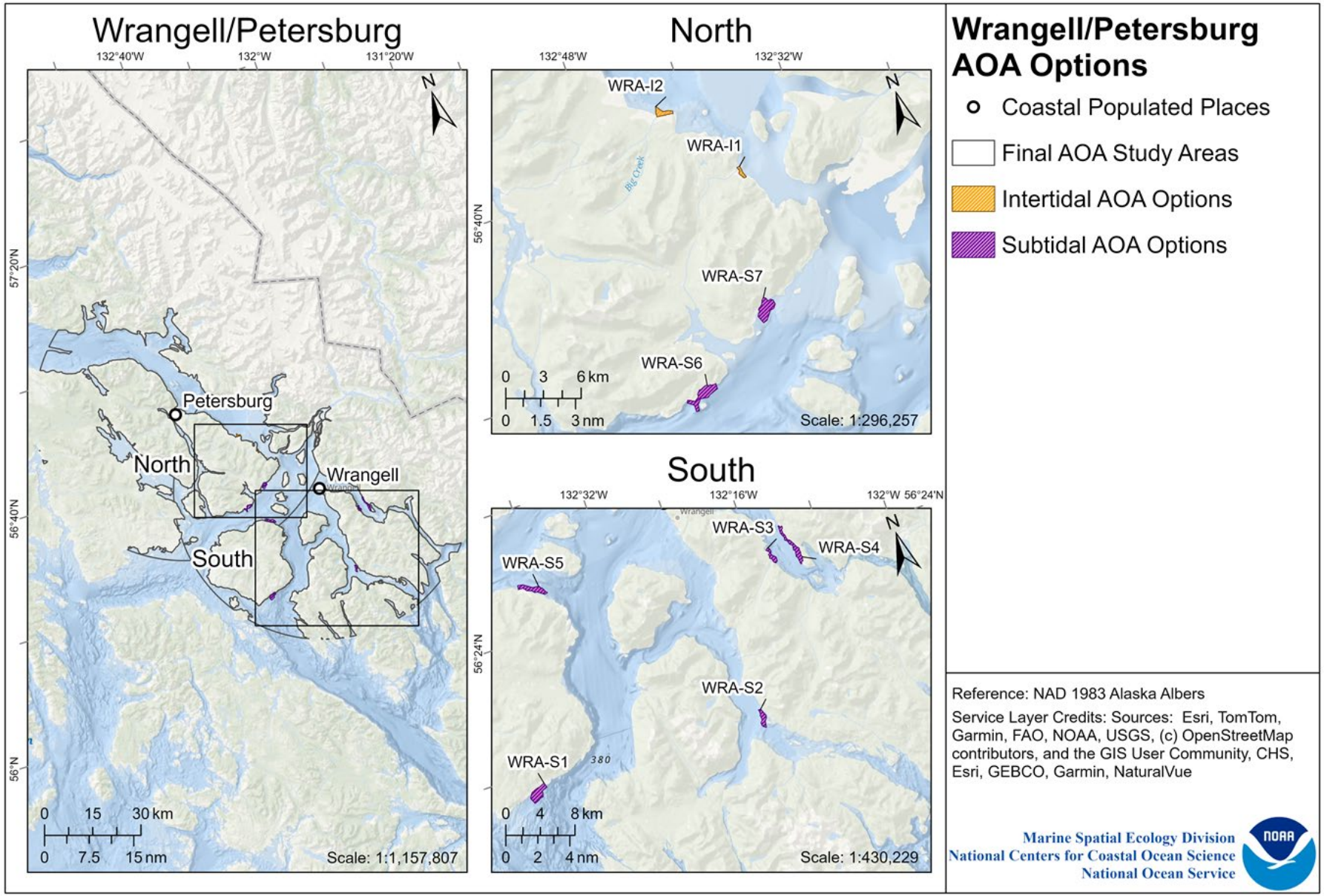


Figure 3.171. Final intertidal and subtidal AOA options for the Wrangell-Petersburg Study Areas.

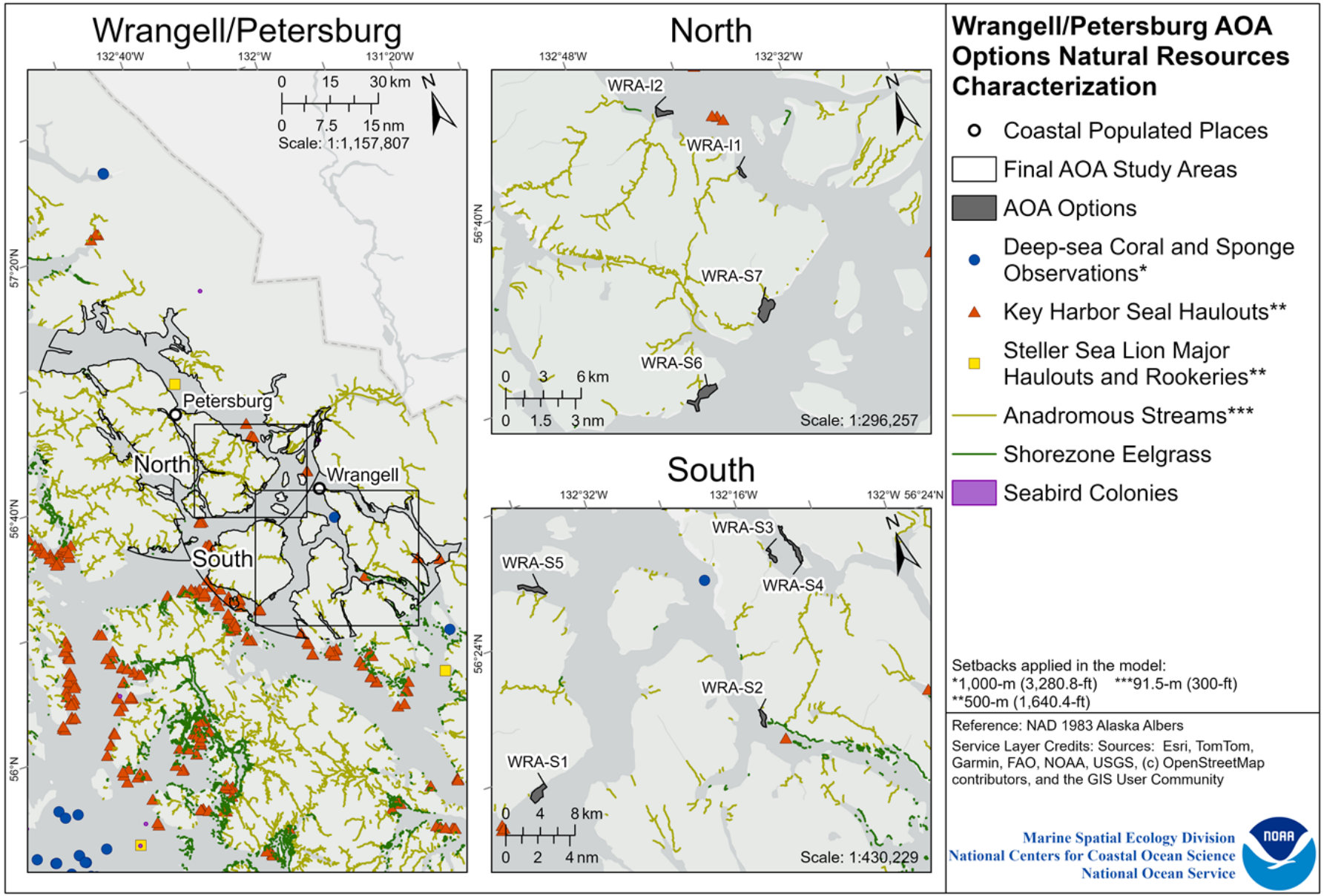


Figure 3.172. Natural resource interactions with the final AOA options in the Wrangell and Petersburg Study Areas.

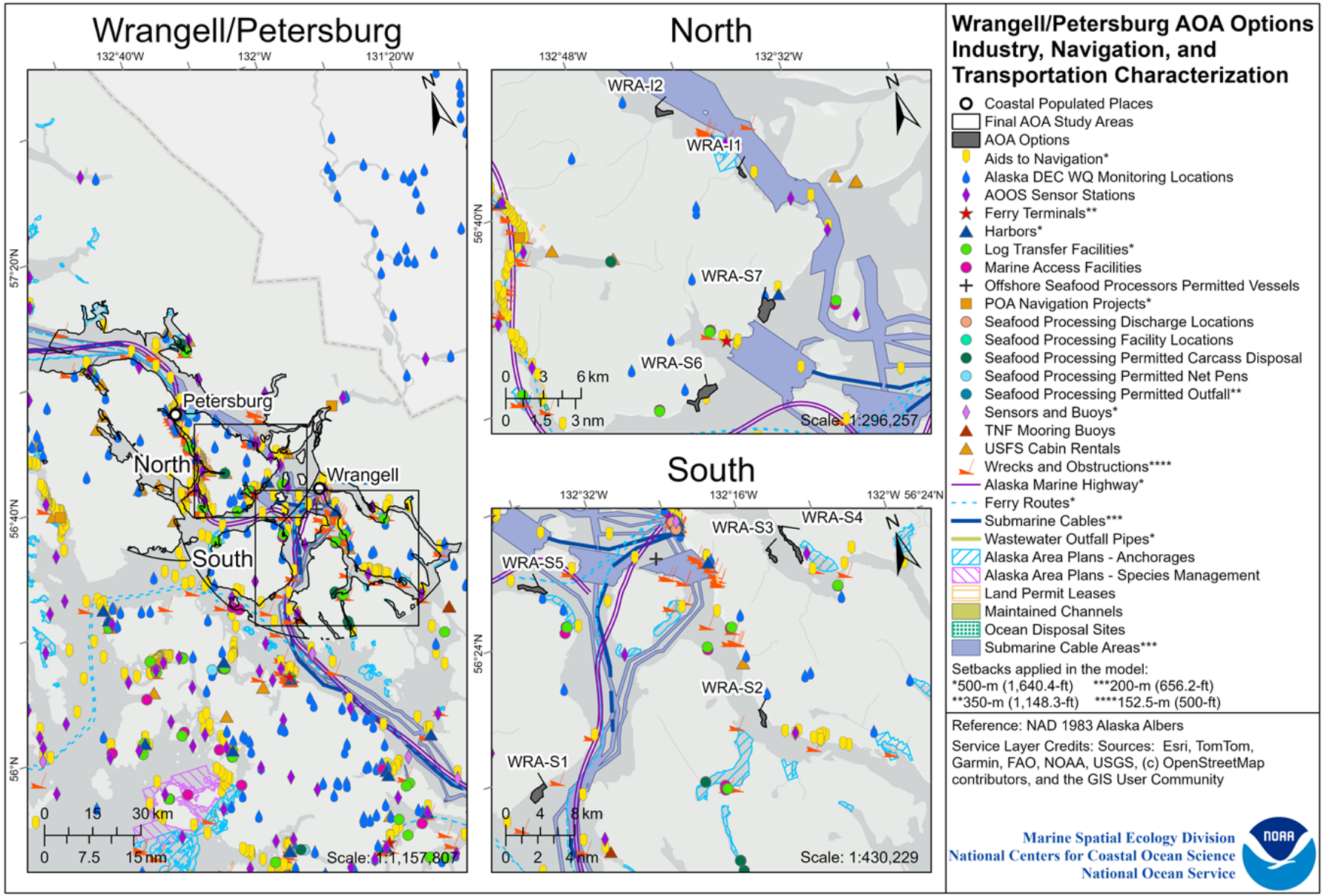


Figure 3.173. Industry, navigation, and transportation interactions with the final AOA options in the Wrangell and Petersburg Study Areas.

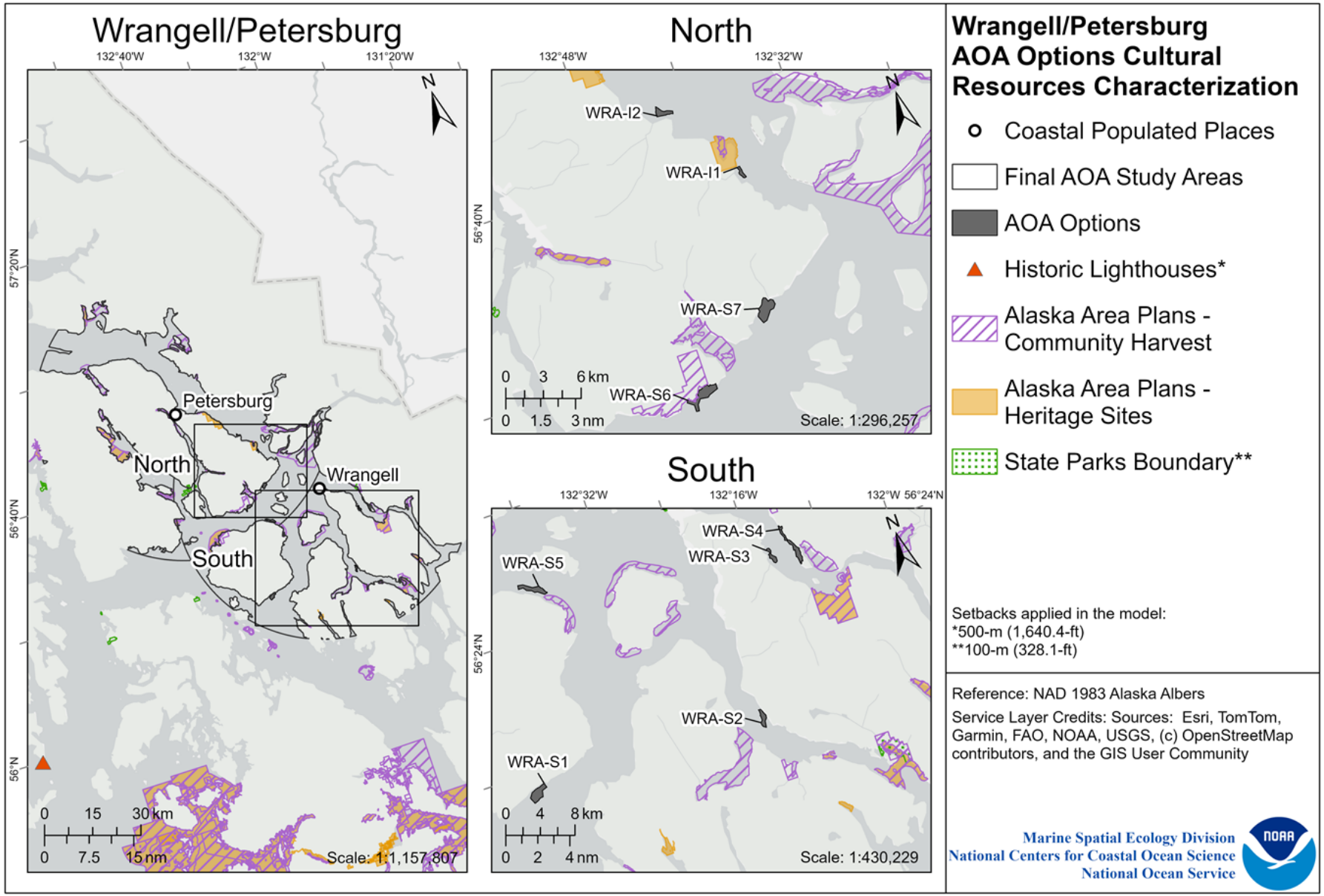


Figure 3.174. Cultural resource interactions with the final AOA options in the Wrangell and Petersburg Study Areas.

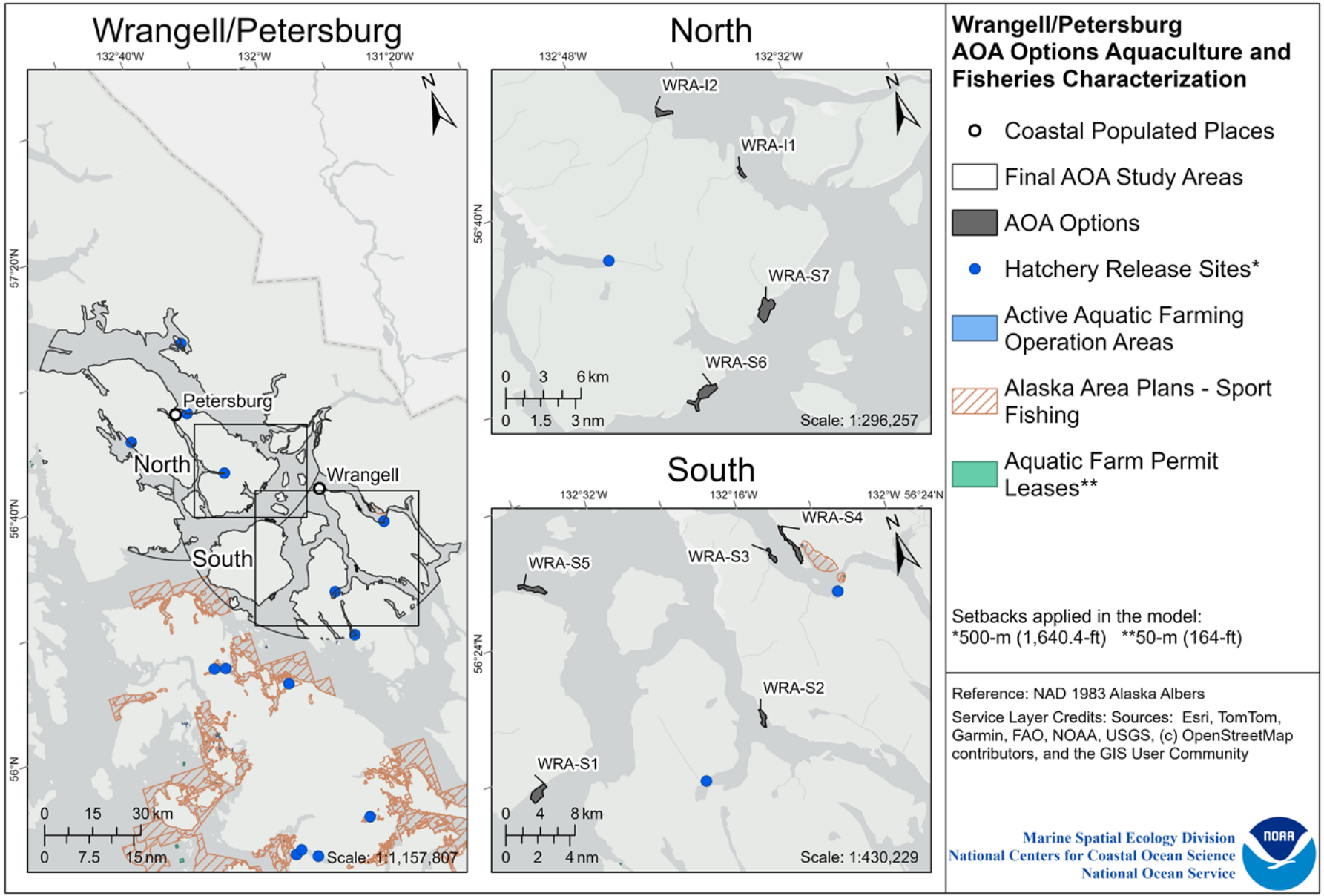


Figure 3.175. Aquaculture and fisheries interactions with the final AOA options in the Wrangell and Petersburg Study Areas.

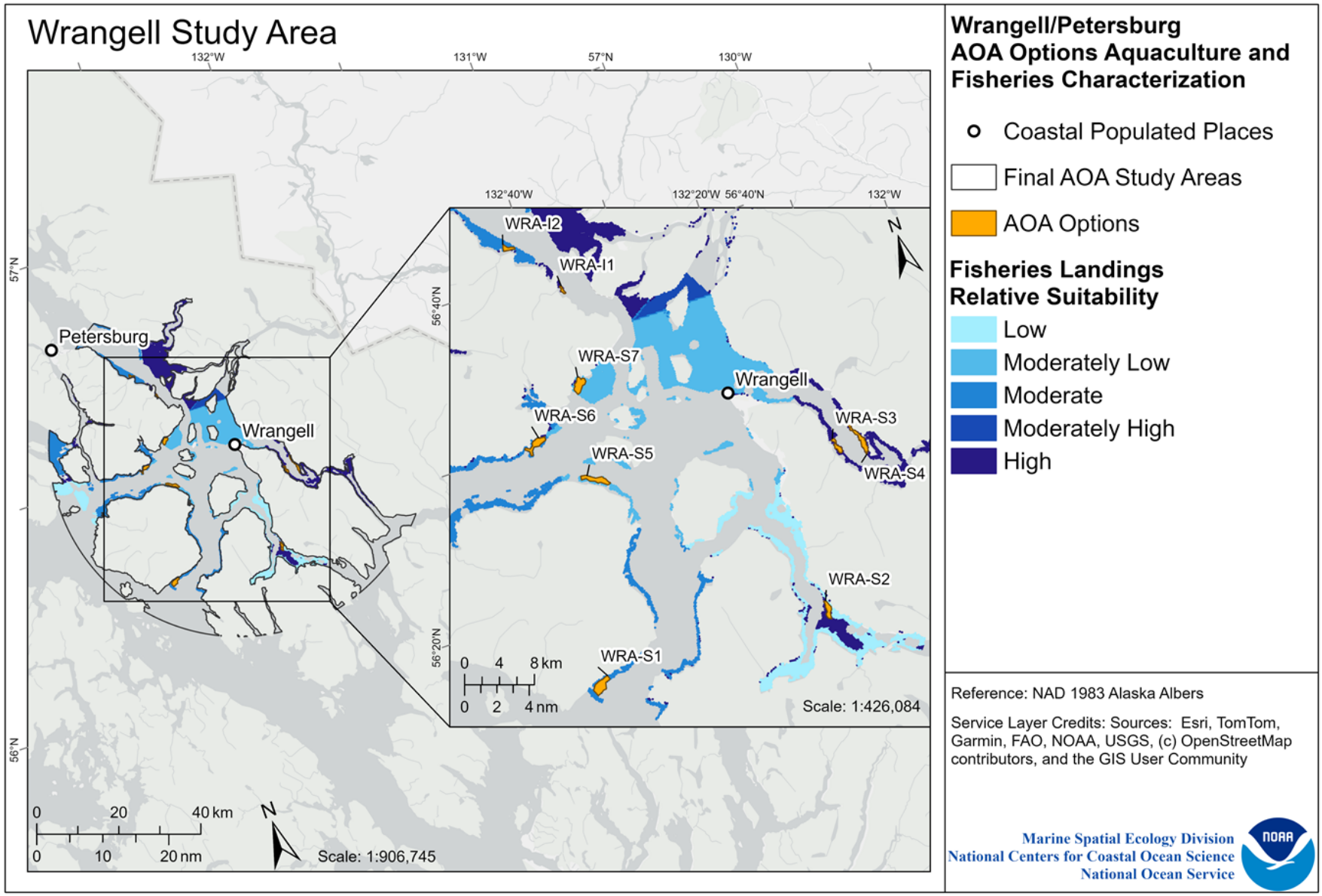


Figure 3.176. Relative suitability of the fishing landings combined data layer for the Wrangell Study Area in relation to the final AOA options in the Wrangell and Petersburg Study Areas.

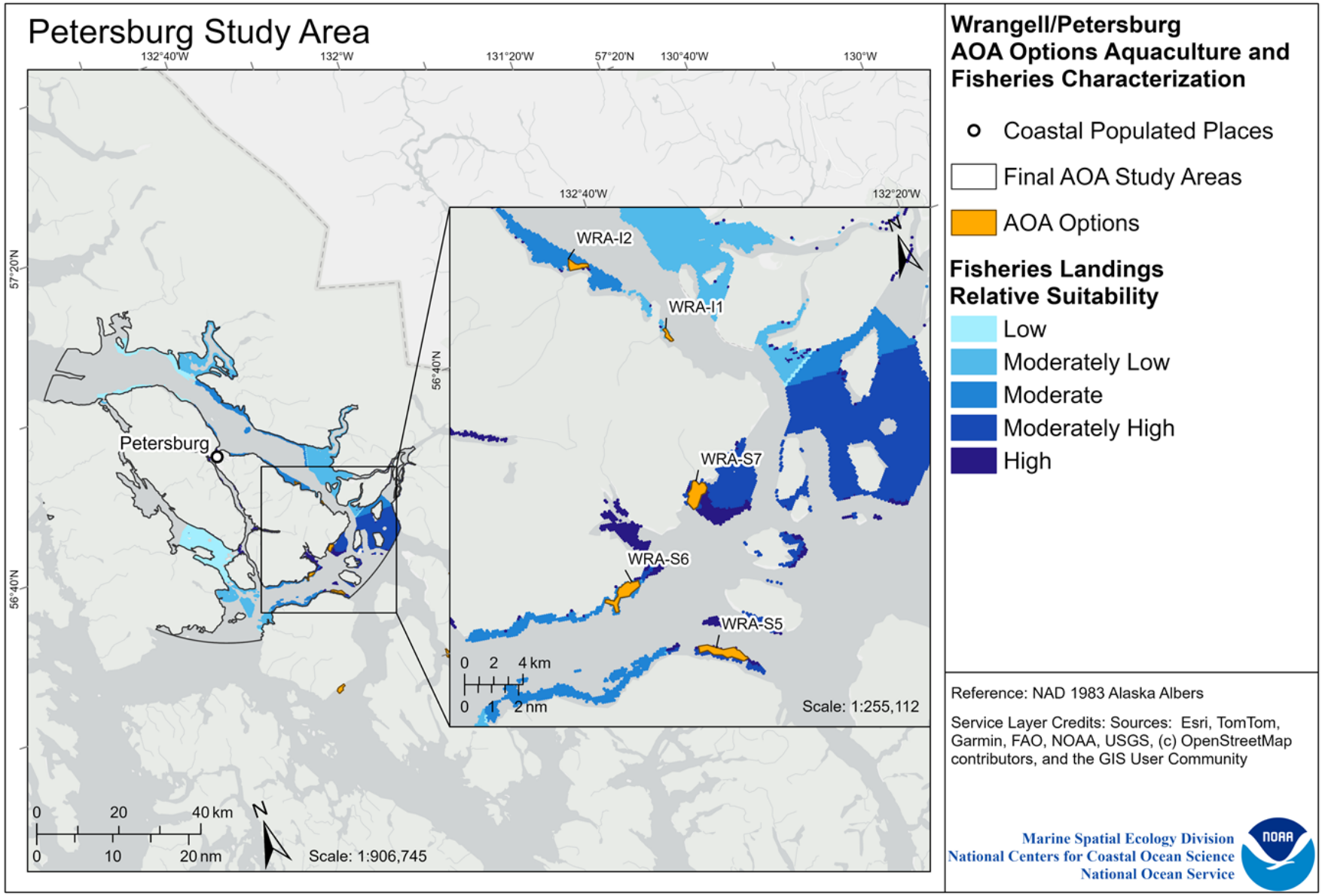


Figure 3.177. Relative suitability of the fishing landings combined data layer for the Petersburg Study Area in relation to the final AOA options in the Wrangell and Petersburg Study Areas.

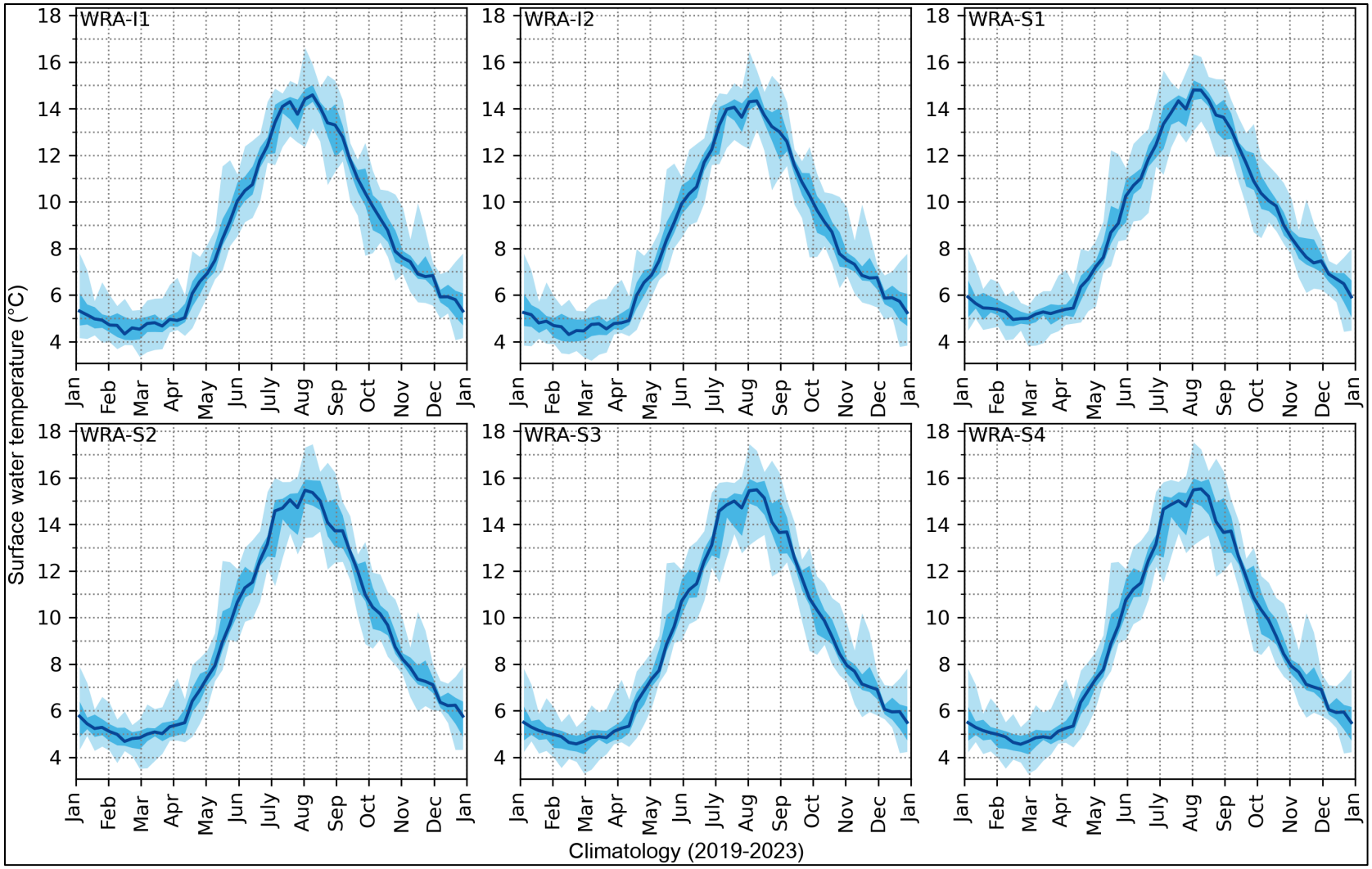


Figure 3.178. Sea surface temperatures for a subset of options from the Wrangell and Petersburg Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

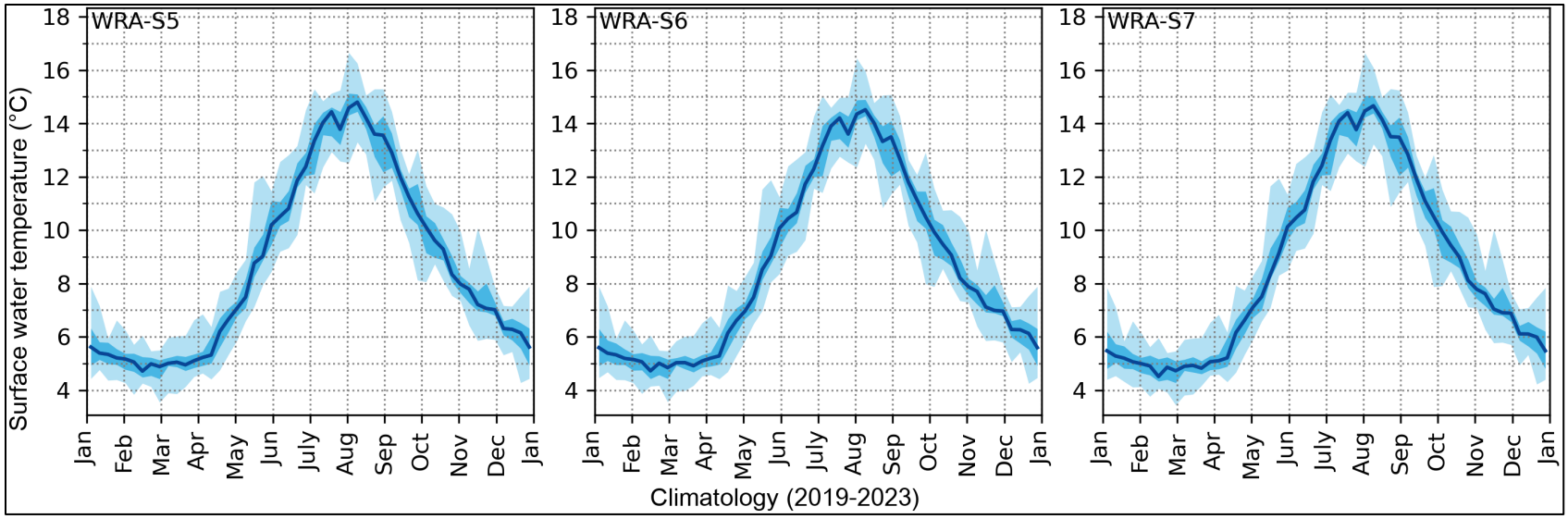


Figure 3.179. Sea surface temperatures for a subset of options from the Wrangell and Petersburg Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

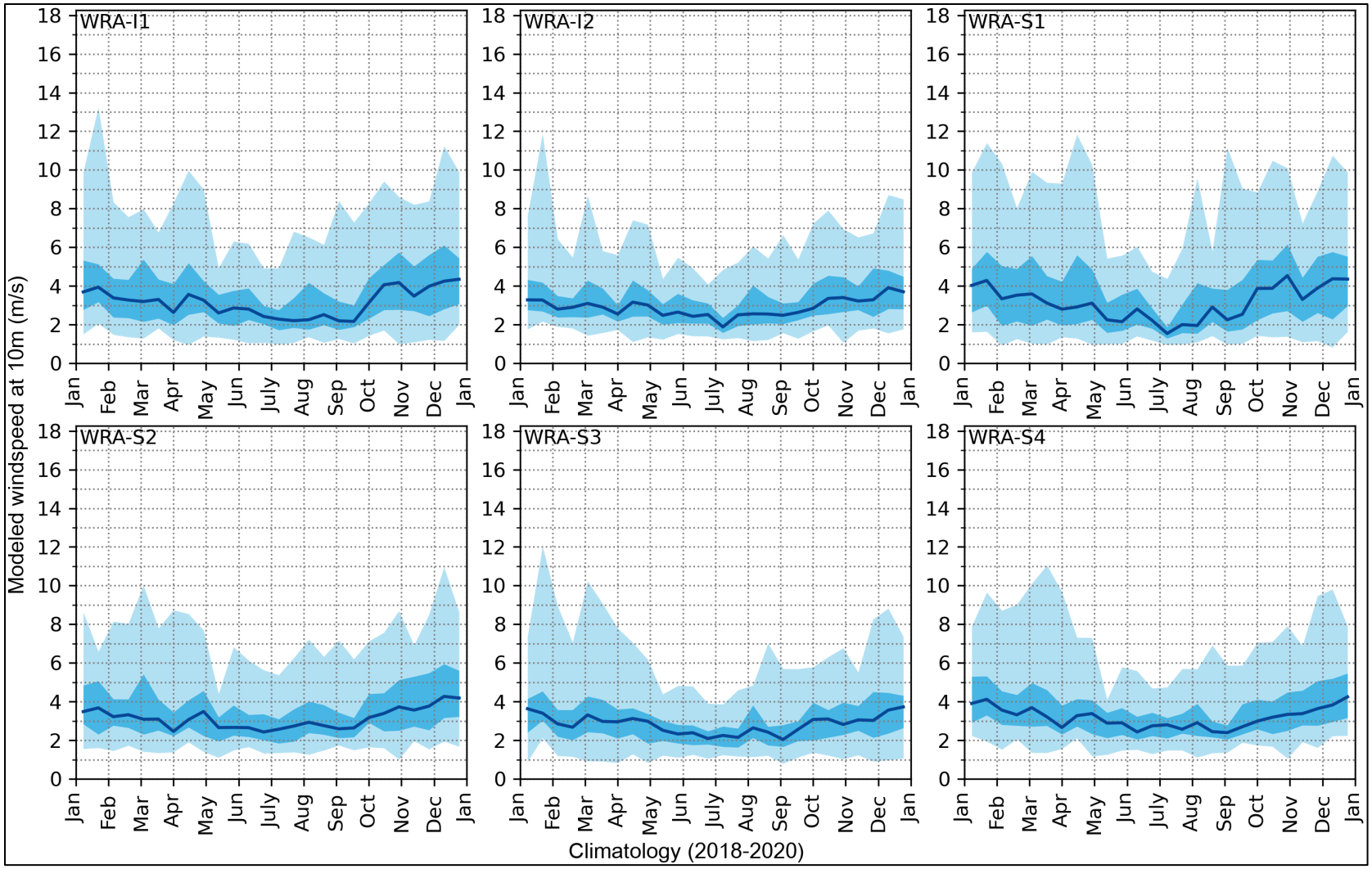


Figure 3.180. Wind speed at 10-m altitude for a subset of options from the Wrangell and Petersburg Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

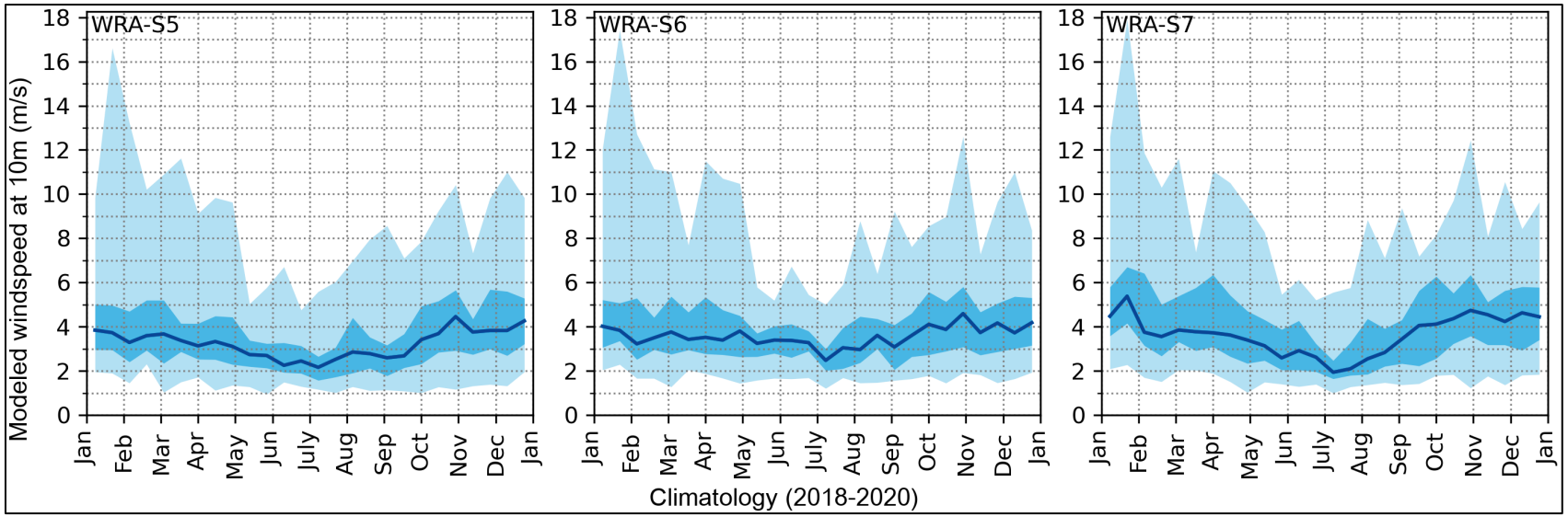


Figure 3.181. Wind speed at 10-m altitude for a subset of options from the Wrangell and Petersburg Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

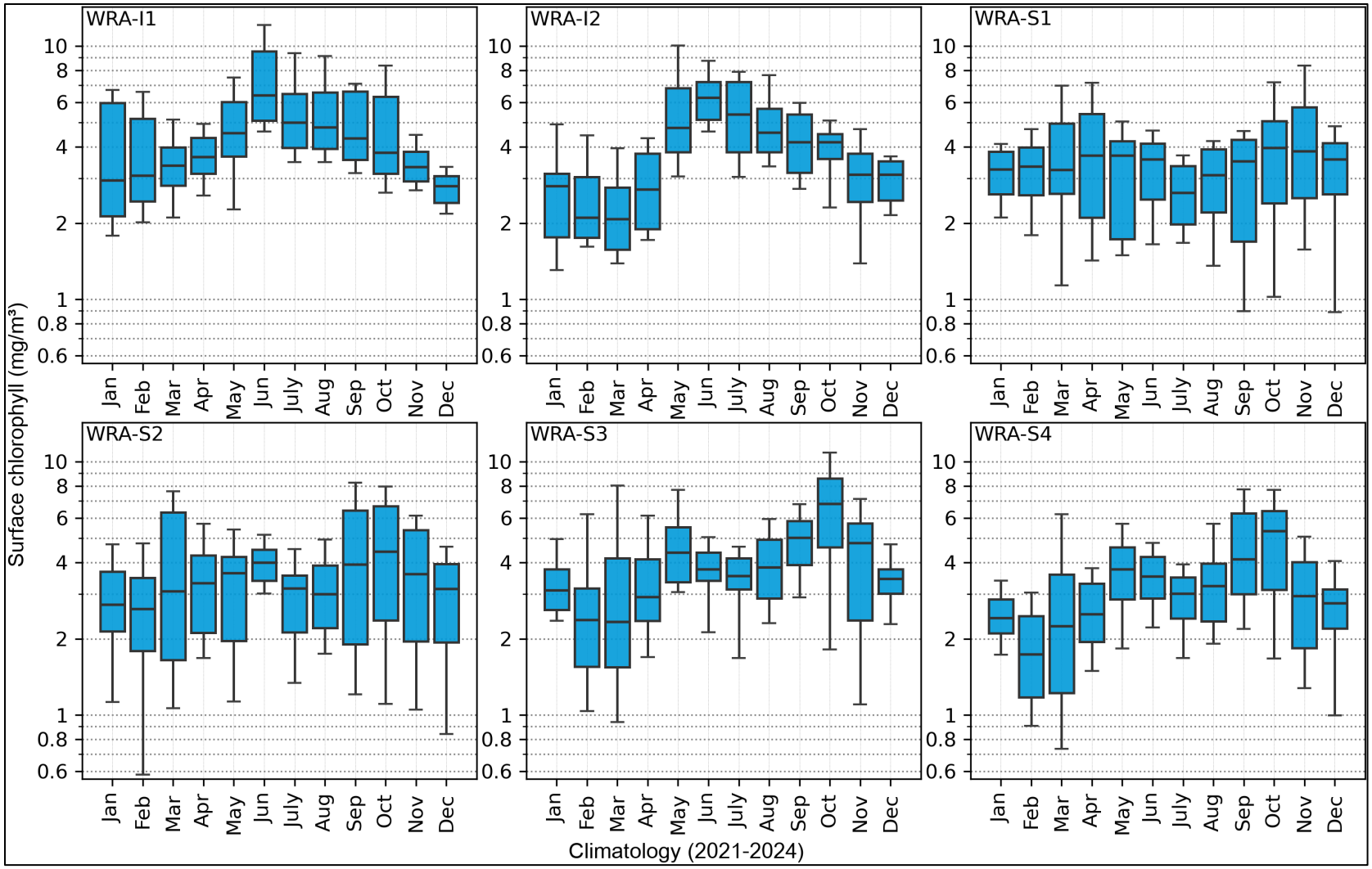


Figure 3.182. Monthly climatological surface chlorophyll *a* for a subset of options from the Wrangell and Petersburg Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

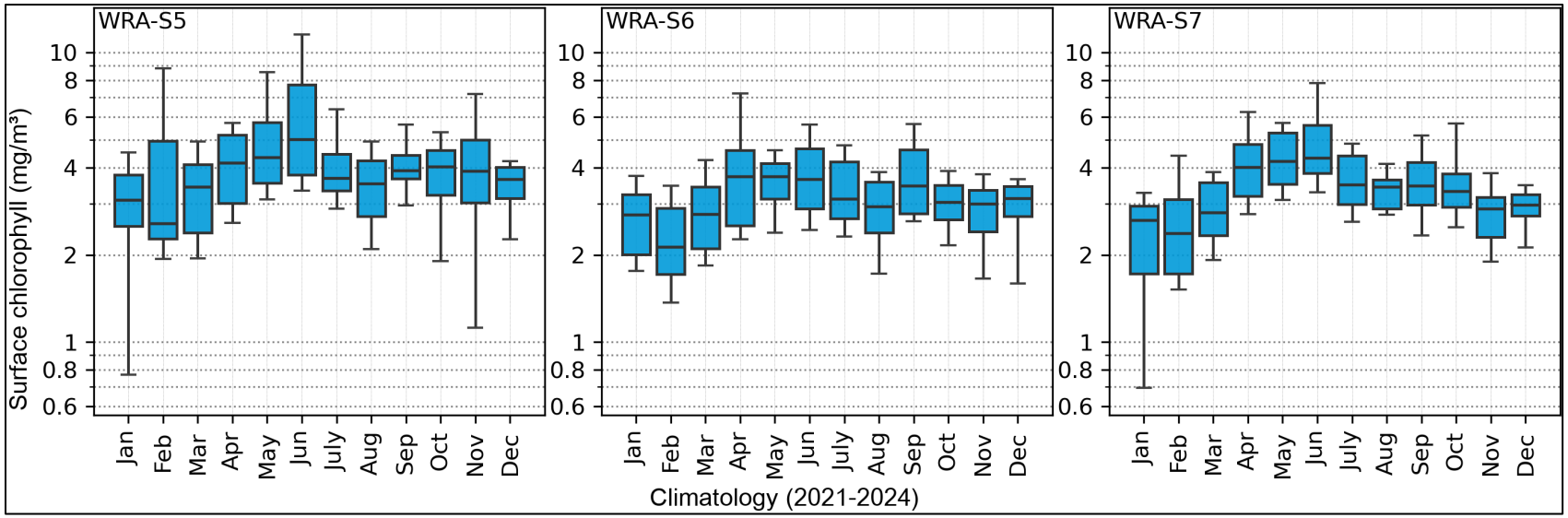


Figure 3.183. Monthly climatological surface chlorophyll *a* for a subset of options from the Wrangell and Petersburg Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

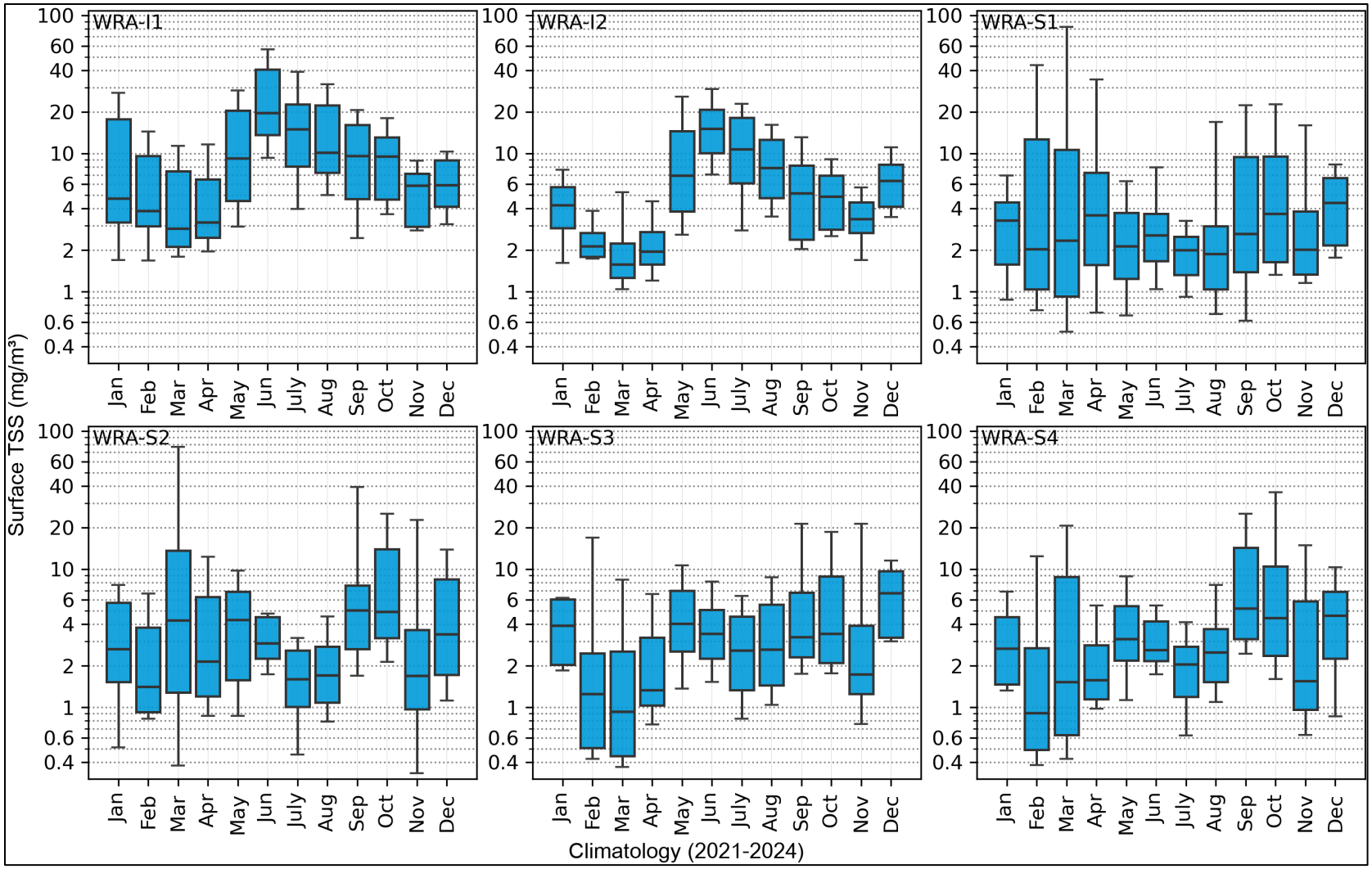


Figure 3.184. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Wrangell and Petersburg Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

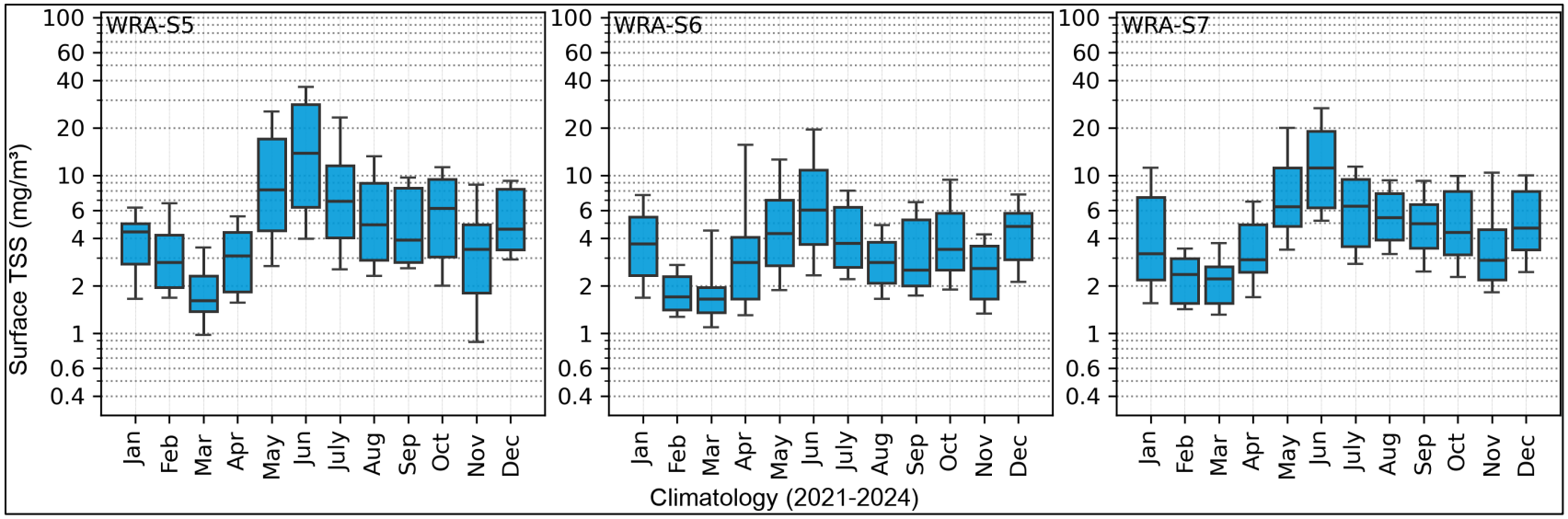


Figure 3.185. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Wrangell and Petersburg Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

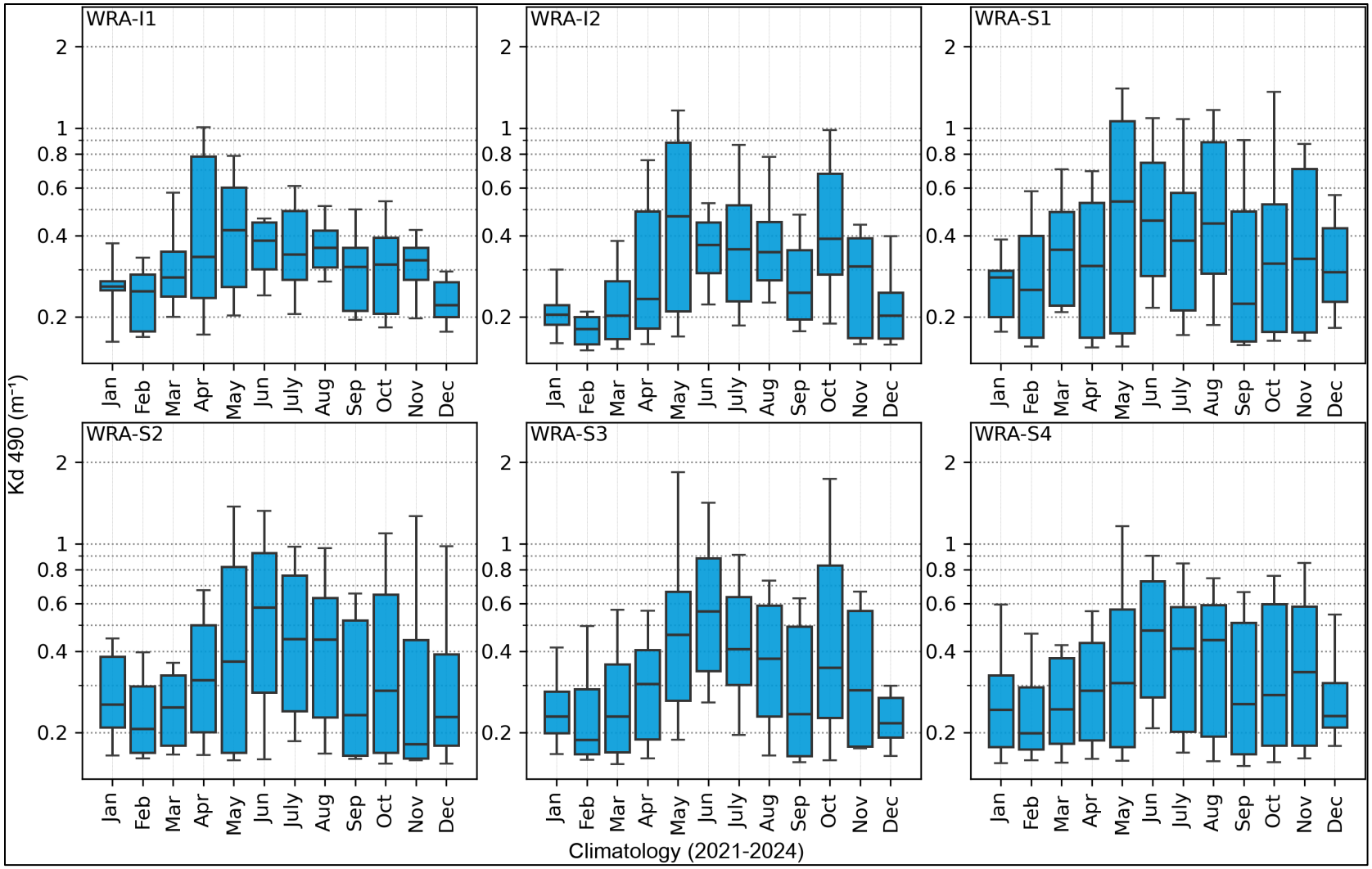


Figure 3.186. Monthly climatological light attenuation, Kd(490), for a subset of options from the Wrangell and Petersburg Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

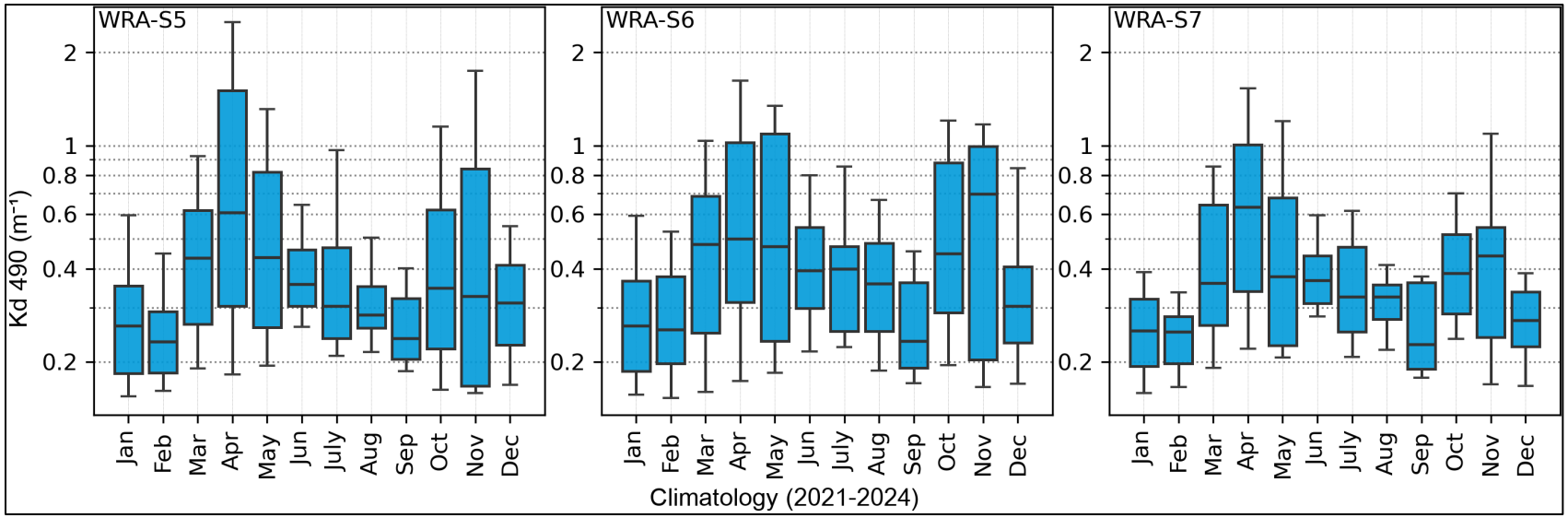


Figure 3.187. Monthly climatological light attenuation, Kd(490), for a subset of options from the Wrangell and Petersburg Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

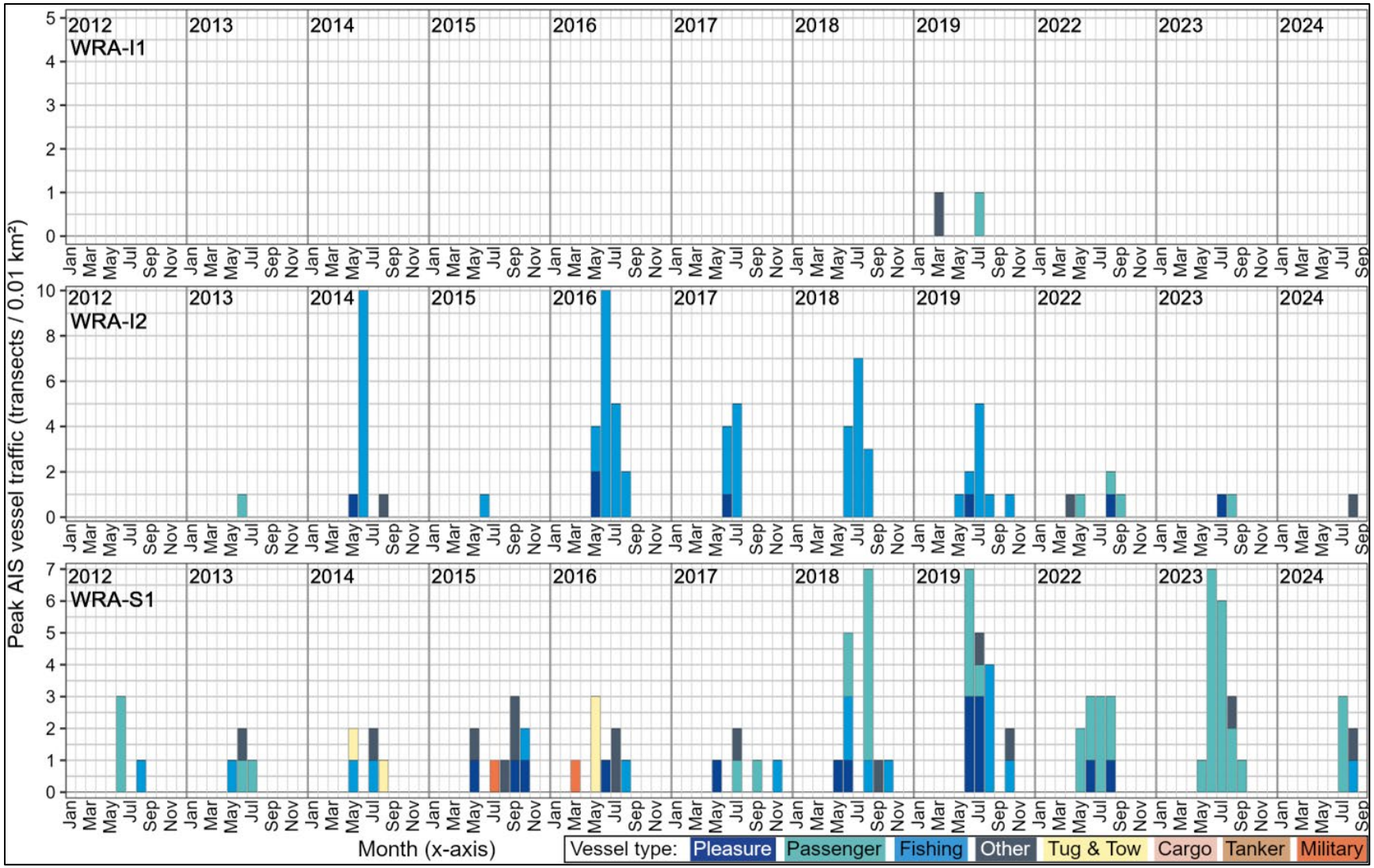


Figure 3.188. Monthly peak vessel traffic activity within options from a subset of the Wrangell and Petersburg Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

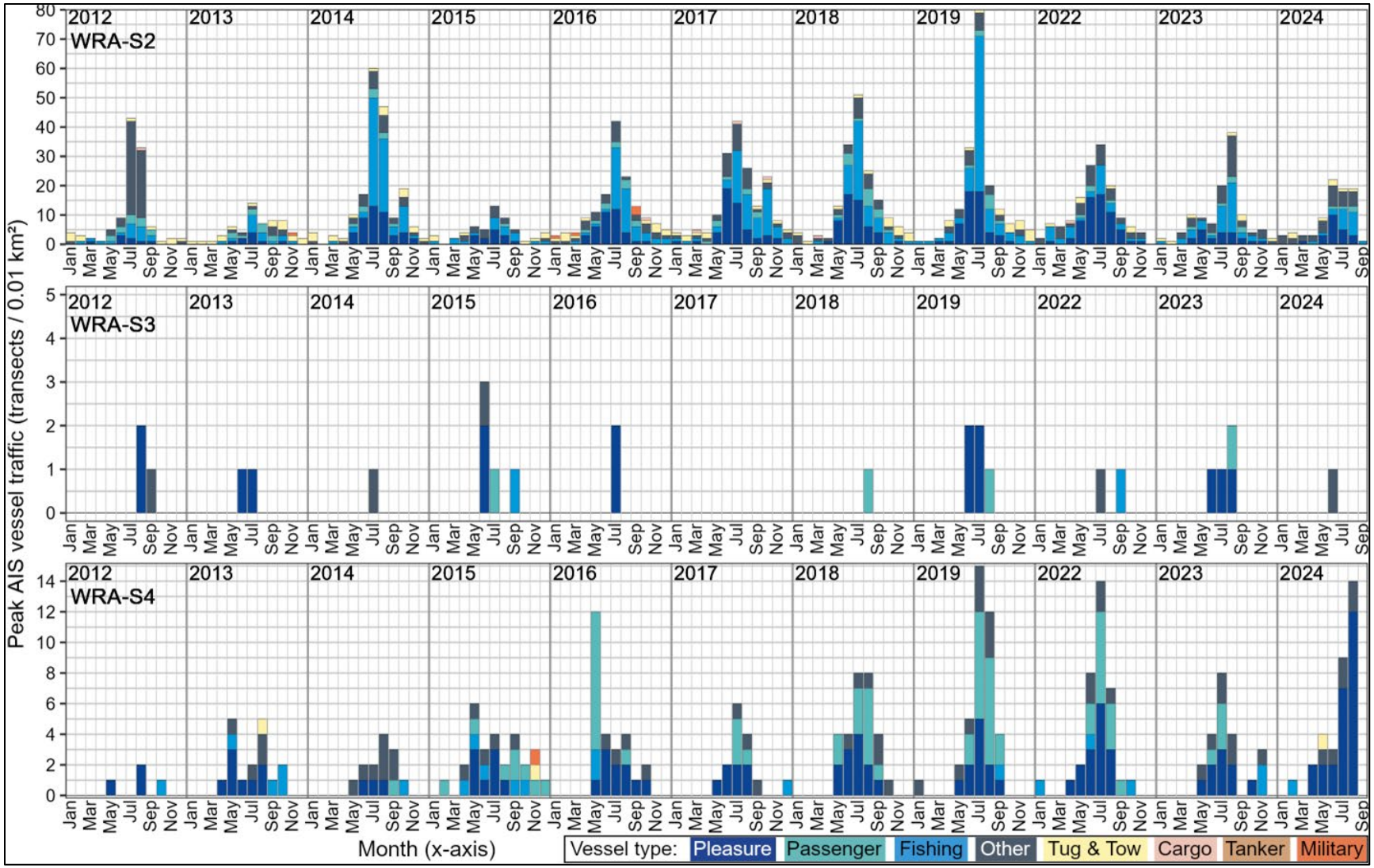


Figure 3.189. Monthly peak vessel traffic activity within options from a subset of the Wrangell and Petersburg Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

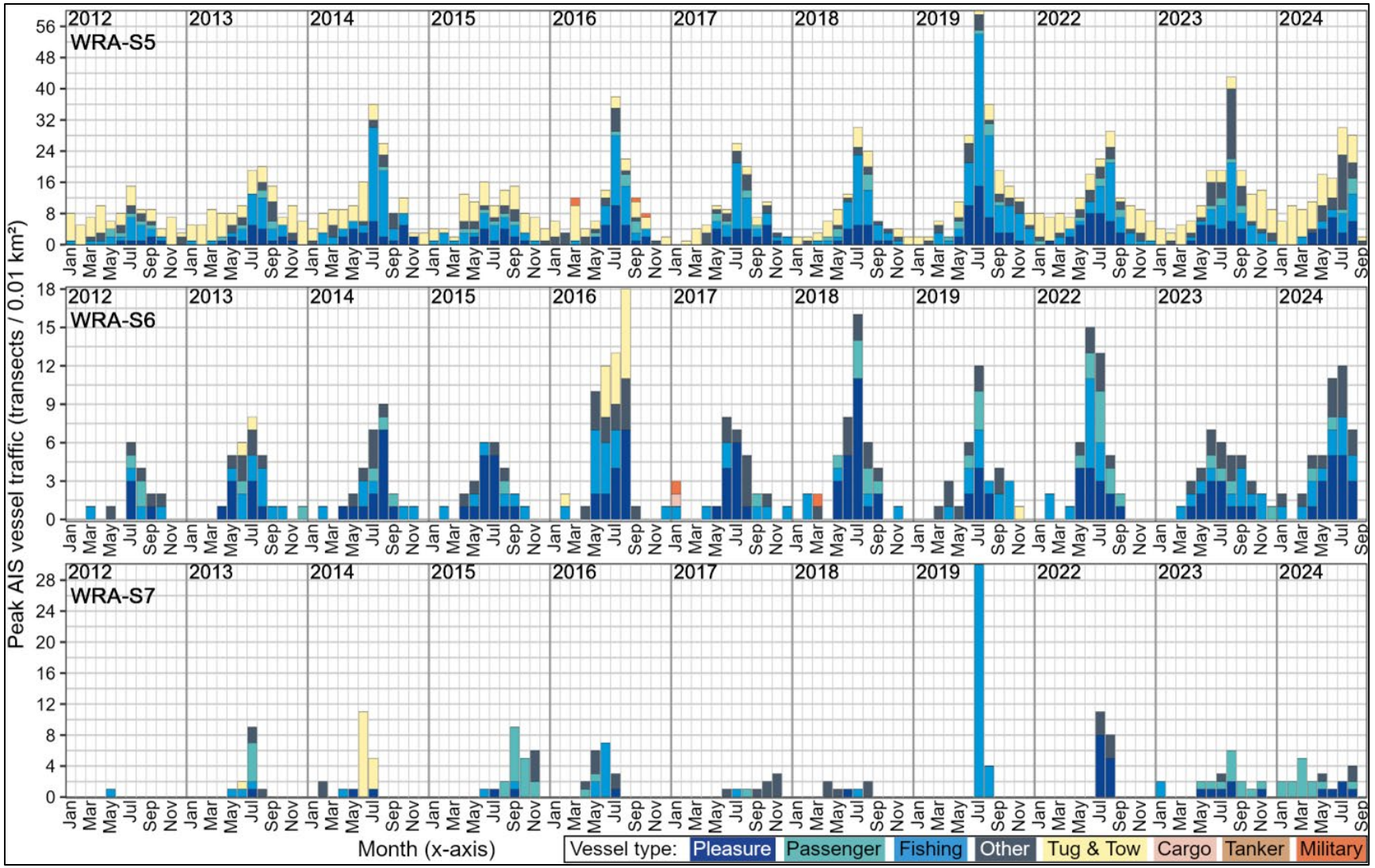


Figure 3.190. Monthly peak vessel traffic activity within options from a subset of the Wrangell and Petersburg Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

WRA-I1

AOA option WRA-I1 is a 58-ac intertidal site within the North extent of the Wrangell/ Petersburg Study Area, located 23 km (12 nm) from Wrangell and 31 km (17 nm) from Petersburg (centroid: 56.6437 N, 132.6251 W). The site is located within subunit Dry Strait Tidelands SMA of the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -12 m (-40 ft) to 0.29 m (0.97 ft) with an average depth of -2.9 m (-9.6 ft). At MHW the depth ranges from -8.1 m (-27 ft) to 4.5 m (15 ft) with an average depth of 1.3 m (4.2 ft). WRA-I1 has an average slope of 2.1° and maximum slope of 9.4°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'mudflat', 'sand and gravel flat or fan', and classifies the biological wave exposure as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.3°C, a minimum daily average of 4.9°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in March. Wind velocity at WRA-I1 averaged 3.5 m/s, with a minimum of 0.97 m/s and a maximum of 13 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in June (4.6 mg/m³) and lowest in November (2.4 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in June (24 mg/m³) and lowest in November (3.3 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in April (0.54 m^{-1}) and lowest in February (0.27 m^{-1}).

Industry and National Security Considerations

WRA-I1 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (0.29 km), Navy undersea cable (exact distance undisclosed), and wreck and obstruction (3.1 km). The site is within ADFG salmon (group code G) statistical unit 10841 and the groundfish (group code G) statistical unit 325631. WRA-I1 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel transect counts peaking at only one. There is not enough AIS activity observed to identify changes over time or regular patterns from year to year.

Natural Resource Considerations

WRA-I1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.15 km), historically mapped eelgrass sites (4.9 km), harbor seal key haulouts (3.7 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0.28 km). WRA-I1 overlaps the Stikine River Coastal IBA and falls within the boundary of the Lynn Canal-Frederick Sound Sea Duck Key Habitat Site.

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of WRA-I1. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds, birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, other mammals, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Wrangell Cooperative Association and Petersburg

Indian Association. Given this proximity, cultural resources could be present to an unknown extent.

WRA-I2

AOA option WRA-I2 is a 130-ac intertidal site within the North extent of the Wrangell/ Petersburg Study Area, located 30 km (16 nm) from Wrangell and 22 km (12 nm) from Petersburg (centroid: 56.702 N, 132.6979 W). The site is located within subunit GU of the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -31 m (-100 ft) to 12 m (39 ft) with an average depth of -4.1 m (-13 ft). At MHW the depth ranges from -26 m (-86 ft) to 16 m (53 ft) with an average depth of 0.073 m (0.24 ft). WRA-I2 has an average slope of 4.9° and maximum slope of 13°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'ramp with gravel and sand beach wide', 'sand and gravel flat or fan', 'rock ramp wide', and classifies the biological wave exposure as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.2°C, a minimum daily average of 4.8°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in March. Wind velocity at WRA-I2 averaged 3.2 m/s, with a minimum of 1.1 m/s and a maximum of 12 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (4.7 mg/m³) and lowest in February (2.2 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in June (10 mg/m³) and lowest in February (1.7 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in October (0.61 m^{-1}) and lowest in February (0.19 m^{-1}).

Industry and National Security Considerations

WRA-I2 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (0.34 km), Navy undersea cable (exact distance undisclosed), and wreck and obstruction (2.7 km). The site is within ADFG salmon (group code G) statistical unit 10850 and the groundfish (group code G) statistical unit 325631. WRA-I2 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 10 total transects (June 2014, June 2016). The primary vessel types observed are fishing, pleasure, and passenger. Overall levels of AIS activity have remained relatively constant over time. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

WRA-I2 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.26 km), historically mapped eelgrass sites (1.2 km), harbor seal key haulouts (2.6 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are four Alaska Heritage Resources Survey sites within approximately 5 km of WRA-I2. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds, large land mammals,

marine invertebrates, marine mammals, non-salmon fish, other mammals, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Wrangell Cooperative Association and Petersburg Indian Association. Given this proximity, cultural resources could be present to an unknown extent.

WRA-S1

AOA option WRA-S1 is a 500-ac subtidal site within the South extent of the Wrangell/ Petersburg Study Area, located 38 km (20 nm) from Wrangell and 78 km (42 nm) from Petersburg (centroid: 56.245 N, 132.7887 W). The site is located within subunit GU of the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -3.5 m (-12 ft) to 82 m (270 ft) with an average depth of 37 m (120 ft). At MHW the depth ranges from 0.73 m (2.4 ft) to 87 m (280 ft) with an average depth of 41 m (130 ft). WRA-S1 has an average slope of 4.9° and maximum slope of 18°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.7°C, a minimum daily average of 5.3°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at WRA-S1 averaged 3.5 m/s, with a minimum of 0.83 m/s and a maximum of 12 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in April (4.6 mg/m³) and lowest in July (2.7 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in March (5.3 mg/m³) and lowest in November (1.8 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.68 m^{-1}) and lowest in February (0.31 m^{-1}).

Industry and National Security Considerations

WRA-S1 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (2.5 km), Navy undersea cable (exact distance undisclosed), ferry route (2.8 km), and wreck and obstruction (1.5 km). The site is within ADFG salmon (group code G) statistical unit 10630 and the groundfish (group code G) statistical unit 325602. WRA-S1 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at seven total transects (August 2018, June 2019, June 2023). The primary vessel types observed are passenger, fishing, pleasure, and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

WRA-S1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.23 km), harbor seal key haulouts (4.0 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: non-salmon fish, large land mammals, marine invertebrates, marine mammals, salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include

the Wrangell Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

WRA-S2

AOA option WRA-S2 is a 230-ac subtidal site within the South extent of the Wrangell/ Petersburg Study Area, located 28 km (15 nm) from Wrangell and 80 km (43 nm) from Petersburg (centroid: 56.2451 N, 132.3454 W). The site is located within subunit GU of the Central/Southern Southeast area plan. The site ranges in depth at MLLW from 27 m (89 ft) to 64 m (210 ft) with an average depth of 45 m (150 ft). At MHW the depth ranges from 31 m (100 ft) to 68 m (220 ft) with an average depth of 50 m (160 ft). WRA-S2 has an average slope of 2.5° and maximum slope of 8.8°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (182 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.8°C, a minimum daily average of 5.1°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in February. Wind velocity at WRA-S2 averaged 3.5 m/s, with a minimum of 1.0 m/s and a maximum of 11 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (4.8 mg/m³) and lowest in February (2.3 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in March (5.4 mg/m³) and lowest in November (1.1 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.85 m^{-1}) and lowest in February (0.23 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 10730 and the groundfish (group code G) statistical unit 325603. WRA-S2 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 80 total transects (July 2019). The primary vessel types observed are fishing, pleasure, other, and tug/tow. AIS activity over the most recent five years has increased by roughly 20% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

WRA-S2 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.23 km), historically mapped eelgrass sites (0.14 km), harbor seal key haulouts (2.2 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are seven Alaska Heritage Resources Survey sites within approximately 5 km of WRA-S2. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, other mammals, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Wrangell Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

WRA-S3

AOA option WRA-S3 is a 170-ac subtidal site within the South extent of the Wrangell/ Petersburg Study Area, located 14 km (7.8 nm) from Wrangell and 68 km (37 nm) from Petersburg (centroid: 56.4012 N, 132.2321 W). The site is located within subunit GU of the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -9.6 m (-31 ft) to 80 m (260 ft) with an average depth of 34 m (110 ft). At MHW the depth ranges from -5.3 m (-17 ft) to 84 m (280 ft) with an average depth of 39 m (130 ft). WRA-S3 has an average slope of 11° and maximum slope of 24°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.7°C, a minimum daily average of 5.0°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in February. Wind velocity at WRA-S3 averaged 3.0 m/s, with a minimum of 0.80 m/s and a maximum of 12 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (4.8 mg/m³) and lowest in March (2.5 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (4.0 mg/m³) and lowest in March (1.1 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (1.0 m^{-1}) and lowest in February (0.29 m^{-1}).

Industry and National Security Considerations

WRA-S3 is within 5 km of at least one documented wreck and obstruction (4.6 km). The site is within ADFG salmon (group code G) statistical unit 10745 and the groundfish (group code G) statistical unit 325604. WRA-S3 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at three total transects (June 2015). The primary vessel types observed are pleasure, other, and passenger. AIS activity over the most recent five years has increased by roughly 26% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

WRA-S3 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.31 km), harbor seal non-key haulouts (2.1 km), and humpback whale feeding BIA (0.46 km).

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of WRA-S3. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, other mammals, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Wrangell Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

WRA-S4

AOA option WRA-S4 is a 440-ac subtidal site within the South extent of the Wrangell/ Petersburg Study Area, located 14 km (7.3 nm) from Wrangell and 67 km (36 nm) from Petersburg (centroid: 56.4039 N, 132.1895 W). The site is located within subunits WT-37, GU of the Wrangell Region units in the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -4.4 m (-14 ft) to 93 m (310 ft) with an average depth of 36 m (120 ft). At MHW the depth ranges from -0.14 m (-0.45 ft) to 97 m (320 ft) with an average depth of 40 m (130 ft). WRA-S4 has an average slope of 13° and maximum slope of 26°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.7°C, a minimum daily average of 5.0°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in February. Wind velocity at WRA-S4 averaged 3.5 m/s, with a minimum of 1.1 m/s and a maximum of 11 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (3.8 mg/m³) and lowest in February (1.6 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in September (5.7 mg/m³) and lowest in February (0.90 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.65 m^{-1}) and lowest in February (0.25 m^{-1}).

Industry and National Security Considerations

WRA-S4 is within 5 km of at least one documented wreck and obstruction (1.9 km). The site is within ADFG salmon (group code G) statistical unit 10745 and the groundfish (group code G) statistical unit 325604. WRA-S4 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 15 total transects (July 2019). The primary vessel types observed are pleasure, passenger, and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

WRA-S4 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (3.0 km), harbor seal non-key haulouts (0 km), and humpback whale feeding BIA (0 km).



Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of WRA-S4. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, other mammals, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Wrangell Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

WRA-S5

AOA option WRA-S5 is a 400-ac subtidal site within the South extent of the Wrangell/ Petersburg Study Area, located 17 km (9.1 nm) from Wrangell and 52 km (28 nm) from Petersburg (centroid: 56.4479 N, 132.6774 W). The site is located within subunit GU of the Central/Southern Southeast area plan. The site ranges in depth at MLLW from 2.1 m (6.8 ft) to 92 m (300 ft) with an average depth of 39 m (130 ft). At MHW the depth ranges from 6.3 m (21 ft) to 96 m (310 ft) with an average depth of 43 m (140 ft). WRA-S5 has an average slope of 7.7° and maximum slope of 20°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (132 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.5°C, a minimum daily average of 5.1°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in February. Wind velocity at WRA-S5 averaged 3.6 m/s, with a minimum of 0.95 m/s and a maximum of 17 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in June (4.8 mg/m^3) and lowest in August (3.2 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in June (11 mg/m^3) and lowest in March (2.0 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in April (1.00 m^{-1}) and lowest in February (0.29 m^{-1}).

Industry and National Security Considerations

WRA-S5 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (1.4 km), Navy undersea cable (exact distance undisclosed), ferry route (0.71 km), and wreck and obstruction (3.7 km). The site is within ADFG salmon (group code G) statistical unit 10840 and the groundfish (group code G) statistical unit 325601. WRA-S5 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 60 total transects (July 2019). The primary vessel types observed are tug/tow, fishing, pleasure, and other. AIS activity over the most recent five years has increased by roughly 37% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

WRA-S5 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.19 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Wrangell Cooperative Association and Petersburg Indian Association. Given this proximity, cultural resources could be present to an unknown extent.

WRA-S6

AOA option WRA-S6 is a 380-ac subtidal site within the North extent of the Wrangell/ Petersburg Study Area, located 21 km (12 nm) from Wrangell and 47 km (25 nm) from Petersburg (centroid: 56.5016 N, 132.7629 W). The site is located within subunit P-27, GU of the Petersburg Region unit in the Central/Southern Southeast area plan. Text descriptions for the subunit include reference to community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -3.9 m (-13 ft) to 77 m (250 ft) with an average depth of 25 m (82 ft). At MHW the depth ranges from 0.34 m (1.1 ft) to 81 m (270 ft) with an average depth of 29 m (96 ft). WRA-S6 has an average slope of 5.7° and maximum slope of 20°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.4°C, a minimum daily average of 5.1°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in February. Wind velocity at WRA-S6 averaged 3.9 m/s, with a minimum of 1.2 m/s and a maximum of 17 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in April (3.5 mg/m³) and lowest in November (1.7 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in June (4.9 mg/m³) and lowest in November (1.3 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in April (0.86 m^{-1}) and lowest in February (0.30 m^{-1}).

Industry and National Security Considerations

WRA-S6 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (2.3 km), Navy undersea cable (exact distance undisclosed), log transfer facility (3.0 km), USFS marine access facility (3.1 km), and ferry route (1.7 km). The site is within ADFG salmon (group code G) statistical unit 10830 and the groundfish (group code G) statistical unit 325601. WRA-S6 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 18 total transects (August 2016). The primary vessel types observed are pleasure, fishing, other, and passenger. AIS activity over the most recent five years has increased by roughly 39% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

WRA-S6 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.42 km), harbor seal non-key haulouts (0.048 km), humpback whale high use areas (2.4 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: birds, birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, other mammals, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Wrangell Cooperative Association and Petersburg Indian Association. Given this proximity, cultural resources could be present to an unknown extent.

WRA-S7

AOA option WRA-S7 is a 380-ac subtidal site within the North extent of the Wrangell/ Petersburg Study Area, located 16 km (8.7 nm) from Wrangell and 47 km (25 nm) from Petersburg (centroid: 56.5456 N, 132.6511 W). The site is located within subunit GU of the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -3.5 m (-11 ft) to 32 m (110 ft) with an average depth of 18 m (59 ft). At MHW the depth ranges from 0.73 m (2.4 ft) to 36 m (120 ft) with an average depth of 22 m (73 ft). WRA-S7 has an average slope of 2.0° and maximum slope of 14°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (6 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 8.4°C, a minimum daily average of 5.1°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in February. Wind velocity at WRA-S7 averaged 4.1 m/s, with a minimum of 1.00 m/s and a maximum of 18 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in April (4.4 mg/m³) and lowest in November (2.5 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in June (10 mg/m³) and lowest in March (2.7 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in April (0.94 m^{-1}) and lowest in February (0.27 m^{-1}).

Industry and National Security Considerations

WRA-S7 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (0.27 km), Navy undersea cable (exact distance undisclosed), and log transfer facility (4.7 km). The site is within ADFG salmon (group code G) statistical unit 10840 and the groundfish (group code G) statistical unit 325601. WRA-S7 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 30 total transects (July 2019). The primary vessel types observed are fishing, passenger, other, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

WRA-S7 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.16 km) and humpback whale feeding BIA (0.80 km). WRA-S7 overlaps the Sumner Strait Marine IBA, which is recognized as containing significant concentrations of seabirds.

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: birds, birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, other mammals, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Wrangell Cooperative Association and Petersburg Indian Association. Given this proximity, cultural resources could be present to an unknown extent.



Craig Study Area

Final AOA options within the Craig Study Area include 11 subtidal sites encompassing 1,855 ac and three intertidal sites totaling 233 ac (Figure 3.191). Options range from 86.9 ac to 415.4 ac and are distributed across the study area (Tables 3.17 and 3.18; Figures 3.191–3.216). Several sites within the study area are located near, and may directly overlap with, ecologically sensitive resources. These include historically mapped eelgrass beds, feeding BIAs and high-use areas for humpback whales and both key and non-key harbor seal haulouts. Given the proximity to these resources, project planning should account for potential ecological impacts and may require coordination or consultation with appropriate resource agencies.

This study area overlaps marine bird concentration areas and important habitats, specifically the Outside Islands Marine IBA, which contains hundreds of thousands of diving seabirds. All AOA options fall within the boundary of the IBA, although no sizeable seabird colonies are located within 5 km of the options.

Public comments related to the Craig draft AOA options included concerns about potential overlap with existing dive fisheries. A primary issue raised by dive fishery participants was the risk of diver air supply lines becoming entangled with aquaculture infrastructure, creating safety hazards and limiting access to common-use resources. SARDFA plays a central role in coordinating industry activities and represents divers, processors, and coastal communities within the Southeast study areas. To minimize conflict and ensure equitable resource access, coordination with SARDFA and ADFG is recommended during the siting of aquaculture operations in areas with active dive fisheries. Additional comments highlighted potential overlap between final AOA options CRA-S5 and a herring spawn on kelp fishery.

General comments focused on potential overlaps between AOA study areas and documented cultural resource sites. In response, the final model run incorporated additional down-scoring of AHRS data layers, resulting in reduced suitability and, ultimately, the removal of portions of, or entire, draft AOA options located within 500 m of AHRS-listed locations. Comments also noted potential impacts to subsistence harvest activities from aquaculture development, and characterization revealed overlap with deer, mammals, birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, and vegetation subsistence search and harvest areas. The degree of potential adverse effect to subsistence harvest activities is highly dependent on the specific harvest activity (e.g., intertidal gathering vs herring roe collection) and the nature of proposed aquaculture development (e.g., subtidal vs intertidal culture). The Craig Tribal Association also expressed concerns related to the proximity of AOA options to herring spawning areas, salmon seine lines, trolling areas, and seal haulouts. Craig Tribal Use Areas data representing salmon seine locations was received by the Team after public comment. There was no overlap with the Craig Study Area after constraints were removed, and as a result, the data were not included in the final round of suitability modeling. All aquaculture projects will be subject to further review during the Alaska state leasing and permitting process. Early and ongoing coordination with coastal communities, nearby Alaska Native Villages, Alaska Native Corporations, and other Tribal Associations is strongly recommended to ensure access to common-use resources, cultural resource sites, and that traditional uses are not adversely impacted.

Below are additional characterizations of site-specific details regarding the geographic location and environmental conditions of AOA options within the Craig Study Area, as well as considerations regarding national security, natural resources, navigation and transportation, cultural resources, and various industries including aquaculture and fisheries. These are presented as tables containing location information for each option and proximity to these considerations (Tables 3.17–3.18). Following these tables are maps that visualize the options along with data used within the suitability model (Figures 3.191–3.196). Next are plots summarizing available time series data to provide additional context on environmental conditions and observed vessel traffic within the options (Figures 3.197–3.216). Following these tables and figures are individual text descriptions for each option summarizing the characteristics observed. These tables, figures, and text summaries were created using many different spatial datasets curated to complement factors considered during the Alaska state aquatic farm lease application and review process, and to assist proponents in the identification of key user groups and resource agencies to engage with during the project design and application process. These data are unlikely to be exhaustive, and there may be additional considerations not captured in this characterization. These different presentation methods are meant not only to communicate site-specific characteristics in multiple ways but also to complement each other. They may also contain unique bits of information not found in the other parts of this characterization.

Table 3.17. Characterization summary for Craig Aquaculture Opportunity Area subtidal and intertidal options within the southern extent: CRA-I1, CRA-S1, CRA-S2, CRA-S3, CRA-S4. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km).

	Southern extent				
	CRA-I1	**CRA-S1**	**CRA-S2**	**CRA-S3**	**CRA-S4**
General characteristics					
Center Coordinates (longitude, latitude)	−133.3900, 55.4683	−133.4110, 55.2848	−133.0280, 55.3728	−133.1680, 55.3758	−133.2700, 55.4500
Size (ac)	86.9	112.3	130	415.4	185.3
Distance to Coastal Populated Places (nm)	8	17.5	7.7	5.9	3.5
Depth (m) (min, max, mean), Average Slope (degrees)	−3.39, 9.6, 0.71, 1.63	1.39, 26.09, 16.22, 4.64	18.72, 86.78, 39.72, 4.48	−23.34, 71, 31.55, 7.16	−1.86, 32.57, 15.93, 3.67
Alaska Area Plan Subunit	MT07	DT01, DT56	CT19, CT30	CT23, CT24, CT30	CT30
Commercial Statistical Areas – Groundfish	335506	335504	335506	335506	335506

	Southern extent				
	CRA-I1	CRA-S1	CRA-S2	CRA-S3	CRA-S4
Commercial Statistical Areas – Salmon, Shellfish	10350	10430	10360	10360	10360
Constraints					
Anadromous Waters Catalog – Streams (91.5-m Setback)	2.21	0.17	0.73	0.11	4.1
Deep-Sea Coral and Sponge Occurrences (1,000-m Setback)	-	-	-	-	-
Ferry Routes (500-m Setback)	-	-	-	-	-
Key Harbor Seal Haulout Locations (500-m Setback)	-	-	-	-	-
Navy Undersea Cables within 5 km (500-m Setback)*	-	Yes	-	Yes	-
Pipelines (500-m Setback)	-	-	-	-	-
Submarine Cable Areas (200-m Setback)	-	-	0.23	0.26	-
Wastewater Outfalls (500-m Setback)	-	-	-	-	-
Wrecks and Obstructions (152.5-m Setback)	-	-	2.5	0.37	4.3
National Security					
Munitions and Explosives of Concern	-	-	-	-	-
Natural Resources					
Cetacean Biologically Important Areas – Feeding	Humpback Whale (0)	Humpback Whale (1.5)	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (0)
Cetacean Biologically Important Areas – Migratory Route	-	-	-	-	-
Humpback Whale High-Use Areas	0	1.98	0	0	0
NMFS ESA Critical Habitat	-	-	-	-	-
Non-Key Harbor Seal Haulout Locations (500-m Setback)	0.1	1.33	0	3.11	3.9
North Pacific Seabird Data**	-	-	-	-	-
ShoreZone Coastal Mapping – Eelgrass Bioband	0	0	0	0	0
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	-	-	-	-	-

	Southern extent				
	CRA-I1	CRA-S1	CRA-S2	CRA-S3	CRA-S4
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-	-	-	-
Industry, Navigation, and Transportation					
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-	-	-	-
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	-	-	-	-	-
Permitted Log Transfer Facility (500-m Setback)	-	-	-	-	-
USFS Recreation Opportunities – Cabin Rentals	-	-	-	-	-
Cultural Resources					
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m Setback)*	2	-	3	3	1
Alaska Area Plans (Community Harvest) overlap	-	-	Yes	Yes	Yes
Subsistence Search and Harvest Areas within 5 km	large land mammals, marine inverts, marine mammals, non-salmon fish, other mammals, salmon	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	large land mammals, marine inverts, non-salmon fish, salmon
Aquaculture and Fisheries					
Alaska Area Plans (Sport Fishing) overlap	-	-	Yes	-	-
Alaska DNR Shore Fishery Lease	-	-	-	-	-
Hatchery Release Sites	-	-	-	-	-
Aquatic Farm Permits	-	-	4.63	2.35	-
*Classified data layer, will denote a value of “Yes” if within 5 km of an option instead of a distance value. **A straight-line distance was used to calculate minimum travel distance.					

Table 3.18. Characterization summary for Craig Aquaculture Opportunity Area subtidal and intertidal options within the the northern extent: CRA-I2, CRA-I3, CRA-S5, CRA-S6, CRA-S7, CRA-S8, CRA-S9, CRA-S10, CRA-S11. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km).

	Northern extent								
	CRA-I2	CRA-I3	CRA-S5	CRA-S6	CRA-S7	CRA-S8	CRA-S9	CRA-S10	CRA-S11
General characteristics									
Center Coordinates (longitude, latitude)	−133.1830, 55.5846	−133.1140, 55.61100	−133.1690, 55.5897	−133.0950, 55.5972	−133.1210, 55.6006	−133.3990, 55.6720	−133.4070, 55.7075	−133.4060, 55.7228	−133.3700, 55.7305
Size (ac)	75.9	69.8	326.1	72.8	95	178.5	130.2	90	119.3
Distance to Coastal Populated Places (nautical miles)	6.7	8.4	6.8	7.8	7.8	15.3	17.5	18.3	19.8
Depth (m) (min, max, mean), Average Slope (degrees)	−3.3, 9.06, 3.55, 2.5	−12.6, 10.96, 1.52, 4.37	−1.55, 24.81, 11.24, 1.91	−2.83, 14.86, 6.1, 2.05	−5.4, 12.15, 7.64, 1.96	−14.02, 50.1, 23.46, 7.44	1.15, 45.54, 21.78, 7.24	−6.11, 59.21, 22.91, 11.68	−22.28, 34.56, 11.52, 6.53
Alaska Area Plan Subunit	CT02	CT02, CT10	CT02	CT02	CT02	10B	10B	10B	10B
Commercial Statistical Areas – Groundfish	335535	335535	335535	335535	335535	335535	335535	335535	335535
Commercial Statistical Areas – Salmon, Shellfish	10360	10360	10360	10360	10360	10380	10380	10380	10380
Constraints									
Anadromous Waters Catalog – Streams (91.5-m Setback)	1.78	0.16	0.63	2.37	0.87	0.37	3.86	4.59	2.73
Deep-Sea Coral and Sponge Occurrences (1,000-m Setback)	-	-	-	-	-	-	-	-	-
Ferry Routes (500-m Setback)	-	-	-	-	-	-	-	-	-
Key Harbor Seal Haulout Locations (500-m Setback)	0.23	2.02	0.9	3.06	3.17	-	2.14	0.29	0.42

	Northern extent								
	CRA-I2	CRA-I3	CRA-S5	CRA-S6	CRA-S7	CRA-S8	CRA-S9	CRA-S10	CRA-S11
Navy Undersea Cables within 5 km (500-m Setback)*	-	-	-	-	-	-	-	-	-
Pipelines (500-m Setback)	-	-	-	-	-	-	-	-	-
Submarine Cable Areas (200-m Setback)	-	-	-	-	-	-	-	-	-
Wastewater Outfalls (500-m Setback)	-	-	-	-	-	-	-	-	-
Wrecks and Obstructions (152.5-m Setback)	-	-	-	-	-	4.62	1.15	1.33	4.23
National Security									
Munitions and Explosives of Concern	-	-	-	-	-	-	-	-	-
Natural Resources									
Cetacean Biologically Important Areas – Feeding	Humpback Whale (0)	Humpback Whale (0.04)	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (0)
Cetacean Biologically Important Areas – Migratory Route	-	-	-	-	-	-	-	-	-
Humpback Whale High-Use Areas	2.26	-	2.96	-	-	0.93	1.15	0	0
NMFS ESA Critical Habitat	-	-	-	-	-	-	-	-	-
Non-Key Harbor Seal Haulout Locations (500-m Setback)	-	-	-	-	-	0	2.07	3.61	-
North Pacific Seabird Data**	-	-	-	-	-	-	-	-	-

	Northern extent								
	CRA-I2	CRA-I3	CRA-S5	CRA-S6	CRA-S7	CRA-S8	CRA-S9	CRA-S10	CRA-S11
ShoreZone Coastal Mapping – Eelgrass Bioband	0	0	0	0	0	0	0	0	0
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m setback)	-	-	-	-	-	-	-	-	-
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m setback)	-	-	-	-	-	-	-	-	-
Industry, Navigation, and Transportation									
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-	-	-	-	-	-	-	-
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	-	-	-	-	-	-	-	-	-
Permitted Log Transfer Facility (500-m setback)	-	-	-	-	-	-	-	-	-
USFS Recreation Opportunities – Cabin Rentals	-	-	-	-	-	-	-	-	-
Cultural Resources									
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m setback)*	6	7	5	7	8	11	10	4	7

	Northern extent								
	CRA-I2	CRA-I3	CRA-S5	CRA-S6	CRA-S7	CRA-S8	CRA-S9	CRA-S10	CRA-S11
Alaska Area Plans (Community Harvest) overlap	-	Yes	-	-	-	Yes	Yes	Yes	Yes
Subsistence Search and Harvest Areas within 5 km	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	large land mammals, marine invert, marine mammals, non-salmon fish, salmon	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	large land mammals, marine inverts, non-salmon fish, salmon	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon
Aquaculture and Fisheries									
Alaska Area Plans (Sport Fishing) overlap	-	-	-	-	-	-	-	-	-
Alaska DNR Shore Fishery Lease	-	-	-	-	-	-	-	-	-
Hatchery Release Sites	-	-	-	4.23	-	-	-	-	-
Aquatic Farm Permits	-	2.6	4.02	2.21	1.42	-	-	-	-
*Classified data layer, will denote a value of “Yes” if within 5 km of an option instead of a distance value. **A straight-line distance was used to calculate minimum travel distance.									

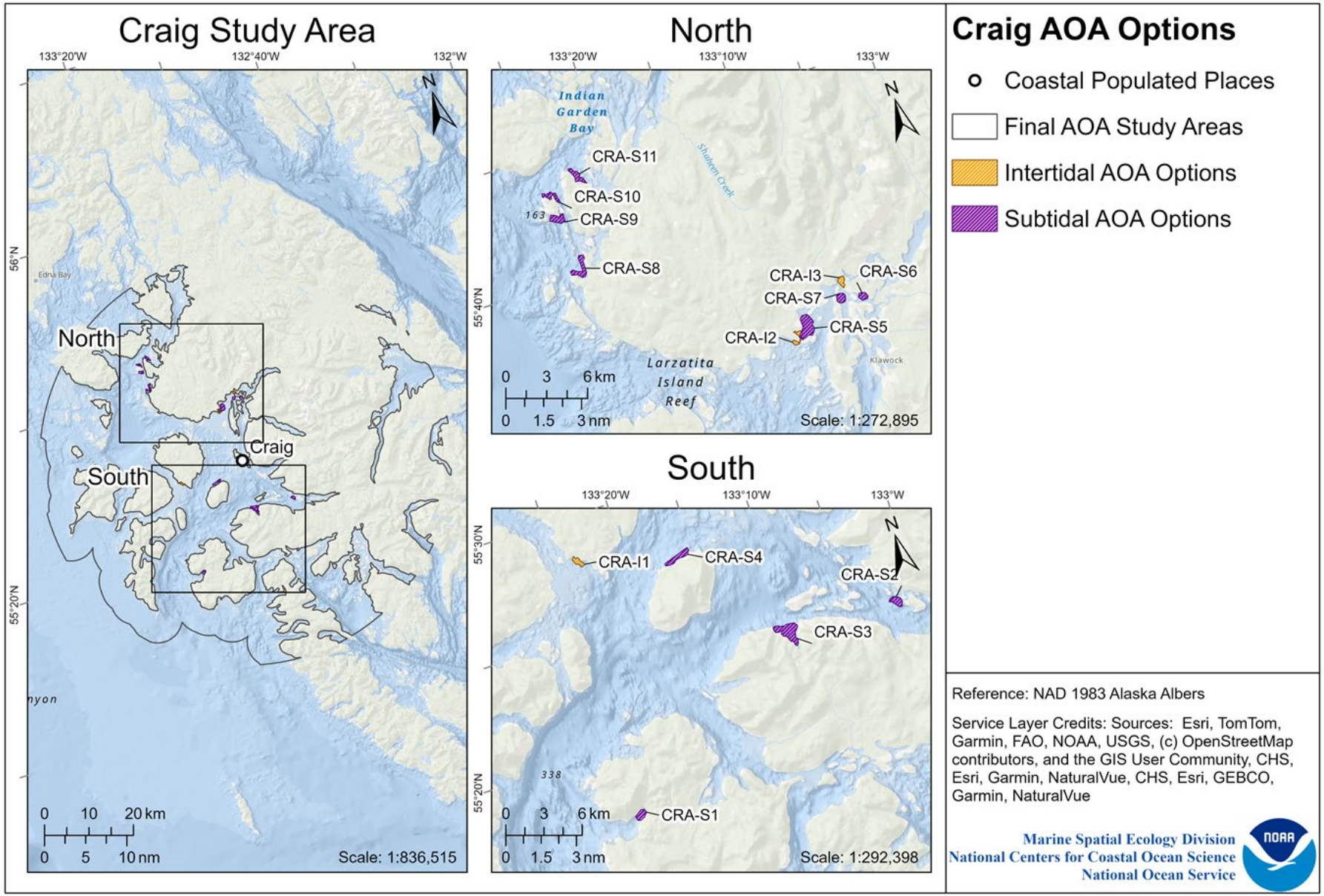


Figure 3.191. Final Alaska Aquaculture Opportunity Area intertidal and subtidal options for the Craig Study Area.

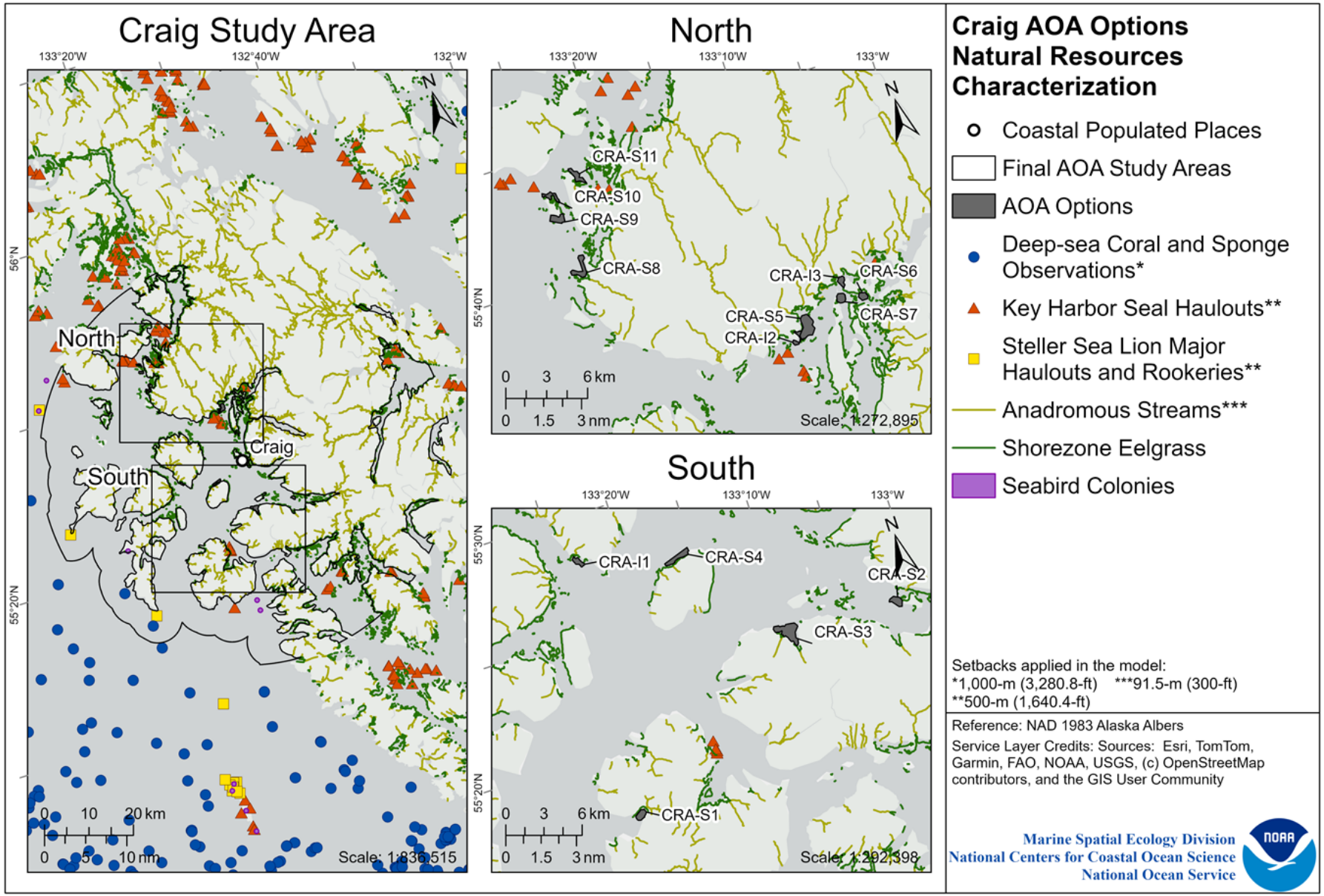


Figure 3.192. Natural resource interactions with the final AOA options in the Craig Study Area.

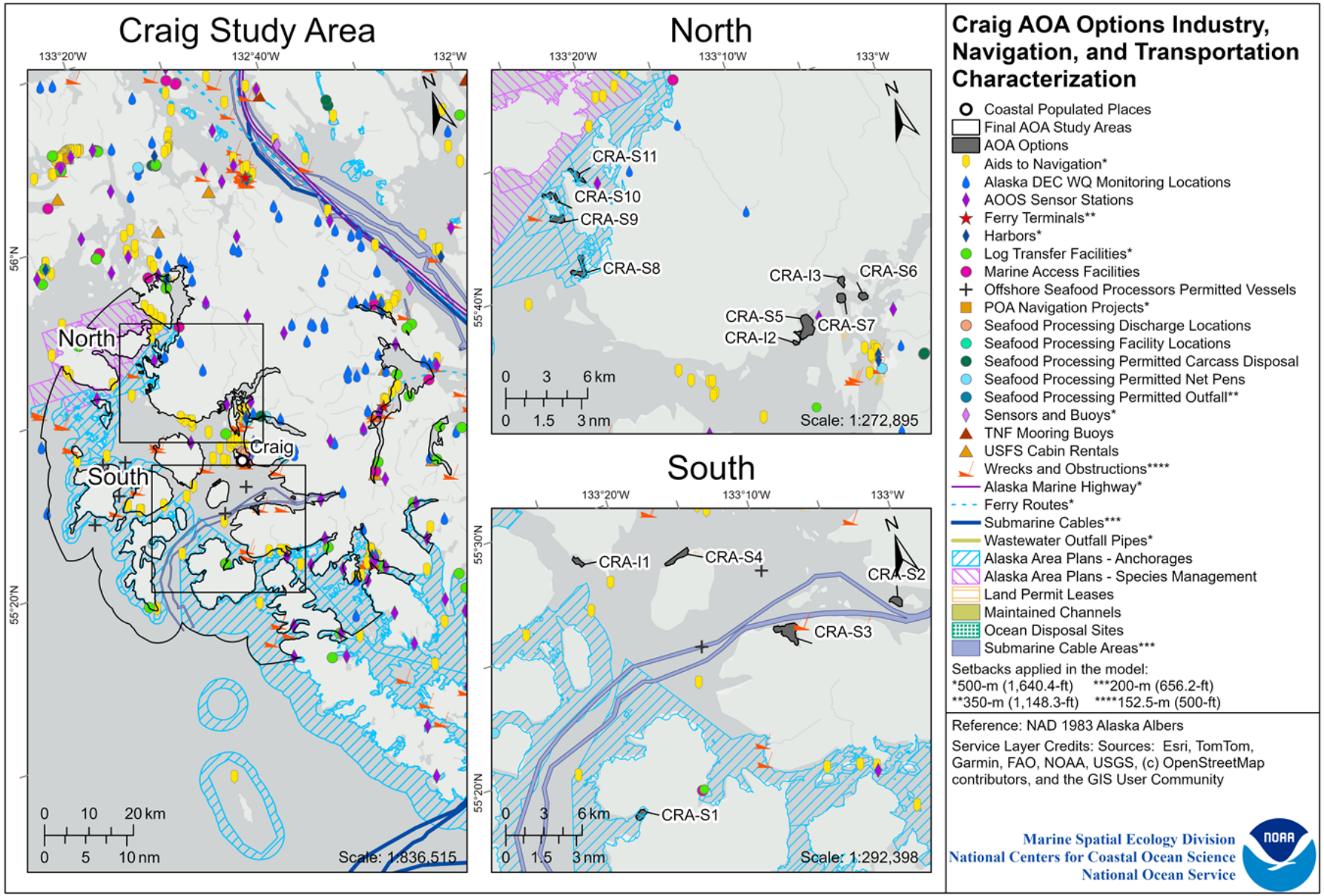


Figure 3.193. Industry, navigation, and transportation interactions with the final AOA options in the Craig Study Area.

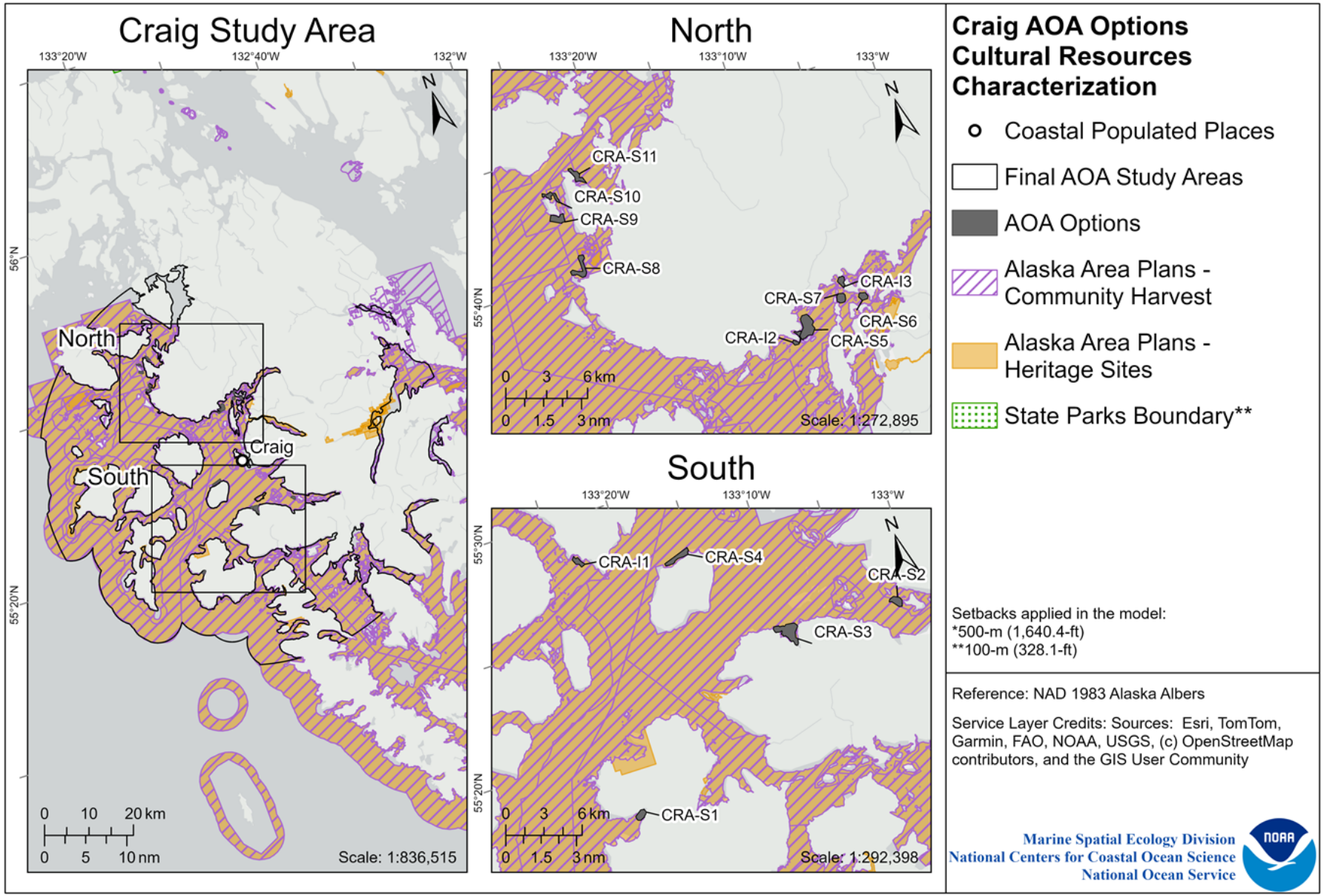


Figure 3.194. Cultural resource interactions with the final AOA options in the Craig Study Area.

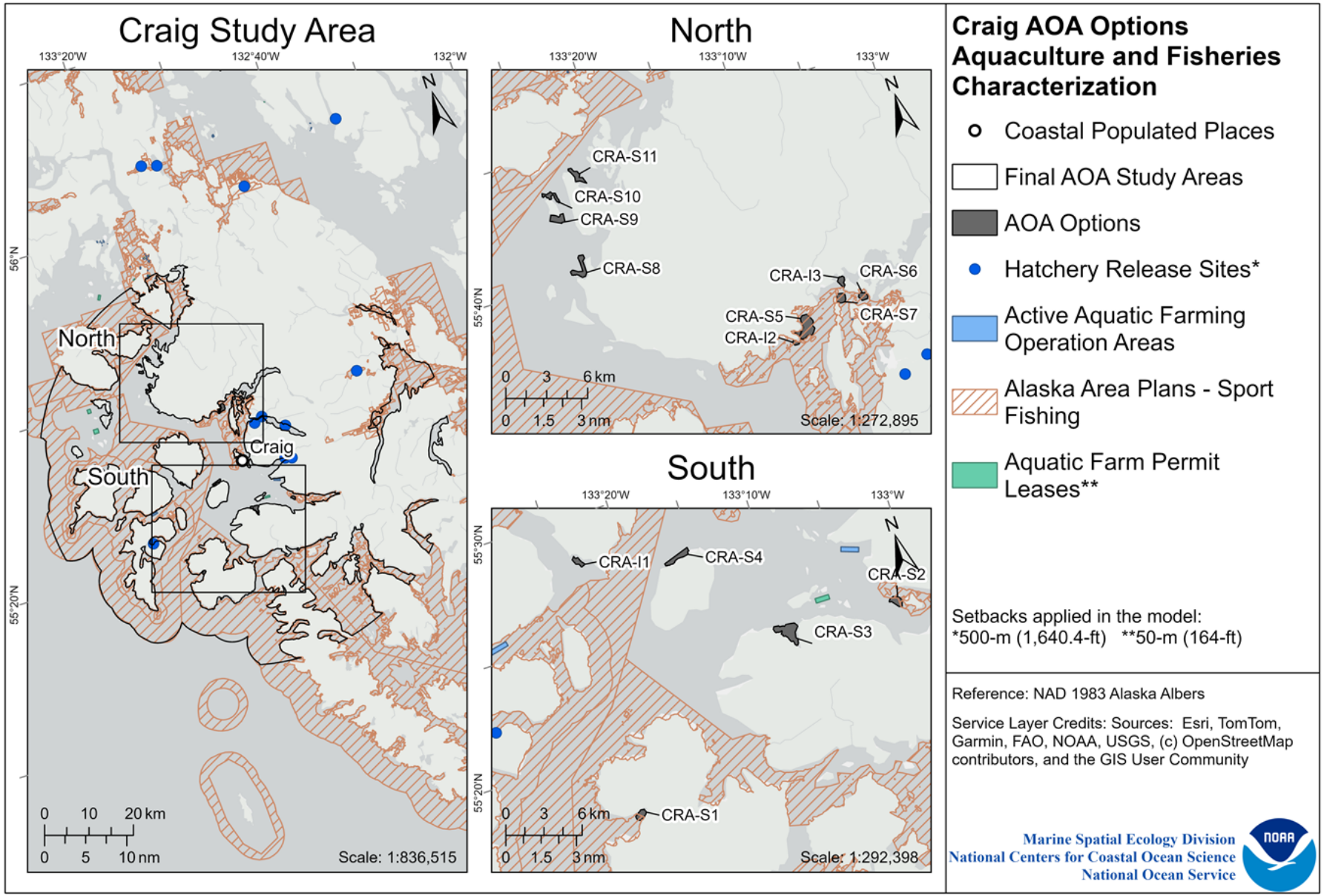


Figure 3.195. Aquaculture and fisheries interactions with the final AOA options in the Craig Study Area.

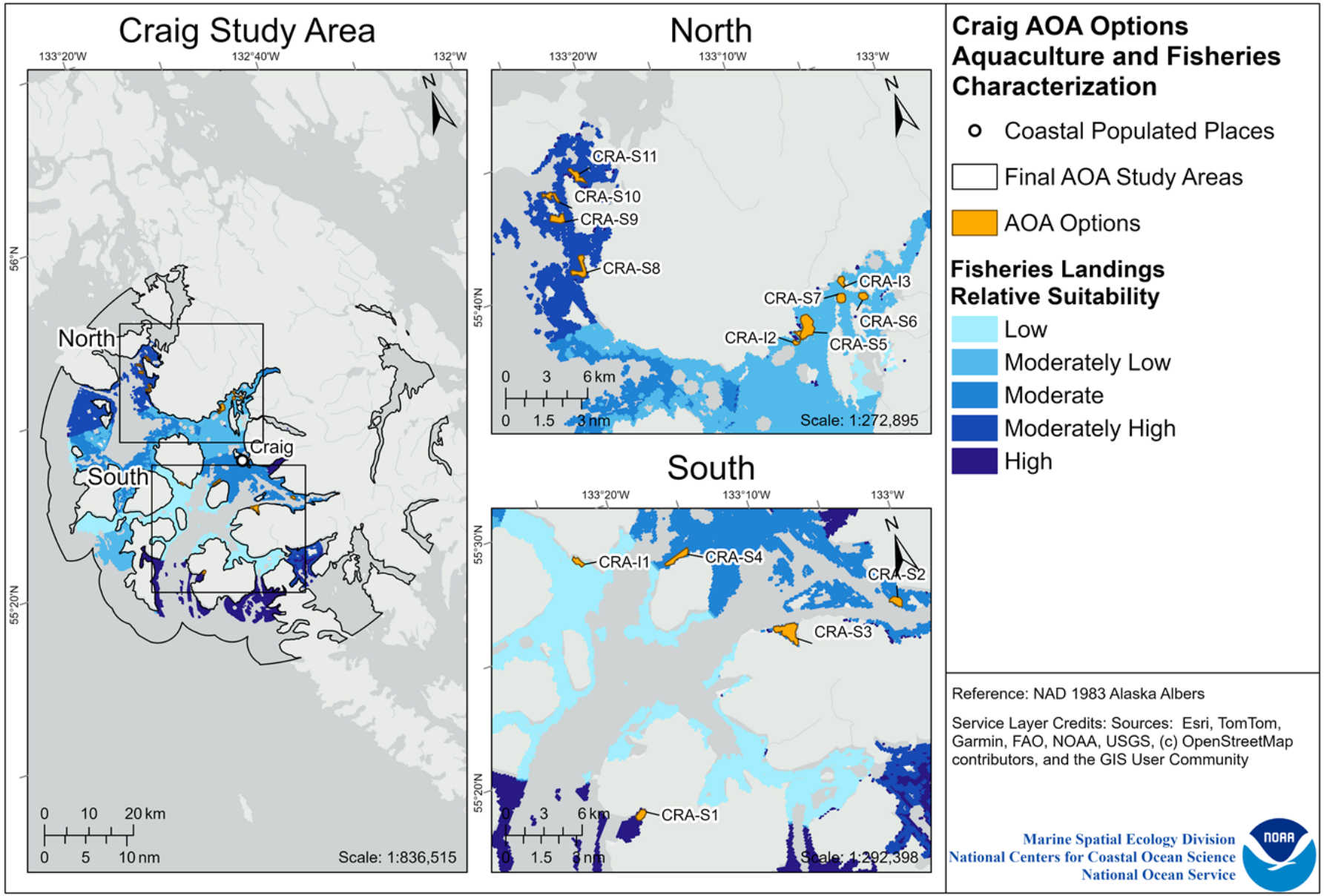


Figure 3.196. Relative suitability of the fishing landings combined data layer in relation to the final AOA options in the Craig Study Area.

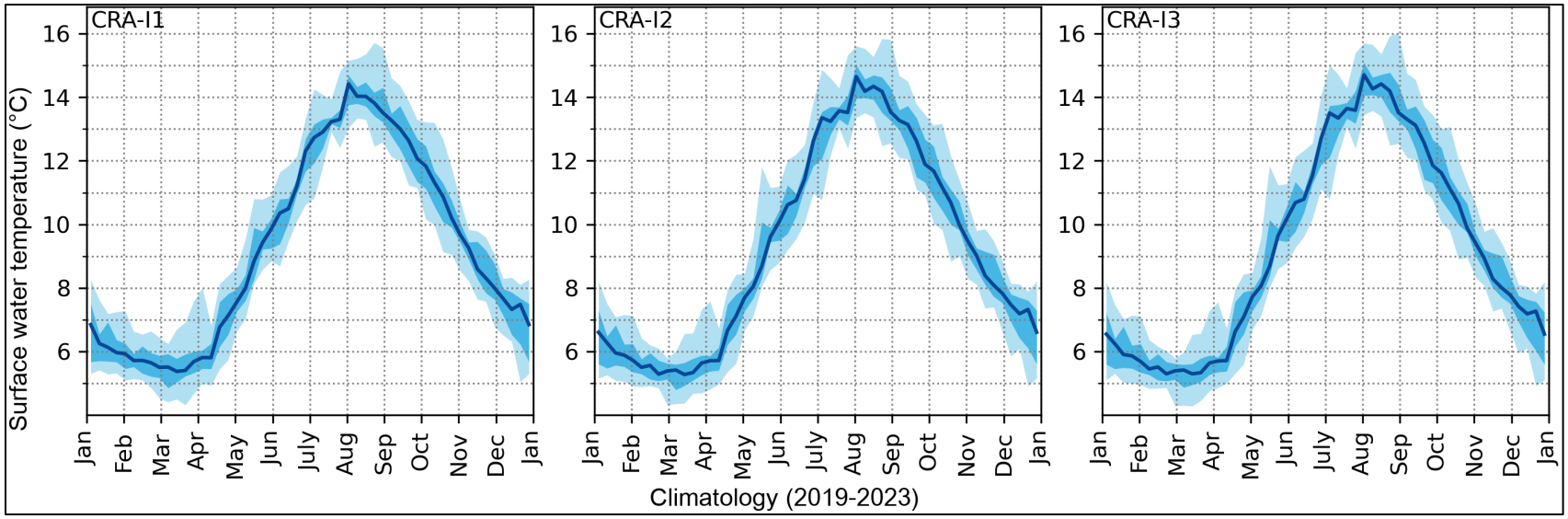


Figure 3.197. Sea surface temperatures for a subset of options from the Craig Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

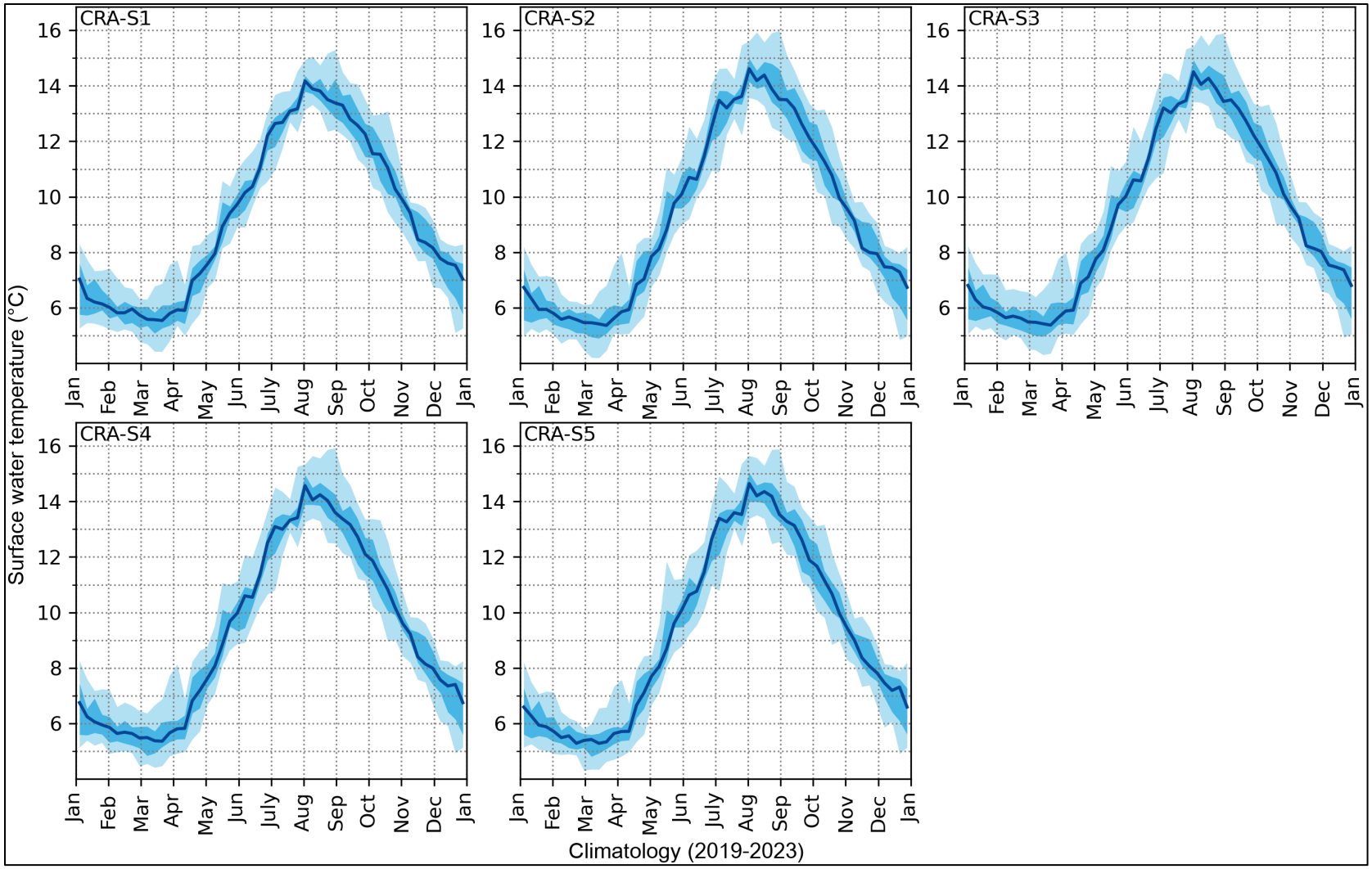


Figure 3.198. Sea surface temperatures for a subset of options from the Craig Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

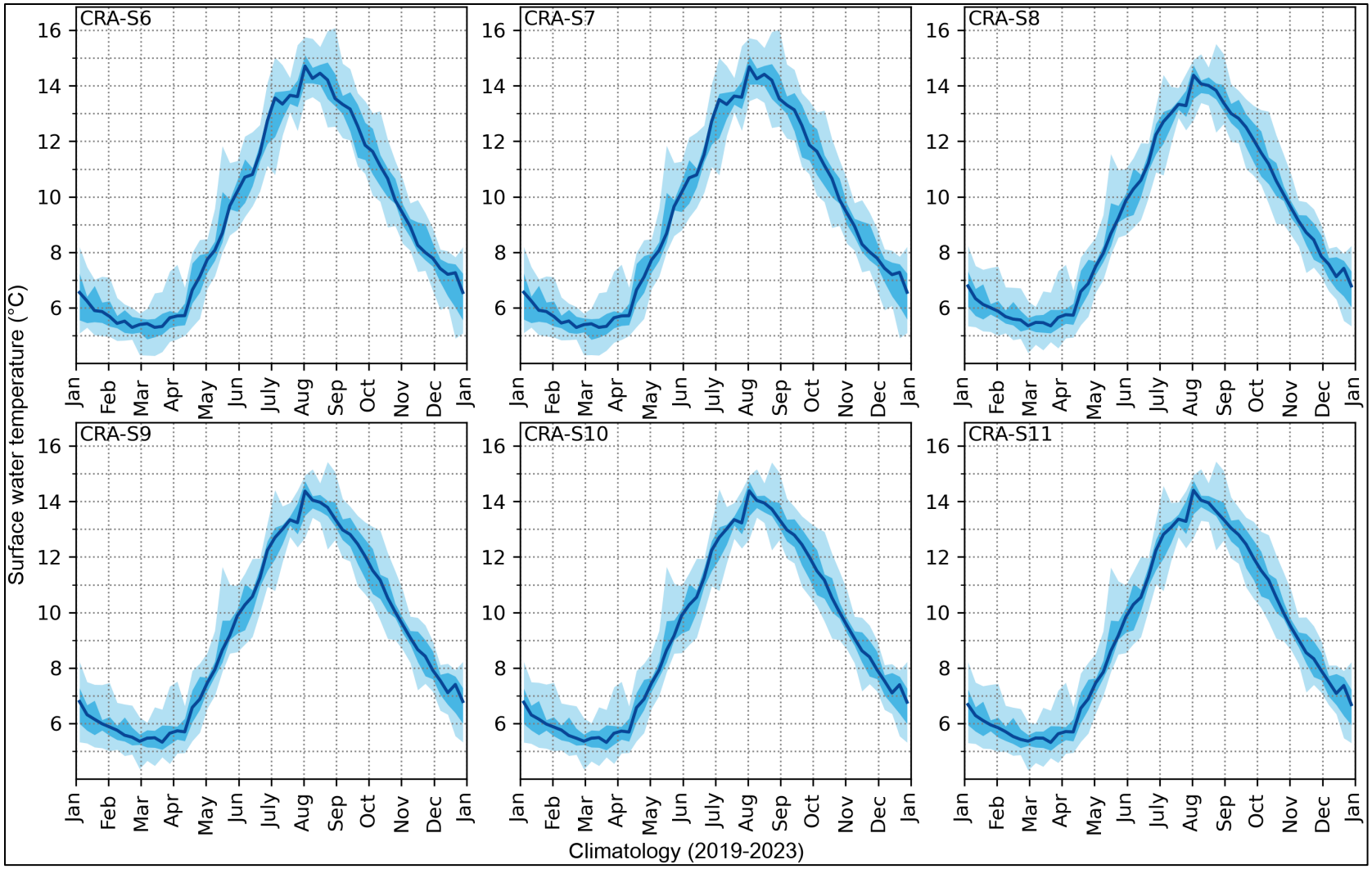


Figure 3.199. Sea surface temperatures for a subset of options from the Craig Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

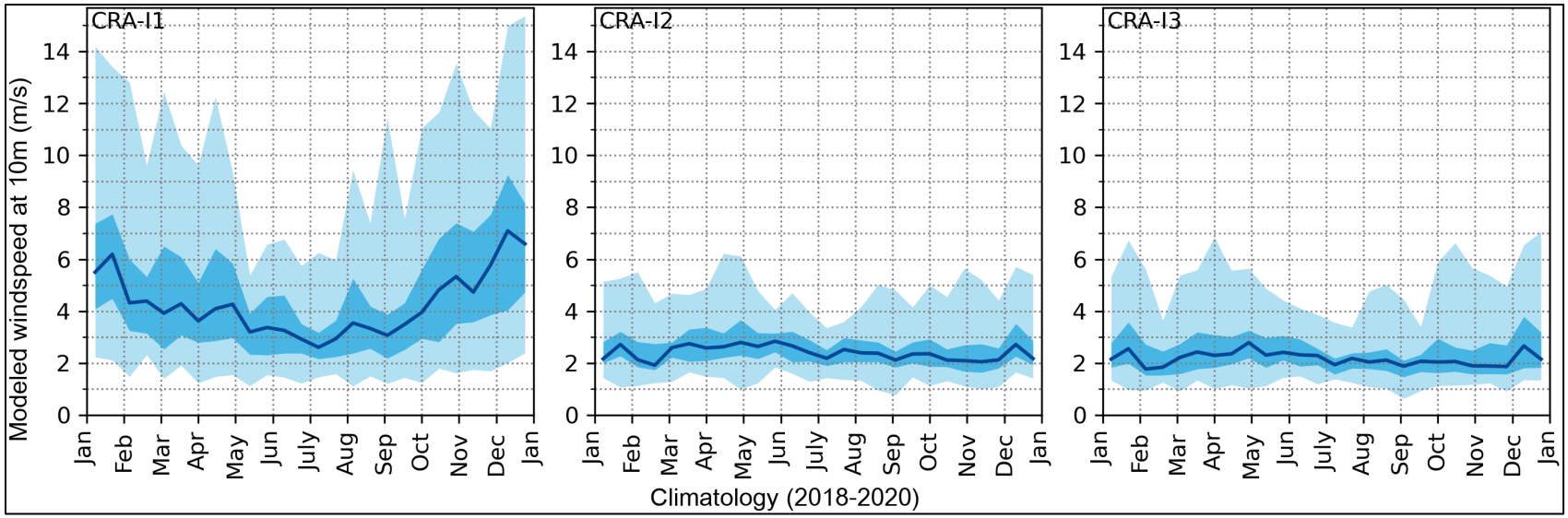


Figure 3.200. Wind speed at 10-m altitude for a subset of options from the Craig Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

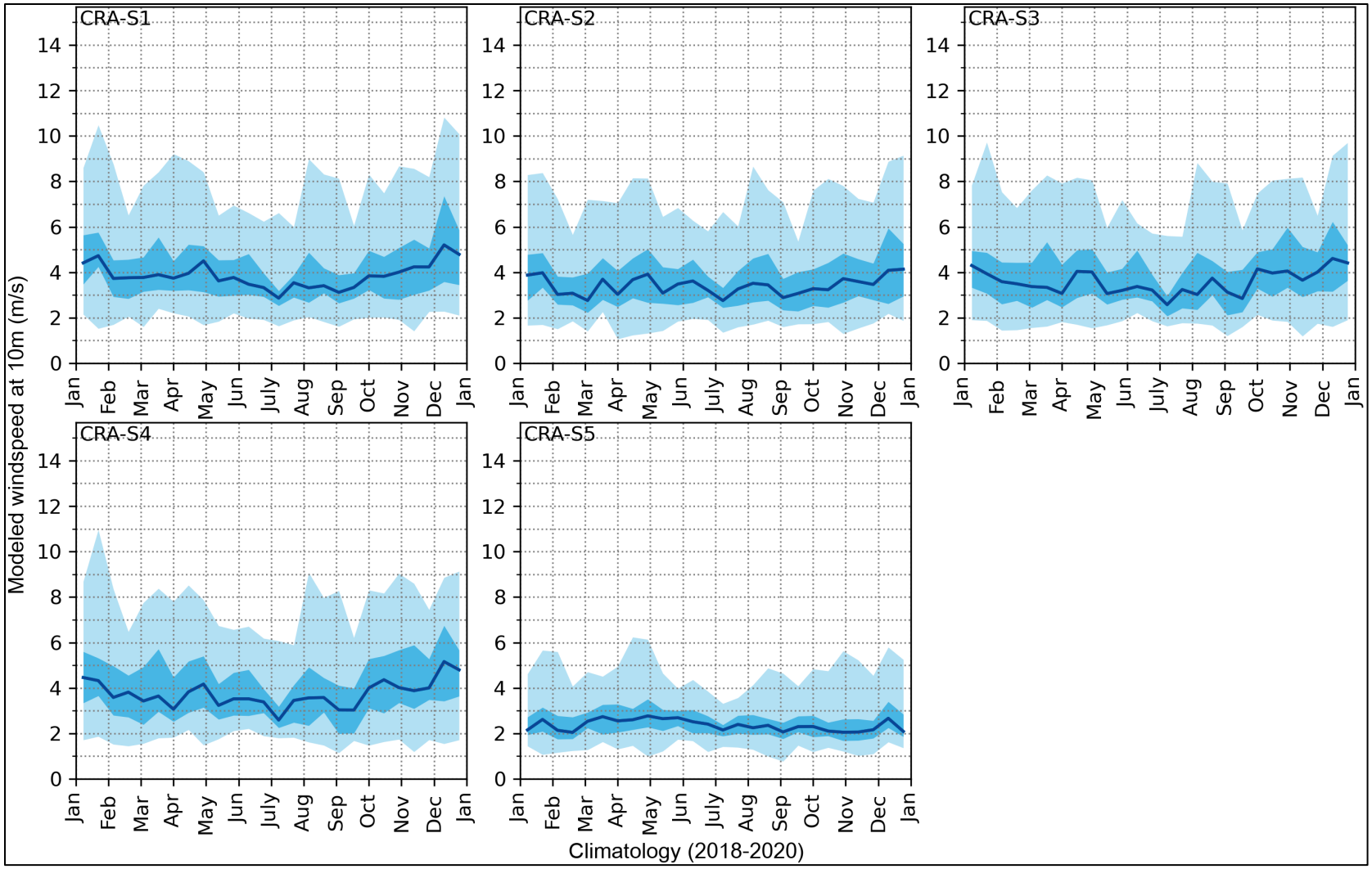


Figure 3.201. Wind speed at 10-m altitude for a subset of options from the Craig Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

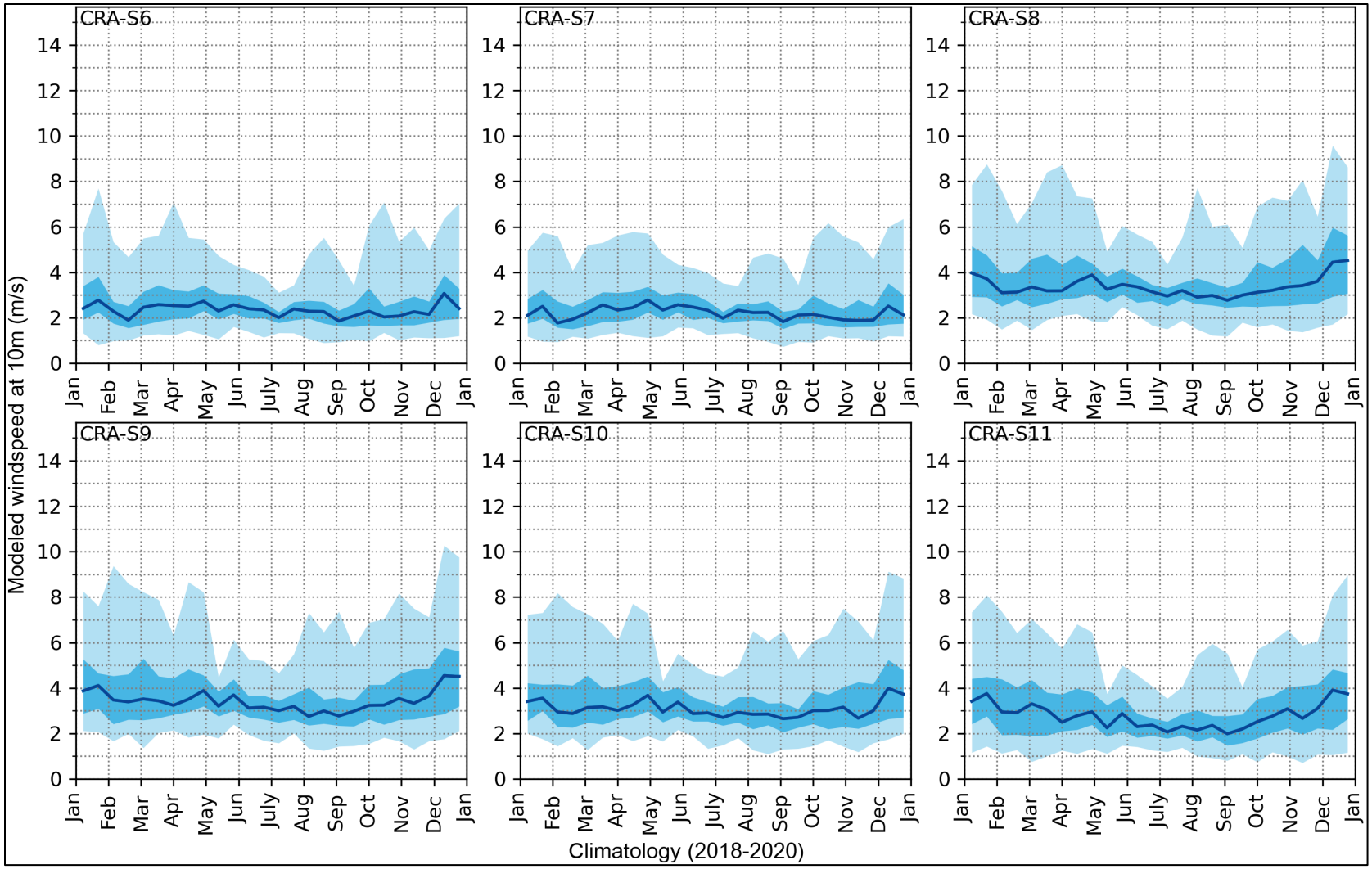


Figure 3.202. Wind speed at 10-m altitude for a subset of options from the Craig Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

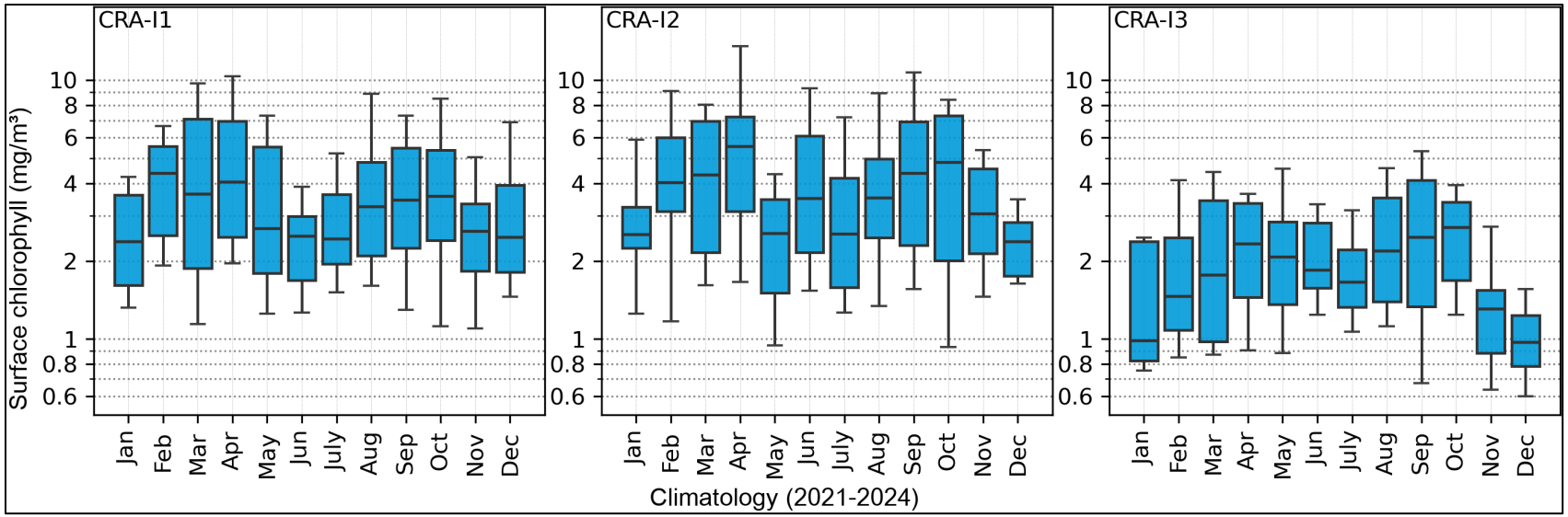


Figure 3.203. Monthly climatological surface chlorophyll *a* for a subset of options from the Craig Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

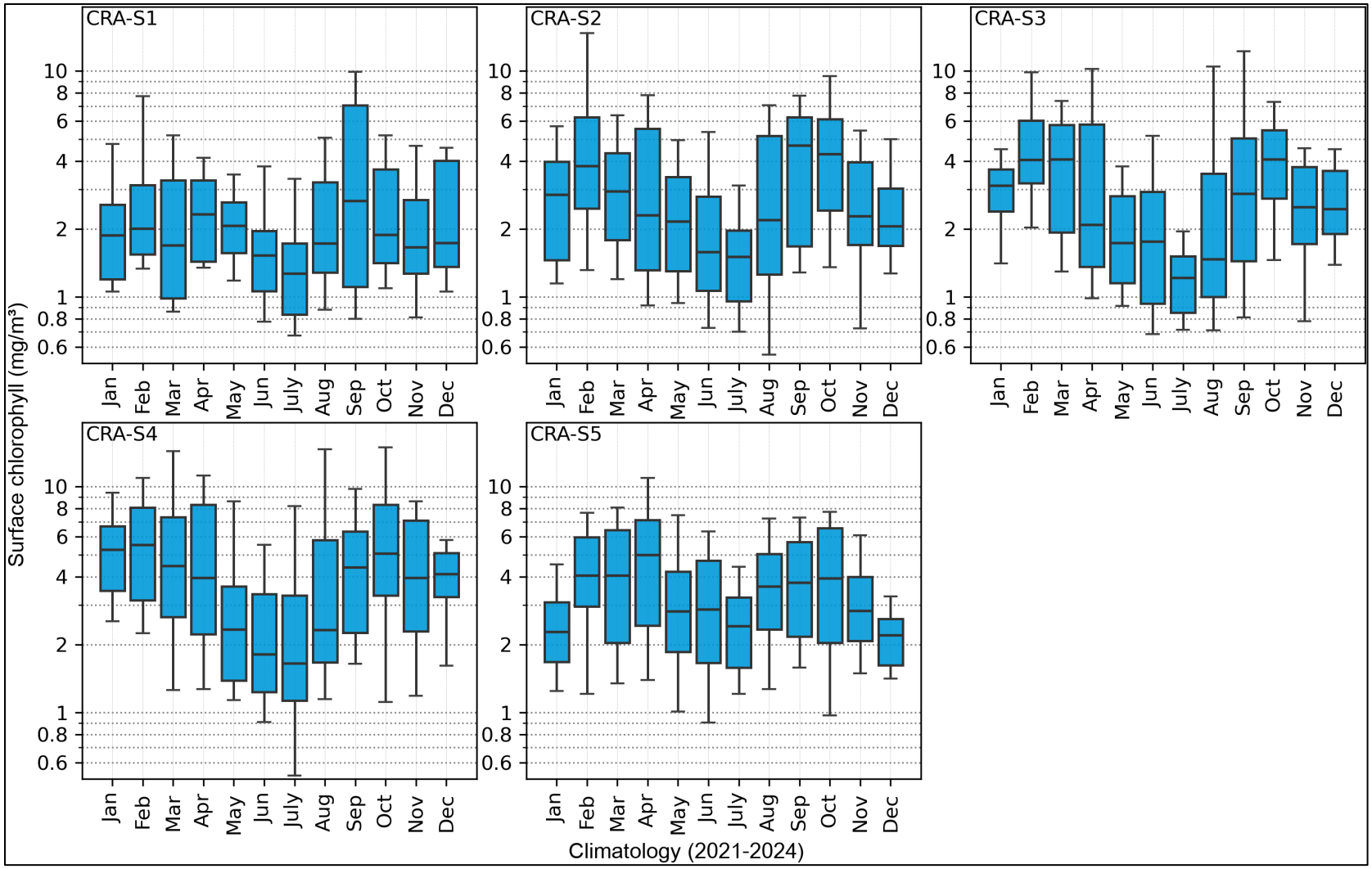


Figure 3.204. Monthly climatological surface chlorophyll *a* for a subset of options from the Craig Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

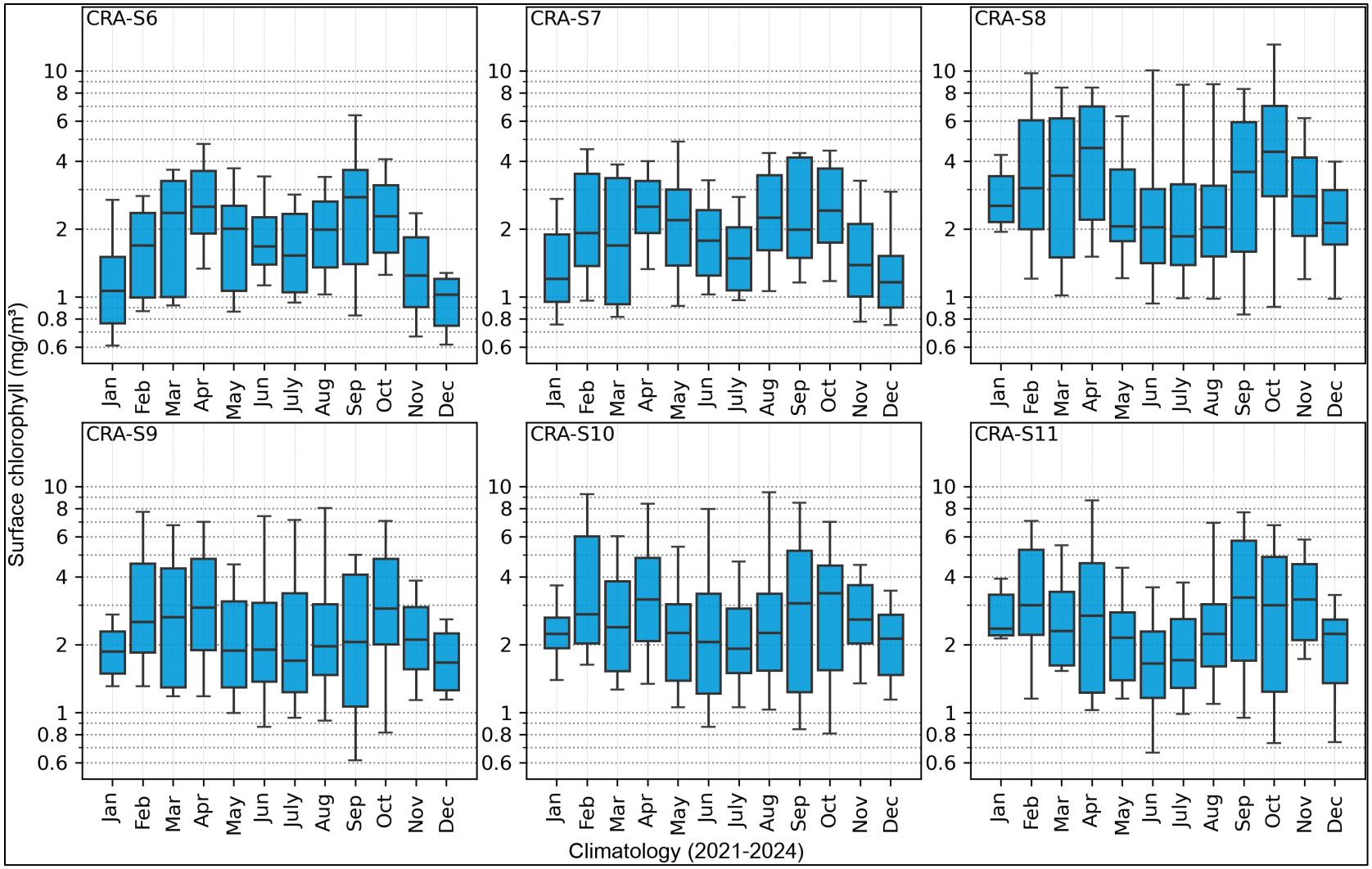


Figure 3.205. Monthly climatological surface chlorophyll *a* for a subset of options from the Craig Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

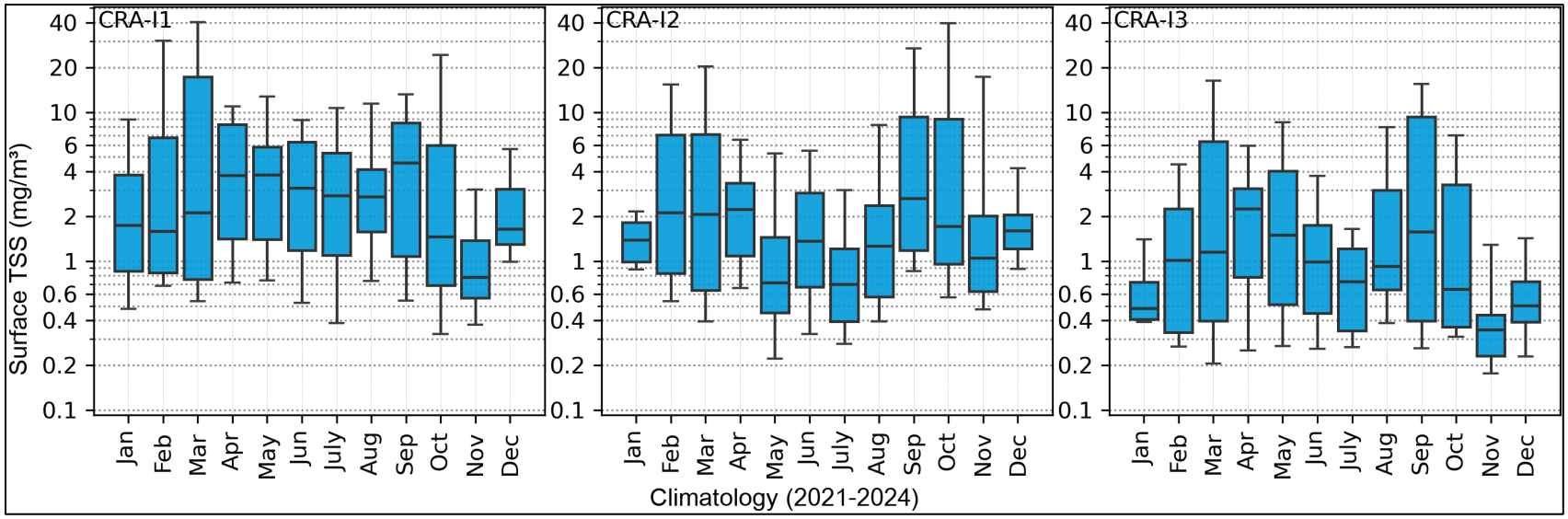


Figure 3.206. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Craig Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

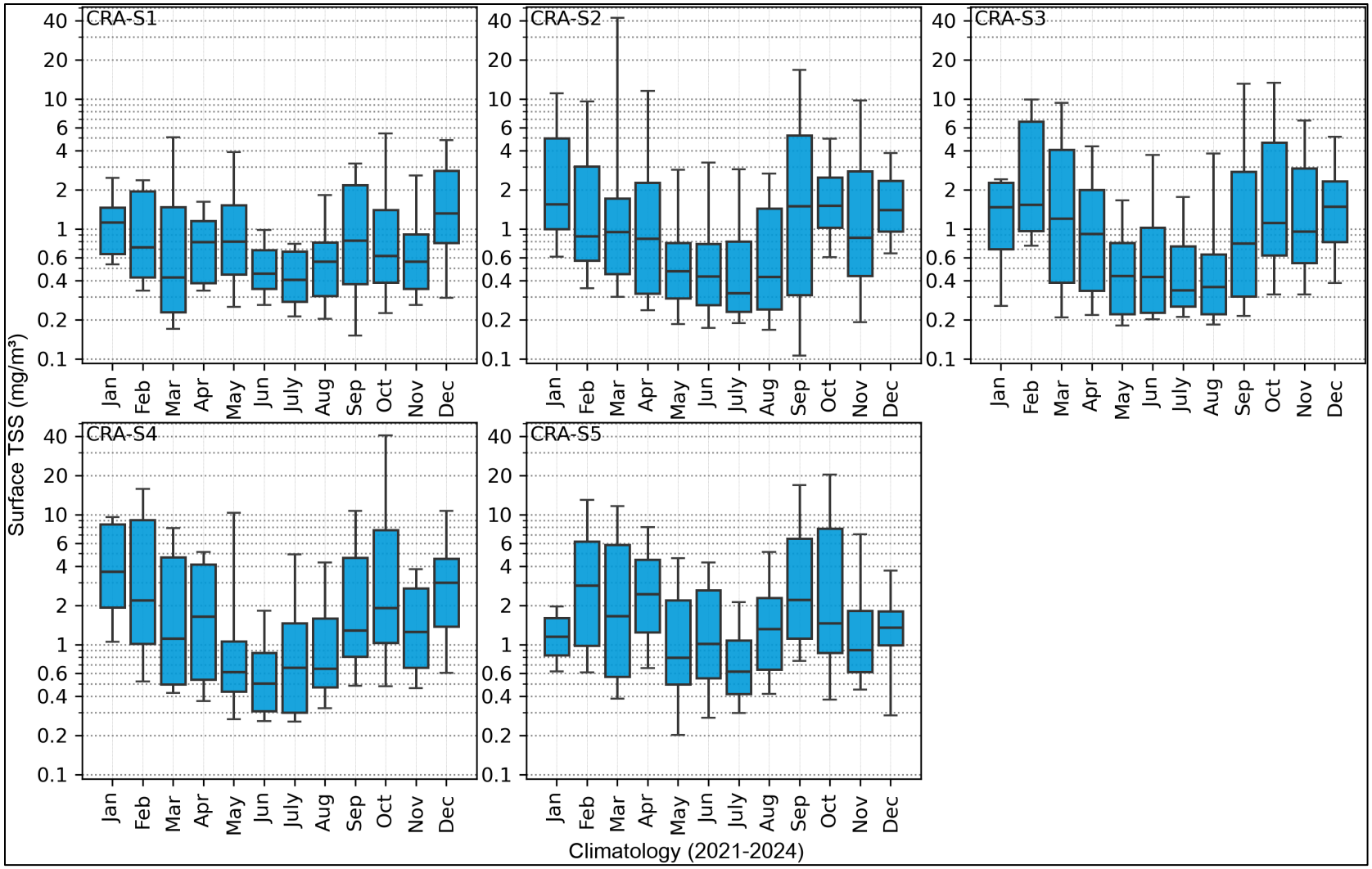


Figure 3.207. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Craig Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

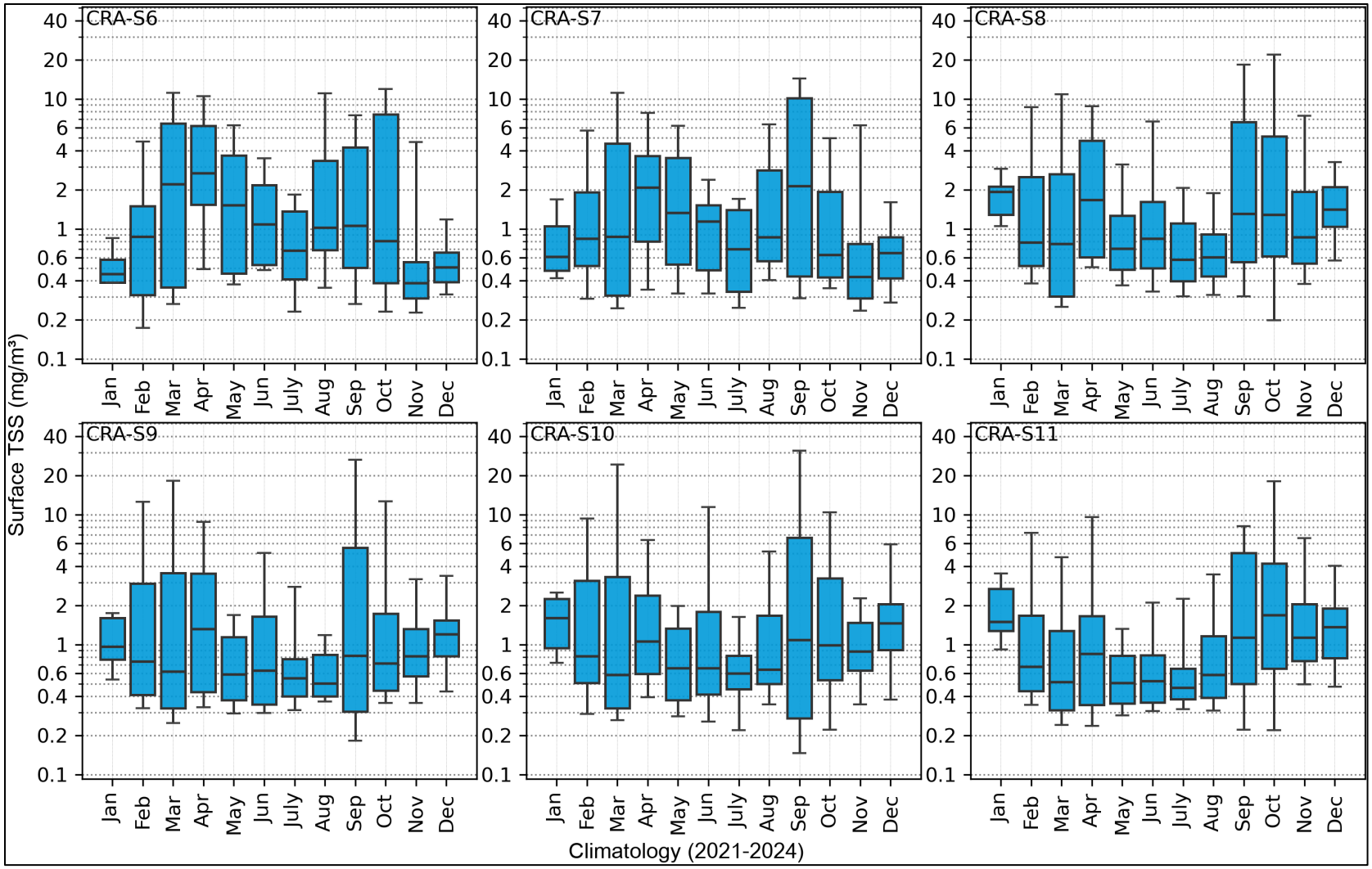


Figure 3.208. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Craig Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

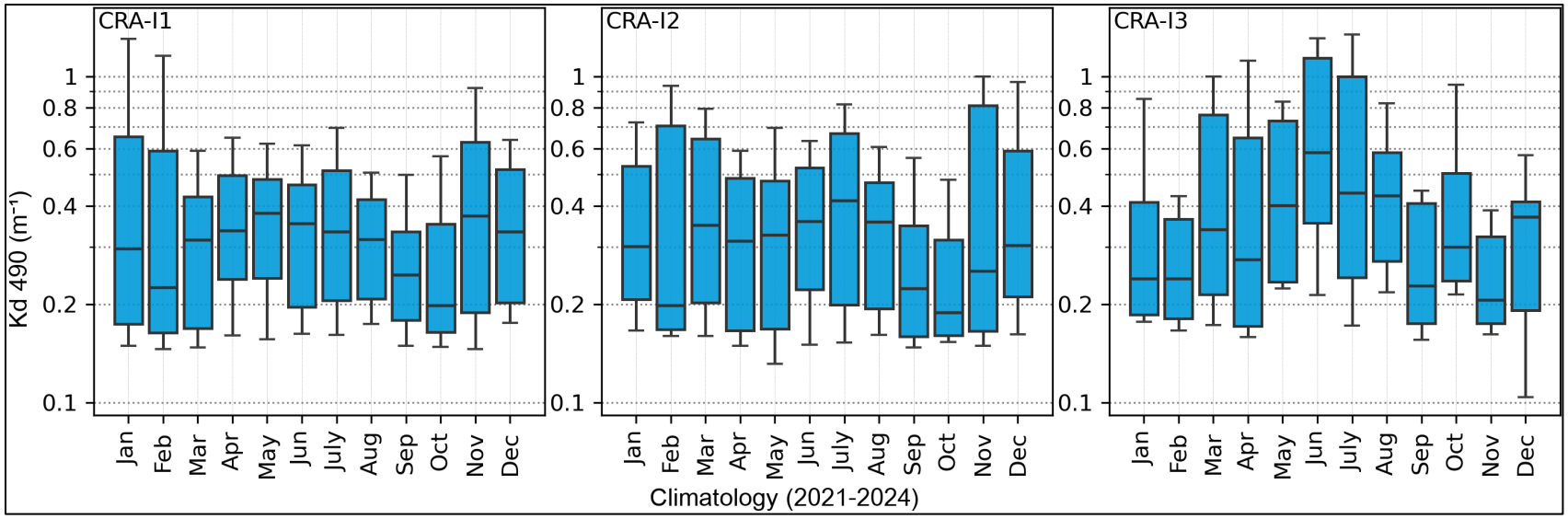


Figure 3.209. Monthly climatological light attenuation, Kd(490), for a subset of options from the Craig Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

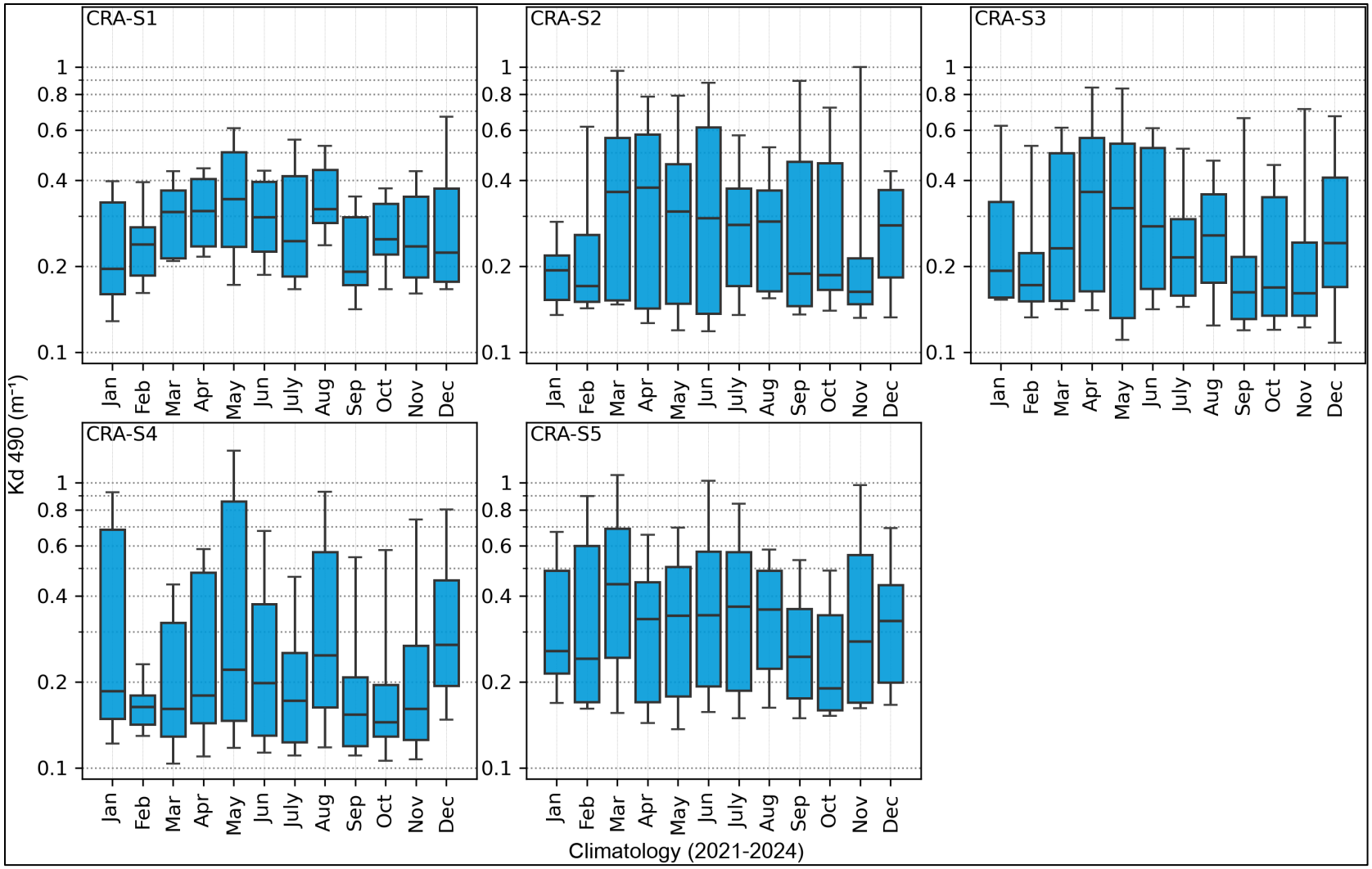


Figure 3.210. Monthly climatological light attenuation, Kd(490), for a subset of options from the Craig Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

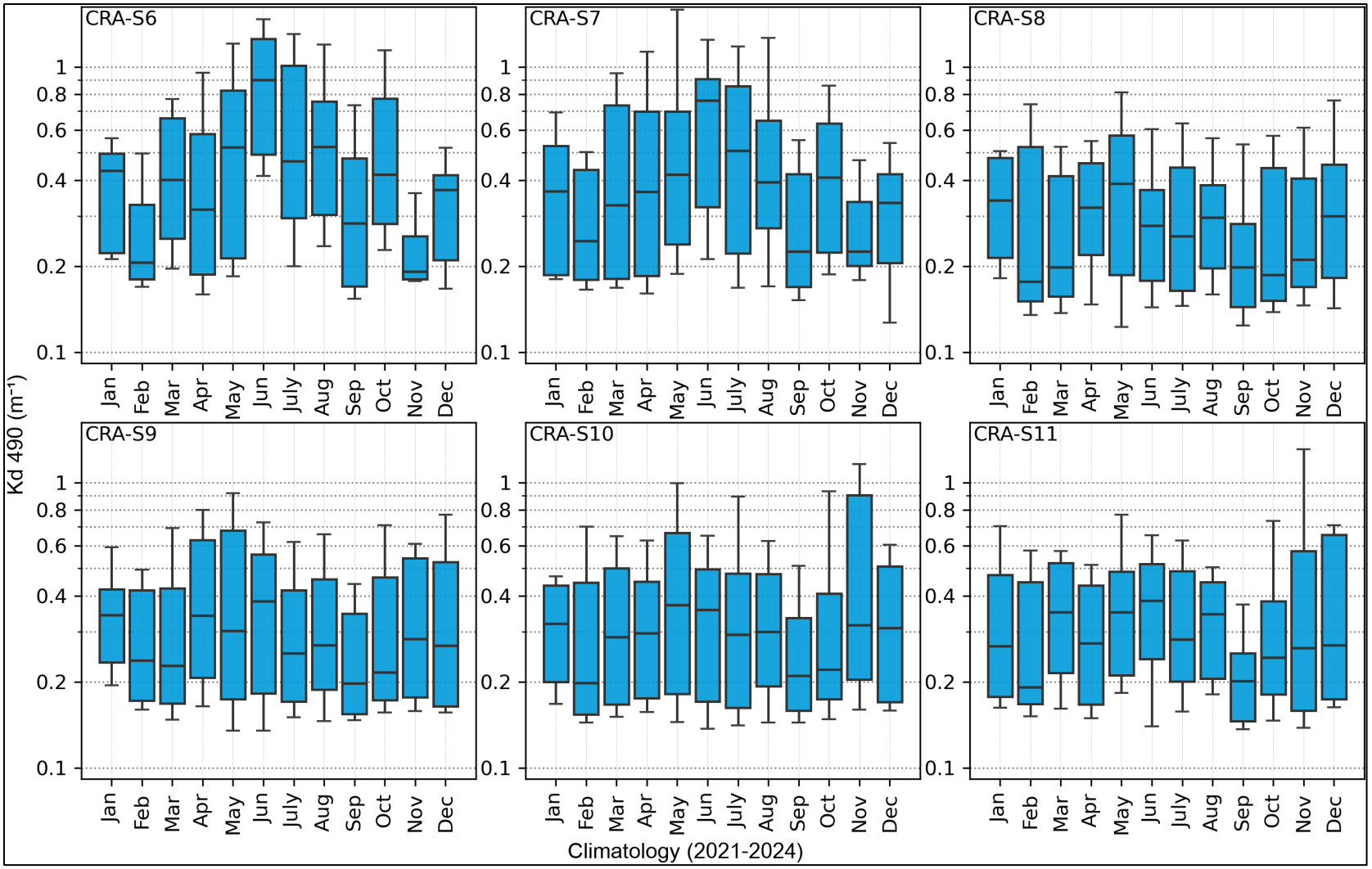


Figure 3.211. Monthly climatological light attenuation, Kd(490), for a subset of options from the Craig Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

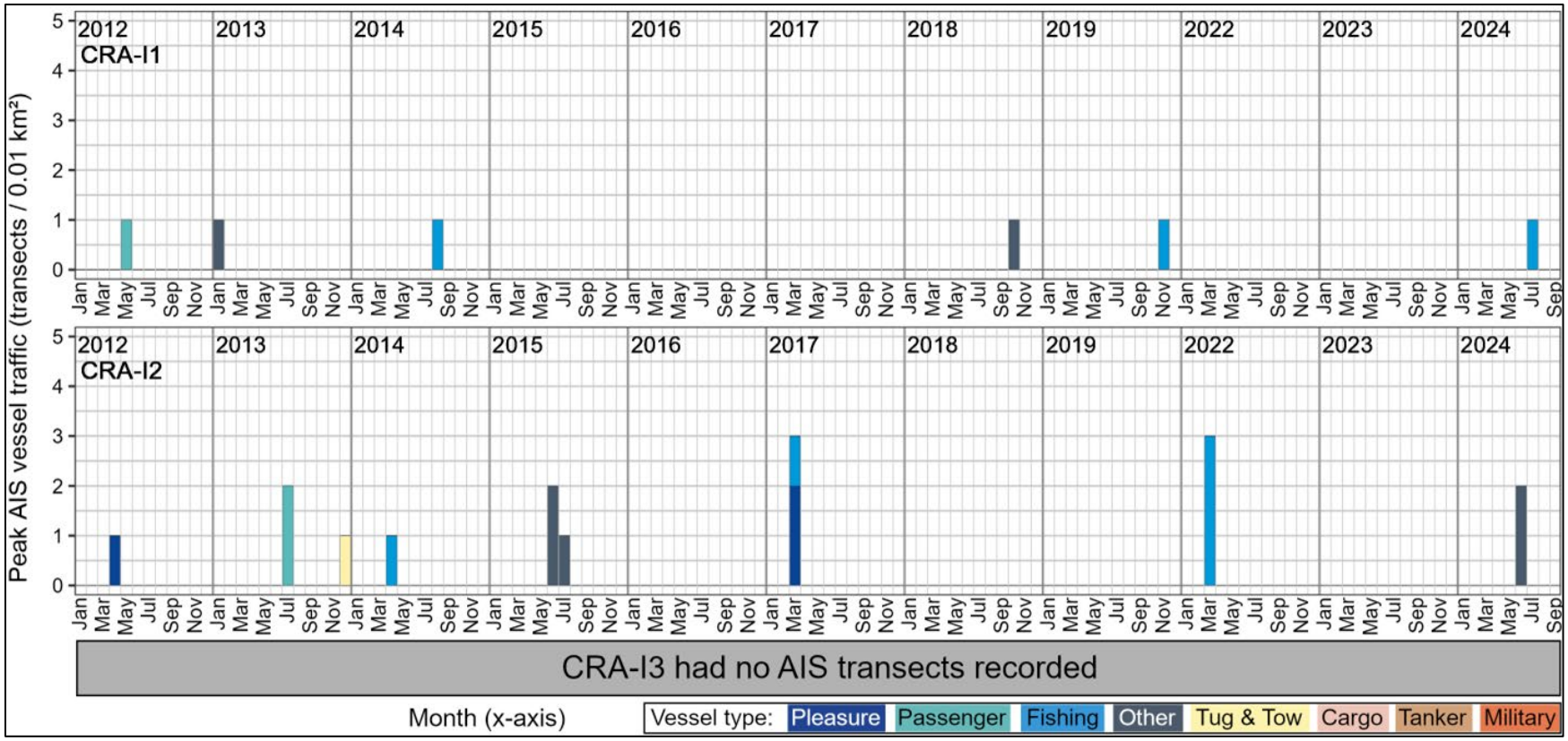


Figure 3.212. Monthly peak vessel traffic activity within options from a subset of the Craig Study Area by vessel type for years 2012-2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

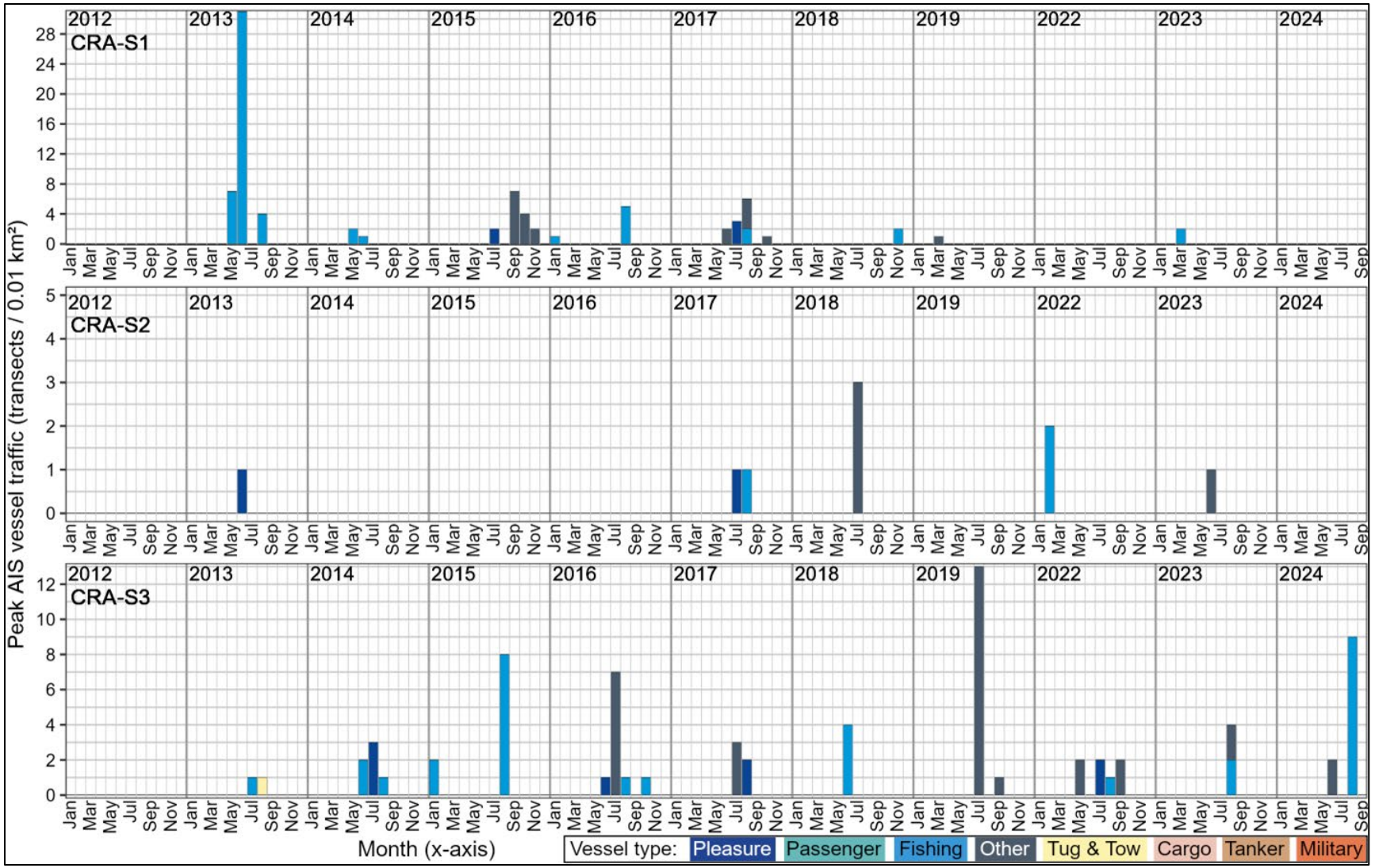


Figure 3.213. Monthly peak vessel traffic activity within options from a subset of the Craig Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

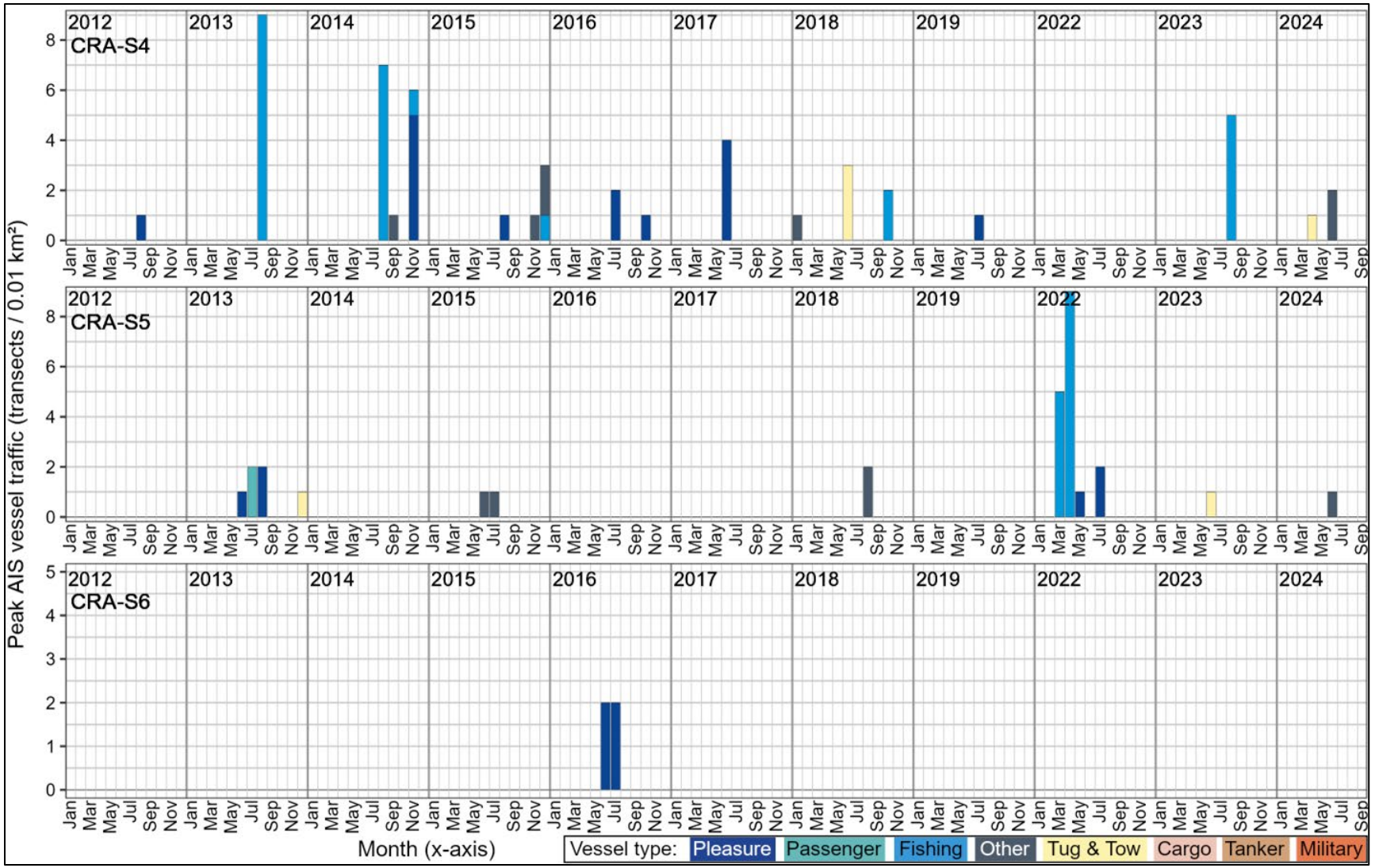


Figure 3.214. Monthly peak vessel traffic activity within options from a subset of the Craig Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

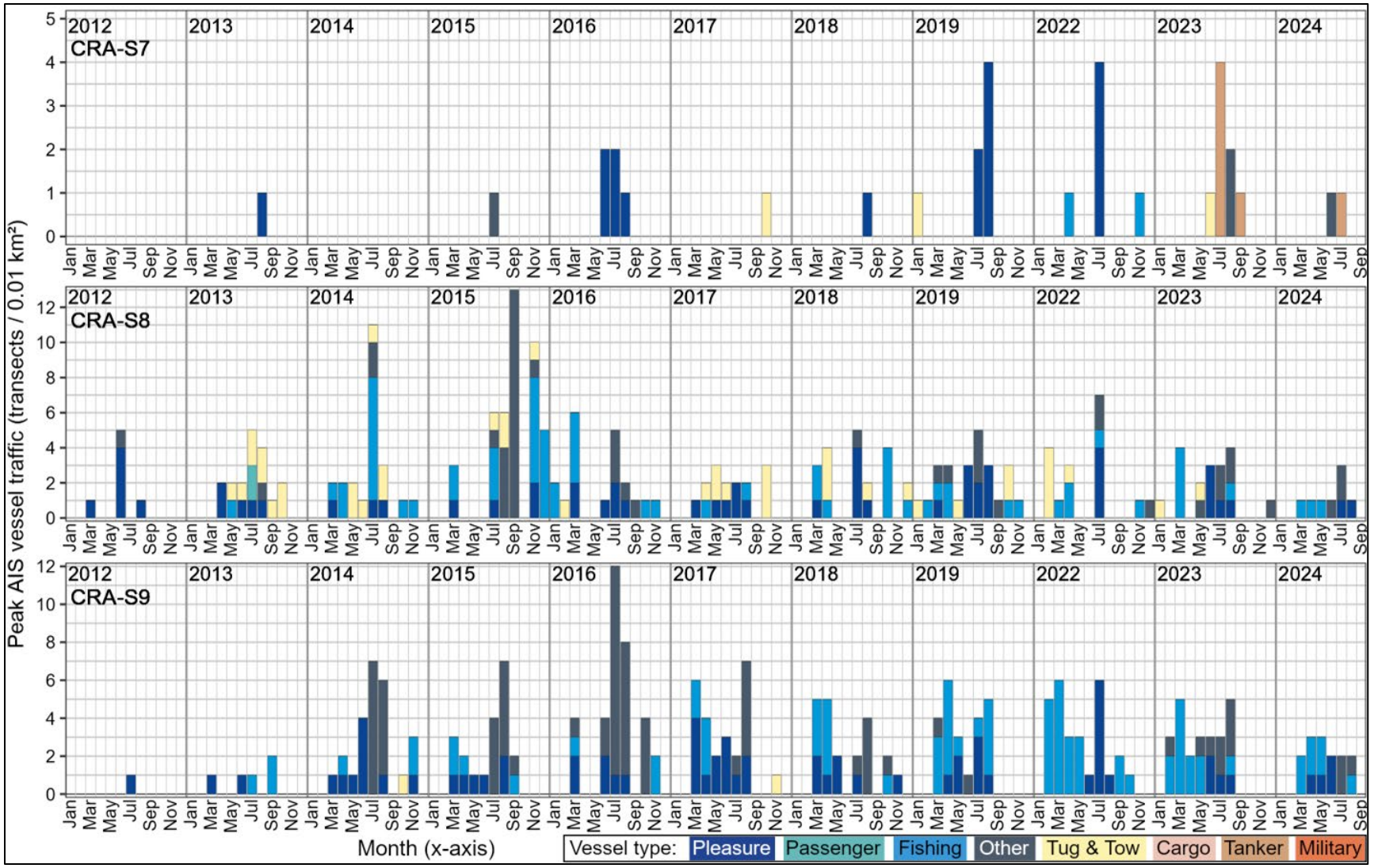


Figure 3.215. Monthly peak vessel traffic activity within options from a subset of the Craig Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

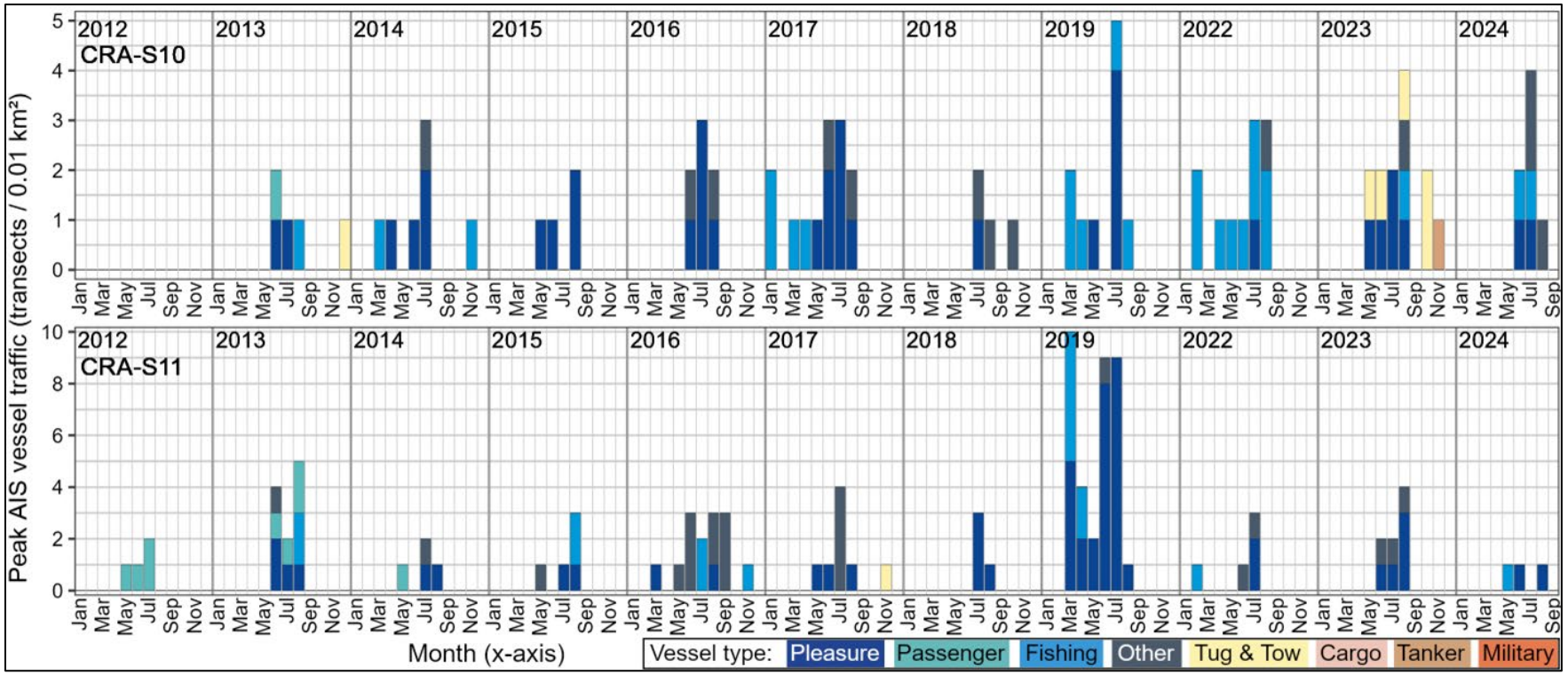


Figure 3.216. Monthly peak vessel traffic activity within options from a subset of the Craig Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

CRA-I1

AOA option CRA-I1 is a 86-ac intertidal site within the South extent of the Craig Study Area, located 15 km (8.0 nm) from Craig (centroid: 55.4683 N, 133.3895 W). The site is located within subunit MT-07 of the Maurell/Outside Lands unit in the Prince of Wales Island area plan. Text descriptions for the subunit includes reference to community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -3.4 m (-11 ft) to 9.6 m (31 ft) with an average depth of 0.71 m (2.3 ft). At MHW the depth ranges from 0.88 m (2.9 ft) to 14 m (46 ft) with an average depth of 5.0 m (16 ft). CRA-I1 has an average slope of 1.6° and maximum slope of 3.7°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'estuaries', 'sand and gravel beach narrow', 'ramp with gravel and sand beach', 'sand and gravel flat or fan', 'platform with gravel and sand beach wide', and classifies the biological wave exposure as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.1°C, a minimum daily average of 5.9°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at CRA-I1 averaged 4.6 m/s, with a minimum of 1.1 m/s and a maximum of 15 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in July (3.3 mg/m³) and lowest in September (2.1 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in April (8.9 mg/m³) and lowest in November (0.98 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in November (0.64 m^{-1}) and lowest in October (0.38 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 10350 and the groundfish (group code G) statistical unit 335506. CRA-I1 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel transect counts peaking at only one. There is not enough AIS activity observed to identify changes over time or regular patterns from year to year.

Natural Resource Considerations

CRA-I1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (2.2 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (0.10 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of CRA-I1. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, other mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Craig Tribal Association, Hydaburg Cooperative Association, and Klawock

Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-I2

AOA option CRA-I2 is a 75-ac intertidal site within the North extent of the Craig Study Area, located 12 km (6.7 nm) from Craig (centroid: 55.5846 N, 133.1825 W). The site is located within subunit CT-02 of the Craig/Klawock unit in the Prince of Wales Island area plan. Text descriptions for the subunit includes reference to community harvest and sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -3.3 m (-11 ft) to 9.1 m (30 ft) with an average depth of 3.6 m (12 ft). At MHW the depth ranges from 1.0 m (3.3 ft) to 13 m (44 ft) with an average depth of 7.8 m (26 ft). CRA-I2 has an average slope of 2.5° and maximum slope of 6.4°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'platform with gravel and sand beach wide', 'ramp with gravel and sand beach', 'sand and gravel beach narrow', 'estuaries', 'sand and gravel flat or fan', and classifies the biological wave exposure as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.1°C, a minimum daily average of 5.7°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at CRA-I2 averaged 2.6 m/s, with a minimum of 0.77 m/s and a maximum of 6.2 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in February (2.9 mg/m³) and lowest in November (1.4 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in February (5.4 mg/m³) and lowest in November (0.84 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.87 m^{-1}) and lowest in September (0.31 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 10360 and the groundfish (group code G) statistical unit 335535. CRA-I2 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at three total transects (March 2017, March 2022). The primary vessel types observed are fishing, other, pleasure, and passenger. AIS activity over the most recent five years has decreased by roughly 43% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

CRA-I2 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (1.8 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (0.23 km), humpback whale high use areas (2.3 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are six Alaska Heritage Resources Survey sites within approximately 5 km of CRA-I2. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist

within 5 km for the following resources: large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Kasaan, Craig Tribal Association, Hydaburg Cooperative Association, and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-I3

AOA option CRA-I3 is a 69-ac intertidal site within the North extent of the Craig Study Area, located 16 km (8.4 nm) from Craig (centroid: 55.611 N, 133.114 W). The site is located within subunits CT-02 and CT-10 of the Craig/Klawock unit in the Prince of Wales Island area plan. Text descriptions for the subunits include reference to community harvest and sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -13 m (-41 ft) to 11 m (36 ft) with an average depth of 1.5 m (5.0 ft). At MHW the depth ranges from -8.3 m (-27 ft) to 15 m (50 ft) with an average depth of 5.8 m (19 ft). CRA-I3 has an average slope of 4.4° and maximum slope of 8.4°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'estuaries', 'channel', 'ramp with gravel and sand beach', 'platform with gravel and sand beach wide', 'sand and gravel beach narrow', 'platform with gravel and sand beach', and classifies the biological wave exposure as protected, semi-exposed, very protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.1°C, a minimum daily average of 5.6°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at CRA-I3 averaged 2.4 m/s, with a minimum of 0.63 m/s and a maximum of 7.1 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (1.2 mg/m³) and lowest in September (0.62 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in April (6.2 mg/m³) and lowest in November (0.60 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (1.3 m^{-1}) and lowest in November (0.26 m^{-1}).

Industry and National Security Considerations

CRA-I3 is within 5 km of at least one documented aquatic farm lease site (2.6 km). The site is within ADFG salmon (group code G) statistical unit 10360 and the groundfish (group code G) statistical unit 335535. CRA-I3 has no observed AIS activity within the option.

Natural Resource Considerations

CRA-I3 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.16 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (2.0 km), and humpback whale feeding BIA (0.041 km).

Cultural Resource Considerations

There are seven Alaska Heritage Resources Survey sites within approximately 5 km of CRA-I3. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine

invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Kasaan, Craig Tribal Association, Hydaburg Cooperative Association, and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S1

AOA option CRA-S1 is a 110-ac subtidal site within the South extent of the Craig Study Area, located 33 km (18 nm) from Craig (centroid: 55.2848 N, 133.4108 W). The site is located within subunits DT-01 and DT-56 of the Dall/Forrester Island unit in the Prince of Wales Island area plan. Text descriptions for the subunits include reference to anchorages, community harvest, and sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from 1.4 m (4.6 ft) to 26 m (86 ft) with an average depth of 16 m (53 ft). At MHW the depth ranges from 5.7 m (19 ft) to 30 m (100 ft) with an average depth of 20 m (67 ft). CRA-S1 has an average slope of 4.6° and maximum slope of 26°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.1°C, a minimum daily average of 6.0°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at CRA-S1 averaged 4.1 m/s, with a minimum of 1.4 m/s and a maximum of 11 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in February (2.0 mg/m³) and lowest in March (0.90 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in February (2.7 mg/m³) and lowest in November (0.69 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in May (0.58 m^{-1}) and lowest in September (0.32 m^{-1}).

Industry and National Security Considerations

CRA-S1 is within 5 km of at least one documented Navy undersea cable (exact distance undisclosed). The site is within ADFG salmon (group code G) statistical unit 10430 and the groundfish (group code G) statistical unit 335504. CRA-S1 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 31 total transects (June 2013). The primary vessel types observed are fishing and other. AIS activity over the most recent five years has decreased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

CRA-S1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.17 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (1.3 km), humpback whale high use areas (2.0 km), and humpback whale feeding BIA (1.5 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates,

marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Craig Tribal Association, Hydaburg Cooperative Association, and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S2

AOA option CRA-S2 is a 130-ac subtidal site within the South extent of the Craig Study Area, located 14 km (7.7 nm) from Craig (centroid: 55.3728 N, 133.0282 W). The site is located within subunits CT-19 and CT-30 of the Craig/Klawock unit in the Prince of Wales Island area plan. Text descriptions for the subunits include reference to community harvest and sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from 19 m (61 ft) to 87 m (280 ft) with an average depth of 40 m (130 ft). At MHW the depth ranges from 23 m (76 ft) to 91 m (300 ft) with an average depth of 44 m (140 ft). CRA-S2 has an average slope of 4.5° and maximum slope of 16°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (51 m away) as protected, semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.2°C, a minimum daily average of 5.7°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at CRA-S2 averaged 3.7 m/s, with a minimum of 1.1 m/s and a maximum of 9.1 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (3.1 mg/m³) and lowest in July (1.5 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in October (2.7 mg/m³) and lowest in July (0.46 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in March (0.58 m^{-1}) and lowest in November (0.30 m^{-1}).

Industry and National Security Considerations

CRA-S2 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (4.6 km), submarine cable, fiber optic cable or cable area (0.23 km), and wreck and obstruction (2.5 km). The site is within ADFG salmon (group code G) statistical unit 10360 and the groundfish (group code G) statistical unit 335506. CRA-S2 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel transect counts peaking at only three. There is not enough AIS activity observed to identify changes over time or regular patterns from year to year.

Natural Resource Considerations

CRA-S2 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.73 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (0 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are three Alaska Heritage Resources Survey sites within approximately 5 km of CRA-S2. These sites may include cultural resources such as archaeological sites, buildings, structures,

objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Kasaan, Craig Tribal Association, Hydaburg Cooperative Association, and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S3

AOA option CRA-S3 is a 420-ac subtidal site within the South extent of the Craig Study Area, located 11 km (5.9 nm) from Craig (centroid: 55.3758 N, 133.1678 W). The site is located within subunits CT-23, CT-24, and CT-30 of the Craig/Klawock unit in the Prince of Wales Island area plan. Text descriptions for the subunits include reference to community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -23 m (-77 ft) to 71 m (230 ft) with an average depth of 32 m (100 ft). At MHW the depth ranges from -19 m (-62 ft) to 75 m (250 ft) with an average depth of 36 m (120 ft). CRA-S3 has an average slope of 7.2° and maximum slope of 25°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected, protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.2°C, a minimum daily average of 5.8°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at CRA-S3 averaged 3.8 m/s, with a minimum of 1.2 m/s and a maximum of 9.7 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in February (3.6 mg/m³) and lowest in July (0.99 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in February (2.9 mg/m³) and lowest in July (0.40 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in March (0.51 m^{-1}) and lowest in October (0.21 m^{-1}).

Industry and National Security Considerations

CRA-S3 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (2.3 km), submarine cable, fiber optic cable or cable area (0.26 km), Navy undersea cable (exact distance undisclosed), and wreck and obstruction (0.37 km). The site is within ADFG salmon (group code G) statistical unit 10360 and the groundfish (group code G) statistical unit 335506. CRA-S3 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 13 total transects (July 2019). The primary vessel types observed are fishing, other, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

CRA-S3 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.11 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (3.1 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are three Alaska Heritage Resources Survey sites within approximately 5 km of CRA-S3. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Kasaan, Craig Tribal Association, Hydaburg Cooperative Association, and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S4

AOA option CRA-S4 is a 180-ac subtidal site within the South extent of the Craig Study Area, located 6.4 km (3.5 nm) from Craig (centroid: 55.45 N, 133.2698 W). The site is located within subunit CT-30 of the Craig/Klawock unit in the Prince of Wales Island area plan. Text descriptions for the subunit includes reference to community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -1.9 m (-6.1 ft) to 33 m (110 ft) with an average depth of 16 m (52 ft). At MHW the depth ranges from 2.4 m (8.0 ft) to 37 m (120 ft) with an average depth of 20 m (66 ft). CRA-S4 has an average slope of 3.7° and maximum slope of 7.1°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.2°C, a minimum daily average of 5.8°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at CRA-S4 averaged 4.0 m/s, with a minimum of 1.1 m/s and a maximum of 11 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in February (5.4 mg/m³) and lowest in June (2.1 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in February (3.3 mg/m³) and lowest in June (0.58 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in May (0.49 m^{-1}) and lowest in October (0.19 m^{-1}).

Industry and National Security Considerations

CRA-S4 is within 5 km of at least one documented wreck and obstruction (4.3 km). The site is within ADFG salmon (group code G) statistical unit 10360 and the groundfish (group code G) statistical unit 335506. CRA-S4 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at nine total transects (August 2013). The primary vessel types observed are fishing, pleasure, and other. AIS activity over the most recent five years has decreased by roughly 47% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

CRA-S4 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (4.1 km), historically mapped eelgrass sites (0 km), harbor seal non-key

haulouts (3.9 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There is one Alaska Heritage Resources Survey site within approximately 5 km of CRA-S4. This site may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Craig Tribal Association, Hydaburg Cooperative Association, and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S5

AOA option CRA-S5 is a 330-ac subtidal site within the North extent of the Craig Study Area, located 13 km (6.8 nm) from Craig (centroid: 55.5897 N, 133.1687 W). The site is located within subunit CT-02 of the Craig/Klawock unit in the Prince of Wales Island area plan. Text descriptions for the subunit includes reference to community harvest and sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -1.6 m (-5.1 ft) to 25 m (81 ft) with an average depth of 11 m (37 ft). At MHW the depth ranges from 2.7 m (9.0 ft) to 29 m (96 ft) with an average depth of 16 m (51 ft). CRA-S5 has an average slope of 1.9° and maximum slope of 8.6°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (6 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.1°C, a minimum daily average of 5.7°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at CRA-S5 averaged 2.5 m/s, with a minimum of 0.77 m/s and a maximum of 6.2 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in February (3.6 mg/m³) and lowest in July (1.6 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in February (4.5 mg/m³) and lowest in July (0.60 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in November (0.62 m^{-1}) and lowest in September (0.36 m^{-1}).

Industry and National Security Considerations

CRA-S5 is within 5 km of at least one documented aquatic farm lease site (4.0 km). The site is within ADFG salmon (group code G) statistical unit 10360 and the groundfish (group code G) statistical unit 335535. CRA-S5 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at nine total transects (April 2022). The primary vessel types observed are fishing, pleasure, other, and tug/tow. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

CRA-S5 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.63

km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (0.90 km), humpback whale high use areas (3.0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are five Alaska Heritage Resources Survey sites within approximately 5 km of CRA-S5. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Kasaan, Craig Tribal Association, Hydaburg Cooperative Association, and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S6

AOA option CRA-S6 is a 72-ac subtidal site within the North extent of the Craig Study Area, located 15 km (7.8 nm) from Craig (centroid: 55.5972 N, 133.0954 W). The site is located within subunit CT-02 of the Craig/Klawock unit in the Prince of Wales Island area plan. Text descriptions for the subunit includes reference to community harvest and sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -2.8 m (-9.3 ft) to 15 m (49 ft) with an average depth of 6.1 m (20 ft). At MHW the depth ranges from 1.5 m (4.9 ft) to 19 m (63 ft) with an average depth of 10 m (34 ft). CRA-S6 has an average slope of 2.0° and maximum slope of 10.0°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected, semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.1°C, a minimum daily average of 5.6°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at CRA-S6 averaged 2.5 m/s, with a minimum of 0.80 m/s and a maximum of 7.7 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in October (1.4 mg/m^3) and lowest in September (0.74 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in April (6.2 mg/m^3) and lowest in November (0.93 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.96 m^{-1}) and lowest in November (0.22 m^{-1}).

Industry and National Security Considerations

CRA-S6 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (2.2 km) and hatchery release site (4.2 km). The site is within ADFG salmon (group code G) statistical unit 10360 and the groundfish (group code G) statistical unit 335535. CRA-S6 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel transect counts peaking at only two. There is not enough AIS activity observed to identify changes over time or regular patterns from year to year.

Natural Resource Considerations

CRA-S6 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (2.4 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (3.1 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are seven Alaska Heritage Resources Survey sites within approximately 5 km of CRA-S6. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Kasaan, Craig Tribal Association, Hydaburg Cooperative Association, and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S7

AOA option CRA-S7 is a 95-ac subtidal site within the North extent of the Craig Study Area, located 14 km (7.8 nm) from Craig (centroid: 55.6006 N, 133.1205 W). The site is located within subunit CT-02 of the Craig/Klawock unit in the Prince of Wales Island area plan. Text descriptions for the subunit includes reference to community harvest and sport fishing occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -5.4 m (-18 ft) to 12 m (40 ft) with an average depth of 7.6 m (25 ft). At MHW the depth ranges from -1.1 m (-3.6 ft) to 16 m (54 ft) with an average depth of 12 m (39 ft). CRA-S7 has an average slope of 2.0° and maximum slope of 9.9°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (1 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.1°C, a minimum daily average of 5.6°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at CRA-S7 averaged 2.4 m/s, with a minimum of 0.73 m/s and a maximum of 6.3 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in August (2.0 mg/m^3) and lowest in September (1.0 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in February (3.2 mg/m^3) and lowest in July (0.81 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (1.0 m^{-1}) and lowest in November (0.30 m^{-1}).

Industry and National Security Considerations

CRA-S7 is within 5 km of at least one documented aquatic farm lease site (1.4 km). The site is within ADFG salmon (group code G) statistical unit 10360 and the groundfish (group code G) statistical unit 335535. CRA-S7 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at four total transects (August 2019, July 2022, July 2023). The primary vessel types observed are pleasure, tanker, other, and tug/tow. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

CRA-S7 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.87 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (3.2 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are eight Alaska Heritage Resources Survey sites within approximately 5 km of CRA-S7. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Kasaan, Craig Tribal Association, Hydaburg Cooperative Association, and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S8

AOA option CRA-S8 is a 180-ac subtidal site within the North extent of the Craig Study Area, located 28 km (15 nm) from Craig (centroid: 55.672 N, 133.3988 W). The site is located within subunit 10b of the Shaheen unit in the Prince of Wales Island area plan. Text descriptions for the subunit includes reference to anchorages and community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -14 m (-46 ft) to 50 m (160 ft) with an average depth of 23 m (77 ft). At MHW the depth ranges from -9.8 m (-32 ft) to 54 m (180 ft) with an average depth of 28 m (91 ft). CRA-S8 has an average slope of 7.4° and maximum slope of 13°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected, protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.1°C, a minimum daily average of 5.8°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at CRA-S8 averaged 3.6 m/s, with a minimum of 1.2 m/s and a maximum of 9.6 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in April (4.3 mg/m³) and lowest in July (2.3 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in April (3.1 mg/m³) and lowest in July (0.88 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in May (0.42 m^{-1}) and lowest in September (0.24 m^{-1}).

Industry and National Security Considerations

CRA-S8 is within 5 km of at least one documented wreck and obstruction (4.6 km). The site is within ADFG salmon (group code G) statistical unit 10380 and the groundfish (group code G) statistical unit 335535. CRA-S8 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 13 total transects (September 2015). The primary vessel types observed are fishing, pleasure, other, and tug/tow. AIS activity over the most recent five years has decreased by roughly 12% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

CRA-S8 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.37 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (0 km), humpback whale high use areas (0.93 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are 11 Alaska Heritage Resources Survey sites within approximately 5 km of CRA-S8. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: large land mammals, marine invertebrates, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Craig Tribal Association and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S9

AOA option CRA-S9 is a 130-ac subtidal site within the North extent of the Craig Study Area, located 32 km (17 nm) from Craig (centroid: 55.7075 N, 133.4067 W). The site is located within subunit 10b of the Shaheen unit in the Prince of Wales Island area plan. Text descriptions for the subunit includes reference to anchorages, community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from 1.1 m (3.8 ft) to 46 m (150 ft) with an average depth of 22 m (71 ft). At MHW the depth ranges from 5.4 m (18 ft) to 50 m (160 ft) with an average depth of 26 m (85 ft). CRA-S9 has an average slope of 7.2° and maximum slope of 19°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.0°C, a minimum daily average of 5.8°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at CRA-S9 averaged 3.7 m/s, with a minimum of 1.2 m/s and a maximum of 10 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in February (2.6 mg/m³) and lowest in May (1.6 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in February (3.0 mg/m³) and lowest in July (0.67 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in November (0.65 m^{-1}) and lowest in September (0.34 m^{-1}).

Industry and National Security Considerations

CRA-S9 is within 5 km of at least one documented wreck and obstruction (1.2 km). The site is within ADFG salmon (group code G) statistical unit 10380 and the groundfish (group code G) statistical unit 335535. CRA-S9 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 12 total transects (July 2016). The primary vessel types observed are fishing, other, and pleasure. AIS activity over the most recent five years has increased by roughly 26% compared to the previous five years. There are no

significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

CRA-S9 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (3.9 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (2.1 km), harbor seal non-key haulouts (2.1 km), humpback whale high use areas (1.1 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are 10 Alaska Heritage Resources Survey sites within approximately 5 km of CRA-S9. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Craig Tribal Association and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S10

AOA option CRA-S10 is a 90-ac subtidal site within the North extent of the Craig Study Area, located 34 km (18 nm) from Craig (centroid: 55.7228 N, 133.406 W). The site is located within subunit 10b of the Shaheen unit in the Prince of Wales Island area plan. Text descriptions for the subunit includes reference to anchorages, community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -6.1 m (-20 ft) to 59 m (190 ft) with an average depth of 23 m (75 ft). At MHW the depth ranges from -1.9 m (-6.1 ft) to 63 m (210 ft) with an average depth of 27 m (89 ft). CRA-S10 has an average slope of 12° and maximum slope of 25°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected, semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.0°C, a minimum daily average of 5.7°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at CRA-S10 averaged 3.3 m/s, with a minimum of 1.1 m/s and a maximum of 9.1 m/s. Chlorophyll *a* concentration (mg/m^3), which is an indicator of phytoplankton abundance, was highest in March (2.6 mg/m^3) and lowest in May (1.6 mg/m^3). Total suspended solids concentration, TSS (mg/m^3), was highest in September (2.8 mg/m^3) and lowest in July (0.66 mg/m^3). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in May (0.53 m^{-1}) and lowest in February (0.29 m^{-1}).

Industry and National Security Considerations

CRA-S10 is within 5 km of at least one documented wreck and obstruction (1.3 km). The site is within ADFG salmon (group code G) statistical unit 10380 and the groundfish (group code G) statistical unit 335535. CRA-S10 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at five total transects (July 2019).

The primary vessel types observed are pleasure, fishing, other, and tug/tow. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

CRA-S10 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (4.6 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (0.29 km), harbor seal non-key haulouts (3.6 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are four Alaska Heritage Resources Survey sites within approximately 5 km of CRA-S10. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Craig Tribal Association and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.

CRA-S11

AOA option CRA-S11 is a 120-ac subtidal site within the North extent of the Craig Study Area, located 37 km (20 nm) from Craig (centroid: 55.7305 N, 133.3702 W). The site is located within subunit 10b of the Shaheen unit in the Prince of Wales Island area plan. Text descriptions for the subunit includes reference to anchorages and community harvest occurring within the subunit. This does not mean they directly overlap with the site, refer to the area plan for more information. The site ranges in depth at MLLW from -22 m (-73 ft) to 35 m (110 ft) with an average depth of 12 m (38 ft). At MHW the depth ranges from -18 m (-59 ft) to 39 m (130 ft) with an average depth of 16 m (52 ft). CRA-S11 has an average slope of 6.5° and maximum slope of 21°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.0°C, a minimum daily average of 5.7°C, and a maximum daily average of 13°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in March. Wind velocity at CRA-S11 averaged 2.9 m/s, with a minimum of 0.71 m/s and a maximum of 9.0 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in February (2.7 mg/m³) and lowest in June (1.5 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in October (3.2 mg/m³) and lowest in May (0.66 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.59 m^{-1}) and lowest in September (0.29 m^{-1}).

Industry and National Security Considerations

CRA-S11 is within 5 km of at least one documented wreck and obstruction (4.2 km). The site is within ADFG salmon (group code G) statistical unit 10380 and the groundfish (group code G) statistical unit 335535. CRA-S11 has relatively high AIS activity

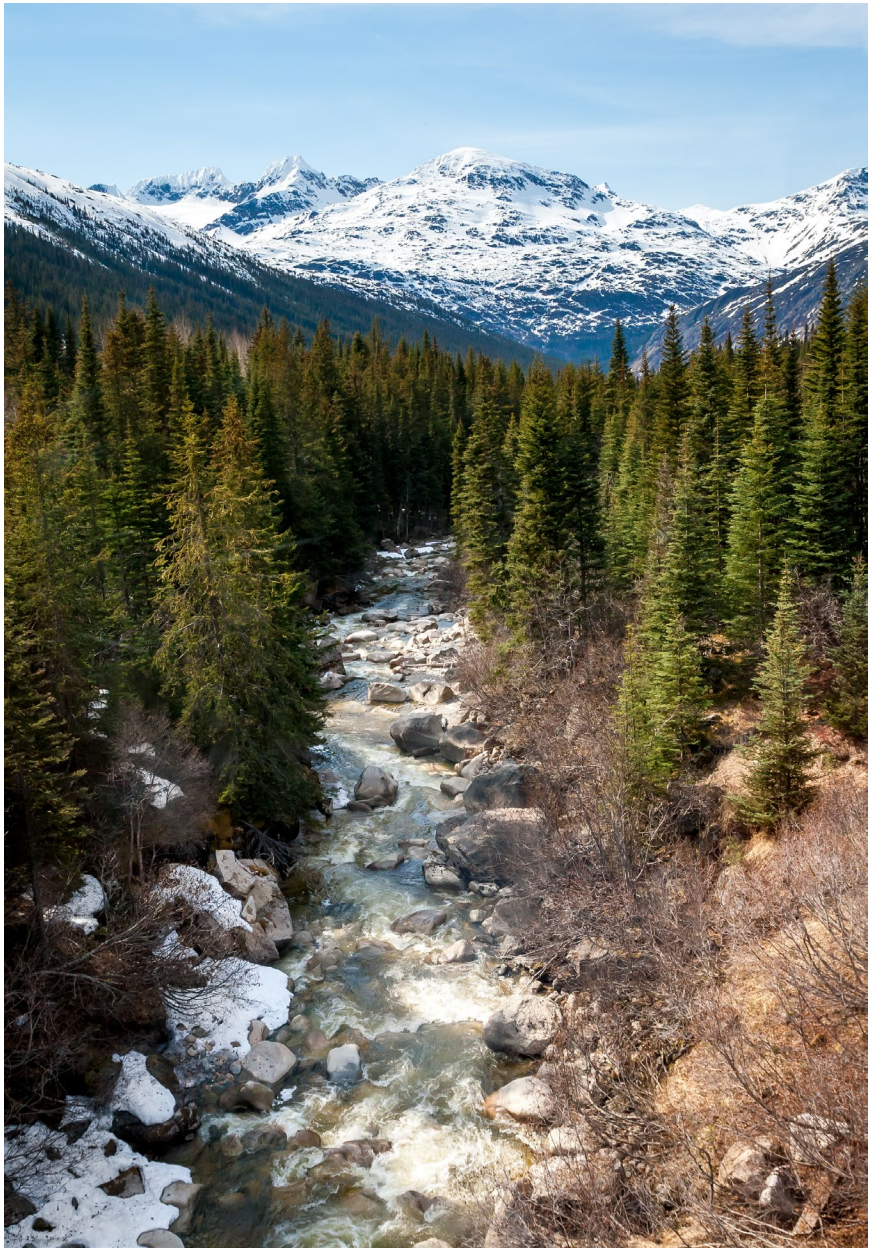
overall compared to the other options in the Study Area, with monthly vessel activity peaking at 10 total transects (March 2019). The primary vessel types observed are pleasure, other, and fishing. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around May-June.

Natural Resource Considerations

CRA-S11 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (2.7 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (0.42 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are seven Alaska Heritage Resources Survey sites within approximately 5 km of CRA-S11. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Craig Tribal Association and Klawock Cooperative Association. Given this proximity, cultural resources could be present to an unknown extent.



Ketchikan Study Area

Final AOA options within the Ketchikan Study Area include eight subtidal sites across 1,429 ac and one intertidal site covering 56 ac (Figure 3.217). Options range from 55.8 ac to 395.3 ac and are distributed across the study area (Table 3.19; Figures 3.217–3.235). Several sites within the study area are located near, and may directly overlap with, ecologically sensitive resources. These include historically mapped eelgrass beds, feeding BIAs and high-use areas for humpback whales, and both key and non-key harbor seal haulouts. Given the proximity to these resources, project planning should account for potential ecological impacts and may require coordination or consultation with appropriate resource agencies.

This study area overlaps with marine bird concentration areas and important habitats, including the Annette-Betton-Cleveland Islands Sea Duck Key Habitat Site. Although some of the AOA options (e.g., KET-S2, KET-S4) fall within the boundary of the sea duck habitat site, the down-scoring of herring spawning sites also benefits sea ducks using this site.

Public comments related to the Ketchikan draft AOA options included concerns about potential overlap with existing dive fisheries. A primary issue raised by dive fishery participants was the risk of diver air supply lines becoming entangled with aquaculture infrastructure, creating safety hazards and limiting access to common-use resources. SARDFA plays a central role in coordinating industry activities and represents divers, processors, and coastal communities within the Southeast study areas. To minimize conflict and ensure equitable resource access, coordination with SARDFA and ADFG is recommended during the siting of aquaculture operations in areas with active dive fisheries.

Draft AOA option KET-S7 was highlighted as a dive area and important anchorage. This option was removed following the final model run.

Additional comments highlighted potential overlap between final AOA options KET-S2 and S4 and sport fishing and personal-use crabbing. To minimize conflict and ensure equitable resource access, coordination with ADFG and the fishing communities is recommended during the siting of aquaculture operations in these areas.



General comments focused on potential overlaps between AOA study areas and documented cultural resource sites. In response, the final model run incorporated additional down-scoring of AHRS data layers, resulting in reduced suitability and, ultimately, the removal of portions of, or entire, draft AOA options located within 500-m of AHRS-listed locations. Comments also noted potential impacts to subsistence harvest activities from aquaculture

development, and characterization revealed overlap with birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, vegetation subsistence search and harvest areas. The degree of potential adverse effect to subsistence harvest activities is highly dependent on the specific harvest activity (e.g., intertidal gathering vs herring roe collection) and the nature of proposed aquaculture development (e.g., subtidal vs intertidal culture). All aquaculture projects will be subject to further review during the Alaska state leasing and permitting process. Early and ongoing coordination with coastal communities, nearby Alaska Native Villages, Alaska Native Corporations, and other Tribal Associations is strongly recommended to ensure access to common-use resources, cultural resource sites, and that traditional uses are not adversely impacted.

Four draft AOA options were removed, KET-I1, S5, S6, and S8, following review by the Military Aviation and Installation Assurance Siting Clearinghouse due to concerns with proximity to Carderock's SEAFAC.

Below are additional characterizations of site-specific details regarding the geographic location and environmental conditions of AOA options within the Ketchikan Study Area, as well as considerations regarding national security, natural resources, navigation and transportation, cultural resources, and various industries including aquaculture and fisheries. These are presented as tables containing location information for each option and proximity to these considerations (Table 3.19). Following these tables are maps that visualize the options along with data used within the suitability model (Figures 3.217–3.222). Next are plots summarizing available time series data to provide additional context on environmental conditions and observed vessel traffic within the options (Figures 3.223–3.235). Following these tables and figures are individual text descriptions for each option summarizing the characteristics observed. These tables, figures, and text summaries were created using many different spatial datasets curated to complement factors considered during the Alaska state aquatic farm lease application and review process, and to assist proponents in the identification of key user groups and resource agencies to engage with during the project design and application process. These data are unlikely to be exhaustive, and there may be additional considerations not captured in this characterization. These different presentation methods are meant not only to communicate site-specific characteristics in multiple ways but also to complement each other. They may also contain unique bits of information not found in the other parts of this characterization.

Table 3.19. Characterization summary for Ketchikan Aquaculture Opportunity Area subtidal and intertidal options KET-I1, KET-S1, KET-S2, KET-S3, KET-S4, KET-S5, KET-S6, KET-S7, KET-S8. A "-" dash indicates no feature fell within a 5-km distance of the specified option. Distance values for each submodel are displayed in kilometers (km).

Entire extent	KET-I1	KET-S1	KET-S2	KET-S3	KET-S4	KET-S5	KET-S6	KET-S7	KET-S8
General characteristics									

Entire extent	KET-I1	KET-S1	KET-S2	KET-S3	KET-S4	KET-S5	KET-S6	KET-S7	KET-S8
Center Coordinates (longitude, latitude)	−149.5840, 59.8499	−149.5571, 59.9008	−131.6793, 55.2762	−131.4745, 55.2900	−131.6837, 55.3000	−131.4058, 55.3713	−131.2854, 55.3783	−131.2231, 55.3926	−131.3593, 55.3962
Size (ac)	55.8	395.3	90	101	79.2	67.3	128.9	348.5	219.6
Distance to coastal populated place (nm)	7.6	10.1	5.8	6.8	6.2	11.8	19.9	20.7	13.5
Depth (m) (min, max, mean), Average Slope (degrees)	−13.77, 12.22, 0.21, 6.3	−2.85, 48.57, 22.81, 4.26	8.51, 48.62, 35.15, 4.13	−4.47, 83.06, 37.16, 11.6	16.95, 32.08, 24.69, 2.34	2.85, 79.43, 43, 14.24	−2.57, 38.29, 17.15, 6.02	−13.36, 74.99, 38.05, 11.33	−7.81, 28.89, 13.88, 4.12
Alaska Area Plan Subunit	K-46, GU	GU	GU	GU	KT23	GU	GU	GU	GU
Commercial Statistical Areas – Groundfish	315501	315501, 315503	315502	315501, 315504	315502	315504	315503	315503	315504
Commercial Statistical Areas – Salmon, Shellfish	10145	10145	10127	10145	10127	10146	10143	10143	10146
Constraints									
Anadromous Waters Catalog – Streams (91.5-m Setback)	0.2	0.59	0.53	1.4	0.72	2.06	0.15	0.82	0.16
Deep-Sea Coral and Sponge Occurrences (1,000-m Setback)	-	-	-	-	-	-	-	-	-

Entire extent	KET-I1	KET-S1	KET-S2	KET-S3	KET-S4	KET-S5	KET-S6	KET-S7	KET-S8
Ferry Routes (500-m Setback)	1.85	2.85	3.31	1.87	4.37	-	-	-	-
Key Harbor Seal Locations (500-m Setback)	-	-	3.71	-	4.93	-	0.2	1.2	-
Navy Undersea Cables within 5 km (500-m Setback)*	Yes	Yes	Yes	Yes	Yes	-	-	-	-
Pipelines (500-m Setback)	-	-	-	-	-	-	-	-	-
Submarine Cable Areas (200-m Setback)	1.67	2.65	2.82	1.38	4.18	-	-	-	-
Wastewater Outfalls (500-m Setback)	-	-	-	-	-	-	-	-	-
Wrecks and Obstructions (152.5-m Setback)	2.76	-	4.31	0.57	-	4.77	-	1.81	2.3
National Security									
Munitions and Explosives of Concern	-	-	-	-	-	-	-	-	-
Natural Resources									
Cetacean Biologically Important Areas – Feeding	Humpback Whale (0)	Humpback Whale (0)	Humpback Whale (3.19)	Humpback Whale (0)	Humpback Whale (2.19)	Humpback Whale (0.64)	Humpback Whale (0.52)	Humpback Whale (0)	Humpback Whale (0)

Entire extent	KET-I1	KET-S1	KET-S2	KET-S3	KET-S4	KET-S5	KET-S6	KET-S7	KET-S8
Cetacean Biologically Important Areas – Migratory Route	-	-	-	-	-	-	-	-	-
Humpback Whale High-Use Areas	0	0.53	0	0	0	-	-	-	-
NMFS ESA Critical Habitat	-	-	-	-	-	-	-	-	-
Non-Key Harbor Seal Locations (500-m Setback)	3.13	-	0	4.31	1.75	-	-	-	1.94
North Pacific Seabird Data**	-	-	-	-	-	-	-	-	-
ShoreZone Coastal Mapping – Eelgrass Bioband	0	0	-	0.51	-	3.62	0	0	1.39
Steller Sea Lion Major Haulouts, 3-nm Protection Area (500-m Setback)	-	-	-	-	-	-	-	-	-
Steller Sea Lion Rookeries, 3-nm Protection Area (500-m Setback)	-	-	-	-	-	-	-	-	-

Entire extent	KET-I1	KET-S1	KET-S2	KET-S3	KET-S4	KET-S5	KET-S6	KET-S7	KET-S8
Industry, Navigation, and Transportation									
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	-	-	-	-	-	-	-	-	-
Integrated Resource Management on the Tongass National Forest – Mooring Buoys	2.68	-	-	0.61	-	-	-	0.19	3.26
Permitted Log Transfer Facility (500-m Setback)	-	-	-	-	-	-	-	-	-
USFS Recreation Opportunities – Cabin Rentals	-	-	-	-	-	-	-	-	-
Cultural Resources									
Alaska Heritage Resources Survey (AHRS) Sites within 5 km (500-m setback)*	1	1	-	2	-	2	1	2	-

Entire extent	KET-I1	KET-S1	KET-S2	KET-S3	KET-S4	KET-S5	KET-S6	KET-S7	KET-S8
Alaska Area Plans (Community Harvest) overlap	-	-	-	-	-	-	-	-	-
Subsistence Search and Harvest Areas within 5 km	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon, vegetation	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon	birds and eggs, large land mammals, marine inverts, marine mammals, non-salmon fish, salmon
Fisheries									
Alaska Area Plans (Sport Fishing) overlap	-	-	-	-	-	-	-	-	-
Alaska DNR Shore Fishery Lease	-	-	-	-	-	-	-	-	-
Hatchery Release Sites	-	-	-	4.61	-	-	-	-	-
Aquatic Farm Permits	-	0.05	-	-	-	-	-	-	-

*Classified data layer; if the option is within the specified distance, a value of “Yes” is shown instead of the travel distance value.
**A straight-line distance was used to calculate minimum travel distance.

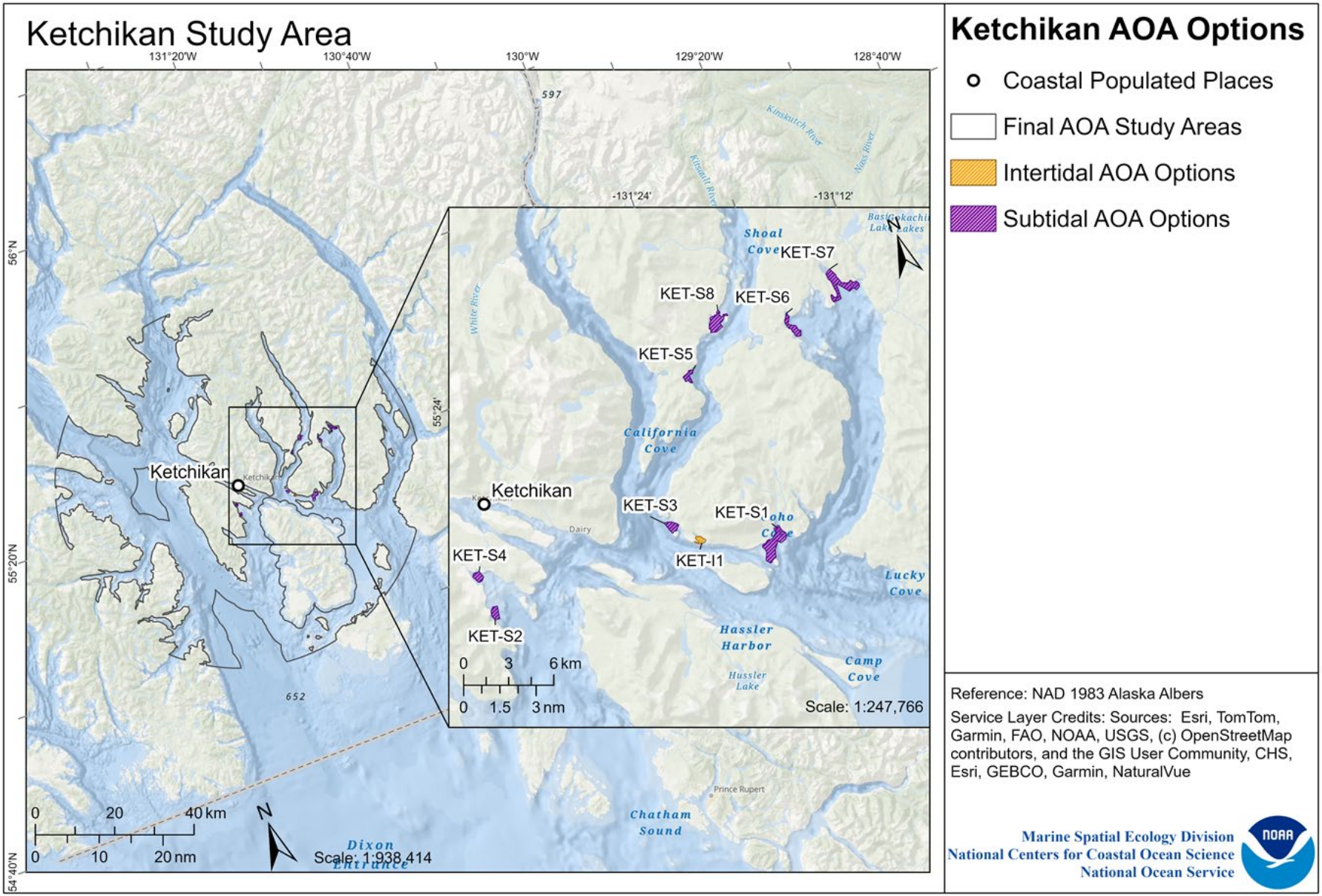


Figure 3.217. Final intertidal and subtidal AOA options for the Ketchikan Study Area.

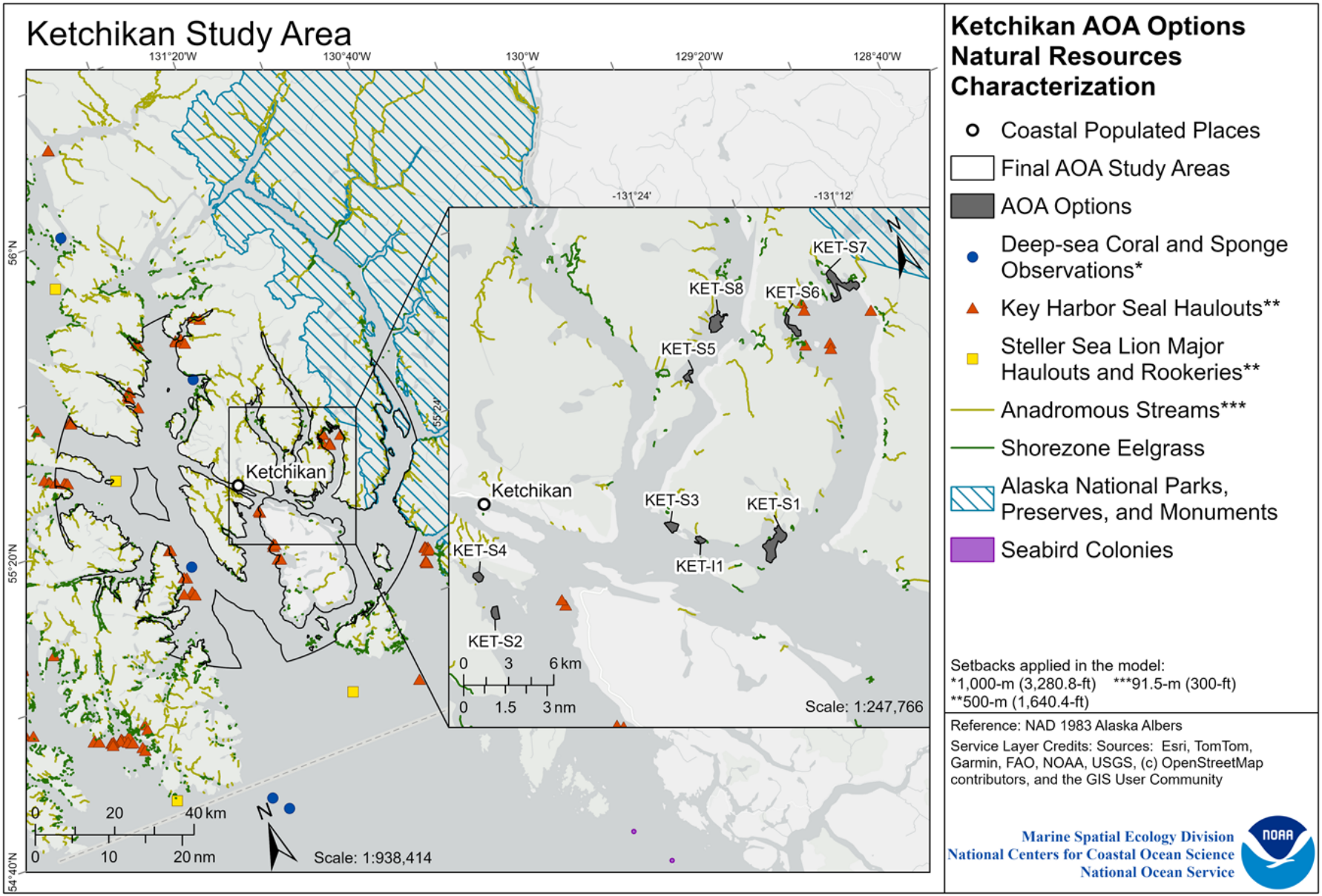


Figure 3.218. Natural resource interactions with the final AOA options in the Ketchikan Study Area.

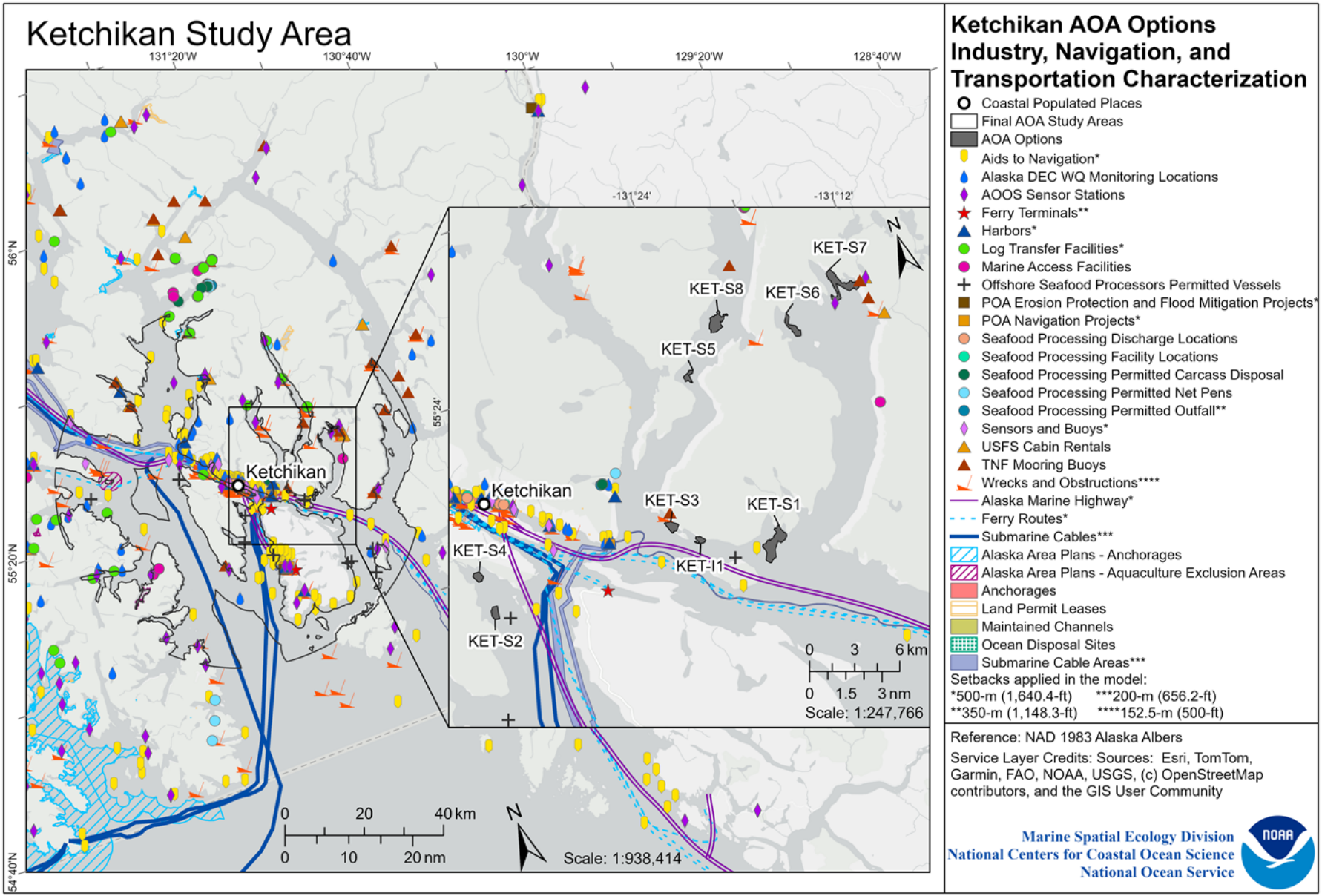


Figure 3.219. Industry, navigation, and transportation interactions with the final AOA options in the Ketchikan Study Area.

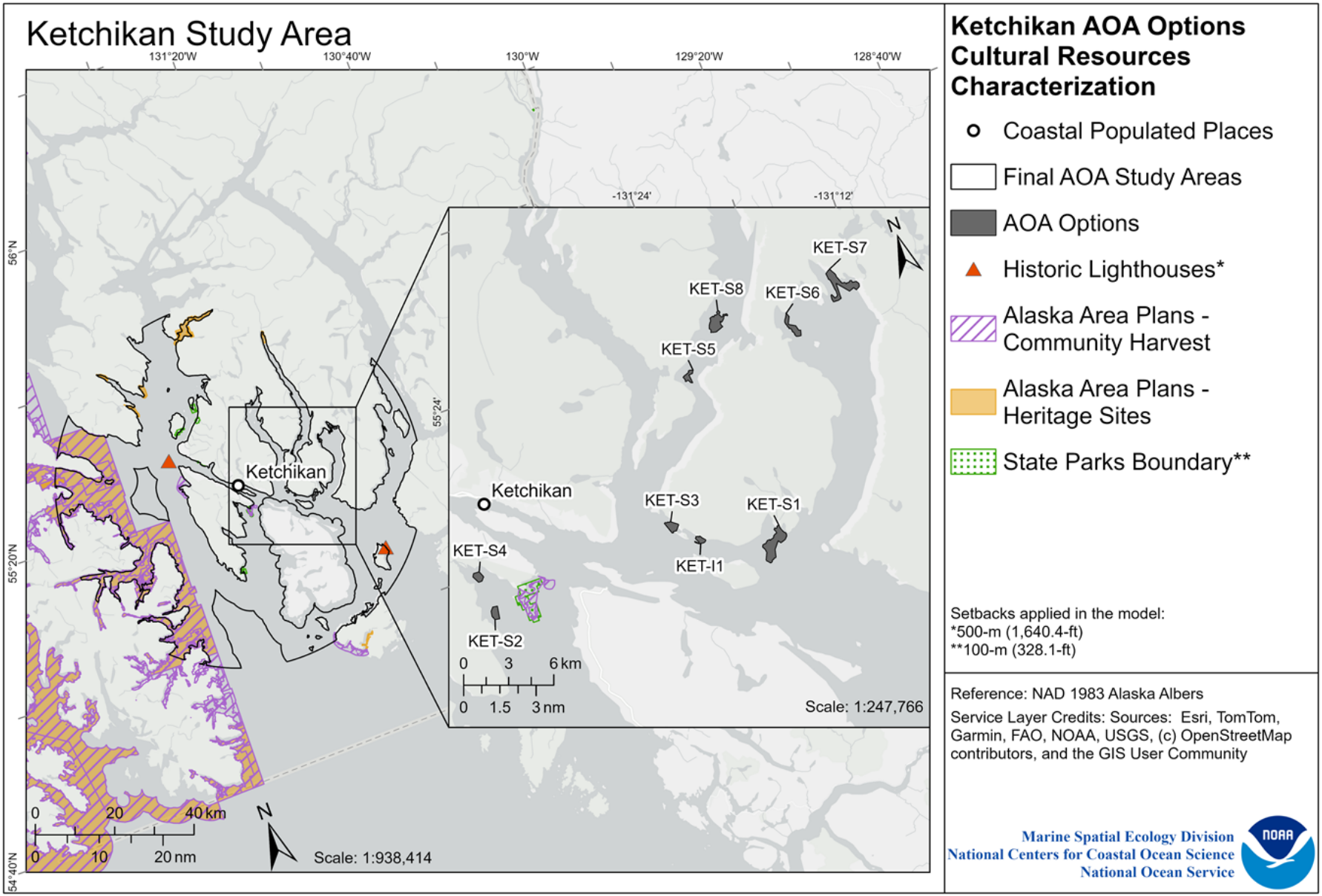


Figure 3.220. Cultural resource interactions with the final AOA options in the Ketchikan Study Area.

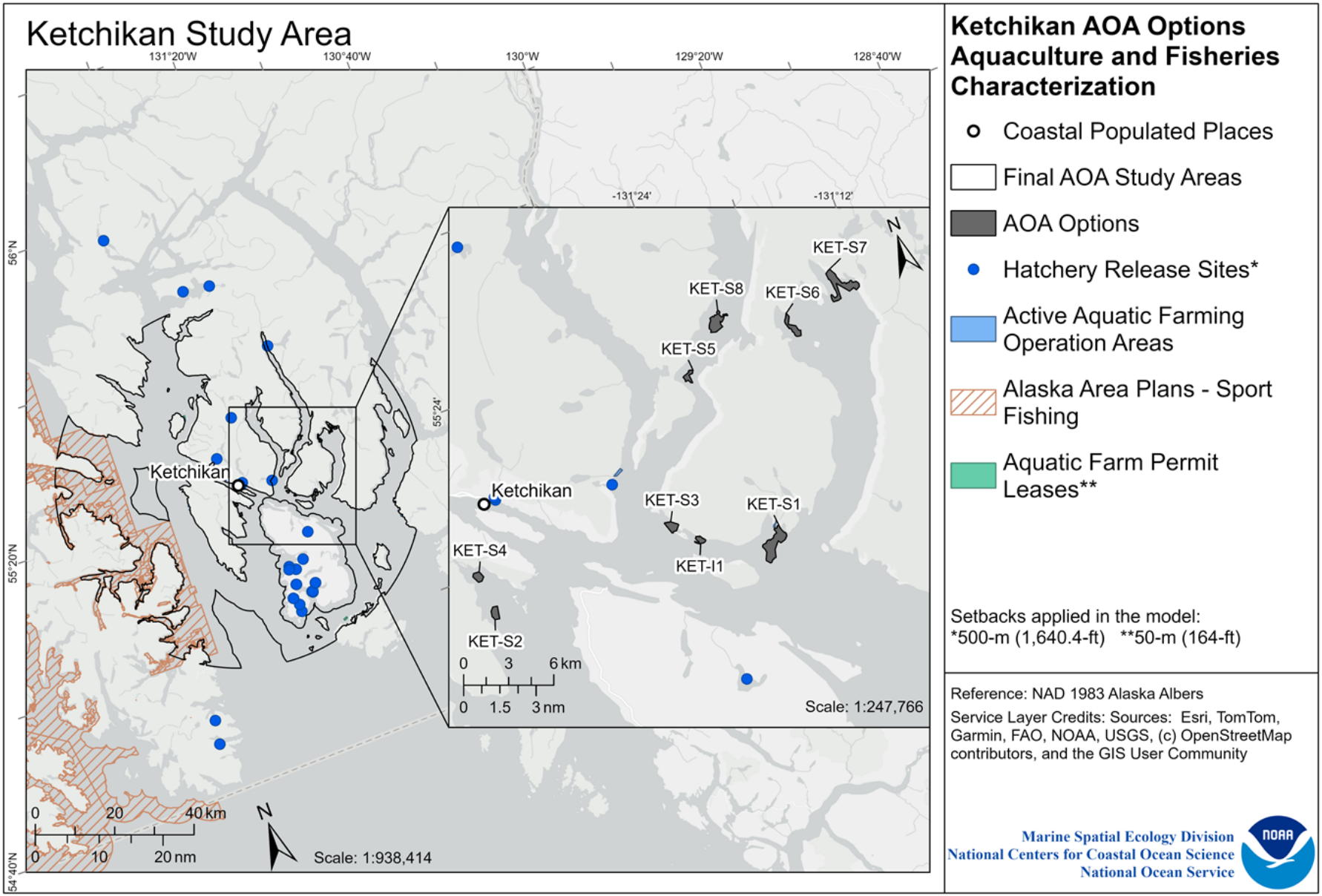


Figure 3.221. Aquaculture and fisheries interactions with the final AOA options in the Ketchikan Study Area.

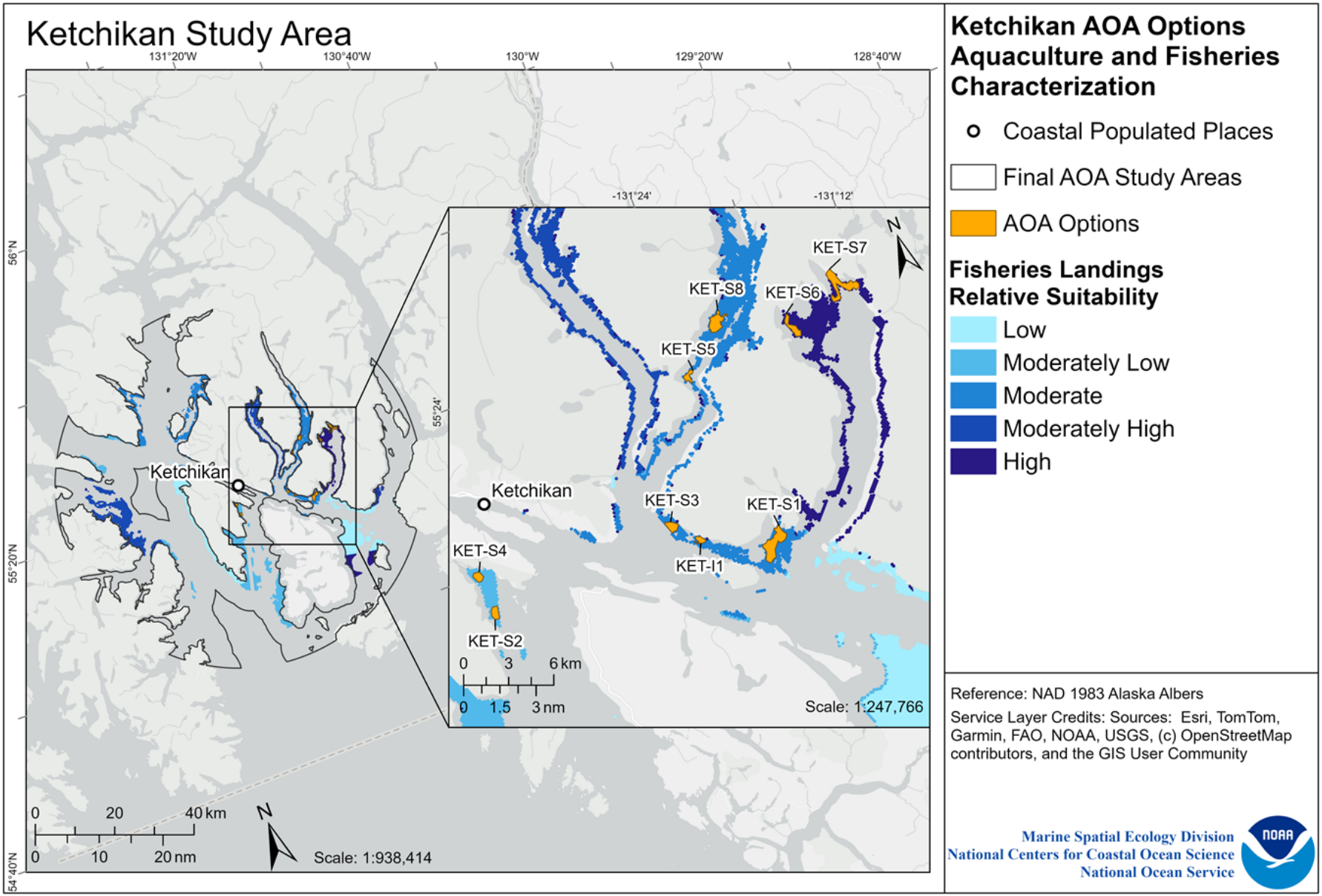


Figure 3.222. Relative suitability of the fishing landings combined data layer in relation to the final AOA options in the Ketchikan Study Area.

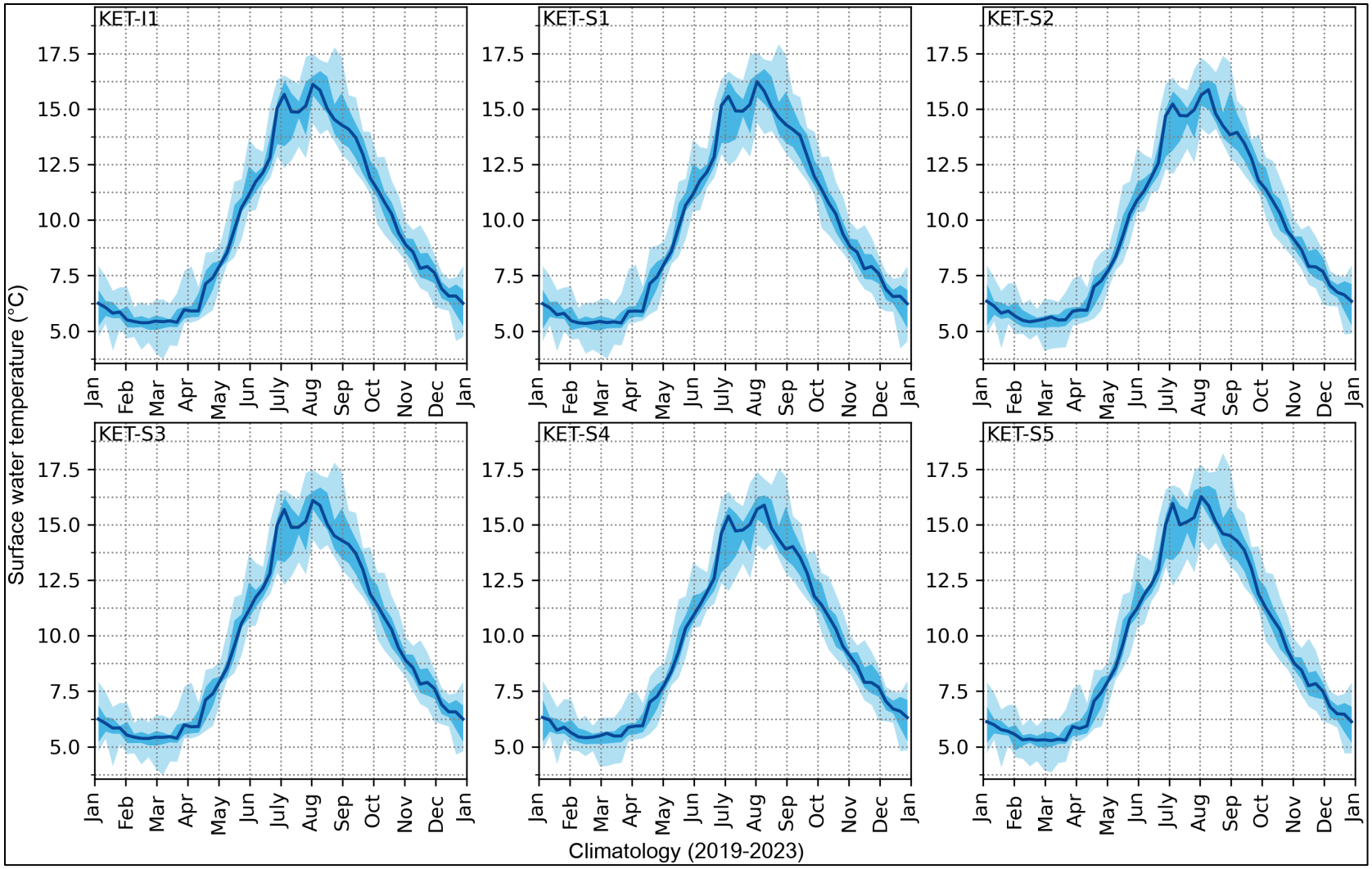


Figure 3.223. Sea surface temperatures for a subset of options from the Ketchikan Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

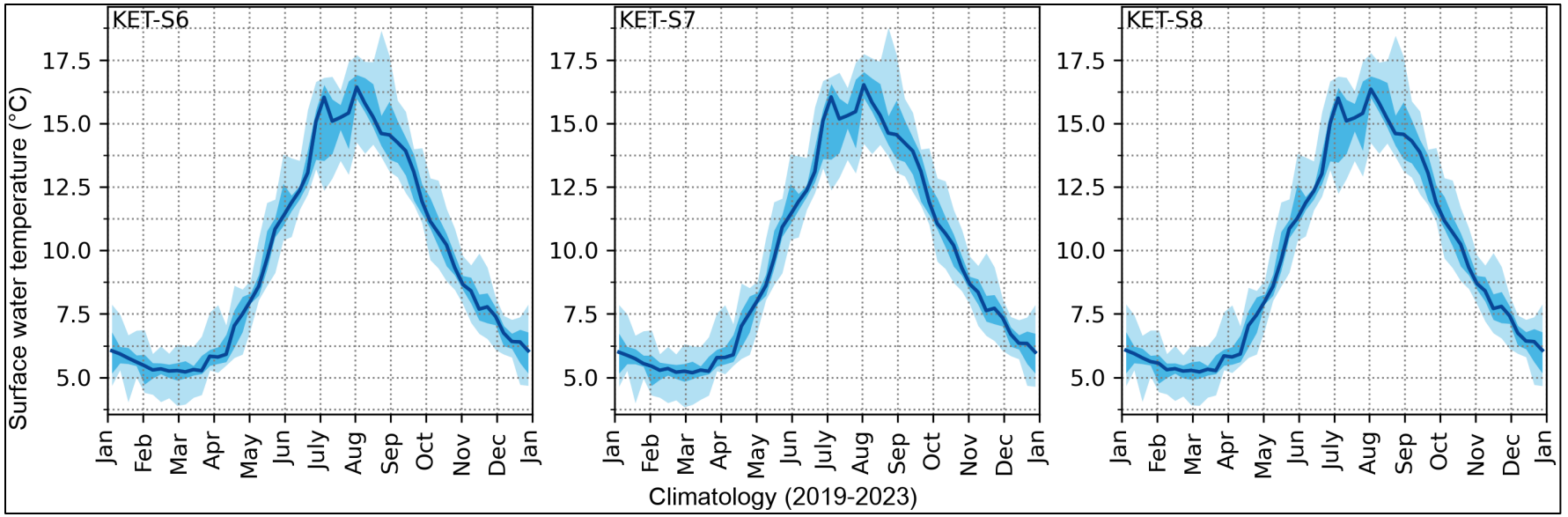


Figure 3.224. Sea surface temperatures for a subset of options from the Ketchikan Study Area. Data represent daily means for satellite measurements from the JPL Multi-scale Ultra-high Resolution Level 4 dataset from 2019 to 2023 at 0.01° resolution (accessed May 31–June 10, 2025). Plots show the median daily average per week (dark blue line), interquartile range (25th–75th percentile) per week (medium blue), and the minimum and maximum per week (lighter blue).

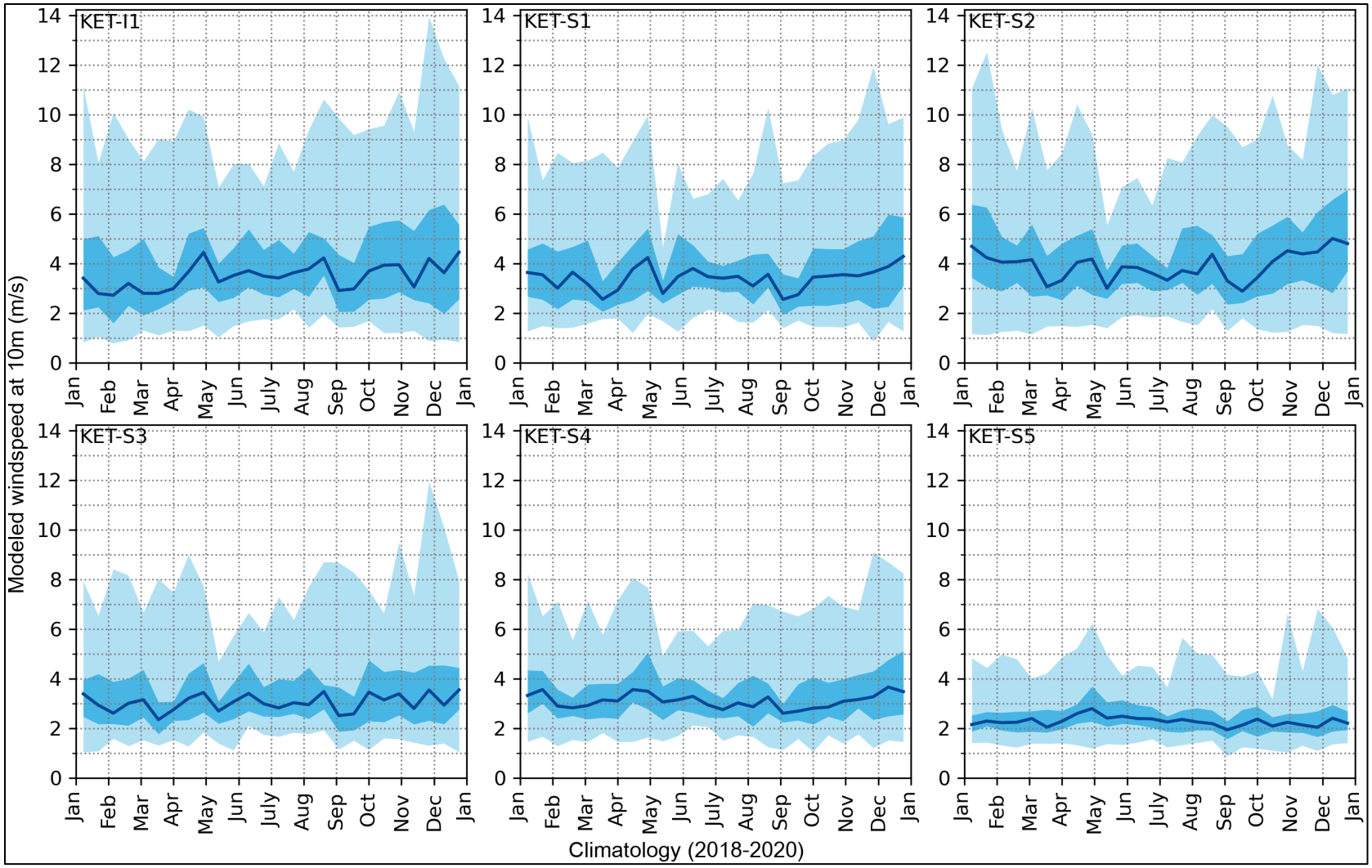


Figure 3.225. Wind speed at 10-m altitude for a subset of options from the Ketchikan Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018–2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

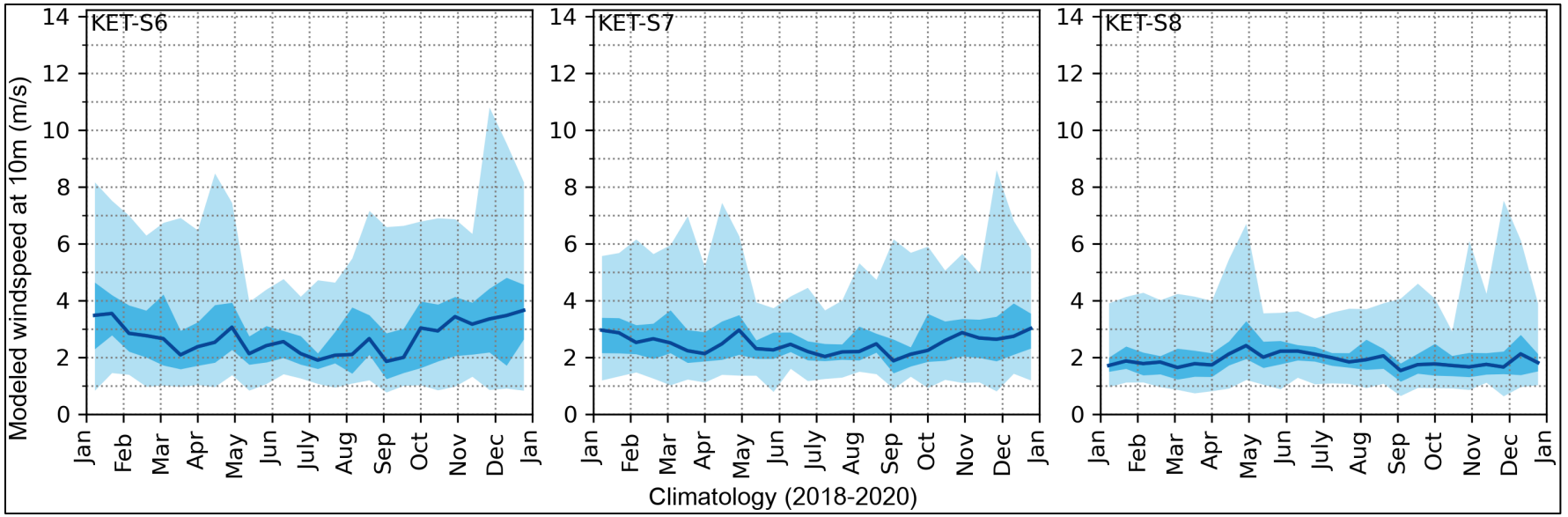


Figure 3.226. Wind speed at 10-m altitude for a subset of options from the Ketchikan Study Area. Data represent daily averages from NREL's WIND Toolkit Long-Term Ensemble Dataset (WTK-LED) (2018 -2020) recorded every five minutes at 2-km resolution (accessed May 28, 2025). Plots show the median daily average per two week period (dark blue line), interquartile range (25th–75th percentile) per two week period (medium blue), and the minimum and maximum per two week period (lighter blue).

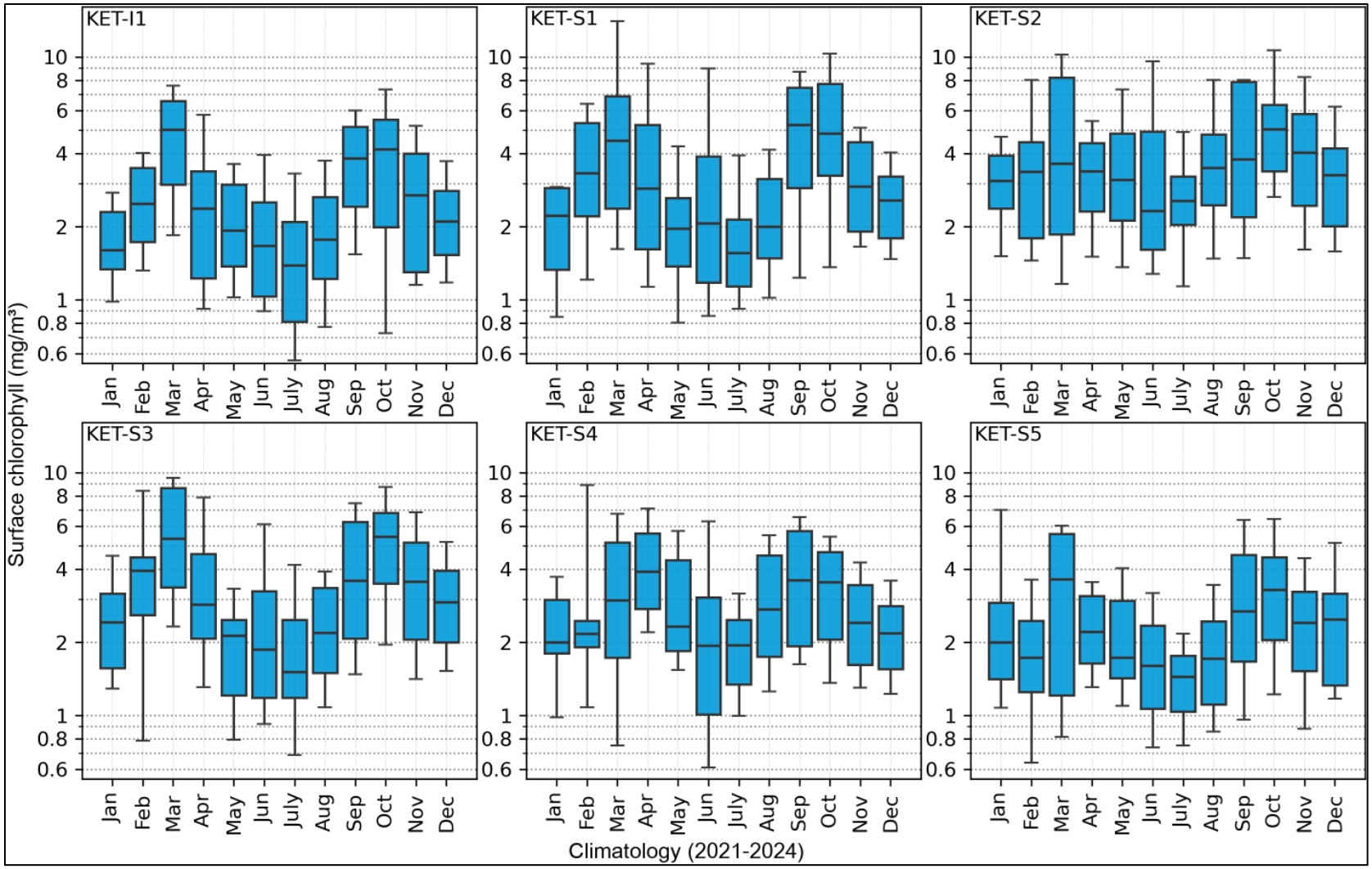


Figure 3.227. Monthly climatological surface chlorophyll *a* for a subset of options from the Ketchikan Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

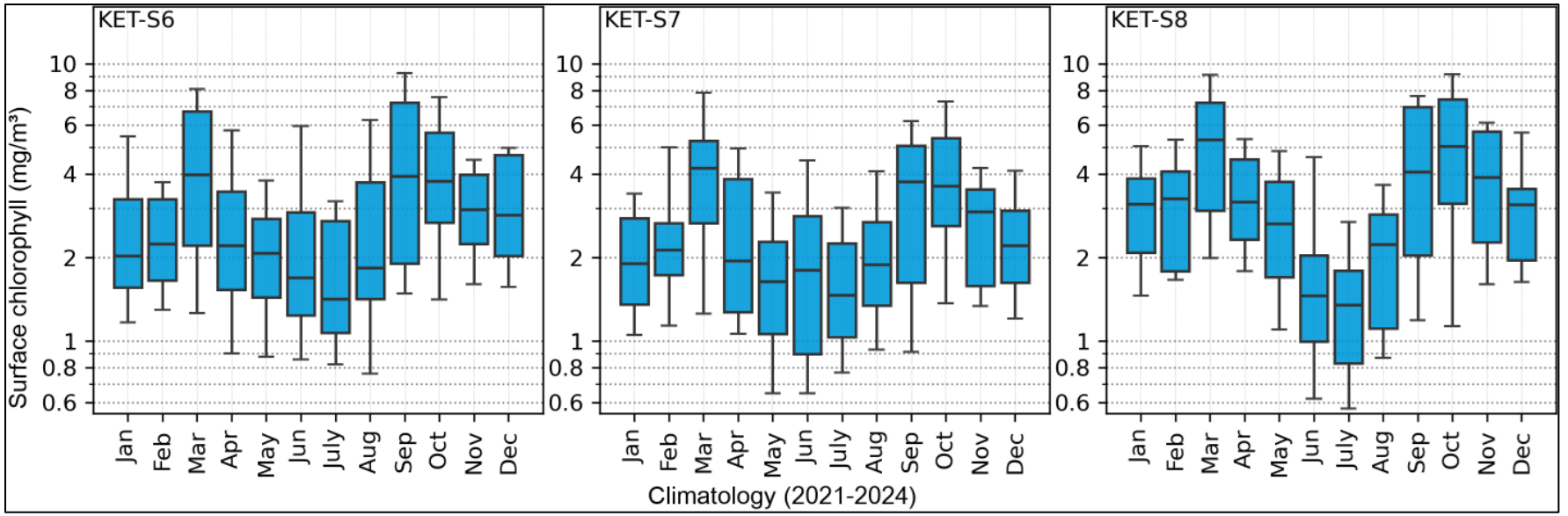


Figure 3.228. Monthly climatological surface chlorophyll *a* for a subset of options from the Ketchikan Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

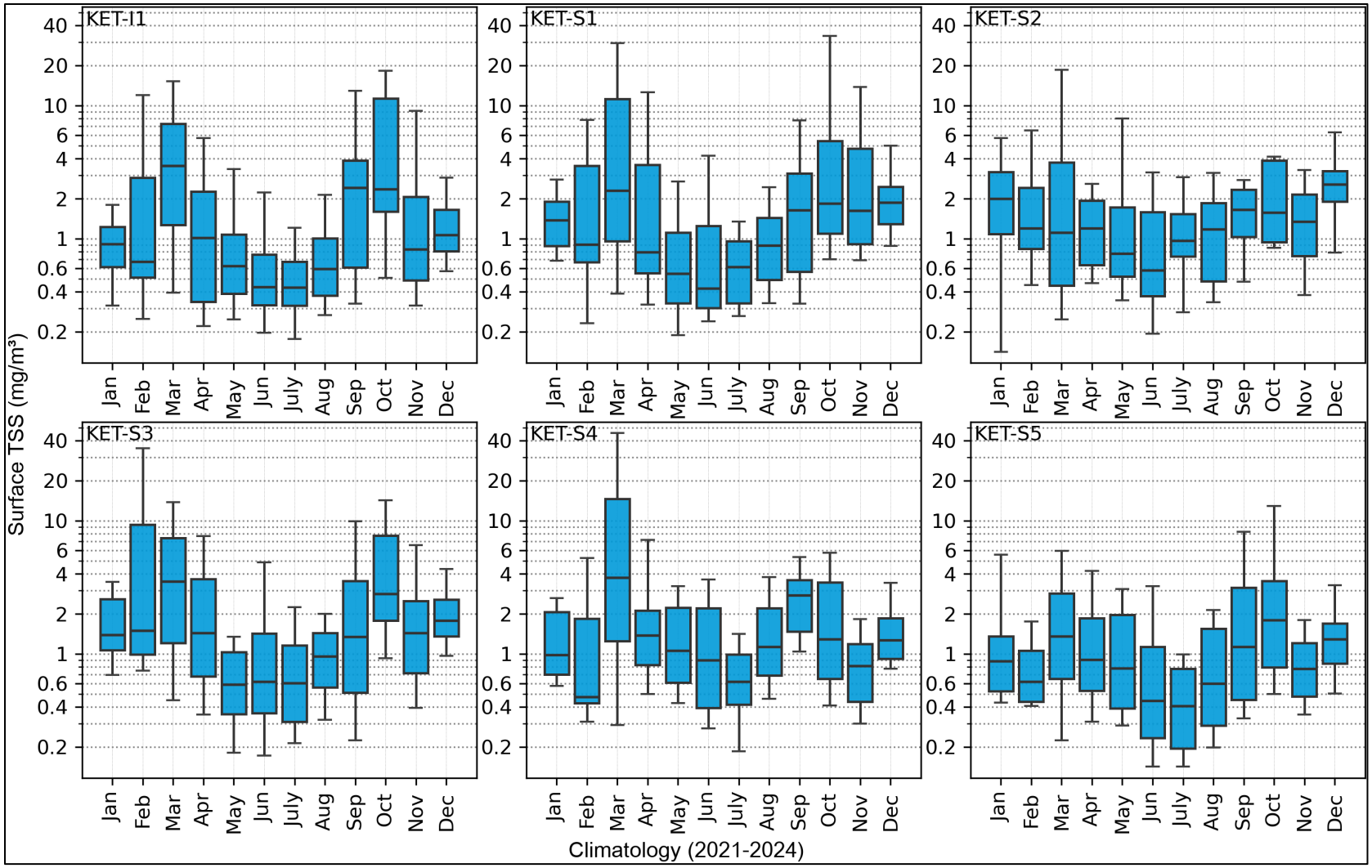


Figure 3.229. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Ketchikan Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

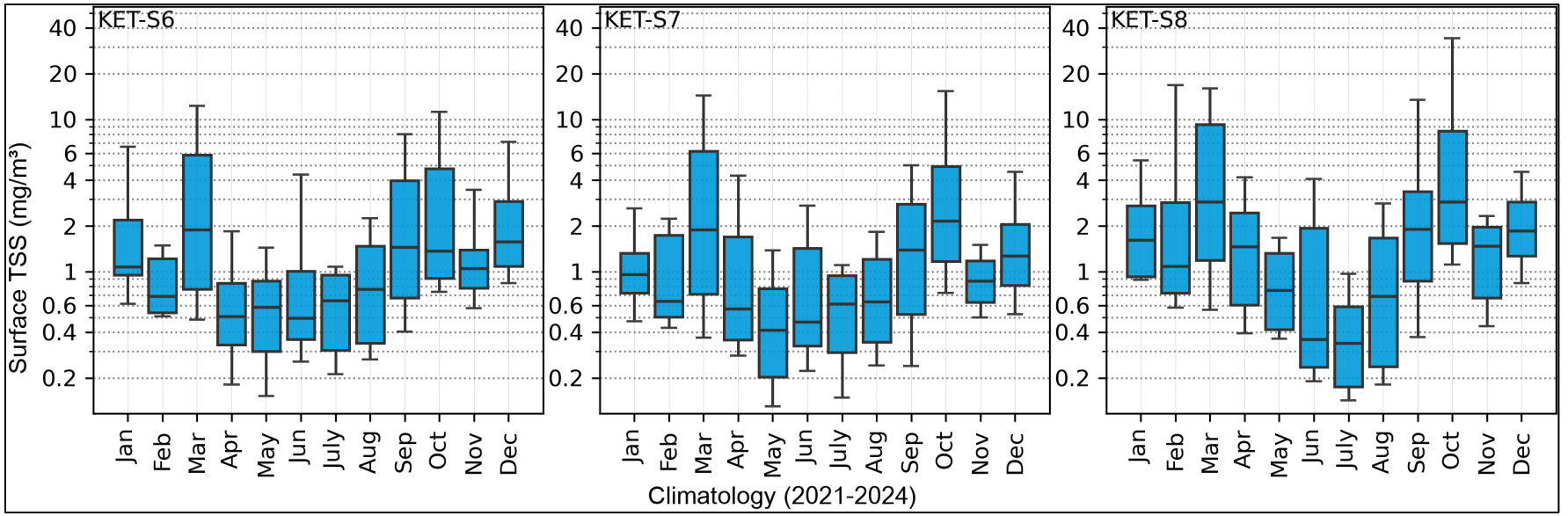


Figure 3.230. Monthly climatological surface total suspended solids (TSS) for a subset of options from the Ketchikan Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

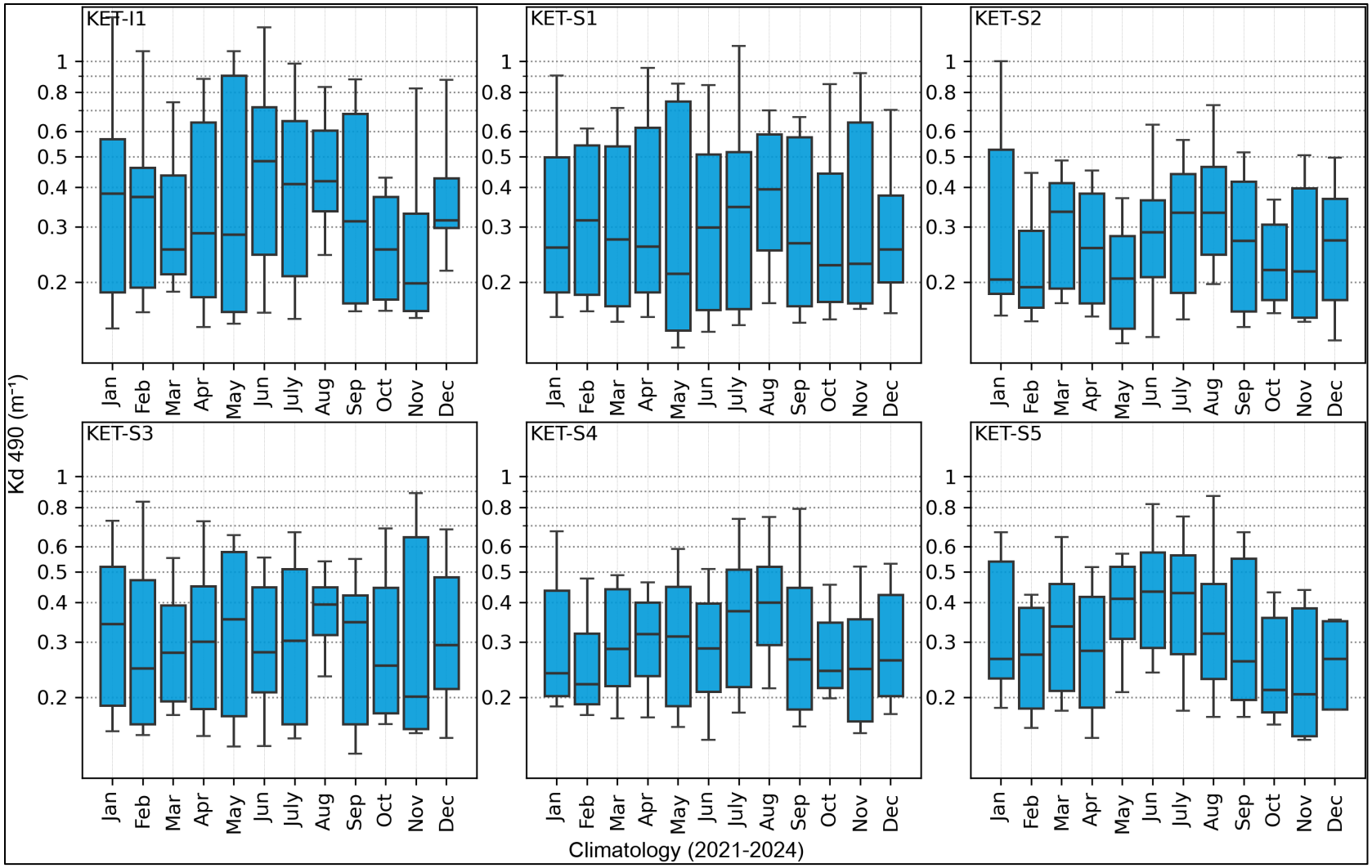


Figure 3.231. Monthly climatological light attenuation, Kd(490), for a subset of options from the Ketchikan Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

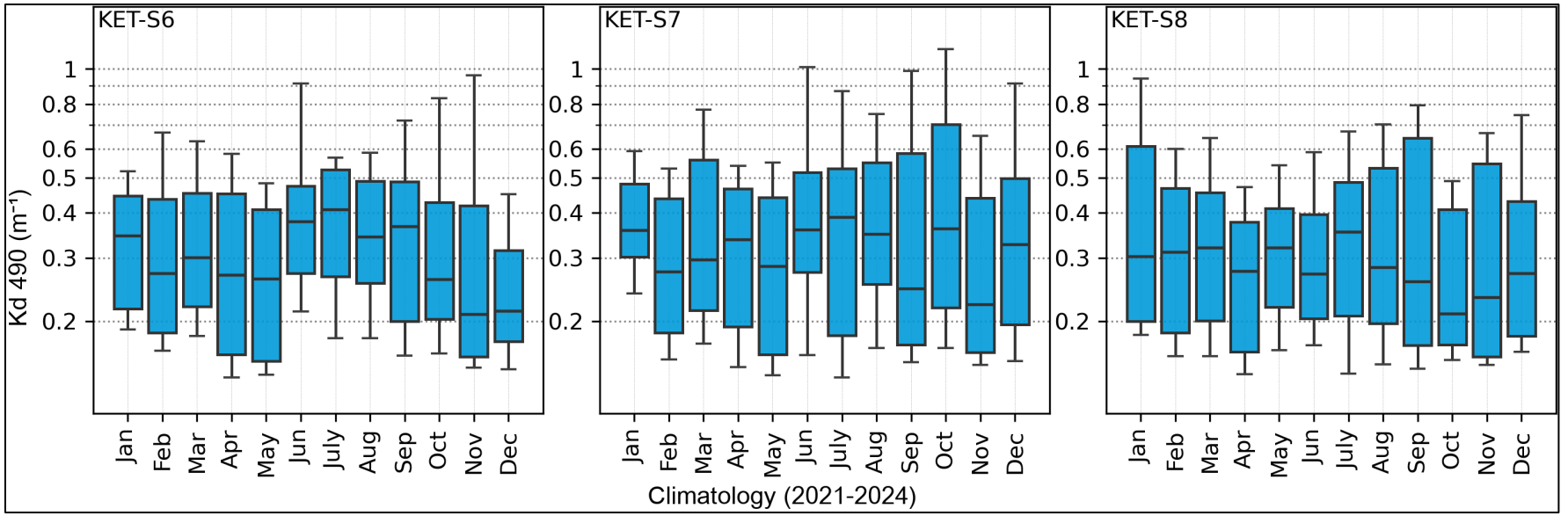


Figure 3.232. Monthly climatological light attenuation, Kd(490), for a subset of options from the Ketchikan Study Area. Data are daily averages plotted on a log scale and sourced from EUMETSAT Sentinel-3A OLCI Ocean Colour Geophysical dataset at 300-m resolution (accessed April 8–May 14, 2025). Boxplot edges represent the upper and lower quartiles (75th and 25th percentiles), with the middle line representing the monthly median. Whiskers show the 10th and 90th percentiles.

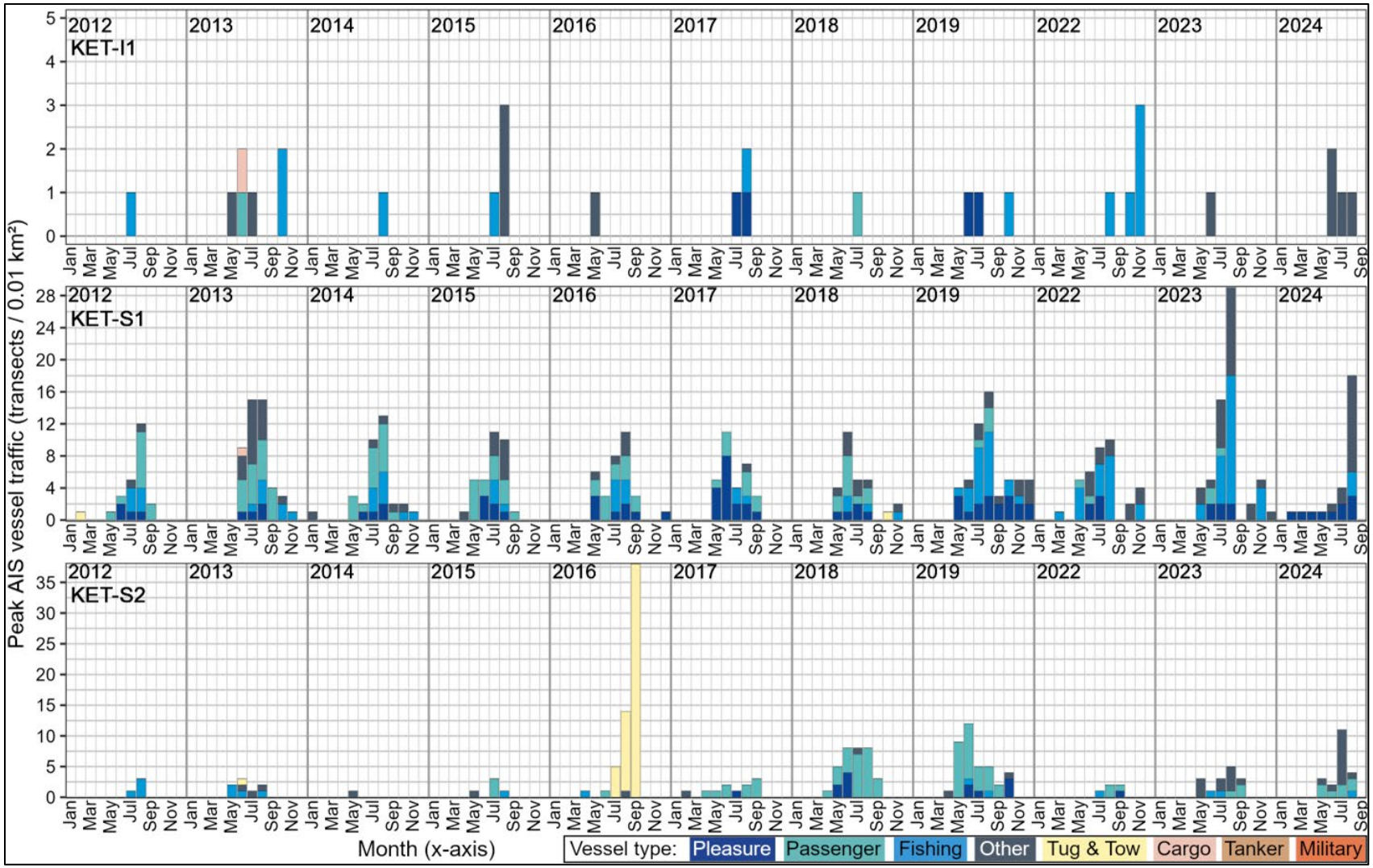


Figure 3.233. Monthly peak vessel traffic activity within options from a subset of the Ketchikan Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

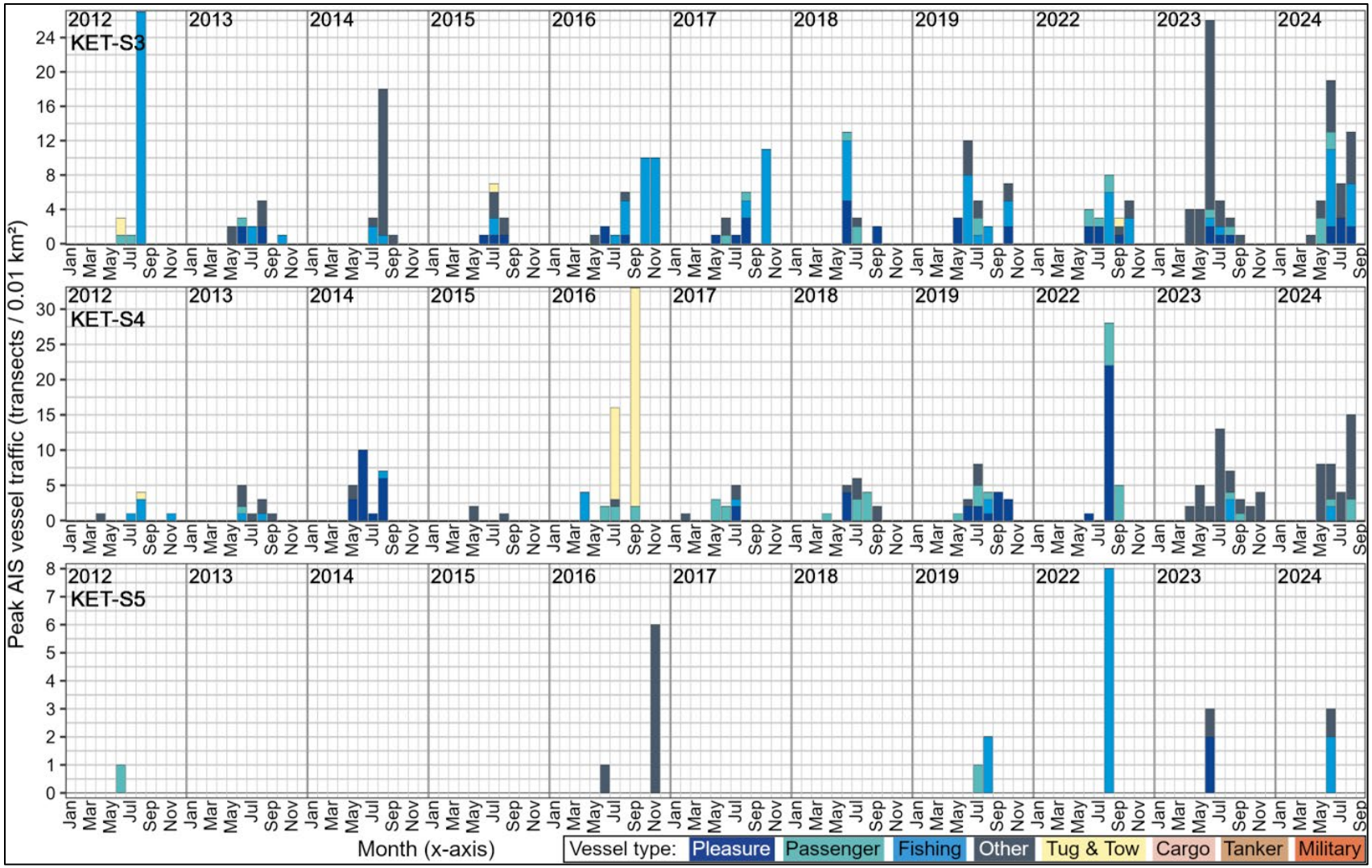


Figure 3.234. Monthly peak vessel traffic activity within options from a subset of the Ketchikan Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

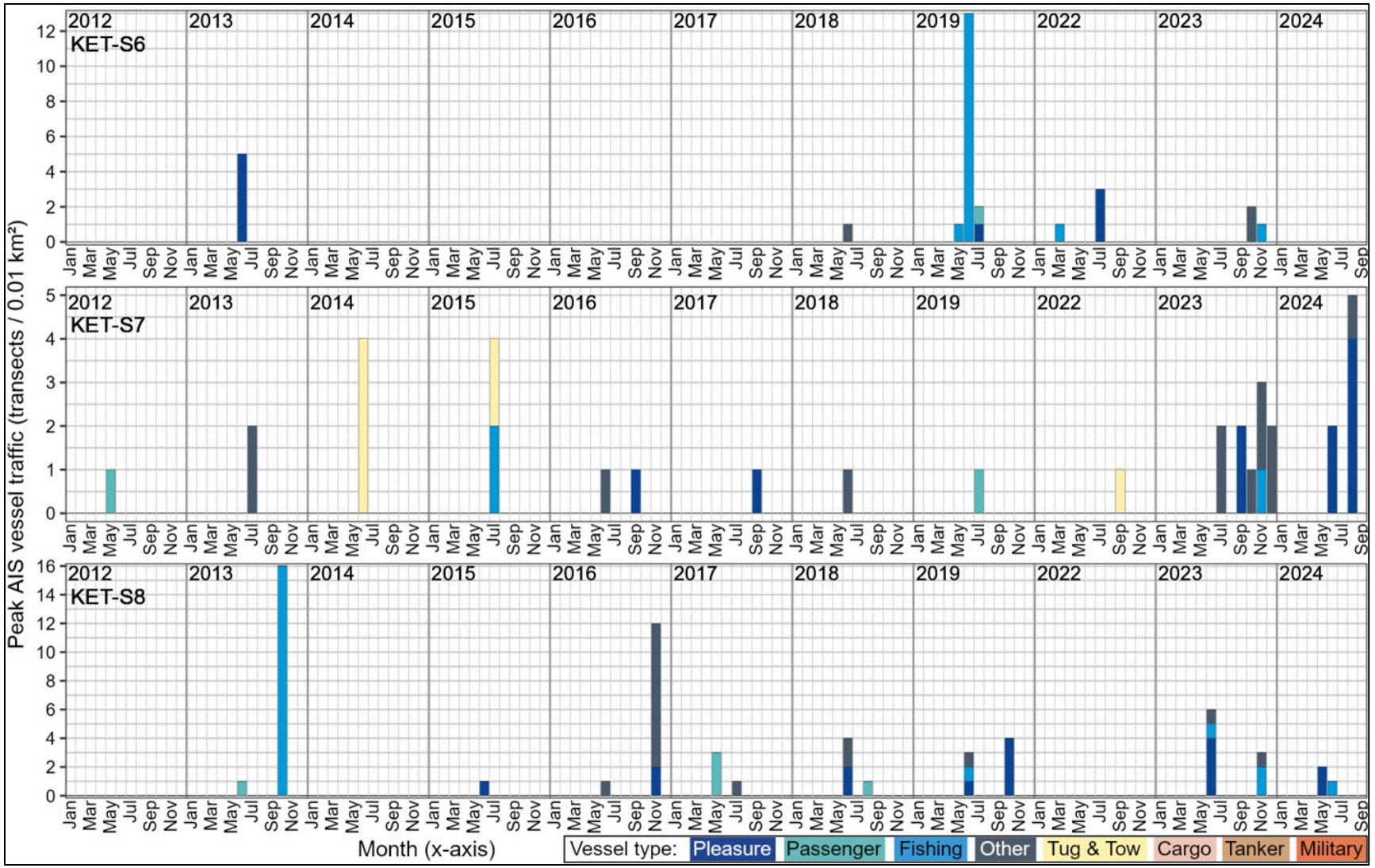


Figure 3.235. Monthly peak vessel traffic activity within options from a subset of the Ketchikan Study Area by vessel type for years 2012–2024 (omits anomalous covid-affected years, 2020, 2021). Values are total transects for the month within a 0.01-km² grid cell. Data are sourced from the Marine Exchange of Alaska Automatic Identification System (AIS) Vessel Traffic dataset (accessed November, 2024).

KET-I1

AOA option KET-I1 is a 55-ac intertidal site within the South extent of the Ketchikan Study Area, located 14 km (7.8 nm) from Ketchikan (centroid: 55.2768 N, 131.4514 W). The site is located within subunits K-46 and GU of the Ketchikan Region unit in the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -14 m (-45 ft) to 12 m (40 ft) with an average depth of 0.21 m (0.69 ft). At MHW the depth ranges from -9.3 m (-31 ft) to 17 m (55 ft) with an average depth of 4.6 m (15 ft). KET-I1 has an average slope of 6.3° and maximum slope of 19°. The Alaska ShoreZone mapping dataset categorizes the shore adjacent to this site as 'ramp with gravel and sand beach wide', 'platform with gravel and sand beach wide', 'gravel beach narrow', 'ramp with gravel beach', 'sand and gravel flat or fan', 'sand and gravel beach narrow', and classifies the biological wave exposure as protected, semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.4°C, a minimum daily average of 5.6°C, and a maximum daily average of 15°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at KET-I1 averaged 3.9 m/s, with a minimum of 0.79 m/s and a maximum of 14 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in February (1.7 mg/m³) and lowest in July (0.90 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in March (7.2 mg/m³) and lowest in July (0.62 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in September (0.73 m^{-1}) and lowest in October (0.37 m^{-1}).

Industry and National Security Considerations

KET-I1 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (1.7 km), Navy undersea cable (exact distance undisclosed), USFS mooring buoy (2.7 km), ferry route (1.8 km), and wreck and obstruction (2.8 km). The site is within ADFG salmon (group code G) statistical unit 10145 and the groundfish (group code G) statistical unit 315501. KET-I1 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at three total transects (August 2015, November 2022). The primary vessel types observed are fishing, other, pleasure, and passenger. AIS activity over the most recent five years has increased by roughly 11% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KET-I1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.20 km), historically mapped eelgrass sites (0 km), harbor seal non-key haulouts (3.1 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There is one Alaska Heritage Resources Survey site within approximately 5 km of KET-I1. This site may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon

fish, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Saxman, Ketchikan Indian Corporation, and Metlakatla Indian Community Annette Island Reserve. Given this proximity, cultural resources could be present to an unknown extent.

KET-S1

AOA option KET-S1 is a 400-ac subtidal site within the South extent of the Ketchikan Study Area, located 19 km (10 nm) from Ketchikan (centroid: 55.2598 N, 131.3798 W). The site is located within subunit GU of the Ketchikan Region unit in the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -2.9 m (-9.4 ft) to 49 m (160 ft) with an average depth of 23 m (75 ft). At MHW the depth ranges from 1.6 m (5.2 ft) to 53 m (170 ft) with an average depth of 27 m (89 ft). KET-S1 has an average slope of 4.3° and maximum slope of 23°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected, semi-exposed.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.4°C, a minimum daily average of 5.5°C, and a maximum daily average of 15°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at KET-S1 averaged 3.7 m/s, with a minimum of 0.87 m/s and a maximum of 12 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in April (4.2 mg/m³) and lowest in May (1.7 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in March (4.7 mg/m³) and lowest in July (0.71 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in August (0.56 m^{-1}) and lowest in May (0.38 m^{-1}).

Industry and National Security Considerations

KET-S1 is within 5 km of at least one documented location from each of the following: aquatic farm lease site (0.054 km), submarine cable, fiber optic cable or cable area (2.7 km), Navy undersea cable (exact distance undisclosed), and ferry route (2.9 km). The site is within ADFG salmon (group code G) statistical unit 10145 and the groundfish (group code G) statistical units 315501 and 315503. KET-S1 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 29 total transects (August 2023). The primary vessel types observed are fishing, other, passenger, and pleasure. AIS activity over the most recent five years has increased by roughly 32% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

KET-S1 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.59 km), historically mapped eelgrass sites (0 km), humpback whale high use areas (0.53 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There is one Alaska Heritage Resources Survey site within approximately 5 km of KET-S1. This site may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land

mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Saxman, Ketchikan Indian Corporation, and Metlakatla Indian Community Annette Island Reserve. Given this proximity, cultural resources could be present to an unknown extent.

KET-S2

AOA option KET-S2 is a 90-ac subtidal site within the South extent of the Ketchikan Study Area, located 11 km (5.8 nm) from Ketchikan (centroid: 55.2762 N, 131.6793 W). The site is located within subunit GU of the Ketchikan Region unit in the Central/Southern Southeast area plan. The site ranges in depth at MLLW from 8.5 m (28 ft) to 49 m (160 ft) with an average depth of 35 m (120 ft). At MHW the depth ranges from 13 m (42 ft) to 53 m (170 ft) with an average depth of 40 m (130 ft). KET-S2 has an average slope of 4.1° and maximum slope of 12°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (81 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.3°C, a minimum daily average of 5.6°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in February. Wind velocity at KET-S2 averaged 4.2 m/s, with a minimum of 1.1 m/s and a maximum of 13 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (4.8 mg/m³) and lowest in June (2.4 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in March (3.4 mg/m³) and lowest in June (0.88 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in August (0.46 m^{-1}) and lowest in May (0.29 m^{-1}).

Industry and National Security Considerations

KET-S2 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (2.8 km), Navy undersea cable (exact distance undisclosed), ferry route (3.3 km), and wreck and obstruction (4.3 km). The site is within ADFG salmon (group code G) statistical unit 10127 and the groundfish (group code G) statistical unit 315502. KET-S2 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 38 total transects (September 2016). The primary vessel types observed are passenger, tug/tow, other, and fishing. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

KET-S2 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.53 km), harbor seal key haulouts (3.7 km), harbor seal non-key haulouts (0 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (3.2 km). KET-S2 overlaps the Annette-Betton-Cleveland Islands Sea Duck Key Habitat Site.

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, and

vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Saxman, Ketchikan Indian Corporation, and Metlakatla Indian Community Annette Island Reserve. Given this proximity, cultural resources could be present to an unknown extent.

KET-S3

AOA option KET-S3 is a 100-ac subtidal site within the South extent of the Ketchikan Study Area, located 13 km (6.8 nm) from Ketchikan (centroid: 55.29 N, 131.4745 W). The site is located within subunit GU of the Ketchikan Region unit in the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -4.5 m (-15 ft) to 83 m (270 ft) with an average depth of 37 m (120 ft). At MHW the depth ranges from -0.042 m (-0.14 ft) to 87 m (290 ft) with an average depth of 42 m (140 ft). KET-S3 has an average slope of 12° and maximum slope of 42°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.4°C, a minimum daily average of 5.6°C, and a maximum daily average of 15°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at KET-S3 averaged 3.3 m/s, with a minimum of 1.0 m/s and a maximum of 12 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in February (2.9 mg/m³) and lowest in May (1.0 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in March (4.0 mg/m³) and lowest in July (0.67 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in August (0.53 m^{-1}) and lowest in September (0.37 m^{-1}).

Industry and National Security Considerations

KET-S3 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (1.4 km), Navy undersea cable (exact distance undisclosed), USFS mooring buoy (0.61 km), hatchery release site (4.6 km), ferry route (1.9 km), and wreck and obstruction (0.57 km). The site is within ADFG salmon (group code G) statistical unit 10145 and the groundfish (group code G) statistical units 315501 and 315504. KET-S3 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 27 total transects (August 2012). The primary vessel types observed are fishing, other, and pleasure. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a regular pattern from year to year, concentrated to a few months, usually peaking around June.

Natural Resource Considerations

KET-S3 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (1.4 km), historically mapped eelgrass sites (0.51 km), harbor seal non-key haulouts (4.3 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of KET-S3. These sites may include cultural resources such as archaeological sites, buildings, structures,

objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Saxman, Ketchikan Indian Corporation, and Metlakatla Indian Community Annette Island Reserve. Given this proximity, cultural resources could be present to an unknown extent.

KET-S4

AOA option KET-S4 is a 79-ac subtidal site within the South extent of the Ketchikan Study Area, located 12 km (6.2 nm) from Ketchikan (centroid: 55.3 N, 131.6837 W). The site is located within subunit KT-23 of the Ketchikan Region unit in the Central/Southern Southeast area plan. The site ranges in depth at MLLW from 17 m (56 ft) to 32 m (110 ft) with an average depth of 25 m (81 ft). At MHW the depth ranges from 21 m (70 ft) to 37 m (120 ft) with an average depth of 29 m (96 ft). KET-S4 has an average slope of 2.3° and maximum slope of 6.5°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (93 m away) as semi-protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.3°C, a minimum daily average of 5.6°C, and a maximum daily average of 14°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in July and is lowest in February. Wind velocity at KET-S4 averaged 3.4 m/s, with a minimum of 1.1 m/s and a maximum of 9.1 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in September (2.5 mg/m³) and lowest in June (0.99 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in March (7.2 mg/m³) and lowest in July (0.52 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in August (0.60 m^{-1}) and lowest in November (0.32 m^{-1}).

Industry and National Security Considerations

KET-S4 is within 5 km of at least one documented location from each of the following: submarine cable, fiber optic cable or cable area (4.2 km), Navy undersea cable (exact distance undisclosed), and ferry route (4.4 km). The site is within ADFG salmon (group code G) statistical unit 10127 and the groundfish (group code G) statistical unit 315502. KET-S4 has relatively high AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 33 total transects (September 2016). The primary vessel types observed are other, pleasure, tug/tow, and passenger. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. AIS activity exhibits a seasonal pattern, usually peaking around June-July.

Natural Resource Considerations

KET-S4 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.72 km), harbor seal key haulouts (4.9 km), harbor seal non-key haulouts (1.8 km), humpback whale high use areas (0 km), and humpback whale feeding BIA (2.2 km). KET-S4 overlaps the Annette-Betton-Cleveland Islands Sea Duck Key Habitat Site.

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, salmon, and vegetation. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Saxman, Ketchikan Indian Corporation, and Metlakatla Indian Community Annette Island Reserve. Given this proximity, cultural resources could be present to an unknown extent.

KET-S5

AOA option KET-S5 is a 67-ac subtidal site within the South extent of the Ketchikan Study Area, located 22 km (12 nm) from Ketchikan (centroid: 55.3713 N, 131.4058 W). The site is located within subunit GU of the Ketchikan Region unit in the Central/Southern Southeast area plan. The site ranges in depth at MLLW from 2.9 m (9.4 ft) to 79 m (260 ft) with an average depth of 43 m (140 ft). At MHW the depth ranges from 7.3 m (24 ft) to 84 m (280 ft) with an average depth of 47 m (160 ft). KET-S5 has an average slope of 14° and maximum slope of 26°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (6 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.4°C, a minimum daily average of 5.5°C, and a maximum daily average of 15°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at KET-S5 averaged 2.4 m/s, with a minimum of 0.88 m/s and a maximum of 6.8 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (2.2 mg/m³) and lowest in June (0.82 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in October (4.2 mg/m³) and lowest in July (0.35 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.62 m^{-1}) and lowest in November (0.32 m^{-1}).

Industry and National Security Considerations

KET-S5 is within 5 km of at least one documented wreck and obstruction (4.8 km). The site is within ADFG salmon (group code G) statistical unit 10146 and the groundfish (group code G) statistical unit 315504. KET-S5 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at eight total transects (August 2022). The primary vessel types observed are fishing, other, and passenger. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KET-S5 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (2.1 km), historically mapped eelgrass sites (3.6 km), and humpback whale feeding BIA (0.64 km).

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of KET-S5. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land

mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Saxman, Ketchikan Indian Corporation, and Metlakatla Indian Community Annette Island Reserve. Given this proximity, cultural resources could be present to an unknown extent.

KET-S6

AOA option KET-S6 is a 130-ac subtidal site within the South extent of the Ketchikan Study Area, located 37 km (20 nm) from Ketchikan (centroid: 55.3783 N, 131.2854 W). The site is located within subunit GU of the Ketchikan Region unit in the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -2.6 m (-8.4 ft) to 38 m (130 ft) with an average depth of 17 m (56 ft). At MHW the depth ranges from 1.9 m (6.1 ft) to 43 m (140 ft) with an average depth of 22 m (71 ft). KET-S6 has an average slope of 6.0° and maximum slope of 14°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (23 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.4°C, a minimum daily average of 5.5°C, and a maximum daily average of 15°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at KET-S6 averaged 2.9 m/s, with a minimum of 0.78 m/s and a maximum of 11 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (3.2 mg/m³) and lowest in May (1.3 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in October (3.9 mg/m³) and lowest in July (0.62 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in June (0.56 m^{-1}) and lowest in April (0.33 m^{-1}).

Industry and National Security Considerations

The site is within ADFG salmon (group code G) statistical unit 10143 and the groundfish (group code G) statistical unit 315503. KET-S6 has relatively low AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 13 total transects (June 2019). The primary vessel types observed are fishing, pleasure, and other. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KET-S6 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.15 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (0.20 km), and humpback whale feeding BIA (0.52 km).

Cultural Resource Considerations

There is one Alaska Heritage Resources Survey site within approximately 5 km of KET-S6. This site may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of

Saxman, Ketchikan Indian Corporation, and Metlakatla Indian Community Annette Island Reserve. Given this proximity, cultural resources could be present to an unknown extent.

KET-S7

AOA option KET-S7 is a 350-ac subtidal site within the South extent of the Ketchikan Study Area, located 38 km (21 nm) from Ketchikan (centroid: 55.3926 N, 131.2231 W). The site is located within subunit GU of the Ketchikan Region unit in the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -13 m (-44 ft) to 75 m (250 ft) with an average depth of 38 m (120 ft). At MHW the depth ranges from -8.9 m (-29 ft) to 79 m (260 ft) with an average depth of 42 m (140 ft). KET-S7 has an average slope of 11° and maximum slope of 28°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.4°C, a minimum daily average of 5.4°C, and a maximum daily average of 15°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at KET-S7 averaged 2.7 m/s, with a minimum of 0.80 m/s and a maximum of 8.6 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in October (2.9 mg/m³) and lowest in June (1.1 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in March (3.2 mg/m³) and lowest in May (0.47 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in October (0.58 m^{-1}) and lowest in May (0.33 m^{-1}).

Industry and National Security Considerations

KET-S7 is within 5 km of at least one documented location from each of the following: USFS mooring buoy (0.19 km) and wreck and obstruction (1.8 km). The site is within ADFG salmon (group code G) statistical unit 10143 and the groundfish (group code G) statistical unit 315503. KET-S7 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at five total transects (August 2024). The primary vessel types observed are other, pleasure, tug/tow, and fishing. AIS activity over the most recent five years has increased by more than 50% compared to the previous five years. There is not enough AIS activity observed to detect regular patterns from year to year.

Natural Resource Considerations

KET-S7 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.82 km), historically mapped eelgrass sites (0 km), harbor seal key haulouts (1.2 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

There are two Alaska Heritage Resources Survey sites within approximately 5 km of KET-S7. These sites may include cultural resources such as archaeological sites, buildings, structures, objects, or locations, etc., from prehistoric to modern, and some paleontological sites. Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Saxman, Ketchikan Indian Corporation, and Metlakatla Indian

Community Annette Island Reserve. Given this proximity, cultural resources could be present to an unknown extent.

KET-S8

AOA option KET-S8 is a 220-ac subtidal site within the South extent of the Ketchikan Study Area, located 25 km (14 nm) from Ketchikan (centroid: 55.3962 N, 131.3593 W). The site is located within subunit GU of the Ketchikan Region unit in the Central/Southern Southeast area plan. The site ranges in depth at MLLW from -7.8 m (-26 ft) to 29 m (95 ft) with an average depth of 14 m (46 ft). At MHW the depth ranges from -3.4 m (-11 ft) to 33 m (110 ft) with an average depth of 18 m (60 ft). KET-S8 has an average slope of 4.1° and maximum slope of 12°. The Alaska ShoreZone mapping dataset categorizes the biological wave exposure of the shore nearest to this site (0 m away) as protected.

Environmental Conditions

Water temperature fluctuates seasonally with a mean daily average water temperature at the surface of 9.4°C, a minimum daily average of 5.5°C, and a maximum daily average of 15°C between 2019 and 2023. Seasonally, daily average temperature at the surface peaks in August and is lowest in February. Wind velocity at KET-S8 averaged 2.0 m/s, with a minimum of 0.64 m/s and a maximum of 7.5 m/s. Chlorophyll *a* concentration (mg/m³), which is an indicator of phytoplankton abundance, was highest in March (4.0 mg/m³) and lowest in July (0.91 mg/m³). Total suspended solids concentration, TSS (mg/m³), was highest in October (5.1 mg/m³) and lowest in July (0.32 mg/m³). The diffuse light coefficient at 490 nanometers, Kd(490), is an indicator of water turbidity. Kd(490) was highest in November (0.53 m^{-1}) and lowest in April (0.33 m^{-1}).

Industry and National Security Considerations

KET-S8 is within 5 km of at least one documented location from each of the following: USFS mooring buoy (3.3 km) and wreck and obstruction (2.3 km). The site is within ADFG salmon (group code G) statistical unit 10146 and the groundfish (group code G) statistical unit 315504. KET-S8 has moderate AIS activity overall compared to the other options in the Study Area, with monthly vessel activity peaking at 16 total transects (October 2013). The primary vessel types observed are fishing, other, and pleasure. AIS activity over the most recent five years has decreased by roughly 13% compared to the previous five years. There are no significant regular or seasonal patterns observed in the AIS activity from year to year.

Natural Resource Considerations

KET-S8 is within 5 km of at least one documented location from each of the following natural resources: anadromous streams (0.16 km), historically mapped eelgrass sites (1.4 km), harbor seal non-key haulouts (1.9 km), and humpback whale feeding BIA (0 km).

Cultural Resource Considerations

Subsistence search and harvest areas exist within 5 km for the following resources: birds and eggs, large land mammals, marine invertebrates, marine mammals, non-salmon fish, and salmon. Federally recognized Alaska Native Villages or Tribal Associations within 50 km include the Organized Village of Saxman, Ketchikan Indian Corporation, and Metlakatla Indian Community Annette Island Reserve. Given this proximity, cultural resources could be present to an unknown extent.

Similar Characteristics Across All AOA Options

Governance

Aquaculture in Alaska state waters operates within one of the most comprehensive regulatory frameworks in the world. Existing regulations govern a multitude of environmental concerns including disease management, siting of gear, seafood safety, and the protection of marine mammals, fish habitat, and threatened and endangered species. Several state and federal agencies are responsible for ensuring the regulations are enforced within the areas of the AOA options, including ADNR, ADFG, ADEC, USACE – Alaska District, U.S. Coast Guard, EPA Region 10, USFWS Alaska Region, NMFS Alaska Region, and USFS Alaska Region 10.

Local Ordinances

Contact your local city or borough to learn about aquaculture ordinances in your area.

State Statutes and Regulations

- Alaska Department of Fish and Game Statutes (AS 16.40.100–199)
- Alaska Department of Fish and Game Regulations (5 Alaska Administrative Code 41.200–400)
- Alaska Department of Natural Resources Statutes (AS 38.05.083–085)
- Alaska Department of Natural Resources Regulations (11 Alaska Administrative Code 63.010-900)

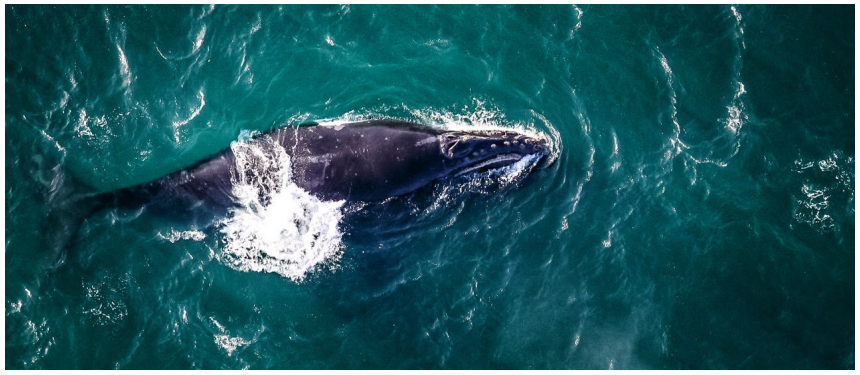
Federal Statutes and Regulations

- U.S. Rivers and Harbors Act (Sections 10 and 14; 33 U.S.C. Section 407 and Section 408)
- DOD, Corps of Engineers, Department of the Army Regulatory Program of the Corps of Engineers (33 Code of Federal Regulations [C.F.R.] 320–334)
- U.S. Clean Water Act (Sections 401 and 404: 33 U.S.C., Sec. 1314)
- National Environmental Policy Act (42 U.S.C. 4321 et. seq.)
- U.S. Fish and Wildlife Coordination Act (16 U.S.C. 661–666c)
- Marine Mammal Protection Act (Section 302; 16 U.S.C.)
- Endangered Species Act (Section 7; 16 U.S.C. 1531 et. seq.)
- Magnuson-Stevens Fishery Conservation and Management Act (Essential Fish Habitat provisions; Section 305; 16 U.S.C. 1801 et.seq.)
- National Historic Preservation Act (Section 106; 16 U.S.C. 470)
- Migratory Bird Treaty Act of 1918 (16 U.S.C. 703–712)
- The Bald and Golden Eagle Protection Act (16 U.S.C. 668–668d et.seq.)

National Wildlife Refuge Submerged Lands Status

The following submerged lands within the Study Areas are part of the Alaska Maritime National Wildlife Refuge, and aquaculture in these areas is subject to a special permitting process administered by the Refuge.

- Submerged lands beneath marine waters within the boundary of Afognak Island, as established by Proclamation 0491, were retained in federal ownership at statehood and are administered by the Refuge.
- Submerged lands beneath marine waters within the boundary of the Karluk Reservation, adjacent to Kodiak Island, as established by PLO 0128, were retained in federal ownership at statehood and are administered by the Refuge.
- Submerged lands beneath marine waters within the boundary of Womens Bay, adjacent to Kodiak Island, as established by E.O. 7748 and subsequent orders, were retained within federal ownership and are administered by the Refuge.





Federal submerged lands beneath marine waters within National Wildlife Refuges are subject to all laws and regulations governing refuge management, with the exception that international law establishes “freedom of navigation” within marine waters. Planners should also consider National Wildlife Refuge land status for uplands near aquaculture sites if associated activities will occur above the mean high tide line, as Refuge permits may be required.

NMFS Protected Resources

Protected resources are known to occur within the Gulf of Alaska study areas and will require further consideration when planning for aquaculture (Table 3.20). Lists of species for both ESA-listed and MMPA stocks are provided in Tables 2.7 and 2.8 (Methods section) with accompanying scores, which are included to provide context on the relative conservation status of the species. This list and the information below were provided by NMFS to inform early planning awareness related to aquaculture development activities in the coastal waters of the Gulf of Alaska (Appendix B).

Table 3.20. ESA/MMPA species that occur within the AOA study regions for Alaska state waters. ESA = Endangered Species Act; MMPA = Marine Mammal Protection Act; AOA = aquaculture opportunity area; WNP = Western North Pacific; GOA = Gulf of Alaska; NSEAK = Northern Southeast Alaska; SSEAK = Southern Southeast Alaska; Y-SEAK = Yakutat-Southeast Alaska; ENP = Eastern North Pacific; EDPS = eastern distinct population segment; WDPS = western distinct population segment.

Species	Species
Dall's Porpoise	Humpback Whale (WNP)
Gray Whale (WNP)	Killer Whale (AT1 transient)
Harbor Porpoise (GOA)	Killer Whale (ENP Alaska resident)
Harbor Porpoise (NSEAK inland)	Killer Whale (ENP Northern resident, offshore)
Harbor Porpoise (SSEAK inland)	Killer Whale (ENP transient)
Harbor Porpoise (Y-SEAK offshore)	Killer Whale (West Coast transient)
Harbor Seal (Clarence Strait stock)	Minke Whale
Harbor Seal (Dixon/Cape Decision stock)	Sperm Whale
Harbor Seal (Lynn Canal/ Stephens Passage stock)	Sunflower Sea Star
Harbor Seal (N. Kodiak stock)	Fin Whale
Harbor Seal (Prince William Sound stock)	Gray Whale (ENP)
Harbor Seal (S. Kodiak stock)	North Pacific Right Whale
Harbor Seal (Sitka/Chatham stock)	Steller Sea Lion (EDPS)
Humpback Whale (Hawaii)	Steller Sea Lion (WDPS)
Humpback Whale (Mexico)	

Cetaceans

Humpback whales are among the most frequently observed baleen whales in all three regions, particularly during summer feeding months. Migratory populations from Hawaii and Mexico return annually, while the WNP population remains ESA listed due to low abundance and limited sightings in Alaskan waters (NOAA NMFS 2023). Gray whales from the Eastern North Pacific (ENP) population migrate through Southeast and Southcentral Alaska in spring and fall, on route to Arctic feeding grounds. The WNP population is critically endangered and rarely observed in the Gulf of Alaska (Weller 2013). Fin whales, listed as endangered, occur in offshore areas of the Gulf of Alaska and are occasionally sighted near Kodiak and Prince William Sound (NOAA NMFS 2022). Fin whales are typically found in deep water (Matsuoka et al. 2013; Rone et al. 2017) away from the immediate coast (Clarke et al. 2020). Minke whales are present in nearshore waters, particularly in Prince William Sound and Southeast Alaska, though they are often underreported due to their elusive behavior (Allen and Angliss 2015). Sperm whales inhabit deep offshore waters near Kodiak and

Southeast Alaska and are known for their extreme diving behavior and acoustic activity (Whitehead 2003). The North Pacific right whale is one of the rarest whale species globally, with fewer than 50 individuals in the eastern population. They are found primarily in coastal or shelf waters but sometimes travel into deeper waters, and critical habitat includes areas south of Kodiak Island and the southeastern Bering Sea, with acoustic detections confirming seasonal use of Gulf of Alaska waters (Wright et al. 2025). Dall's porpoises are common in deeper offshore waters across all three regions and are known for their high-speed swimming and bow-riding behavior. Harbor porpoises are widely distributed in nearshore waters, with genetically distinct stocks in the Gulf of Alaska, Northern Southeast Alaska, Southern Southeast Alaska, and Yakutat-Southeast Alaska offshore zones (Hobbs and Waite 2010). These porpoises are vulnerable to gillnet entanglement and are federally protected under the MMPA. Multiple ecotypes of killer whales (*Orcinus orca*) occur in the region. The AT1 transient group, once common in Prince William Sound, has declined sharply since the EVOS (Matkin et al. 2008). ENP Alaska resident killer whales are salmon specialists and are frequently observed in Southeast and Southcentral Alaska. Northern resident and offshore ecotypes range into Southeast and the Gulf of Alaska, while West Coast transients and other transient groups prey on seals, porpoises, and occasionally large whales (Ford et al. 2000).

Pinnipeds

Harbor seals are present year-round throughout Alaska, including all three regions. Based on the most recent estimates of abundance and trend, the Southeast Alaska, Kodiak, and Prince William Sound stocks are all decreasing (Young et al. 2024). None of these stocks are currently classified as "strategic" under the MMPA. All stocks are subject to ongoing monitoring and management. Prince William Sound seals have shown signs of recovery following oil spill impacts (Small et al. 2003). Steller sea lions occur throughout the region. In Alaska, the eastern distinct population segment Steller sea lion occurs primarily in Southeast Alaska and is protected under the MMPA but was removed from the threatened listing under the ESA in 2013. The WDPS Steller sea lion occurs primarily west of 144° W. in waters that include Prince William Sound and Kodiak (Jemison et al. 2018) and is listed as endangered under the ESA and protected under the MMPA. This population also occurs in northern Southeast Alaska north of Sumner Strait and is no longer increasing since the population began to rebound in the early 2000s. All pinnipeds use haulouts and rookeries and can be easily disturbed, which can lead to a stampede into the water if they feel threatened and can be particularly dangerous for pups who may be crushed. Therefore, care should be taken to follow applicable NMFS marine mammal regulations and viewing guidelines to minimize disturbance in these areas.



Invertebrates

Sunflower sea stars are habitat generalists and are present in all three regions year-round. They occupy a wide range of benthic substrates including mud, sand, shell, gravel, and rocky bottoms and are known to occur in kelp forest and eelgrass habitats. Individuals reside in the intertidal and subtidal zones throughout their range and are most common in waters less than 25 m. Once abundant in Alaska, this species experienced dramatic declines due to sea star wasting syndrome, prompting consideration for ESA listing (88 FR 16212; March 16, 2023). While some patchy recovery has been observed in some parts of its range, this species remains vulnerable.[18]

Essential Fish Habitat and Fishery Management Plans

Pursuant to the Magnuson-Stevens Act, each fishery management plan must identify and describe EFH for the managed fishery. The statute defines EFH as "those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity." 16 U.S.C. § 1853(a)(7) and § 1802(10). NOAA regulations further define EFH by specifying that "necessary" means "the habitat required to support a sustainable fishery and the managed species contribution to a healthy ecosystem" (50 C.F.R. § 600.10). Table 3.21 provides a list of EFH that overlap with the AOA study areas.

Table 3.21. Essential Fish Habitat and Fisheries Management Plans that overlap with the Aquaculture Opportunity Area options.

Species	Region	Life Stages with EFH Designation
Alaska plaice	All	Larvae, Egg
Alaska skate	All	Adult
Aleutian skate	All	Adult
Arrowtooth flounder	All	Adult, Early juvenile, Larvae
Atka mackerel adult	All	Adult
Chinook salmon	All	Mature, Juvenile, Immature
Chum salmon	All	Mature, Juvenile, Immature
Coho salmon	All	Mature, Juvenile
Pacific Dover sole	All	Adult, Larvae, Egg
Dusky rockfish	All	Adult
English sole	All	Early juvenile
Flathead sole	All	Adult, Early juvenile, Larvae, Egg
Harlequin rockfish	All	Adult
Kamchatka flounder	All	Adult

[18] https://www.fisheries.noaa.gov/action/proposed-rule-list-sunflower-sea-star-threatened-under-endangered-species-act

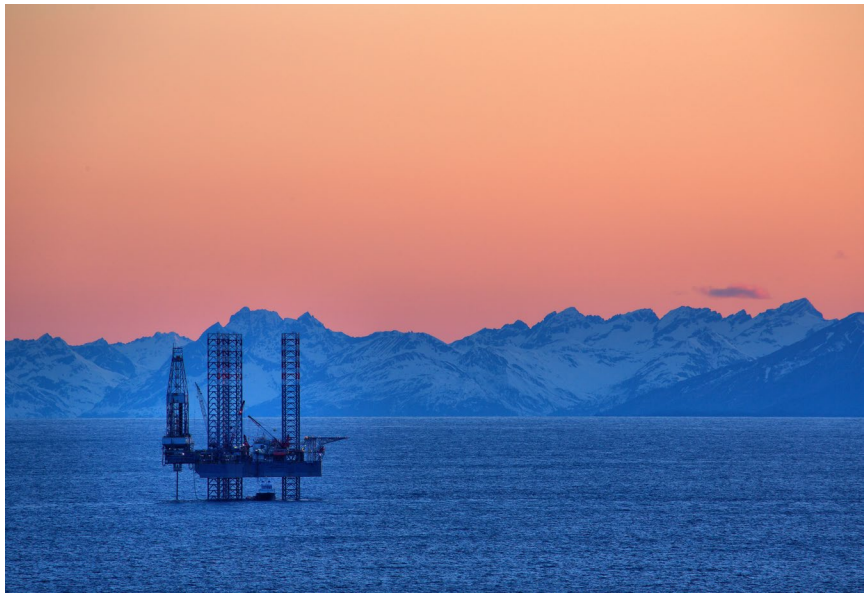
Species	Region	Life Stages with EFH Designation
Longspine thornyhead rockfish	All	Adult
Northern rock sole	All	Adult, Larvae
Northern rockfish	All	Adult
Octopus	All	
Pacific cod	All	Adult, Early juvenile, Larvae
Pacific ocean perch	All	Adult, Early juvenile, Larvae
Pink salmon	All	Mature, Juvenile
Redbanded rockfish	All	Adult
Rex sole	All	Adult, Early juvenile, Larvae, Egg
Rocksole	All	Early juvenile
Rougheye rockfish	All	Adult
Sablefish	All	Adult, Early juvenile, Larvae
Sharpchin rockfish	All	Adult
Shortraker rockfish	All	Adult
Shortspine thornyhead rockfish	All	Adult
Sockeye salmon	All	Mature, Juvenile, Immature
Southern rocksole	All	Larvae
Starry flounder	All	Early juvenile
Walleye pollock	All	Adult, Early juvenile, Larvae, Egg
Yelloweye rockfish	All	Adult
Yellowfin sole	All	Early juvenile, Egg

Other Considerations

Given the proximity of coastal aquaculture sites to industrial activities and rural communities with limited or antiquated wastewater treatment, the potential for oil spills and sewage discharges must be carefully considered in site selection and management. While such incidents are relatively infrequent, their ecological and economic consequences can be profound.

Alaska has experienced several major oil spills that have shaped public perception, regulatory oversight, and coastal resource governance. The most significant being the 1989 Exxon Valdez disaster, which released approximately 260,000 barrels of crude oil

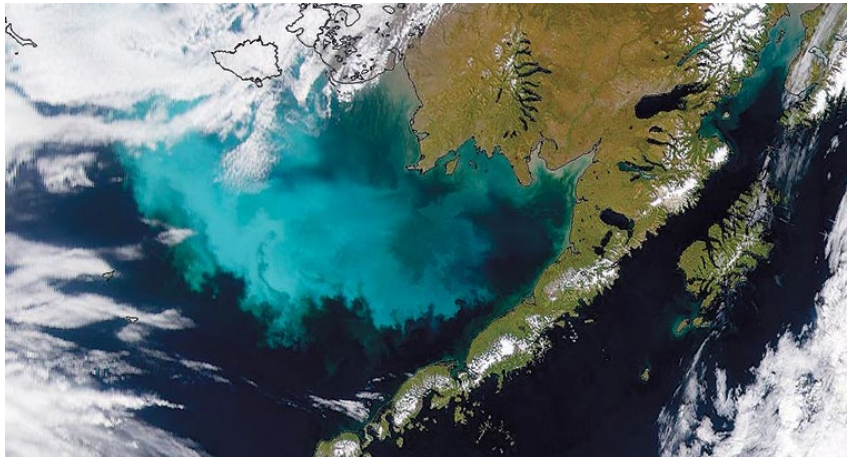
into Prince William Sound, contaminating over 1,300 mi of shoreline and causing extensive mortality among seabirds, marine mammals, and fish populations.[19] The spill disrupted subsistence and commercial fisheries, triggered long-term ecological degradation, and led to sweeping reforms in oil transport and spill response protocols. Subsequent spills, though smaller in scale, have continued to impact marine habitats and fisheries, often resulting in extended closures of commercial and subsistence harvest areas and impacts to critical natural resources and tourism. The effects of oil spills can have a cascading impact on local economies, food security, and cultural practices.



In addition to oil-related risks, inadequate wastewater treatment and sewage spills present ongoing challenges for aquaculture development in coastal Alaska. Aging infrastructure, limited sanitation systems, and extreme weather events can result in the discharge of untreated or partially treated sewage into nearshore waters. These spills can contaminate shellfish growing areas and elevate the risk of waterborne and shellfish-derived illnesses. In communities lacking piped systems, overflows from holding tanks are standard during storm surges or freeze-thaw cycles, further exacerbating public health and environmental concerns. Consideration of current and future upland development is critical to preserving investment in the aquaculture industry and the quality and reputation of Alaskan cultured seafood.

Beyond human-derived pollution, naturally occurring biotoxins also pose a significant threat to aquaculture operations in Alaska. Naturally occurring harmful algal blooms (HABs) can produce toxins such as saxitoxin and domoic acid that cause paralytic shellfish poisoning and amnesic shellfish poisoning, respectively. These compounds accumulate in filter-feeding organisms like mussels and clams, rendering them unsafe for consumption and triggering harvest closures and lengthy reopening processes. Southeast and Southcentral Alaska and Kodiak Island are particularly vulnerable to HAB events, which can occur unpredictably and persist for weeks or months. Monitoring programs and early warning systems are essential to mitigate biotoxin risks, but gaps in coverage and limited forecasting capacity remain challenges. Relevant to shellfish aquaculture in Alaska are the industry-supported HAB and water-quality monitoring requirements. These requirements limit the time between sample collection and receipt at the state public health lab in Anchorage. As a result, consideration of sampling logistics and proximity to nearby air transport services is critical in planning for shellfish aquaculture projects.

[19] https://darrp.noaa.gov/oil-spills/exxon-valdez



For seaweed aquaculture specifically, Alaska's 50-50 rule is a critical consideration. Implemented by ADFG as guidance for farmers to help maintain and preserve genetic diversity, the rule recommends that spores from at least 50–60 wild kelp plants be collected within 50 km of a farm site each year. As a result, the locations of wild kelp beds directly influence the suitability of areas for commercial seaweed farm siting, and are considerations for aquatic farm operation permits, stock acquisition permits (for the collection of wild stock to populate a farm or hatchery), and stock transport permits (from a hatcher/farm to another farm). To support current and prospective farmers meeting the 50-50 rule and to help determine the potential suitability of draft AOA options for seaweed farming, the Alaska Regional Office tasked an Alaska Sea Grant State Fellow with developing a seaweed source inventory across the Alaska AOA Study Areas. This effort involved two components: 1) a participatory mapping process using SeaSketch,[20] in which active seaweed farmers, hatchery workers/operators, and others with local knowledge were interviewed and asked to map known wild kelp beds; and 2) collating the best available existing data sources on the locations of wild kelp beds (e.g., ShoreZone). Together, these approaches were used to develop updated spatial data on the location of wild seaweed beds within AOA Study Areas to aid in the Alaska AOA spatial analysis environmental characterization. Results of this work and a table showing documented source beds by species are provided in Appendix D.

The invasive European green crab has been detected in Alaska and is spreading to new areas. The current distribution includes some areas near Ketchikan, including the beaches of Metlakatla and Tamgas Harbor, and Annette Island Reserve (Perry 2025). This expanding population of invasive crabs poses a threat to wildlife and could conflict with aquaculture operations. Coordination with the Alaska Department of Fish and Game, who have the latest information on European green crab occurrence, is advised to minimize overlap between potential aquaculture activities and this species. Best management practices to prevent the unintentional spread of European green crabs and other invasive species through aquaculture activities should be implemented for projects occurring in areas with confirmed or likely near-term expansion of invasive species.



[20] https://www.seasketch.org/

DISCUSSION

The Gulf of Alaska is a geographically expansive and ecologically rich marine region, characterized by dynamic coastal systems and high biological productivity. Alaska's coastal waters support diverse ecosystems shaped by glacial inputs, strong currents, and seasonal upwelling, making it one of the most biologically diverse regions of the North Pacific (Spies 2006). Alaska's rugged coastline and remote communities present both challenges and opportunities for aquaculture development. Alaska's coastal population is relatively small compared to other U.S. coastal states (U.S. Census Bureau 2020), and the logistical challenges of accessing national seafood markets are compounded by the region's remote geography and limited infrastructure. Yet Alaska is deeply connected to the ocean through subsistence practices, commercial fisheries, and maritime industries that shape local economies and identities. Aquaculture development in this region has the potential to complement existing wild-capture fisheries, sustain working waterfronts, and support the broader existing seafood processing and distribution infrastructure. The coastal communities at the heart of the study areas serve as regional hubs, offering infrastructure, marine expertise, and place-based knowledge that could support sustainable and well-sited aquaculture expansion.

To support informed decision-making, coastal resource managers and stakeholders must have access to robust geospatial tools and scientific data that can guide regulatory processes, safeguard ecological integrity and cultural identity, and foster sustainable development. This spatial analysis was developed for the specific purpose of identifying locations that might be suitable for locating AOAs and includes limitations particular to that purpose. However, much of the spatial information provided herein will also be helpful to the aquaculture industry and coastal managers for planning and siting of projects in the region outside the scope of AOAs.

By leveraging the power of spatial intelligence and interdisciplinary science, this Atlas contributes to an informed, adaptive, and comprehensive approach to coastal aquaculture development in Alaska. This analysis represents one of the most comprehensive marine spatial modeling efforts conducted in the Gulf of Alaska and U.S. state waters to date. By integrating 86 data layers, including oceanographic conditions, habitat distributions, human use patterns, and regulatory boundaries, the maps and models provide many insights into the region's seascape. While the overall suitability modeling aligns with global best practices (Ehler and Douvere 2009), novel approaches were developed to address Alaska-specific considerations such as subsistence use areas, fisheries, and protected species and sensitive habitats critical to state and federal agency review of aquaculture development in Alaska. Innovative data products were also created to improve spatial resolution and coverage across remote coastal areas. These modeling tools and data layers will serve as valuable assets not only for aquaculture siting but also for future marine spatial planning efforts across Alaska and other regions of the U.S.

Foundational to this process was robust public engagement. Public input was gathered through a series of public comment periods, regional listening sessions, workshops, and direct discussions. These efforts included formal notices in the Federal Register (85 FR 67519; October 23, 2020; 88 FR 72046; October 19, 2023; 90 FR 17051; April 3, 2025), workshops, as well as over 100 one-on-one meetings with individuals representing fisheries, Alaska organizations, environmental groups, the aquaculture industry, and

marine resource experts. Given Alaska's vast coastline and the diversity of its coastal communities, the engagement process prioritized flexibility, including the additional step of soliciting public comment on draft AOA options.



The modeling effort incorporated tribal and stakeholder feedback to refine data inputs, identify gaps, and improve the relevance of spatial layers used in the analysis. For example, despite spatially coarse fishing data, the application of depth thresholds for dive and pot fisheries derived from industry input allowed for a more nuanced approach to the evaluation of high-use fishing areas. While this approach provides valuable context, more specific implications of the co-occurrence of aquaculture and other users need to be evaluated during future environmental analyses. The next formal opportunity for public input will occur when NOAA issues a Notice of Intent to prepare a PEIS, initiating a formal scoping process that invites broad participation.

The spatial modeling approach used in this analysis was designed to support the identification of discrete areas within Alaska's state waters, ranging from approximately 50 to 2,000 ac, for shellfish and macroalgae aquaculture development. The modeling framework was developed to inform NMFS as part of the broader planning process for AOAs and will contribute to the development of the PEIS. Following completion of the PEIS, one or more areas may be formally identified as AOAs.

While this analysis provides a robust foundation for identifying aquaculture potential, it is important to note that the modeling parameters, such as depth, proximity to shore, and jurisdictional boundaries, were intentionally broad to accommodate a wide range of production scales and techniques. These general criteria were selected to ensure relevance across aquaculture types, but they do not account for the specific operational or biological requirements of individual species or farming systems. As such, additional spatial analyses tailored to individual project goals may identify sites that are more suitable than those identified through this generalized framework. Similarly, due to the limitations inherent in spatial

datasets for many remote regions of Alaska, further site-specific and context-sensitive analysis is necessary to inform final siting decisions within AOA options. For example, the Kodiak Study Area presents promising aquaculture potential but will require additional environmental monitoring, nuanced siting within options, and additional coordination to address overlapping uses, complex environmental conditions, and resources not captured at this scale of spatial suitability modeling. This is likely true across all study areas, where limited oceanographic modeling and observational data were available to provide site-specific information on variables such as salinity, wave height, current speed, surficial sediment composition, and high-resolution seafloor topography. Additionally, shellfish culture is vulnerable to biotoxins that naturally occur in Alaska waters but were beyond the scope of this analysis. Entities interested in this type of culture will need to consult the established HAB community and resources, such as the Alaska Harmful Algal Bloom Network, to better understand biotoxin risks in their region of interest.

Ultimately, this spatial modeling effort provides a strategic starting point for aquaculture planning in Alaska's state waters. It highlights both opportunity and complexity, underscoring the need for site-specific assessments, stakeholder engagement, and adaptive management. The 77 final AOA options identified were selected from hundreds of possibilities of the highest-scoring spaces (between 50 and 2,000 ac) across the 10 study areas. While the purpose of this planning effort was to identify the most suitable AOA options for each study area, the remaining ranked options provide a high level of spatial intelligence, which could prove helpful for additional applications. These remaining options represent areas that are similar in suitability in that they also have low levels of conflict with other ocean users while meeting basic industry requirements for generalized aquaculture operations, albeit with some constraints resulting in slightly lower scores. Industry, coastal managers, and coastal planners could utilize these other options outside of the AOA process to inform industry planning and early siting discussions with permitting agencies.

Southwest Study Area

The Southwest study area includes options centered around the communities of Kodiak, Old Harbor, and Larsen Bay. The communities of the Kodiak Archipelago are known for their rich marine biodiversity, strong subsistence traditions, and commercial fishing. Seasonal migrations bring species such as Pacific salmon, halibut, and sablefish into nearshore habitats, while resident populations of herring, sea cucumbers, and shellfish support both traditional subsistence and emerging mariculture ventures (ADFG 2022a).

In general, the remote nature of Kodiak, and in particular the western communities, resulted in significant differences in capacity for engagement and the overall response to the AOA marine spatial planning initiative. The Kodiak AOA options largely avoided overlap with military operations and primary industry, navigation, and transportation corridors. There is a large area of munitions and unexploded ordnance on the east side of the island that may require DOD coordination for development. Afognak and Womens Bay submerged lands, which are within the Alaska Maritime National Wildlife Refuge, were removed from consideration at the request of ADNR and USFWS.

All Kodiak AOA options overlap with critical habitat for the Steller sea lion WDPS. Several sites in Kodiak overlap or are in proximity to BIAs for gray and fin whales, and humpback whale Mexico and WNP DPS critical habitat. All Kodiak AOA options overlap with

critical habitat for the southwest DPS of northern sea otter, and several sites overlap concentration areas for Steller's eiders. Due to the potential for interactions with protected species including pinnipeds, cetaceans, sea otters, and migratory birds, early coordination with NMFS and the USFWS are recommended. Consultation with NMFS under the ESA Section 7 may be necessary in this region during the permitting process. Coordination with the ADFG will also be essential to ensure aquaculture activities pose minimal risk to endangered and protected species.

Habitat interactions are a key consideration across Southwest Alaska study areas. Submerged aquatic vegetation, including eelgrass and native macroalgae beds, is widespread in the study areas and provides critical ecological functions. Several AOA options overlap with these sensitive habitats, underscoring the need for targeted resource surveys and selective siting to minimize environmental impacts and support practical farm operations. Additionally, multiple sites are located near the 91.5-m setback for anadromous streams. Given the environmental importance of anadromous streams as spawning and rearing habitat for one of Alaska's most iconic species, salmon, aquaculture operations sited in proximity must adhere to the highest standards of environmental stewardship and habitat protection.

Subsistence harvest on Kodiak Island reflects a deep and enduring relationship between communities and the marine environment. Local harvesters rely on a wide range of resources, including shellfish, seaweed, salmon, herring, cod, and other finfish, gathered from the island's extensive intertidal and nearshore zones. These areas are used seasonally and align with long-standing cultural traditions that continue to guide how, when, and where harvesting occurs. Recognizing the importance of these places and practices, tribal governments and community stakeholders on Kodiak Island have emphasized the need for planning processes that include early and sustained engagement and incorporation of Indigenous spatial data, and transparent methods for identifying and avoiding areas of cultural, historical, and subsistence significance.

Public comments on selected AOA options also highlight concerns about wave exposure and seasonal icing, particularly in exposed outer coastal zones. The absence of high-resolution wave modeling or observational data for many inland portions of the study area introduces uncertainty. As a result, storm-driven and seasonal wave events may constrain the feasibility of certain aquaculture systems at specific sites. It should be highlighted that aquaculture farm design and engineering have advanced the capability to withstand dynamic offshore environments (Fredriksson et al. 2003, Fredheim and Langan 2009, Goudey 2009, Lekang 2013, Holm et al. 2017). Further, a growing body of evidence suggests dynamic and exposed environments can result in upwelling of nutrients that can stimulate growth of cultured macroalgae and reduce biofouling (Peteiro and Freire 2011, Frieder 2022). However, operation in these locations will require robust farm infrastructure to withstand wave action and storms (Buck and Buchholz 2004).



Southcentral Study Area

The Southcentral Alaska study area includes coastal waters near Seward, Cordova, and Valdez, within the northern Gulf of Alaska, known for its glacial fjords, high marine productivity, and strong fishing industry. Seasonal migrations bring species such as Pacific salmon, halibut, and sablefish into nearshore habitats, while resident populations of herring, sea cucumbers, and shellfish support local commercial, sport, and subsistence fisheries (ADFG 2022b).

AOA option identification in Southcentral Alaska was shaped by a range of environmental and logistical constraints that limited the area available for suitability analysis within the areas. Steep bathymetry, complex oceanographic conditions driven by substantial glacial and freshwater inputs, and a high density of competing coastal uses resulted in the exclusion of large portions of Resurrection Bay in Seward, the Port of Valdez, and Nelson Bay in Cordova, collectively posing significant challenges to site selection across the entire Southcentral study areas.

No intertidal AOA options were identified in the region, primarily due to steep bathymetric profiles and rocky shorelines that restrict the availability of suitable habitat at a scale consistent with the planning goals. These physical limitations have historically precluded geoduck clam aquaculture in the region. However, oyster farms in Cordova utilize intertidal “hardening sites,” typically under 10 ac in size, well below the 50-ac minimum size outlined in AOA planning objectives. The minimal acreage needed for hardening sites falls outside the planning goals for the AOA process. However, their critical importance to the oyster industry is recognized.

All Southcentral Study Area AOA options are located between 12.7 nm and 19.4 nm from the nearest coastal population centers, placing them at or beyond the midpoint of the 25-nm transit setback. As suggested in comments, the remote nature of these sites may present challenges related to required on-site in-person monitoring visits, especially in winter months. The remote nature of these sites is also likely to need more significant capital at startup to ensure vessels are of a size adequate to conduct site visits across a range of conditions safely.

The Southcentral AOA options largely avoided interactions with military operations and major industry, navigation, and transportation corridors. However, monthly peak AIS vessel traffic data from 2012 to 2024 reveal consistent seasonal and spatial patterns across all sites, with peaks during summer months (June through August).

Protected species interactions are of concern across all Southcentral study areas. Several AOA options in Seward and Cordova intersect with designated critical habitat for the WDPS of Steller sea lions, and several AOA options in Valdez and Cordova overlap with critical habitat for the Mexico DPS of humpback whales and BIAs for humpback whales. Due to the potential for interactions with protected species including pinnipeds, cetaceans, sea otters, and migratory birds, early coordination with NMFS and the USFWS are recommended. Consultation with NMFS under the ESA Section 7 may be necessary in this region during the permitting process. Coordination with the Alaska ADFG will also be essential to ensure aquaculture activities pose minimal risk to endangered and protected species.

Habitat interactions are a particular concern in the region. Submerged aquatic vegetation, including eelgrass and native macroalgae beds, is prevalent across many Southcentral study

areas. Several AOA options overlap with these ecologically important habitats, and targeted resource surveys and selective siting may be required to minimize environmental impacts. Additionally, multiple sites are located near the 91.5-m setback for anadromous streams. Given the environmental importance of anadromous streams as spawning and rearing habitat for one of Alaska's most iconic species group, salmon, aquaculture operations sited in proximity must adhere to the highest standards of environmental stewardship and habitat protection.



Except for AOA options COR-S1, S3, and S4 in Sheep Bay (Cordova Study Area), most AOA options do not overlap with salmon harvest areas identified by industry members as zones of most significant concern. Nevertheless, potential conflicts with fisheries persist and will require ongoing coordination and improved spatial data products to support informed siting decisions. Despite the continuing and apparent conflict between aquaculture and some fisheries participants, individual fishery participants and fishing trade organizations actively engaged in constructive dialogue around the site suitability modeling process. Their participation demonstrated a willingness to identify practical solutions, including the development of improved spatial data products to support conflict resolution and informed aquaculture planning.

Another critical challenge in aquaculture siting in Southcentral Alaska is the potential for conflict with cultural resources and subsistence harvest areas. These concerns were consistently raised in public comments on the draft AOA options, particularly by tribal governments and Alaska Native organizations. Many emphasized the potential risk that aquaculture development could disrupt access to traditional harvest sites, alter culturally significant landscapes, or interfere with long-standing subsistence practices that are vital to food security, cultural continuity, and community well-being.

Subsistence harvest in Southcentral Alaska encompasses a wide range of marine resources, including shellfish, seaweed, salmon, herring, and other finfish collected from intertidal and nearshore zones. These areas are often used seasonally and are deeply embedded in Indigenous Knowledge systems, oral histories, and community traditions. In recognition of these concerns, tribal representatives and community stakeholders have called for more

inclusive planning processes that respect Indigenous sovereignty and prioritize co-management approaches. This includes the need for early and sustained consultation, incorporation of Indigenous spatial data, and transparent mechanisms for identifying and avoiding areas of cultural and subsistence importance. While concerns remain, many tribal organizations and community leaders have engaged constructively in the site suitability modeling process and recognize the potential for aquaculture to provide a means of economic development, food sovereignty, and a continued cultural and physical connection to their ancestral lands. Their participation reflects a shared interest in finding balanced solutions that support aquaculture development while safeguarding cultural heritage and subsistence rights. Continued collaboration, grounded in trust, transparency, and shared stewardship, will be essential to ensure that aquaculture planning aligns with community values and long-term sustainability goals.

Southeast Study Area

The Southeast study area lies within Alaska's Inside Passage, encompassing portions of the Alexander Archipelago and adjacent mainland fjords. Seasonal migrations bring species such as Pacific salmon, halibut, and black cod into the region's estuaries and nearshore zones, while resident populations of herring, sea cucumbers, and shellfish anchor local fisheries (ADFG 2022c). However, large-scale coastal upwelling is less pronounced than in other parts of the Pacific. Southeast Alaska benefits from localized nutrient enrichment driven by glacial melt, estuarine mixing, and submarine canyons such as Noyes Canyon near the Queen Charlotte–Fairweather fault system (Weingartner 2005).

The six Southeast Alaska AOA study areas encompass a diverse array of AOA options that reflect the region's varied socioeconomic landscape. Options include larger subtidal sites that may be most suitable for operations equipped to function in deeper, more exposed environments, where user conflicts are potentially minimized. In contrast, smaller AOA sites located nearer to population centers offer advantages such as shore-based access and suitability for small-vessel operations, aligning with community-scale development opportunities.

The Southeast Alaska AOA options generally avoid interactions with military operations, as well as conflicts related to industry, navigation, and transportation. However, monthly peak AIS vessel traffic data from 2012 to 2024 reveal consistent seasonal and spatial patterns across many AOA options, with peaks during summer months (June through August).

AOA options within Sitka overlapped with gray whale feeding BIAs, and many overlapped with humpback whale high-use areas. Due to the potential for interactions with protected species, including pinnipeds, cetaceans, sea otters, and migratory birds, early coordination with NMFS and the USFWS is recommended, and consultation with NMFS and USFWS under Section 7 of the ESA will be necessary in this region during the permitting process. Coordination with the ADFG will also be essential to ensure aquaculture activities pose minimal risk to endangered and protected species.

Habitat interactions are also of particular concern in the region. Submerged aquatic vegetation, including eelgrass and native macroalgae beds, is prevalent across many of the Southeast study areas. Several AOA options overlap with these important habitats, and targeted resource surveys to support selective siting within AOA options may be required to minimize ecological impacts. Additionally, multiple sites are located near the 91.5-m setback for anadromous streams established by ADFG. Given the

environmental importance of anadromous streams as spawning and rearing habitat for one of Alaska's most iconic species groups, salmon, aquaculture operations sited in proximity must adhere to the highest standards of environmental stewardship and habitat protection.

One of the most significant challenges to aquaculture siting in Southeast Alaska is the potential for conflict with existing fisheries, particularly commercial dive fisheries. These concerns were prominently reflected in public comments on the AOA options, with many respondents highlighting the risk that aquaculture infrastructure could interfere with diver operations. Specifically, there is concern that surface-supplied air lines used in dive fisheries could become entangled with aquaculture gear, posing safety hazards and restricting access to common-use subtidal resources. Dive fisheries represent a specialized and economically significant sector of Alaska's commercial fishing industry. Divers harvest geoduck clams, California sea cucumbers, and red sea urchins from shallow subtidal zones, typically ranging from 4.5 to 18 m (15 to 60 ft) in depth. However, geoducks may be collected at depths exceeding 21 m (70 ft) (ADFG 2023). These fisheries are concentrated in Southeast Alaska but are present across all AOA study areas. Recent proposals submitted to the Alaska Board of Fisheries by SARDFA sought to establish minimum distance-from-shore and depth-based siting restrictions for aquaculture operations within active dive harvest areas. Although these proposals were not adopted, they underscore the concerns of existing fisheries participants and the need for continued coordination to support sustainable aquaculture development. Despite the ongoing and apparent conflict between aquaculture and some fisheries participants, SARDFA, individual fishery participants, and other fishing trade organizations actively engaged in constructive dialogue around the AOA suitability modeling process. Their participation demonstrated a willingness to identify practical solutions, including the development of improved spatial data products to support conflict resolution and informed aquaculture planning.



Another critical challenge in siting aquaculture in Southeast Alaska is the potential for conflict with cultural resources and subsistence harvest areas. These concerns were consistently raised in public comments on the draft AOA options, particularly by tribal

governments and Alaska Native organizations. Many emphasized the potential risks that aquaculture development could disrupt access to traditional harvest sites, alter culturally significant landscapes, or interfere with long-standing subsistence practices vital to food security, cultural continuity, and community well-being.

Subsistence harvest in Southeast Alaska encompasses a wide range of marine resources, including shellfish, seaweed, salmon, herring, and other finfish collected from intertidal and nearshore zones. These areas are often used seasonally and are deeply embedded in Indigenous Knowledge systems, oral histories, and community traditions. In recognition of these concerns, tribal representatives and community members have called for more inclusive planning processes that prioritize Indigenous sovereignty and co-management approaches. This includes early and sustained consultation, incorporation of Indigenous spatial data, and transparent mechanisms for identifying and avoiding areas of cultural and subsistence importance. While concerns remain, many tribal organizations and community leaders have engaged constructively in the site suitability modeling process and recognize the potential for aquaculture to provide a means of economic development, food sovereignty, and a continued cultural and physical connection to their ancestral lands. Their participation reflects a shared interest in finding balanced solutions that support aquaculture development while safeguarding cultural heritage and subsistence rights. Continued collaboration, grounded in trust, transparency, and shared stewardship, will be essential to ensure that aquaculture planning aligns with community values and long-term sustainability goals.



CONCLUSIONS

Alaska's coastal waters are among the most dynamic in the U.S., shaped by seasonal shifts, long-term ecological trends, and evolving patterns of human use. While this spatial analysis offers a robust foundation for identifying AOA options, it must be viewed as a snapshot in time, one that will require periodic updates to remain relevant. Environmental variability, environmental change, and infrastructure expansion all have the potential to reshape the suitability of specific sites. For instance, new shoreside infrastructure investment currently underway in Alaska is likely to provide new opportunities in locations within the AOA study areas and in unstudied regions. Similarly, marine habitats such as kelp beds, fish aggregations, and marine mammal BIAs may shift in response to climatic events, HABs, or other stressors (Jacobs et al. 2015, Phillips and Pérez-Ramírez 2018). These potential outcomes reinforce the need for flexible, adaptive planning tools.





While Alaska's aquaculture sector may be uniquely positioned to adapt and possibly benefit from predicted future climate scenarios (Fong et al. 2024), risks remain. Shifts in water quality, disease outbreaks, and intensified HABs or *Vibrio* spp. levels could threaten production and public health (Jacobs et al. 2015, McLaughlin et al. 2005). Additionally, expanding and shifting ranges of native, non-native, or invasive species can affect ecosystem health and aquaculture viability in the future. The time series data used here are relatively short since they were not intended to distinguish climate-scale changes over time. Integrating longer-scale datasets, climate scenarios, and techno-economic modeling into future planning will be essential for building a resilient aquaculture industry.

Alaska's unique context demands tailored approaches that balance aquaculture development with ecological integrity and community values. Considerations such as subsistence use, cultural resources, and trust resource management require early engagement that can reduce conflict, provide for efficient permitting, and support conservation outcomes.

NOAA's spatial planning tools are designed to support Alaska's coastal communities as they navigate the complexities of marine development. By integrating ecological, economic, and cultural considerations, these tools help identify sites that balance opportunity with stewardship. In Alaska, this means accounting for subsistence practices, fisheries, the resilience of working waterfronts, and the natural resources that underpin Alaska's cultural identity and economic success. This analysis supports AOA identification by offering spatial modeling results tailored to Alaska's unique geography and governance. While the Atlas provides valuable insights into early siting considerations, its use should remain focused on AOA planning. Broader applications require caution and context-specific evaluation. Further, despite incorporating the best available data, this analysis revealed several gaps that limit comprehensive planning. Commercial and subsistence fisheries data were often coarse or confidential, making it challenging to assess spatial overlaps. Participatory mapping with local fishers and communities could help fill these gaps (NOAA OCM 2014). Marine traffic data also present challenges. AIS coverage is sparse in remote regions, and many vessels, especially skiffs and fishing boats, do not transmit AIS signals. Supplementing AIS with radar, satellite imagery, and visual surveys could improve accuracy (Patraiko and Holthus 2013, Kanjir et al. 2018, Emmens et al. 2021). Collaboration with the U.S. Coast Guard, tribal organizations, and local pilots could further refine navigation risk assessments.

NOAA continues to develop science-based tools to help coastal communities navigate through and balance coastal development challenges. This robust marine planning process to support the identification of AOAs uses the best available data to account for key environmental, economic, social, and cultural considerations to find appropriate space for sustainable aquaculture and support efficient permitting. Aquaculture development can support U.S. jobs, sustain working waterfronts, and increase domestic food security. This analysis supports AOA identification directly through the provision of regional spatial modeling results to inform possible locations for AOAs in the Gulf of Alaska. While E.O. 13921 focused on aquaculture for the purpose of seafood production, the results of this analysis are relevant to all aquaculture types including aquaculture for the purpose of restoration, increasing ecosystem services (Theuerkauf et al. 2019, 2022) and energy production through cultivation of macroalgae (Rajkumar et al. 2014). While the data layers used in this analysis provide a wealth of information that may be useful to the aquaculture community and coastal managers in early consideration for siting specific projects, the results of the spatial modeling are for the specific purpose of identifying locations that might be suitable for locating AOAs and include limitations specific to that purpose. Caution should be exercised when using the Atlas for purposes other than planning for AOAs.



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APPENDICES

Appendix A

Full data inventory for Alaska with data processing notes for those datasets where processing was required

Table A - 1. Data inventory table for data used to create the study areas to support the planning goals. Any dataset that has an empty processing description was ingested into the model with all original features retained. SEAK = Southeast Alaska.....2
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Table A - 1. Data inventory table for data used to create the study areas to support the planning goals. Any dataset that has an empty processing description was ingested into the model with all original features retained. SEAK = Southeast Alaska.

Dataset Name	Processing Description	Citation
Alaska Coastline	Any areas overlapping with land were removed from consideration.	Alaska Department of Natural Resources (DNR), 2023-07: Alaska Coastline 1:63,360, 2017-03-20. Alaska DNR Geospatial Information System (GIS) Public Access Coordinator, https://gis.data.alaska.gov/datasets/SOA-DNR::alaska-coastline/about?layer=4
Arctic Weekly Sea Ice Concentration and Stage of Development	Weekly data from 2013–2021 were collected of sea ice extents to generate a *Maximum Sea Ice Extent* dataset. Any areas overlapping with maximum sea ice extent were removed.	U.S. National Ice Center, 2020: U.S. National Ice Center Arctic and Antarctic Sea Ice Concentration and Climatologies in Gridded Format, Version 1, Arctic Weekly Sea Ice Concentration and Stage of Development. Boulder, Colorado USA. NSIDC: National Snow and Ice Data Center. https://doi.org/10.7265/46cc-3952. Date accessed: 2024-06-11.
Central Gulf of Alaska Grid	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Bathymetry (mhw, mllw)* dataset. This rescaled dataset was also shifted in order to create depth datasets at different tide datums. *Depths Over 200 ft* dataset was also generated using these data by extracting areas with depths greater than 200 ft for exclusion within the constraints analysis.	Alaska Fisheries Science Center, 2024-06-11: FSC/RACE/GAP/Zimmermann: Central Gulf of Alaska Grid from 1901 to 1999. NOAA National Centers for Environmental Information, https://www.fisheries.noaa.gov/inport/item/22897
Closed Waters Salmon Net Fisheries, Southeast Alaska	Filtered to include only Annette Islands Reserve.	Alaska Department of Fish and Game (ADFG), 2024-02-10: SEAK Closed Waters Salmon Net Fisheries poly, 2023. ADFG Commercial Fisheries Division, https://gis.data.alaska.gov/datasets/adfg::seak-closedwaters-salmonnetfisheries-poly/about
Coastal Populated Places	Filtered to include any place that has at least 1,000 residents. Used as a reference within the Study Area creation process.	NOAA Office for Coastal Management, 2023-12-05: Coastal Populated Places, 2023. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/66114
Electronic Navigational Charts (ENC) Approach Coastline	Used to create an *Islands* dataset representing islands within Alaska state waters. Filtered to include any island that covers at least 80% of a grid cell.	NOAA Office of Coast Survey, 2024: ENC Approach Coastline (line). Electronic Navigation Chart (ENC) Direct to GIS, https://nauticalcharts.noaa.gov/learn/encdirect/#map-services. Date accessed: 2024-08.
Electronic Navigational Charts (ENC) Harbor Coastline	Used to create an *Islands* dataset representing islands within Alaska state waters. Filtered to include any island that covers at least 80% of a grid cell.	NOAA Office of Coast Survey, 2024: ENC Harbor Coastline (line). Electronic Navigation Chart (ENC) Direct to GIS, https://nauticalcharts.noaa.gov/learn/encdirect/#map-services. Date accessed: 2024-08.

Dataset Name	Processing Description	Citation
Federal and State Waters	Any area overlapping federal waters was removed to include only areas within state waters.	NOAA Office for Coastal Management, 2023-07: Federal and State Waters, 2019-08-09. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/54383
Harbors	Used as a reference within the Study Area creation process.	Alaska Department of Transportation and Public Facilities (ADOTPF), 2024-09-24: Harbors, 2024. ADOTPF, https://gis.data.alaska.gov/datasets/AKDOT::harbors-akdot/about
Southeast Alaska MHHW Coastal Digital Elevation Model	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Bathymetry (mhw, mllw)* dataset. This rescaled dataset was also shifted in order to create depth datasets at different tide datums. *Depths Over 200 ft* dataset was also generated using these data by extracting areas with depths greater than 200 ft for exclusion within the constraints analysis.	NOAA National Geophysical Data Center, 2024-06-11: Southeast Alaska 8/3 arc-second Mean High-High Water (MHHW) Coastal Digital Elevation Model, 2010. NOAA National Centers for Environmental Information, https://www.ncei.noaa.gov/metadata/geoportal/rest/metadata/item/gov.noaa.ngdc.mgg.dem:715/html#
Station Listings and Tidal Datums	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Bathymetry (mhw, mllw)* dataset. This rescaled dataset was also shifted in order to create depth datasets at different tide datums. *Depths Over 200 ft* dataset was also generated using these data by extracting areas with depths greater than 200 ft for exclusion within the constraints analysis.	NOAA National Ocean Service Center for Operational Oceanographic Products and Services (CO-OPS), 2024-06-11: Station Listings and Tidal Datums, 2024. NOAA CO-OPS, https://tidesandcurrents.noaa.gov/

Table A – 2. Data inventory table for the National Security Submodel. A score of zero indicates the dataset is a constraint layer. Any dataset that has an empty processing description was ingested into the model with all original features retained.

Dataset name	Score	Buffer (m)	Processing description	Citation
Danger Zones and Restricted Areas	0	0		NOAA Office for Coastal Management, 2024-05-20: Danger Zones and Restricted Areas, 2022-07-01. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/48876
Munitions and Explosives of Concern	0.5	0		NOAA Office for Coastal Management, 2024-09-24. Munitions and Explosives of Concern, 2023. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/69013
Navy Undersea Cables	0	500	Controlled Unclassified Information	Department of Defense, 2024: Undersea Cables. NOAA Office of Coast Survey (via secure file exchange), Controlled Unclassified Information, unpublished. Date received: 2024-11-24.

Table A – 3. Data inventory table for the Natural Resources Submodel. A score of zero indicates the dataset is a constraint layer. Any dataset that has an empty processing description was ingested into the model with all original features retained. ESI = Environmental Sensitivity Index. NPRW = North Pacific right whale.

Dataset Name	Score	Buffer (m)	Processing Description	Citation
Alaska National Parks, Preserves, Monuments	0.5	0		Alaska Department of Environmental Conservation (DEC), 2024-09-24: Alaska National Parks, Preserves, Monuments, 2020-12-02. Alaska DEC, https://gis.data.alaska.gov/datasets/ADEC::alaska-national-parks-preserves-monuments/about
Alaska State Game Refuges, Critical Habitat, and Sanctuaries	0	0		Alaska Department of Environmental Conservation (DEC), 2024-05-20: Alaska State Game Refuges, Critical Habitat, and Sanctuaries, 2018. Alaska DEC, https://data-soa-adec.opendata.arcgis.com/datasets/ADEC::alaska-state-game-refuges-critical-habitat-sanctuaries-1/about
Anadromous Waters Catalog – Streams	0	91.5	Filtered the Anadromous Waters Catalog to include only streams.	Alaska Department of Fish and Game (ADFG), 2024-05-20: Anadromous Waters Catalog, 2023. ADFG, https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=maps.dataFiles
Cetacean Biologically Important Areas (BIAs) – Feeding	Fin Whale: 0.2 Gray Whale: 0.8 NPRW: 0.1	0	A *Protected Species Combined* dataset was created by filtering the BIA dataset by Fin Whale, Gray Whale, and North Pacific Right Whale Feeding BIAs.	Wild LA, Riley HE, Pearson HC, Gabriele CM, Neilson JL, Szabo A, Moran J, Straley JM, DeLand S. 2023. Biologically Important Areas II for cetaceans within U.S. and adjacent waters – Gulf of Alaska Region. Front. Mar. Sci. 10:1134085. https://doi.org/10.3389/fmars.2023.1134085 (Data access link: https://oceannoise.noaa.gov/biologically-important-areas).
Deep-Sea Coral and Sponge Occurrences	0	1,000		Deep Sea Coral Research and Technology Program, 2016. Observations of Deep-Sea Coral and Sponge Occurrences from the NOAA National Deep-Sea Coral and Sponge Database, 1842-Present, version 20241022-1 (NCEI Accession 0145037). NOAA National Centers for Environmental Information, https://www.ncei.noaa.gov/archive/accession/0145037. Date accessed: 2024-05-20.

Dataset Name	Score	Buffer (m)	Processing Description	Citation
Essential Fish Habitat (EFH)	25th percentile:0.6 50th percentile:0.7 75th percentile:0.8 95th percentile:0.9	0	The *EFH Combined* dataset was generated by taking the product of the layers for the juvenile life stages of Pacific Cod, Pacific Herring, Pacific Ocean Perch, Pollock, Rocksole, Sablefish, Starry Flounder, and Yellowfin Sole.	Pirtle JL, Laman EA, Harris J, Siple MC, Rooper CN, Hurst TP, Conrath CL, Gibson GA. 2023. Advancing model-based essential fish habitat descriptions for North Pacific species in the Gulf of Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-468, 541 p. https://doi.org/10.25923/ygdf-5f65
Essential Fish Habitat (EFH) Boundaries	0	NA	Used to create the delineation for the *Taku Glacier Boundary* dataset in conjunction with the Juneau Study Area.	NOAA National Marine Fisheries Service (NMFS), 2024-11: Essential Fish Habitat (EFH) in Alaska, 2024. NOAA NMFS, https://www.fisheries.noaa.gov/alaska/habitat-conservation/essential-fish-habitat-efh-alaska
Key Harbor Seal Haulout Locations	0	0	Filtered to include only key haulouts.	London JM, Yano KM, Richmond EL, Withrow DE, Dahle SP, Jansen JK, Ziel HL, Brady GM, Boveng PL. 2015. Observed Haul-out Locations for Harbor Seals in Coastal Alaska. Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration, https://services2.arcgis.com/C8EMgrsFcRFL6LrL/ArcGIS/rest/services/pv_cst_haulout/FeatureServer. Date accessed: 2024-05-20.
National Wetlands Inventory	0	NA	Filtered to include only features that are marine or estuarine.	U.S. Fish and Wildlife Service (USFWS) 2024-09-01: Wetlands Classification Index, National Wetlands Inventory (NWI), 2024-05-01. USFWS, https://www.fws.gov/program/national-wetlands-inventory
North Pacific Seabird Data	0.8	0	USFWS guidance documentation outlined seabird colonies of significance, which was used to filter the data and extract colonies that met specific criteria.	Seabird Information Network, 2024-10-2. North Pacific Seabird Data Portal, 2024. Seabirds.net, http://axiom.seabirds.net/maps/north-pacific-seabirds/
Northern Sea Otter Abundance and Distribution, Kodiak Archipelago	Continuous with range of 0.5–1	0	Applied a kernel density estimate function to generate the *Sea Otter Relative Population Density Estimate* dataset.	Cobb M. 2018. Northern sea otter (*Enhydra lutris*) abundance and distribution on the Kodiak Archipelago. Refuge Report 2018.2, Kodiak National Wildlife Refuge, U.S. Fish and Wildlife Service, Kodiak, AK. Date accessed: 2024-06-25.

Dataset Name	Score	Buffer (m)	Processing Description	Citation
Northern Sea Otter Abundance and Distribution, Southcentral Alaska	Continuous with range of 0.5–1	0	Applied a kernel density estimate function to generate the *Sea Otter Relative Population Density Estimate* dataset.	Esslinger GG, Robinson BH, Monson DH, Taylor RL, Esler D, Weitzman BP, Garlich-Miller J. 2021. Abundance and distribution of sea otters (*Enhydra lutris*) in the southcentral Alaska stock, 2014, 2017, and 2019: U.S. Geological Survey Open-File Report 2021–1122, 19 p., https://doi.org/10.3133/ofr20211122. Date accessed: 2024-06-25.
Northern Sea Otter Abundance and Distribution, Southeast Alaska	Continuous with range of 0.5–1	0		Schuette P, Eisaguirre J, Weitzman B, Power C, Wetherington E, Cate J, Womble J, Pearson L, Melody D, Merriman C, Hanks K, Esslinger G. 2023. Northern Sea Otter (*Enhydra lutris kenyoni*) Population Abundance and Distribution across the Southeast Alaska Stock Summer 2022. USFWS Region 7 Technical Report MMM 2023-01, U.S. Fish and Wildlife Service, Alaska Region Headquarters, Anchorage, AK. https://www.fws.gov/media/usfws-region-7-technical-report-mmm-2023-01-march-2023. Date accessed: 2024-06-25.
Pacific Herring Spawn Aerial Survey Observations in Prince William Sound, Alaska	Continuous with range of 0.5–1	0	Used to create *Herring Spawn Occurrences per Year* dataset. Divided number of occurrences per relative 10-year period to get an occurrences per year dataset.	Morella J. 2023. Aerial survey observations of Pacific herring spawn in Prince William Sound, Alaska, 1973-2021. Alaska Department of Fish and Game Dataset. 10.24431/rw1k440. Date accessed: 2024-06-25.
Pacific Herring Spawn Observations, Southeast Alaska	Continuous with range of 0.5–1	0	Used to create *Herring Spawn Occurrences per Year* dataset. A 100-m buffer was applied to survey line data, and then divided the number of occurrences per relative 10-year period to generate an occurrences per year dataset.	Alaska Department of Fish and Game (ADFG), 2024-06-25: Southeast Alaska Herring Surveys, 2020-2024. ADFG, https://services.arcgis.com/VdkVOAHovLuozJG4/arcgis/rest/services/CF_Southeast_AK_HerringSurveys_Public_View/FeatureServer/2
Pacific Herring Spawning Areas, Kodiak and Seward	0.5	0	Best available herring spawning dataset for Kodiak and Seward shows documented herring spawning sites in the area.	NOAA Office of Response and Restoration, 2024-06-25: Download ESI Maps and GIS Data – Pacific Herring Spawning Areas (for Kodiak and Seward), 1997-2023. https://response.restoration.noaa.gov/esi_download

Dataset Name	Score	Buffer (m)	Processing Description	Citation
ShoreZone Coastal Mapping – Eelgrass Bioband	0.1 for overlap with NWI; 0.5 for everything else	0	Filtered to include only the eelgrass Bioband.	Cook S, Daley S, Morrow K, Ward S. 2017. Coastal and Ocean Resources, Victoria, B.C., Canada. ShoreZone Coastal Imaging and Habitat Mapping Protocol. NOAA National Marine Fisheries Service, https://www.fisheries.noaa.gov/alaska/habitat-conservation/alaska-shorezone. Date accessed: 2024-09-24.
Steller Sea Lion Haulouts and Rookeries	0	500	Filtered to include only Steller Sea Lion Major Haulout and Rookery Locations.	Protected Resources Division, NOAA National Marine Fisheries Service (NMFS), Alaska Region (AKR), 2024. Steller sea lion haulout and rookery locations in the U.S. for 2016-05-14 (NCEI Accession 0129877). https://doi.org/10.7289/v58c9t7v. AKR Protected Resources Division Data Layers and Scoring for Aquaculture Opportunity Atlas (Atlas). NOAA Technical Memorandum, U.S. Department of Commerce. Juneau, Alaska.
Steller's Eider Abundance and Distribution, Kodiak	0.5	0	Filtered to include only eider groups of sizes greater than 126, as per guidance from USFWS.	Larned WW, Anderson PD, Corcoran R. 2010. Distribution and abundance of Steller's eiders (*Polysticta stelleri*) in the Kodiak Archipelago, Alaska, February 2010. Unpublished report, U.S. Fish and Wildlife Service, Alaska Region (OR: Waterfowl Management, Kodiak NWR), Anchorage, Alaska.

Table A – 4. Data inventory table for the Industry, Navigation, and Transportation Submodel data inventory table. A score of zero indicates the dataset is a constraint layer. Any dataset that has an empty processing description was ingested into the model with all original features retained.

Dataset name	Score	Buffer (m)	Processing description	Citation
Aids To Navigation	0	500		NOAA Office for Coastal Management, 2024-05-20: Aids to Navigation 2022-01-07. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/56120
Alaska Area and Management Plan Boundary	0.5	0	Used to create *Alaska Area Plans (Anchorages)* and *Alaska Area Plans (Species Management)* datasets. Filtered to include only locations mentioning anchorages and species management.	Alaska Department of Natural Resources (DNR) – Information Resource Management, 2024-05-14: Area and Management Plan Boundary, 2020. Alaska DNR, https://data-soa-dnr.opendata.arcgis.com/datasets/99120ebf1efc40e4a4774eca6fb00c7a_19/about
Alaska Area and Management Plan Boundary	0	0	Used to create *Alaska Area Plans (Aquaculture Exclusion Areas)* dataset by filtering for areas that include explicit exclusion of aquatic farming.	Alaska Department of Natural Resources – Information Resource Management, 2024-05-14: Area and Management Plan Boundary, 2020. https://data-soa-dnr.opendata.arcgis.com/datasets/99120ebf1efc40e4a4774eca6fb00c7a_19/about
Alaska DEC Water Quality Monitoring Locations	0	0		Alaska Department of Environmental Conservation (DEC), 2024-05-20: Alaska DEC Water Quality Monitoring Locations, 2001-04-04 - 2014-07-01. Alaska DEC, https://gis.data.alaska.gov/datasets/ADEC::alaska-dec-wq-monitoring-locations/about
Alaska DNR Land Permit or Lease	0.5	0		Alaska Department of Natural Resources (DNR) GIS Public Access Coordinator, 2024-09-24: Land Permit or Lease – Polygon, 2022. Alaska DNR, https://data-soa-dnr.opendata.arcgis.com/maps/SOA-DNR::land-permit-or-lease/explore?layer=2.%20Date%20Accessed%3A%202024-09-24andlocation=60.510188%2C-153.773425%2C5.48
Alaska Marine Highway	0	500		Audubon Alaska, 2024-05-20: Alaska Marine Highway, 2016. Alaska Ocean Observing System (AOOS), https://portal.aoos.org/?portal_id=121#metadata/d87622e4-5735-11e9-84f0-0023aeec7b98/2b010340-6e05-11e9-9316-0023aeec7b98
Anchorages	0	0		NOAA Office for Coastal Management, 2024-07-17: Anchorages, 2023. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/48849

Dataset name	Score	Buffer (m)	Processing description	Citation
AOOS Sensors Locations	0	0		National Ocean Services, 2024-10-16: NOAA Center for Operational Oceanographic Products and Services (CO-OPS) – Alaska Ocean Observing System (AOOS) Sensor Locations, 2024-11. CO-OPS, https://tidesandcurrents.noaa.gov/gis-data-portal/
Automatic Identification System (AIS) Vessel Traffic	Continuous	0	An *AIS Combined* dataset was generated for use within the model. Original AIS data were sent as disconnected vessel traffic lines; a script was run to join vessel transects into continuous transects. Vessel effort was then calculated on a continuous grid to get vessel density by month.	Marine Exchange of Alaska, 2024-02-06: Automatic Identification System (AIS) Vessel Traffic, 2012-2024. Marine Exchange of Alaska (Contact provider for access), https://www.mxak.org/services/maritime-domain-management/historicaldata/
Central Gulf of Alaska Grid	0	NA	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Bathymetry (mhw, mllw)* dataset used in modeling. This rescaled dataset was also shifted in order to create depth datasets at different tide datums. *Depths over 200 ft* dataset was also generated using these data by extracting areas with depths greater than 200 ft for exclusion within the constraints analysis.	Alaska Fisheries Science Center, 2024-06-11: FSC/RACE/GAP/Zimmermann: Central Gulf of Alaska Grid from 1901 to 1999. NOAA National Centers for Environmental Information, https://www.fisheries.noaa.gov/inport/item/22897
Coastal Maintained Channels	0	0		NOAA Office of Coast Survey, 2024-05-20: Coastal Maintained Channels in U.S. waters, 2024. https://www.fisheries.noaa.gov/inport/item/39972

Dataset name	Score	Buffer (m)	Processing description	Citation
Coastal Populated Places	0	40233.6	Filtered to include any place that has at least 1,000 residents. Dataset was used to calculate both straight-line and travel distance from select populated places, where any area outside of the 40,233.6-m (25-nm) buffer was given a score of zero and removed. A continuous cost distance grid was generated using the distance from each coastal populated place to each precision siting polygon to generate a *Travel Distance* dataset.	NOAA Office for Coastal Management, 2023-12-05: Coastal Populated Places, 2023. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/66114
Electronic Navigational Chart (ENC) Approach Coastline	0	0	Used to create an *Islands* dataset representing islands within Alaska state waters. Filtered to include any island that covers at least 80% of a grid cell.	NOAA Office of Coast Survey, 2024: ENC Approach Coastline (line). Electronic Navigation Chart (ENC) Direct to GIS, https://nauticalcharts.noaa.gov/learn/encdirect/#map-services. Date accessed: 2024-08.
Electronic Navigational Chart (ENC) Harbor Coastline	0	0	Used to create an *Islands* dataset representing islands within Alaska state waters. Filtered to include any island that covers at least 80% of a grid cell.	NOAA Office of Coast Survey, 2024: ENC Harbor Coastline (line). Electronic Navigation Chart (ENC) Direct to GIS, https://nauticalcharts.noaa.gov/learn/encdirect/#map-services. Date accessed: 2024-08.
Environmental Sensors and Buoys	0	500		National Data Buoy Center, 2024-05-20: Marine Observations by Program, 2024. NOAA National Weather Service, https://www.ndbc.noaa.gov/
Ferry Routes	0	500		Bureau of Transportation Statistics, Census Bureau, the U.S. Geological Survey, the National Oceanic and Atmospheric Association, and the U.S. Army Corps of Engineers, 2024-05-20: Ferry Routes, 2020-12-31. U.S. Department of Transportation, https://data-usdot.opendata.arcgis.com/datasets/usdot::ferry-routes/about

Dataset name	Score	Buffer (m)	Processing description	Citation
Ferry Terminals	0	350		Alaska Department of Transportation and Public Facilities, 2024-05-20: Ferry Terminals, 2021. Alaska Department of Transportation and Public Facilities, https://data-soa-akdot.opendata.arcgis.com/datasets/AKDOT::ferry-terminals-akdot/about
Fiberoptic Cable	0	200		Alaska Department of Natural Resources (DNR), 2024-05-20: Fiberoptic Cable 1:63.360, 2023. Alaska DNR, https://data-soa-dnr.opendata.arcgis.com/datasets/SOA-DNR::fiberoptic-cable-163360-1/about
Harbors	0.5	500		Alaska Department of Transportation and Public Facilities (ADOTPF), 2024-09-24: Harbors, 2024. ADOTPF, https://gis.data.alaska.gov/datasets/AKDOT::harbors-akdot/about
Integrated Resource Management on the Tongass National Forest – Marine Access Facilities	0.3	500	Filtered to include only marine access facilities.	U.S. Forest Service (USFS) Tongass National Forest (NF) Region 10, 2025-06-09: Integrated Resource Management on the Tongass National Forest, 2023. USFS Tongass NF Region 10, https://services1.arcgis.com/gGHDlz6USftL5Pau/arcgis/rest/services/Integrated_Resource_Management_on_the_Tongass_National_Forest/FeatureServer
Land Status within the National Wildlife Refuges of Alaska – Afognak and Womens Bay Submerged Lands	0	0	Filtered to include only Afognak and Womens Bay Submerged Lands.	U.S. Fish and Wildlife Service (USFWS) Region 7, Division of Realty and Conservation Planning, 2024-05-20: Land Status within the National Wildlife Refuges of Alaska, 2024. USFWS, https://www.arcgis.com/home/item.html?id=3eed8d6b30ea443dafe4380d70d0fa5e
Ocean Disposal Sites	0	0		NOAA Office for Coastal Management, 2024-05-20: Ocean Disposal Sites, 2018-07-03. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/54193
Offshore Seafood Processors Permitted Vessels	0	0		Alaska Department of Environmental Conservation (DEC), 2024-05-20: AKG523000 Offshore Seafood Processors Permitted Vessels, 2019-04-18. Alaska DEC, https://gis.data.alaska.gov/datasets/ADEC::alaska-dec-seafood-processing-facilities/about?layer=6
Permitted Log Transfer Facilities	0.2	500		Alaska Department of Natural Resources (DNR), Division of Forestry and Fire Protection, 2024-05-20: Permitted Log Transfer Facilities Public View, 2021-02-25. Alaska DNR, https://statewide-geoportal-1-soa-dnr.hub.arcgis.com/datasets/SOA-DNR::permitted-log-transfer-facilities-public-view/about

Dataset name	Score	Buffer (m)	Processing description	Citation
Pipelines	0	500		NOAA Office for Coastal Management, 2024-05-20: Pipelines, 2024. MarineCadastre.gov, (deprecated).
Seafood Processing Discharge Locations	0	0		Alaska Department of Environmental Conservation (DEC), 2024-05-20: Seafood Processing Discharge Locations, 2021. Alaska DEC, https://gis.data.alaska.gov/datasets/ADEC::alaska-dec-seafood-processing-facilities/about?layer=3
Seafood Processing Facility Locations	0	0		Alaska Department of Environmental Conservation (DEC), 2024-05-20: Seafood Processing Facility Locations, 2019. Alaska DEC, https://gis.data.alaska.gov/datasets/ADEC::alaska-dec-seafood-processing-facilities/about?layer=2
Seafood Processing Permitted Carcass Disposal Sites	0	0		Alaska Department of Environmental Conservation (DEC), 2024-05-20: AKG130000 Permitted Carcass Disposal Site, 2019. Alaska DEC, https://gis.data.alaska.gov/datasets/ADEC::alaska-dec-seafood-processing-facilities/about?layer=14
Seafood Processing Permitted Net Pens	0	0		Alaska Department of Environmental Conservation (DEC), 2024-05-20: AKG130000 Permitted Net Pens, 2019. Alaska DEC, https://gis.data.alaska.gov/datasets/ADEC::alaska-dec-seafood-processing-facilities/about?layer=13
Seafood Processing Permitted Outfalls	0	500		Alaska Department of Environmental Conservation (DEC), 2024-05-20: AKG130000 Permitted Outfall, 2019. Alaska DEC, https://gis.data.alaska.gov/datasets/ADEC::alaska-dec-seafood-processing-facilities/about?layer=12
Shipping Fairways, Lanes, and Zones	0	500		NOAA Office of Coast Survey, 2024-05-20: Shipping Fairways, Lanes, and Zones for US waters from 2001-07-11 to Present. https://www.fisheries.noaa.gov/inport/item/39986
ShoreZone Coastal Mapping – Wave Exposure	very exposed: 0.2 exposed: 0.4 semi-exposed: 0.6	0	Filtered to include only wave exposure sub layers.	Cook S, Daley S, Morrow K, Ward S. 2017. Coastal and Ocean Resources, Victoria, B.C., Canada. ShoreZone Coastal Imaging and Habitat Mapping Protocol. NOAA National Marine Fisheries Service, https://www.fisheries.noaa.gov/alaska/habitat-conservation/alaska-shorezone. Date accessed: 2024-09-24.

Dataset name	Score	Buffer (m)	Processing description	Citation
Southeast Alaska MHHW Coastal Digital Elevation Model	0	NA	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Bathymetry (mhw, mllw)* dataset used in modeling. This rescaled dataset was also shifted in order to create depth datasets at different tide datums. *Depths over 200 ft* dataset was also generated using these data by extracting areas with depths greater than 200 ft for exclusion within the constraints analysis.	NOAA National Geophysical Data Center, 2024-06-11: Southeast Alaska 8/3 arc-second Mean High-High Water (MHHW) Coastal Digital Elevation Model, 2010. NOAA National Centers for Environmental Information, https://www.ncei.noaa.gov/metadata/geoportal/rest/metadata/item/gov.noaa.ngdc.mgg.dem:715/html#
Station Listings and Tidal Datums	0	NA	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Bathymetry (mhw, mllw)* dataset used in modeling. This rescaled dataset was also shifted in order to create depth datasets at different tide datums. *Depths over 200 ft* dataset was also generated using these data by extracting areas with depths greater than 200 ft for exclusion within the constraints analysis.	NOAA National Ocean Service Center for Operational Oceanographic Products and Services (CO-OPS), 2024-06-11: Station Listings and Tidal Datums, 2024. NOAA CO-OPS, https://tidesandcurrents.noaa.gov/
Submarine Cable Areas	0	200		NOAA Office for Coastal Management, 2024-05-20: Submarine Cable Areas, 2023. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/66190

Dataset name	Score	Buffer (m)	Processing description	Citation
Submarine Cables	0	200		NOAA Office for Coastal Management, 2024-05-20: Submarine Cables, 2023. MarineCadastre.gov, (deprecated).
Tongass National Forest Mooring Buoys	0.3	500		U.S. Forest Service (USFS), 2025-06-09: Tongass National Forest, Mooring buoys, 2025-06-07. USFS, unpublished internal electronic geospatial data.
USACE – AD Erosion Protection and Flood Mitigation Projects	0	500		U.S. Army Corps of Engineers (USACE) Alaska District (AD), 2024-05-20: USACE Erosion Protection and Flood Mitigation Projects, 2022. USACE AD, (deprecated), https://www.poa.usace.army.mil/About/Offices/Construction-Operations/Erosion-and-Flood-Mitigation/
USACE – AD Navigation Projects	0	500		U.S. Army Corps of Engineers (USACE), 2024-05-20: USACE Alaska District (AD) Navigation Projects, 2020. USACE AD, (deprecated), https://www.poa.usace.army.mil/About/Offices/Construction-Operations/Erosion-and-Flood-Mitigation/
U.S. Wave Dataset	<= 1 m: 0.6 <= 1.5 m: 0.4 <= 2 m: 0.2	0	Extracted average wave height from national dataset to create a *Significant Wave Height* dataset.	Department of Energy's (DOE) Water Power Technology Office's (WPTO), 2024-11: US Wave Dataset, 1979-2010. DOE WPTO, https://registry.opendata.aws/wpto-pds-us-wave/
USFS Recreation Opportunities – Cabin Rentals	0.3	500	Filtered to include any cabin rentals.	U.S. Forest Service (USFS), 2025-06-09: Recreation Opportunities, 2017. USFS, https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_RecreationOpportunities_01/MapServer/0
Wastewater Outfalls	0	500		NOAA Office for Coastal Management, 2024-05-20: Wastewater Outfalls, 2022-08-08. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/66706
Wrecks and Obstructions	0	152.5		NOAA Office for Coastal Management, 2024-05-20: Wrecks and Obstructions, 2023-08-14. MarineCadastre.gov, (deprecated).

Table A – 5. Data inventory table for the Cultural Resources Submodel. A score of zero indicates the dataset is a constraint layer. Any dataset that has an empty processing description was ingested into the model with all original features retained.

Dataset name	Score	Buffer (m)	Processing description	Citation
Alaska Area and Management Plan Boundary	0.5	0	Used to create *Alaska Area Plans (Community Harvest)* and *Alaska Area Plans (Heritage Sites)* datasets. Filtered to include only areas including community harvest and heritage sites, respectively.	Alaska Department of Natural Resources (DNR), Information Resource Management, 2024-01-15: Area and Management Plan Boundary, 2020. Alaska DNR, https://data-soa-dnr.opendata.arcgis.com/datasets/99120ebf1efc40e4a4774eca6fb00c7a_19/about
Alaska Heritage Resources Survey (AHRS) Sites	0.2	500	Controlled Unclassified Information	Alaska Department of Natural Resources (DNR), Office of History and Archaeology, 2024-12-04: Alaska Heritage Resources Survey (AHRS), 2024: AHRS Sites. Alaska DNR, Controlled Unclassified Information, https://dnr.alaska.gov/parks/oha/ahrs/ahrs.htm
Historic Lighthouses	0.5	500		NOAA Office of Coastal Management, 2024-09-24: Historic Lighthouses, 2018-07-17. MarineCadastre.gov, (deprecated).
Northern Sea Otter Abundance and Distribution, Kodiak Archipelago	Density in top 75th percentile given score of 0.5	0	Applied a kernel density estimate function to generate the *Sea Otter Relative Population Density Estimate* dataset.	Cobb M. 2018. Northern sea otter (*Enhydra lutris*) abundance and distribution on the Kodiak Archipelago. Refuge Report 2018.2, Kodiak National Wildlife Refuge, U.S. Fish and Wildlife Service, Kodiak, AK. Date accessed: 2024-06-25.
Northern Sea Otter Abundance and Distribution, Southcentral Alaska	Density in top 75th percentile given score of 0.5	0	Applied a kernel density estimate function to the data to generate the *Sea Otter Relative Population Density Estimate* dataset.	Esslinger GG, Robinson BH, Monson DH, Taylor RL, Esler D, Weitzman BP, Garlich-Miller J. 2021. Abundance and distribution of sea otters (*Enhydra lutris*) in the southcentral Alaska stock, 2014, 2017, and 2019: U.S. Geological Survey Open-File Report 2021–1122, 19 p., https://doi.org/10.3133/ofr20211122. Date accessed: 2024-06-25.
Northern Sea Otter Abundance and Distribution, Southeast Alaska	Density in top 75th percentile given score of 0.5	0		Schuette P, Eisaguirre J, Weitzman B, Power C, Wetherington E, Cate J, Womble J, Pearson L, Melody D, Merriman C, Hanks K, Esslinger G. 2023. Northern Sea Otter (*Enhydra lutris kenyoni*) Population Abundance and Distribution across the Southeast Alaska Stock Summer 2022. USFWS Region 7 Technical Report MMM 2023-01, U.S. Fish and Wildlife Service, Alaska Region Headquarters, Anchorage, AK. https://www.fws.gov/media/usfws-region-7-technical-report-mmm-2023-01-march-2023. Date accessed: 2024-06-25.

Dataset name	Score	Buffer (m)	Processing description	Citation
Pacific Herring Spawn Aerial Survey Observations in Prince William Sound, Alaska	Binned categorical; 0–0.5 occurrences per year = 1 > 0.5 occurrences per year = 0.5	0	Used to create *Herring Spawn Occurrences per Year* dataset. Divided number of occurrences per relative 10-year period to get an occurrences per year dataset.	Morella, J. 2023. Aerial survey observations of Pacific herring spawn in Prince William Sound, Alaska, 1973-2021. Dataset. 10.24431/rw1k440. Date accessed: 2024-06-25.
Pacific Herring Spawn Observations, Southeast Alaska	Binned categorical; 0–0.5 occurrences per year = 1 > 0.5 occurrences per year = 0.5	0	Used to create *Herring Spawn Occurrences per Year* dataset. A 100-m buffer was applied to survey line data, and then divided the number of occurrences per relative 10-year period to get an occurrences per year dataset.	Alaska Department of Fish and Game (ADFG), 2024-06-25. Southeast Alaska Herring Surveys, 2020-2024. ADFG, https://services.arcgis.com/VdkVOAHovLuozJG4/arcgis/rest/services/CF_Southeast_AK_HerringSurveys_Public_View/FeatureServer/2
Pacific Herring Spawning Areas, Kodiak and Seward	0.5	0	Best available herring spawning dataset for Kodiak and Seward shows documented herring spawning sites in the area.	NOAA Office of Response and Restoration, 2024-06-25. Download ESI Maps and GIS Data – Pacific Herring Spawning Areas (for Kodiak and Seaward), 1997-2023. https://response.restoration.noaa.gov/esi_download
State Park Boundary	0	100		Alaska Department of Natural Resources (DNR), 2024-05-20: State Park Boundary, 2019-09-09. Alaska DNR Information Resource Management, https://gis.data.alaska.gov/datasets/SOA-DNR::state-park-boundary/about

Table A – 6. Data inventory table for the Aquaculture and Fisheries Submodel. A score of zero indicates the dataset is a constraint layer. Any dataset that has an empty processing description was ingested into the model with all original features retained.

Dataset name	Score	Buffer (m)	Processing description	Citation
Active Aquatic Farming Operation Areas	0	0	Filtered to include only active aquatic permits.	Alaska Department of Fish and Game (ADFG), 2024-05-20. Active Aquatic Farming Operation Areas, 2019. ADFG, https://gis.adfg.alaska.gov/mapping/rest/services/CF_public/Aquatic_Farming_Operations/MapServer/2
Alaska Area and Management Plan Boundary	0.5	0	Used to create *Alaska Area Plans (Sport Fishing)* dataset by filtering to include only areas that mention sport fishing.	Alaska Department of Natural Resources (DNR), Information Resource Management, 2024-06-15: Area and Management Plan Boundary, 2020. Alaska DNR, https://data-soa-dnr.opendata.arcgis.com/datasets/99120ebf1efc40e4a4774eca6fb00c7a_19/about
Alaska DNR Shore Fishery Lease	0.5	0		Alaska Department of Natural Resources (DNR), Information Resource Management, 2024-09-04: Shore Fishery Lease, 2023. Alaska DNR, https://data-soa-dnr.opendata.arcgis.com/datasets/SOA-DNR::shore-fishery-lease/about
Aquatic Farm Permit or Lease	0	50		Alaska Department of Natural Resources (DNR), 2024-05-20: Aquatic Farm Permit or Lease – Polygon, 2023-07-11. Alaska DNR, https://data-soa-dnr.opendata.arcgis.com/datasets/SOA-DNR::aquatic-farm-permit-or-lease-polygon/about
Commercial Fisheries Landings	Continuous	0	Controlled Unclassified Information. Fisheries landings data were joined to statistical areas dataset to create a spatial dataset using both salmon and groundfish stat areas. A *Fisheries Landings Combined* dataset was created by calculating fishing effort per acre for each fishery, and then a final minimum value was calculated.	NOAA National Marine Fisheries Service (NMFS), 2024-09-10: Commercial Fisheries Landings, 2024. NOAA NMFS (via secure file exchange), Controlled Unclassified Information, unpublished.
Commercial Statistical Areas	NA	0	Used as a spatial reference for the commercial fisheries landings data in order to create a *Fisheries Landings Combined* dataset.	Alaska Department of Fish and Game (ADFG), 2024-06-04. Commercial Statistical Areas, 2024. ADFG https://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercialByFishery.statmaps

Dataset name	Score	Buffer (m)	Processing description	Citation
Geoduck Bed Surveys	0.3	0	Controlled Unclassified Information	Alaska Department of Fish and Game (ADFG), 2024-06-04. Geoduck Bed Surveys, 2024 (Unpublished shapefile, Controlled Unclassified Information). (ADFG), available from the author upon request.
Hatchery Release Sites	0.5	500		DFGCWTOTOP database [Internet]. 1976 – present. Juneau, AK: Alaska Department of Fish and Game, Division of Commercial Fisheries, Mark, Tag and Age Laboratory – Hatchery Release Report. Cited 2025. Available from: https://mtalab.adfg.alaska.gov/CWT/reports/default.aspx. Date accessed: 2024-06-04.

Table A – 7. Data inventory table for data used within to assist with the precision siting process. Any dataset that has an empty processing description was ingested into the model with all original features retained.

Dataset Name	Score	Processing Description	Citation
Alaska Coastline	Continuous	Distance to shore was calculated for use with the precision siting analysis.	Alaska Department of Natural Resources (DNR), 2023-07: Alaska Coastline 1:63,360, 2017-03-20. Alaska DNR Geospatial Information System (GIS) Public Access Coordinator, https://gis.data.alaska.gov/datasets/SOA-DNR::alaska-coastline/about?layer=4
Central Gulf of Alaska Grid	Continuous	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Bathymetry (mhw, mllw)* dataset used precision siting as a continuous dataset. This rescaled dataset was also shifted in order to create *Depth* datasets at different tide datums. Within the precision siting analysis, shallower areas were deemed more suitable.	Alaska Fisheries Science Center, 2024-06-11: FSC/RACE/GAP/Zimmermann: Central Gulf of Alaska Grid from 1901 to 1999. NOAA National Centers for Environmental Information, https://www.fisheries.noaa.gov/inport/item/22897
Coastal Populated Places	Continuous	Filtered to include any place that has at least 1,000 residents. A continuous cost distance grid was generated using the distance from each coastal populated place to each precision siting polygon to generate a *Travel Distance* dataset. The closer to a populated place, the higher the score.	NOAA Office for Coastal Management, 2023-12-05: Coastal Populated Places, 2023. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/66114
Harbors	Continuous	Filtered to include Old Harbor and Larsen Bay Harbor. A continuous cost distance grid was generated using the distance from each filtered harbor point to each precision siting polygon to generate a *Travel Distance* dataset.	Alaska Department of Transportation and Public Facilities (ADOTPF), 2024-09-24: Harbors, 2024. ADOTPF, https://gis.data.alaska.gov/datasets/AKDOT::harbors-akdot/about
Southeast Alaska MHHW Coastal Digital Elevation Model	Continuous	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Bathymetry (mhw, mllw)* dataset used precision siting as a continuous dataset. This rescaled dataset was also shifted in order to create *Depth* datasets at different tide datums. Within the precision siting analysis, shallower areas were deemed more suitable.	NOAA National Geophysical Data Center, 2024-06-11: Southeast Alaska 8/3 arc-second Mean-High High Water (MHHW) Coastal Digital Elevation Model, 2010. NOAA National Centers for Environmental Information, https://www.ncei.noaa.gov/metadata/geoportal/rest/metadata/item/gov.noaa.ngdc.mgg.dem:715/html#

Dataset Name	Score	Processing Description	Citation
Station Listings and Tidal Datums	Continuous	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Bathymetry (mhw, mllw)* dataset used precision siting as a continuous dataset. This rescaled dataset was also shifted in order to create *Depth* datasets at different tide datums. Within the precision siting analysis, shallower areas were deemed more suitable.	NOAA National Ocean Service Center for Operational Oceanographic Products and Services (CO-OPS), 2024-06-11: Station Listings and Tidal Datums, 2024. NOAA CO-OPS, https://tidesandcurrents.noaa.gov/

Table A – 8. Data inventory table for data used for characterization of the options. Any dataset that has an empty processing description was ingested into the model with all original features retained. GHRSST = Group for High Resolution Sea Surface Temperature.

Dataset Name	Processing Description	Citation
Alaska Area and Management Plan Boundaries	Referenced the *Alaska Area Plan Subunits, Alaska Area Plans (Community Harvest), and Alaska Area Plans (Sport Fishing)*.	Alaska Department of Natural Resources (DNR) – Information Resource Management, 2024-05-14: Area and Management Plan Boundary, 2020. Alaska DNR, https://data-soa-dnr.opendata.arcgis.com/datasets/99120ebf1efc40e4a4774eca6fb00c7a_19/about
Alaska DNR Shore Fishery Lease		Alaska Department of Natural Resources (DNR), Information Resource Management, 2024-09-04: Shore Fishery Lease, 2023. Alaska DNR, https://data-soa-dnr.opendata.arcgis.com/datasets/SOA-DNR::shore-fishery-lease/about
Alaska Heritage Resources Survey (AHRS) Sites	Controlled Unclassified Information	Alaska Department of Natural Resources (DNR), Office of History and Archaeology, 2024-12-04: Alaska Heritage Resources Survey (AHRS), 2024: AHRS Sites. Alaska DNR, Controlled Unclassified Information, https://dnr.alaska.gov/parks/oha/ahrs/ahrs.htm
Alaska Seaweed Source Inventory	This shapefile was created through a participatory mapping process. During this process, stakeholders, including seaweed farmers, hatchery operators, and harvesters, delineated known seaweed beds using SeaSketch, a web-based GIS platform that provided base layers of shoreline maps and satellite imagery. Participants used the tool to draw polygons marking the location and species composition of beds.	NOAA National Marine Fisheries Service (NMFS), 2025-07: Alaska Seaweed Source Inventory, 2024-2025. NOAA NMFS Alaska Regional Office, https://www.fisheries.noaa.gov/inport/item/76159
Anadromous Waters Catalog – Streams	Filtered the Anadromous Waters Catalog to include only streams.	Alaska Department of Fish and Game (ADFG), 2024-05-20: Anadromous Waters Catalog, 2023. ADFG, https://www.adfg.alaska.gov/sf/SARR/AWC/index.cfm?ADFG=maps.dataFiles
Automatic Identification System (AIS) Vessel Traffic	An *AIS Combined* dataset was generated for use within the model. Original AIS data were sent as disconnected vessel traffic lines; a script was run to join vessel transects into continuous transects. Vessel effort was then calculated on a continuous grid to get vessel density by month.	Marine Exchange of Alaska, 2024-02-06: Automatic Identification System (AIS) Vessel Traffic, 2012-2024. Marine Exchange of Alaska, https://www.mxak.org/services/maritime-domain-management/historicaldata/

Dataset Name	Processing Description	Citation
Central Gulf of Alaska Grid	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Depths Over 200 ft* dataset used in characterization and precision siting as a continuous dataset. This rescaled dataset was also shifted in order to create depth datasets at different tide datums. *Depths Over 200 ft* dataset was also generated using these data by extracting areas with depths greater than 200 ft for exclusion within the constraints analysis.	Alaska Fisheries Science Center, 2024-06-11: FSC/RACE/GAP/Zimmermann: Central Gulf of Alaska Grid from 1901 to 1999. NOAA National Centers for Environmental Information, https://www.fisheries.noaa.gov/inport/item/22897
Cetacean Biologically Important Areas		Wild LA, Riley HE, Pearson HC, Gabriele CM, Neilson JL, Szabo A, Moran J, Straley JM, DeLand S. 2023. Biologically Important Areas II for cetaceans within U.S. and adjacent waters – Gulf of Alaska Region. Front. Mar. Sci. 10:1134085. https://doi.org/10.3389/fmars.2023.1134085 (Data access link: https://oceannoise.noaa.gov/biologically-important-areas).
Coastal Populated Places	Filtered to include any place that has at least 1,000 residents. A continuous cost distance grid was generated using the distance from each coastal populated place to each precision siting polygon to generate a *Travel Distance* dataset.	NOAA Office for Coastal Management, 2023-12-05: Coastal Populated Places, 2023. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/66114
Commercial Statistical Areas	Used to create two datasets by extracting applicable codes that overlap with each option: *Commercial Statistical Areas – Groundfish* and *Commercial Statistical Areas – Salmon, Shellfish* *Commercial Statistical Areas – Groundfish* created by extracting codes using the same layer for Groundfish and Shellfish in Southcentral and Southwest Alaska where the codes were identical and for only Groundfish in Southeast Alaska. *Commercial Statistical Areas – Salmon, Shellfish* created by extracting codes using the same layer for Salmon and Shellfish in Southeast Alaska where the codes are identical, and for only salmon in Southcentral and Southwest Alaska.	Alaska Department of Fish and Game (ADFG), 2024-06-04. Commercial Statistical Areas, 2024. ADFG https://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercialByFishery.statmaps

Dataset Name	Processing Description	Citation
Deep-Sea Coral and Sponge Occurrences		Deep Sea Coral Research and Technology Program, 2016. Observations of Deep-Sea Coral and Sponge Occurrences from the NOAA National Deep-Sea Coral and Sponge Database, 1842-Present, version 20241022-1 (NCEI Accession 0145037). NOAA National Centers for Environmental Information, https://www.ncei.noaa.gov/archive/accession/0145037. Date accessed: 2024-05-20.
Designation of Critical Habitat for the Southwest Alaska Distinct Population Segment of the Northern Sea Otter		U.S. Fish Wildlife Service, Marine Mammals Management Office, 2025-11-27: Designation of Critical Habitat for the Southwest Alaska Distinct Population Segment of the Northern Sea Otter, 2029-10-08. U.S. Fish and Wildlife Service, https://ecos.fws.gov/ecp/species/2884#crithab
Designation of Critical Habitat for the Southwest Alaska Distinct Population Segment of the Northern Sea Otter		U.S. Fish Wildlife Service, Marine Mammals Management Office, 2025-11-27: Designation of Critical Habitat for the Southwest Alaska Distinct Population Segment of the Northern Sea Otter, 2029-10-08. U.S. Fish and Wildlife Service, https://ecos.fws.gov/ecp/species/2884#crithab
Ferry Routes		Bureau of Transportation Statistics, Census Bureau, the U.S. Geological Survey, the National Oceanic and Atmospheric Association, and the U.S. Army Corps of Engineers, 2024-05-20: Ferry Routes, 2020-12-31. U.S. Department of Transportation, https://data-usdot.opendata.arcgis.com/datasets/usdot::ferry-routes/about
Harbors	Filtered to include Old Harbor and Larsen Bay Harbor. A continuous cost distance grid was generated using the distance from each filtered harbor point to each precision siting polygon to generate a *Travel Distance* dataset.	Alaska Department of Transportation and Public Facilities (ADOTPF), 2024-09-24: Harbors, 2024. ADOTPF, https://gis.data.alaska.gov/datasets/AKDOT::harbors-akdot/about
Humpback Whale High-Use Areas	*Please see Appendix C in this document.*	*Please see Appendix C in this document.*
Integrated Resource Management on the Tongass Nation Forest – Marine Access Facilities		U.S. Forest Service (USFS) Tongass National Forest (NF) Region 10, 2025-06-09: Integrated Resource Management on the Tongass National Forest, 2023. USFS Tongass NF Region 10, https://services1.arcgis.com/gGHDlz6USftL5Pau/arcgis/rest/services/Integrated_Resource_Management_on_the_Tongass_National_Forest/FeatureServer

Dataset Name	Processing Description	Citation
Key and Non-Key Harbor Seal Haulout Locations		London JM, Yano KM, Richmond EL, Withrow DE, Dahle SP, Jansen JK, Ziel HL, Brady GM, Boveng PL. 2015. Observed Haul-out Locations for Harbor Seals in Coastal Alaska. Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration, https://services2.arcgis.com/C8EMgrsFcRFL6LrL/ArcGIS/rest/services/pv_cst_haulout/FeatureServer Date accessed: 2024-05-20.
Munitions and Explosives of Concern		NOAA Office for Coastal Management, 2024-09-24. Munitions and Explosives of Concern, 2023. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/69013
Navy Undersea Cables	Controlled Unclassified Information	Department of Defense, 2024: Undersea Cables. NOAA Office of Coast Survey (via secure file exchange), Controlled Unclassified Information, unpublished. Date received: 2024-11-24.
NMFS ESA Critical Habitat	Layers included from this geodatabase were filtered according to overlap within the Alaska region and whether the species is classified as having critical habitat in Alaska.	NOAA National Marine Fisheries Service (NMFS), 2025-04-22: NMFS Endangered Species Act (ESA) Critical Habitat, 2022. NOAA NMFS, https://noaa.maps.arcgis.com/home/item.html?id=f66c1e33f91d480db7d1b1c1336223c3
North Pacific Seabird Data	USFWS guidance documentation outlined seabird colonies of significance, which was used to filter the data and extract colonies that met specific criteria.	Seabird Information Network, 2024-10-2. North Pacific Seabird Data Portal, 2024. Seabirds.net, http://axiom.seabirds.net/maps/north-pacific-seabirds/
Ocean Color Full Resolution Product	Used to generate the monthly climatological plots for Chlorophyll *a*, *Light Attenuation (Kd),* and *Total Suspended Solids.*	European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), 2017-2025: Sentinel-3A Ocean Land Colour Instrument (OLCI) Level-2 Ocean Color Full Resolution Product. https://data.eumetsat.int/product/EO:EUM:DAT:0407. Accessed 2025-04-08 to 2025-05-14.
Offshore Wind	Used to generate a dataset representing a daily average *Wind Speed at 10-m Height* for the years 2018–2020.	Draxl C, Wang J, Sheridan L, Jung C, Bodini N, Buckhold S, Aghili CT, Peco K, Kotamarthi R, Kumler A, et al. 2024. WTK-LED: The WIND Toolkit Long-Term Ensemble Dataset, 2018-2020. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5000-88457. https://www.nrel.gov/docs/fy25osti/88457.pdf. Date accessed 2025-05-28.

Dataset Name	Processing Description	Citation
Permitted Log Transfer Facilities		Alaska Department of Natural Resources (DNR), Division of Forestry and Fire Protection, 2024-05-20: Permitted Log Transfer Facilities Public View, 2021-02-25. Alaska DNR, https://statewide-geoportal-1-soa-dnr.hub.arcgis.com/datasets/SOA-DNR::permitted-log-transfer-facilities-public-view/about
Pipelines		NOAA Office for Coastal Management, 2024-05-20: Pipelines, 2024. MarineCadastre.gov, (deprecated).
Sea Surface Temperature	Used to generate a daily average Sea Surface Temperature dataset for the years 2019–2023.	JPL MUR MEaSUREs Project. 2015. GHRSST Level 4 MUR Global Foundation Sea Surface Temperature Analysis. Ver. 4.1. PO. DAAC, CA, USA. https://doi.org/10.5067/GHGMR-4FJ04. Accessed 2025-05-31 to 2025-06-10.
ShoreZone Coastal Mapping – Eelgrass Bioband	Filtered to include only the eelgrass Bioband.	Cook S, Daley S, Morrow K, Ward S. 2017. Coastal and Ocean Resources, Victoria, B.C., Canada. ShoreZone Coastal Imaging and Habitat Mapping Protocol. NOAA National Marine Fisheries Service, https://www.fisheries.noaa.gov/alaska/habitat-conservation/alaska-shorezone. Date accessed: 2024-09-24.
Southeast Alaska MHHW Coastal Digital Elevation Model	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Depths Over 200 ft* dataset used in modeling. This rescaled dataset was also shifted in order to create depth datasets at different tide datums. Areas with depths greater than 200 ft were given scores of 0.	NOAA National Geophysical Data Center, 2024-06-11: Southeast Alaska 8/3 arc-second Mean High-High Water (MHHW) Coastal Digital Elevation Model, 2010. NOAA National Centers for Environmental Information, https://www.ncei.noaa.gov/metadata/geoportal/rest/metadata/item/gov.noaa.ngdc.mgg.dem:715/html#
Station Listings and Tidal Datums	Multiple bathymetric datasets were mosaicked and the resolution smoothed to create one single bathymetric grid over the entire study region to create the *Depths Over 200 ft* dataset used in modeling. This rescaled dataset was also shifted in order to create depth datasets at different tide datums. Areas with depths greater than 200 ft were given scores of 0.	NOAA National Ocean Service Center for Operational Oceanographic Products and Services (CO-OPS), 2024-06-11: Station Listings and Tidal Datums, 2024. NOAA CO-OPS, https://tidesandcurrents.noaa.gov/

Dataset Name	Processing Description	Citation
Steller Sea Lion Major Haulout and Rookery Locations	Specific scoring of Steller sea lion haulouts and rookeries were specified in a Protected Resources Division memo. Both categorical and continuous scoring were used out of a specified distance from haulouts and rookeries.	Protected Resources Division, NOAA National Marine Fisheries Service (NMFS), Alaska Region (AKR), 2024. Steller sea lion haulout and rookery locations in the U.S. for 2016-05-14 (NCEI Accession 0129877), https://doi.org/10.7289/v58c9t7v. AKR Protected Resources Division Data Layers and Scoring for Aquaculture Opportunity Atlas (Atlas). NOAA Technical Memorandum, U.S. Department of Commerce. Juneau, Alaska.
Submarine Cable Areas		NOAA Office for Coastal Management, 2024-05-20: Submarine Cable Areas, 2023. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/66190
Subsistence Search and Harvest Areas		Alaska Department of Fish and Game (ADFG), Division of Subsistence, 2025: Subsistence Search and Harvest Areas, 2025. ADFG, Division of Subsistence, Community Subsistence Information System, https://www.adfg.alaska.gov/sb/CSIS/
USFS Recreation Opportunities – Cabin Rentals	Filtered to include any cabin rentals.	U.S. Forest Service (USFS), 2025-06-09: Recreation Opportunities, 2017. USFS, https://apps.fs.usda.gov/arcx/rest/services/EDW/EDW_RecreationOpportunities_01/MapServer/0
Wastewater Outfalls		NOAA Office for Coastal Management, 2024-05-20: Wastewater Outfalls, 2022-08-08. MarineCadastre.gov, https://www.fisheries.noaa.gov/inport/item/66706
Wrecks and Obstructions		NOAA Office for Coastal Management, 2024-05-20: Wrecks and Obstructions, 2023-08-14. MarineCadastre.gov, (deprecated).

Appendix B

Memorandum from the National Marine Fisheries Service Alaska Region and Office of Protected Resources with recommendations for data layers and scoring for protected species

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, AK 99802-1668

June 11, 2025

MEMORANDUM FOR: Kristine Cherry
Chief, Regulatory and Policy Branch
NOAA Fisheries Office of Aquaculture (OAQ)

James A. Morris, Jr., Ph.D.
Coastal Aquaculture Siting and Sustainability
National Centers for Coastal Ocean Science (NCCOS)

FROM: Anne Marie Eich, Ph.D. Anne Marie Eich
Assistant Regional Administrator, Protected Resources Division NOAA Fisheries, Alaska Region (AKR)

SUBJECT: AKR Protected Resources Division Data Layers and Scoring for Aquaculture Opportunity Atlas

In June 2023, NOAA Fisheries selected the Alaska Region (AKR) as the third region in which to identify Aquaculture Opportunity Areas (AOAs). In Alaska, AOAs are only identified within state waters. AKR Protected Resources Division (PRD) was tasked with providing pertinent protected species information to ensure that the AOA identification process uses the best-available science to identify areas suitable for domestic aquaculture production, while minimizing impacts to NOAA-trust protected species. To holistically consider protected species within the Alaska AOA spatial suitability model, the National Centers for Coastal Ocean Science (NCCOS) sought to develop a combined data layer reflecting the overall suitability scores for protected species within the Alaska AOA study areas[1] in collaboration with AKR, Alaska Fisheries Science Center (AFSC), and other Alaska protected species experts. NCCOS framed their request (NCCOS 2023) based on previous AOA PRD decision memos (NMFS 2021a, NMFS 2021b) for consistent data provision and scoring methods to inform the development of the Alaska AOA Atlas (Atlas). Protected species occur throughout all of the Alaska AOA study areas. However, based on the data sets identified, only two of the ten Alaska AOA study areas contained overlapping data layers needed for the modeling effort to develop a combined data layer. For these two study areas, the Steller sea lion data layer was included as an individual layer within the study area Natural Resources submodel. For the remaining eight study areas, only Steller sea lion haulouts and rookery data were included for modeling. For all ten Alaska AOA study areas, it was determined that information for other species (i.e., species not included in the model) would be captured in a written narrative with appropriate figures, or "characterization" of final site options as appropriate.

[1] https://www.fisheries.noaa.gov/alaska/aquaculture/final-aoa-study-areas-alaska

NCCOS and AKR have coordinated to develop an approach that describes how to include and score data layers for protected species (including those listed as endangered or threatened under the Endangered Species Act (ESA)) into the NCCOS spatial models, which will result in a peer-reviewed Atlas of AOAs. The Atlas will be used by NOAA Fisheries to inform the development of preliminary alternatives that will be described in the Notice of Intent (NOI) to prepare a Programmatic Environmental Impact Statement (PEIS). The approach outlined below was developed collaboratively between AKR-PRD, AKR-Aquaculture, AFSC, and NCCOS, with input from species experts outside of NOAA, and describes how the final AKR-PRD data layer was developed for inclusion in modeling aquaculture site suitability for the Alaska Atlas.

APPROACH

AKR-PRD, AKR-Aquaculture, and NCCOS relied on the scoring table previously developed by Office of Protected Resources, OAQ, Southeast Regional Office, and West Coast Regional Office to provide more detailed information on protected species vulnerability based on species status, population size, and trend for species protected, or proposed for protection, under the ESA and/or Marine Mammal Protection Act (MMPA) in the spatial model (Table 1). Table 1 lists the scores that can be used in the model for MMPA and ESA-listed species data layers ranging from 0.1 (most vulnerable species, based on their biological status) to 0.8 (least vulnerable species) for the best available data on protected species. Species and stocks are ranked according to factors that are more or less likely to affect their ability to withstand mortality, serious injury, or other impacts to the species' ability to survive and recover.

Table 1. AOA model scoring system for ESA and MMPA species data layers (reproduced from NMFS 2021b).

Status	*Trend*	*Converted scores for model*
Endangered	declining, small population*, or both	0.10
Endangered	stable or unknown	0.20
Endangered	increasing	0.30
Threatened	declining or unknown	0.40
Threatened	stable or increasing	0.50
MMPA Strategic	declining or unknown	0.60
MMPA Listed	small population	0.70
MMPA Listed	large population	0.80

**Small population equates to populations of 500 individuals or less (Franklin 1980).*

AKR-PRD SPECIES CONSIDERED

AKR-PRD evaluated the best scientific information available for the distributions of vulnerable protected species within the 10 Alaska AOA Study Areas[2] across Southeast, Southcentral, and Southwest Alaska for the purpose of identifying available data for use in the suitability modeling and characterization phases of the development of the Alaska AOA Atlas and subsequent PEIS (Table 2). All Alaska AOA study areas are in state waters up to 61 m (200 ft) depth.

Table 2. ESA/MMPA species that occur within the AOA study regions for Alaska state waters and their recommended scores, as determined by species status and trend, for use in the suitability model.

Species	*Status and Trend*	*Score*
Fin Whale	Endangered; unknown or increasing	0.2
Gray Whale (ENP)	MMPA; large population	0.8
North Pacific Right Whale	Endangered; unknown trend, small population	0.1
Steller Sea Lion (EDPS)	MMPA; large population	0.8
Steller Sea Lion (WDPS)	Endangered; increasing	0.3

Species Considered but Not Used in the Spatial Analysis/Suitability Model

Initially, all protected species in Alaska that were scored at 0.40 or less (per Table 1) were prioritized for inclusion in the modeling effort. However, after further consideration, some species that scored 0.40 or less were not included in the modeling for a number of reasons, including a lack of recent quantitative data, a lack of variability in distribution throughout the AOA study areas, or lack of occurrence in waters less than 61 m deep. These species will be included in the characterization tables within the content of the Alaska Atlas. The species that scored 0.40 or less, but will not be included in the spatial modeling include ESA-listed Mexico and Western North Pacific DPS humpback whales, sperm whales, sunflower sea stars (proposed threatened; 88 FR 73230, March 16, 2023), and Western North Pacific (WNP) gray whales.

ESA-listed sperm whales were not included in the suitability model because they are not anticipated to occur in waters 61 m or less (the Alaska AOA study areas). The proposed threatened sunflower sea star was not included in the AKR-PRD data layer because limited data indicate the species occurs throughout the 10 AOA study areas in unknown relative densities. Available species distribution model layers for the ESA-listed WNP gray whale were not included due to the extreme rarity of this species. Although ENP gray whales scored 0.8, we included them in the model as a surrogate for WNP gray whales, and to reflect the potential for significant interactions between the species and aquaculture facilities. By including the

[2] https://www.fisheries.noaa.gov/alaska/aquaculture/final-aoa-study-areas-alaska

"Biologically Important Areas II" (BIA II) feeding layer (Wild et al. 2023) for ENP gray whales in the modeling effort, we intend to highlight areas where all gray whales may overlap with aquaculture sites. The BIA II data layers for humpback whales rely on the use of data that were collected over a decade ago. In an effort to use best available information to include in the Alaska Atlas, NCCOS and AKR-PRD designed a data solicitation project to incorporate local knowledge from humpback whale experts in communities associated with the 10 AOA study areas. Although the data will be valuable for consideration in narrative/characterization form, we determined that it wasn't suitable for the modeling effort. The WNP gray whale and ESA-listed humpback whale DPSs will be further flagged during the characterization step to ensure users of the Atlas are informed of the potential presence of these rare and ESA-listed species when considering siting suitability.

Other marine mammals protected by the MMPA were not included in the modeling effort at this time, but will be included in subsequent characterization steps for the proposed Atlas study areas (see Table 3). All of the species, including those with data layers in the spatial model, will be further discussed during the site characterization phase of the AOA process.

Table 3. ESA/MMPA species that overlap with study areas but were not included in the suitability model. Scores, as determined by species status and trend (as of May 2025), are provided for informational purposes for consideration in site characterization descriptions.

Species	*Status and Trend*	*Score*
Dall's Porpoise	MMPA; unknown trend, large population	0.8
Gray Whale (WNP)	Endangered; unknown trend, small population	0.1
Harbor Porpoise (GOA)	MMPA; unknown trend, large population	0.8
Harbor Porpoise (NSEAK inland)	MMPA; unknown trend, large population	0.8
Harbor Porpoise (SSEAK inland)	MMPA; unknown trend, large population	0.8
Harbor Porpoise (Y-SEAK offshore)	MMPA; unknown trend, unknown population	0.6
Harbor Seal (Clarence Strait stock)	MMPA; large population	0.8
Harbor Seal (Dixon/Cape Decision stock)	MMPA; large population	0.8
Harbor Seal (Lynn Canal/ Stephens Passage stock)	MMPA; unknown trend, unknown population	0.6
Harbor Seal (N. Kodiak stock)	MMPA; large population	0.8
Harbor Seal (Prince William Sound stock)	MMPA; declining population	0.6
Harbor Seal (S. Kodiak stock)	MMPA; large population	0.8

Species	*Status and Trend*	*Score*
Harbor Seal (Sitka/Chatham stock)	MMPA; unknown trend	0.6
Humpback Whale (Hawaii)	MMPA; large population	0.8
Humpback Whale (Mexico)	Threatened; unknown trend	0.4
Humpback Whale (WNP)	Endangered; unknown trend	0.2
Killer Whale (AT1 transient)	MMPA Strategic; declining population	0.6
Killer Whale (ENP Alaska resident)	MMPA; large population	0.8
Killer Whale (ENP Northern resident, offshore)	MMPA; stable, small population	0.7
Killer Whale (ENP transient)	MMPA; unknown trend, small population	0.7
Killer Whale (West Coast transient)	MMPA; small population	0.7
Minke Whale	MMPA; stable, large population	0.8
Sperm Whale	Endangered; unknown trend	0.2
Sunflower Sea Star	Proposed ESA-Listed Threatened; unknown trend	0.4

The AKR-PRD data layers presented below represent the best available data which AKR-PRD was able to access and evaluate within the timeline available to complete this work. If future iterations of the suitability model are planned, we would encourage the modelers to request an updated version of the protected species distribution layers described below, and/or assist with a survey effort to gather current distribution information.

Data Available for Consideration

The 10 Alaska AOA Study Areas[3] occur within state waters across Southeast, Southcentral, and Southwest Alaska. There are six study areas located in Southeast Alaska, three in Southcentral Alaska, and one in Southwest Alaska. AKR-PRD reviewed the available information for the 10 study areas and identified multiple applicable data layers overlapping with study area locations. As Atlas study areas will be modeled independently, the AKR-PRD data provided are not comparable for a "Cumulative Suitability Model" across all study areas given potential differences in data types between areas.

Two primary sources of comprehensive data were identified to provide protected species occurrence for the development of a combined protected species data layer for the Alaska AOA study areas: 1) ESA-listed and MMPA protected Steller sea lion rookeries and haulouts that co-occur with AOA study areas (Attachment 1); and 2) Cetacean "Biologically Important Areas II" (BIA II) layers developed by regional and species experts in collaboration with NOAA Fisheries

[3] https://www.fisheries.noaa.gov/alaska/aquaculture/final-aoa-study-areas-alaska

(Wild et al. 2023). Information about other protected species that occur in the AOAs will be included via written narrative (i.e., characterization).

Steller Sea Lion (*Eumetopias jubatus*) Rookeries and Haulouts

The AFSC Marine Mammal Laboratory and AKR-PRD analyzed the spatial distribution of Steller sea lions for both populations. Buffer zones around rookeries were based on the highest vulnerability habitat use of adult female, young of the year, and juvenile Steller sea lions derived from satellite telemetry research. Buffer zones around haulouts were based on Steller sea lion critical habitat aquatic zones (see 58 FR 45269, August 27, 1993). Figure 1 shows the general range and location of Steller sea lion occurrence, haulouts, and rookeries. Steller sea lions occur in all Alaska AOA study areas. These sites are divided along 144° W longitude line, with western Distinct Population Segment (WDPS) Steller sea lions occurring primarily to the west of the delineation line, and eastern Distinct Population Segment (EDPS) Steller sea lions occurring primarily to the east of the line. EDPS Steller sea lions are not ESA-listed (78 FR 66140, November 4, 2013), but are protected under the MMPA. WDPS Steller sea lions are listed as endangered (62 FR 24345, May 5, 1997).

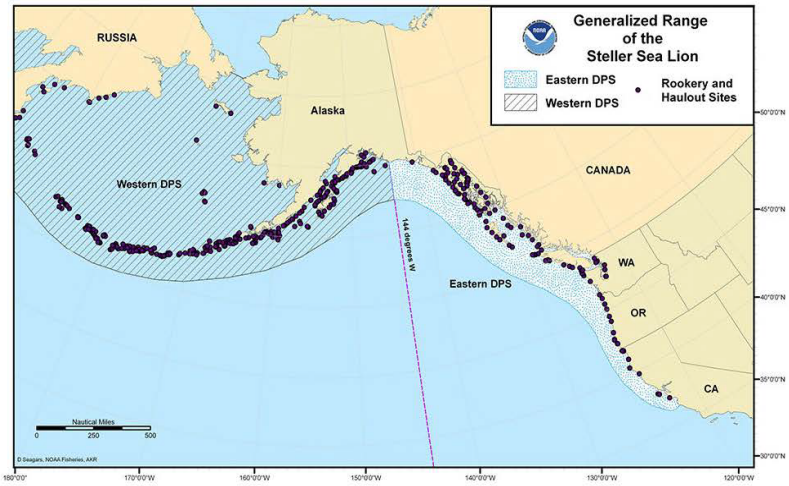


Figure 1. Generalized range of the Steller sea lion with the 144° W Longitude line division between Eastern and Western DPS, showing locations of rookeries and haulouts.

Based on movement data and genetic analyses, WDPS Steller sea lions occur in a mixing zone in the northern region of the EDPS, east of 144° W longitude and north of Sumner Strait (NMFS

2020[4], Hastings et al. 2020; Figure 2). Because endangered WDPS Steller sea lions occur in this mixing zone in northern Southeast Alaska, overlapping with some AOA study areas, we incorporated this in our analyses.

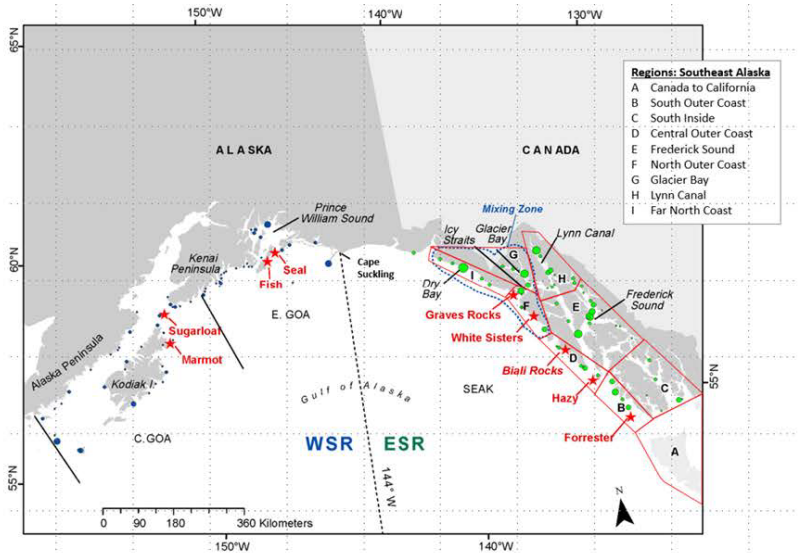


Figure 2. Map of SSL DPS boundaries, rookery locations, and occurrence regions for WDPS Steller sea lions. The black dotted line shows the DPS boundary (144° W longitude) between the EDPS (ESR) and WDPS (WSR). Red stars indicate eight rookeries where pups were marked (sea lions were resighted but not marked at Biali Rocks). Red lines define the nine study regions (see legend for codes). The core Mixing Zone in the EDPS region is delineated by the blue dashed line and is a zone with significant mixing of Steller sea lions born in both the WSR and ESR. Dots are other sites used by at least 20 nonpups (blue dots for the WSR and green dots for the ESR). The sizes of the dots indicate maximum numbers of nonpups counted during aerial or brand–resight surveys from 2000 to 2015 (ranges are: 20–200, 201–500, 501–1,000, 1,001–1,500, 1,501–2,500, 2,501–3,500, > 3,500). Adapted with permission from K. Hastings (Hastings et al. 2020, NMFS 2020).

Information Considered but Not Used for the Steller Sea Lion in the Suitability Model

AKR-PRD recommended incorporating Steller sea lion designated critical habitat[5] aquatic zones (aquatic zones extend 3,000 ft seaward of each rookery and major haulout in Alaska east of 144 degrees longitude and 20 nm seaward of each rookery and major haulout west of 144 degrees

[4] NMFS 2020 provides guidance on the anticipated occurrence of endangered WDPS Steller sea lions within areas east of 144° W Longitude, as well as the proportion of WDPS vs EDPS animals in those areas based on best available science (Hastings et al. 2020).

[5] 50 CFR § 226.202

longitude) into the spatial analysis, but did not consider terrestrial or air zones as they do not overlap with Alaska AOA study areas or the special aquatic foraging areas (i.e., identifying AOAs does not remove/impact prey). Aquatic zones that extend 3,000 ft seaward of each rookery and major haulout in Alaska were considered, however, distances out to 20 nm were determined to have lower potential overlap with Steller sea lions than areas closer to shore and therefore not included in the suitability model. These will be discussed further in the characterization sections of the Atlas.

NCCOS considered the no approach/no transit buffer areas out to three nautical miles for WDPS Steller sea lion rookeries (50 CFR § 224.103) as a constraint in the spatial analysis (i.e., equal to zero in the model).

NOAA Fisheries identified special prohibitions for WDPS Steller sea lion (50 CFR § 224.103):

(1) ***General Prohibitions.*** The following regulatory provisions shall apply to the western population of Steller sea lions:

(i) ***No discharge of firearms.*** Except as provided in paragraph (d)(2) of this section, no person subject to the jurisdiction of the United States may discharge a firearm at or within 100 yards (91.4 meters) of a Steller sea lion west of 144° W longitude. A firearm is any weapon, such as a pistol or rifle, capable of firing a missile using an explosive charge as a propellant.

(ii) (***No approach in buffer areas.*** Except as provided in paragraph (d)(2) of this section:

(A) No owner or operator of a vessel may allow the vessel to approach within 3 nautical miles (5.5 kilometers) of a Steller sea lion rookery site listed in paragraph (d)(1)(iii) of this section;

(B) No person may approach on land not privately owned within one-half statutory mile (0.8 kilometers) or within sight of a Steller sea lion rookery site listed in paragraph (d)(1)(iii) of this section, whichever is greater, except on Marmot Island; and

(C) No person may approach on land not privately owned within one and one-half statutory miles (2.4 kilometers) or within sight of the eastern shore of Marmot Island, including the Steller sea lion rookery site listed in paragraph (d)(1)(iii) of this section, whichever is greater.

However, none of the rookeries listed in paragraph (d)(1)(iii)[6] overlap with Alaska AOA study areas.

[6] https://www.ecfr.gov/current/title-50/chapter-II/subchapter-C/part-224/section-224.103

Information Considered for Steller sea lion in Spatial Analysis/Suitability Model

AKR-PRD and the AFSC Marine Mammal Lab provided data and information based on the best scientific information and our professional opinion regarding our concerns and considerations for WDPS and EDPS Steller sea lions, in relation to citing of future aquaculture farms in Alaska (see Attachment 1). The scoring used by NCCOS in the suitability model for Steller sea lion, including the continuous scoring, was developed and supported by the analysis provided in Attachment 1. Attachment 1 provides the foundation information to the suitability modeling and characterization for SSL in the Alaska AOA Atlas.

For these reasons, AKR-PRD determined that the first data layer would consist of Steller sea lion rookeries, and major and minor haulouts overlapping with the AOA study areas. The following definitions were applied in identifying these locations:

- **Rookeries:** Steller sea lion breeding and pupping sites – at least one count of 50 newborn pups, since 1973 (Pitcher et al. 2007).
- **Major Haulouts:** Steller sea lion resting sites – major haulouts are sites that are not rookeries, have had significant historical counts of Steller sea lions: at least one count of 200 or more during the breeding season or at least 100 during the non-breeding season, since 1973.
- **Minor Haulouts:** Steller sea lion sites that are not rookeries and have had significant historical counts of Steller sea lions with at least one count less than 200 during the breeding season or less than 100 during the non-breeding season, since 1973.

Steller Sea Lion Occurrence and Seasonal Use

The WDPS of Steller sea lions are primarily found north of Sumner Strait in Southeast Alaska (Hastings et al. 2020). Most adult Steller sea lions occupy rookeries during the summer pupping and breeding season (mid-May through July) and exhibit a high level of site fidelity (Raum-Suryan et al. 2002, Hastings et al. 2017). During the breeding season, some juveniles and non-breeding adult Steller sea lions occur at or near the rookeries, but most are on haulouts (sites that provide regular retreat from the water on exposed rocky shoreline, gravel beaches, and ice) (Call and Loughlin 2005, Ban and Trites 2007). Steller sea lions disperse widely after the breeding season, likely to access seasonally important prey resources (Gende and Sigler 2006, Sigler et al. 2009, Womble et al. 2009). During fall and winter many Steller sea lions disperse from rookeries and increase use of haulouts, particularly on terrestrial sites (Calkins 1998).

Distance from Steller Sea Lion Rookery/Haulout

The distances of aquatic zones surrounding rookeries and haulouts that were included in the spatial analysis were determined based on telemetry data showing highest observed use by adult female, young of the year, and juvenile Steller sea lions out to three nautical miles (5.5 km). In the Gulf of Alaska, foraging habitat is primarily shallow, nearshore, and continental shelf waters 4.3 to 13 nm offshore with a secondary occurrence inshore of the 3,280 ft (1,000 m) isobath. The Steller Sea Lion Recovery Team recommended that waters extending 3,000 ft from rookeries and

major haulouts throughout the range of Steller sea lions be considered essential habitat that merits special management consideration (58 FR 17185, April 1, 1993).

AKR-PRD provided NCCOS with a suggested qualitative ranking of very high, high, medium, and low abundance/overlap areas (Attachment 1) around Steller sea lion haulouts and rookeries varying by status (WDPS vs. EDPS), size of the rookery or haulout, and distance from the haulout or rookery. Using the scoring method identified by AKR and NCCOS for species in Table 1, the team translated the very high/high/medium/low categories in Attachment 1 into model input values (Table 4). Considerations that were used for the model input values included:

- Regulated no entry zones out to 3 nm around designated major rookeries (**50 CFR § 224.103**) were considered a constraint (0.0 score)
- All major SSL rookeries/haulouts (>50 animals) have 1,500 ft exclusion buffer (0.0 score) (ADF&G 2024)[7]
- Any WDPS rookery identified under **50 CFR § 224.103** would have an exclusion buffer (0.0 score) out to 3 nm
- WDPS rookeries identified subsequent to **50 CFR § 224.103** overlapping with AOA study areas from 1,500 ft to 3 nm would be down scored (0.3 for endangered but increasing population trend as per NMFS 2021 memo)
- WDPS major haulouts out to 3,000 ft would be down scored (0.4), and from 3,001 ft to 3 nm would use a continuous score of 0.4 to 1.0 incrementally increasing the score as distance increases approaching the 3 nm buffer
- WDPS minor haulouts downscored out to 3,000 ft (0.6 score)
- EDPS rookeries North Sumner Strait from 1,500 ft to 3,000 ft would have a weighted downscore (0.3-0.8) based on proportion of WDPS/EDPS mixing (NMFS 2020 defines anticipated mixing proportion), and continuous score of 0.3 to 1.0 incrementally increasing the score as distance increases approaching the 3 nm buffer
- EDPS major haulouts North of Sumner Strait same as above but weighting (0.4-0.8) based on proportion of mixing to 3,000 ft and continuous scoring 0.4-1 to 3 nm
- EDPS minor haulouts North of Sumner Strait downscored out to 3,000 ft (0.8 score)
- EDPS rookeries North of Sumner Strait downscored out to 3,000 ft (0.8 score), and continuous downscoring from 0.8 to 1 out from 3,000 ft to 3 nm
- EDPS rookeries south of Sumner Strait from 1,500 ft to 3,000 ft would have a downscore (0.8 score), and continuous downscoring 0.8-1 out to 3nm

[7] Alaska Department of Fish & Game 2024 Guidelines for Emerging Mariculture Industry and Marine Mammal Interactions - https://www.adfg.alaska.gov/static/fishing/PDFs/aquaticfarming/mariculture_and_marinemammals.pdf

- EDPS major haulouts south of Sumner Strait from 1,500 ft to 3,000 ft would have a downscore (0.9), and continuous downscoring 0.9-1 out to 3 nm
- EDPS minor haulouts south of Sumner Strait downscored (0.9 score) out to 3,000 ft

Continuous scoring[8] was used around WDPS major and minor haulouts and EDPS rookeries and haulouts to account for a lower expected density at increasing distances from the haulout or rookery. Weighted scores were calculated for EDPS rookeries and haulouts North of Sumner Strait within the EDPS and WDPS mixing zone east of 144° W Longitude and north of Sumner Strait based on the proportion of EDPS and WDPS population occurrence at individual sites and the standards (NMFS 2020, Hastings et al. 2020; Figure 2).[3]

Table 4. Model score values for aquatic zones around Steller sea lion rookeries and haulouts within the AOA study areas in Alaska state waters.

Distance from rookery/haulout	WDPS/ EDPS/ Both	≤ 3,000 ft[9]	> 3,000 ft to 3 nm
Steller sea lion Rookeries listed in 50 CFR § 224.103	WDPS	0	0
All other WDPS Rookeries not listed in 50 CFR § 224.103	WDPS	0.3	0.3
WDPS Major Haulouts	WDPS	0.4	Continuous scoring from 0.4 - 1.0
WDPS Minor Haulouts	WDPS	0.6	n/a
EDPS Rookeries North of Sumner Strait	Both	0.3 - 0.8 weighted based on proportion of population occurrence[10]	Continuous scoring from weighted score (0.3-0.8) to 1.0
EDPS Major Haulouts North of Sumner Strait	Both	0.4 - 0.8 weighted based on proportion of population occurrence[6]	Continuous scoring from weighted score (0.4-0.8) to 1.0
EDPS Minor Haulouts North of Sumner Strait	EDPS	0.8	n/a

[8] Continuous scoring automatically assigns a score along a continuous scale within a defined distance (buffer) around a feature based on its proximity to that feature.
[9] We selected this distance as a boundary for scoring based on designated critical habitat out to 3,000 ft (**50 CFR § 226.202**), and recommendations from the Steller Sea Lion Recovery Team (58 FR 17185).
[10] NMFS 2020 provides guidance on the anticipated occurrence of endangered WDPS Steller sea lions within areas east of 144° W Longitude, as well as the proportion of WDPS vs EDPS animals in those areas based on best available science (Hastings et al. 2020).

Distance from rookery/haulout	WDPS/ EDPS/ Both	≤ 3,000 ft[9]	> 3,000 ft to 3 nm
EDPS Rookeries South of Sumner Strait	EDPS	0.8	Continuous scoring from 0.8 - 1.0
EDPS Major Haulouts South of Sumner Strait	EDPS	0.9	Continuous scoring from 0.9 - 1.0
EDPS Minor Haulouts South of Sumner Strait	EDPS	0.9	n/a

Figure 3 is an example of how the aquatic zones around Steller sea lion haulouts and rookeries can be displayed. This map shows the Sitka AOA study area.

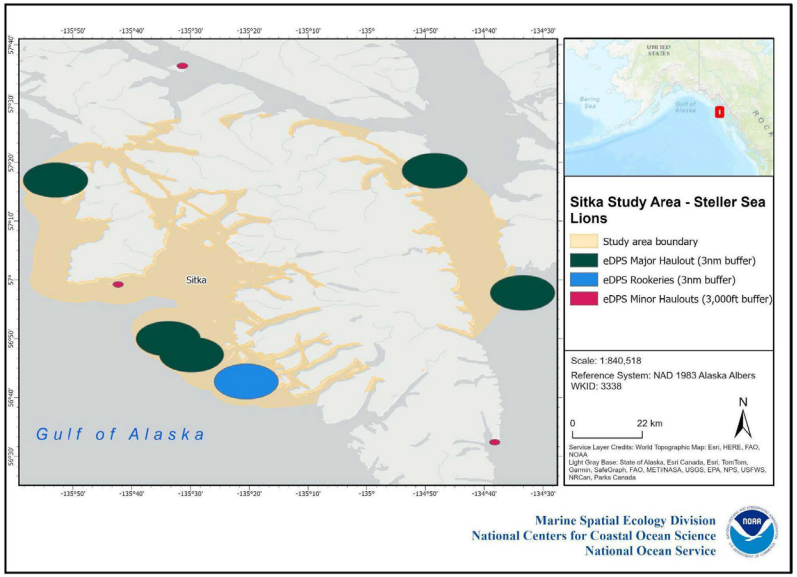


Figure 3. Map of the Sitka AOA study area showing all EDPS Steller sea lion sites for rookeries and major/minor haulouts with the relevant buffers applied for each site (three nautical miles for rookeries and major haulouts, 3,000 ft for minor haulouts).

Cetacean Biologically Important Areas

The second type of data layer used in the Alaska AOA spatial analysis is the BIA II layers for North Pacific Right whale, gray whale, and fin whale feeding areas (Wild et al. 2023). Wild et al. (2023) describes the Cetacean Biologically Important Areas II (BIA II), and provides a

comprehensive analysis of available data for many cetacean stocks in Alaska. North Pacific Right whale, gray whale, and fin whale feeding BIAs co-occur in the Kodiak study area. Gray whale feeding areas also occur in the Sitka study area, as depicted below in Figure 4. All three of the BIA II cetacean data layers included in this modeling effort overlap with the Steller sea lion data layer.

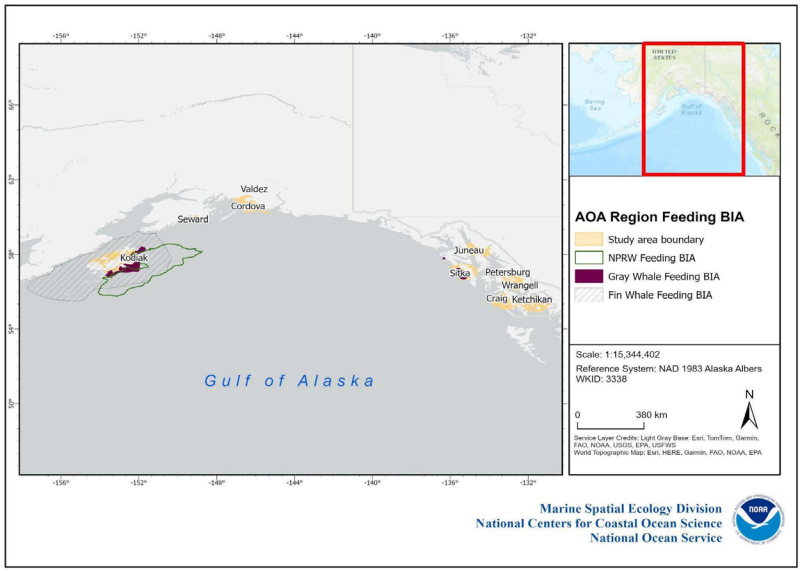


Figure 4. Gulf of Alaska map showing all cetacean BIAs that were used within the spatial suitability analysis protected resources combined data layer.

Several caveats related to the identification of BIA IIs are important to note here and should be kept in mind when using BIAs in environmental assessments or impact analyses (NMFS 2021b):

1. Only known areas and periods of biological importance were identified; other areas that are biologically important to cetaceans could exist within Alaska state waters but not be included here due to insufficient information.
2. The quantity and type of data from within Alaska state waters used to define the Biologically Important Areas were spatially and temporally heterogeneous. The types of data used included sighting, acoustic, tagging, genetic, and photo identification data.
3. The Biologically Important Area designation is not equivalent to habitat or range. For distinctly migratory species or populations, Important Areas highlight specific locations and periods within which critical behaviors occur and likely represent only a fraction of

the overall range. Feeding BIAs represent areas and times where an aggregation of a species, stock, or population preferentially feeds.

Information Considered but Not Used for the Cetacean Spatial Analysis/Suitability Model

In addition to the BIA II layers described above, Wild et al. (2023) also identified *Watch List Areas* and humpback whale feeding BIAs. *Watch List Areas* are locations where some information was available to suggest a BIA might exist, but the scoring matrix used by the authors gave the area an importance score of 0. The authors determined that future consideration and additional information was needed to fill in information gaps. AKR-PRD considered the use of *Watch List Area* layers for spatial analysis, but determined that since these layers did not meet the criteria for BIA II identification, they should not be included in the modeling effort for Alaska.

Feeding areas for humpback whales (unlisted Hawaii humpback whales, endangered Western North Pacific humpback whales, and threatened Mexico humpback whale DPSs) were not included in the AKR-PRD data layer primarily because these layers cover nearly all of the AOAs homogeneously. While specific boundary and intensity levels provided more specific locations, these locations primarily overlapped the entire study area and thus provided no meaningful contrast within the study areas in terms of relative suitability.

However, both *Watch List Areas* and humpback whale feeding BIA IIs will be presented in the Atlas with written characterization to ensure users of the Atlas are informed of the location of these areas when considering siting suitability. Additional information, including a detailed description of the importance of those areas, is available in Wild et al. (2023).

Final AKR-PRD Data Layer

For the Alaska AOA spatial analysis, NCCOS developed a constraint model (data layers with no compatibility with aquaculture) and five submodels which assess suitability related to: 1) National Security; 2) Industry, Navigation, and Transportation 3) Aquaculture and Commercial Fishing; 4) Natural Resources; and 5) Cultural Resources. These submodels are combined to calculate a "Cumulative Suitability Model" that is then used to identify clusters of the most suitable areas within each of the 10 Alaska AOA study areas. Options within the most suitable clusters will be characterized and used to inform development of preliminary alternatives that will be considered in the PEIS.

AKR-PRD's understanding is that NCCOS does not impose any relative weighting on the submodels before combining their scores into the "Cumulative Suitability Model." Submodel comparisons in the Alaska AOA Atlas are unweighted because multiple types of aquaculture are proposed and NCCOS believes comparisons can be more effectively made during later phases in the process. The use of submodels is designed to avoid more numerous data layers having greater control over final model outcomes, such that each submodel contributes an equal amount to the final suitability score. Because the final suitability scores compare very different types of

activities, the overall score does not have an empirical meaning; however, the relative rank of the scores is important to determining which sites are more suitable. Therefore, it is important that the ranked scores of the areas in the AKR-PRD data layer of the Natural Resources submodel are reflective of the data identified by AKR-PRD regarding protected species occurrence and vulnerability.

Only the Kodiak and Sitka study areas contained overlapping data layers needed for the development of a combined data layer (Figures 5 through 8). These include feeding areas for the North Pacific Right whale, gray whale, and fin whale, and Steller sea lion haulouts and rookeries in the Kodiak study area; and gray whale feeding areas and Steller sea lion haulouts and rookeries in the Sitka study area. Considering that the Alaska AOA spatial modeling approach is to model each study area independently, individual combined data layers were developed for the Kodiak and Sitka study areas. The Kodiak and Sitka combined data layers were calculated using the product method (versus geometric mean or arithmetic mean) to ensure that the final score for grid cells with multiple protected species layers would reflect the lowest possible score versus areas with a single protected species or no quantitative species data at all. This is consistent with the approach taken by SERO and WCR PRDs for previous AOA modeling efforts (see NMFS 2021b).

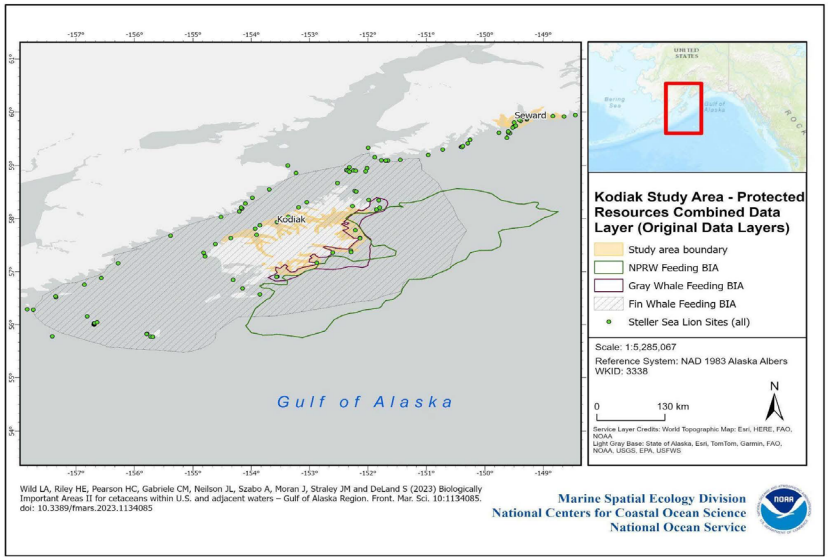


Figure 5. Chart showing the overlay of all Alaska protected resources data layers that are included in the protected resources combined data layer in the Kodiak study area.

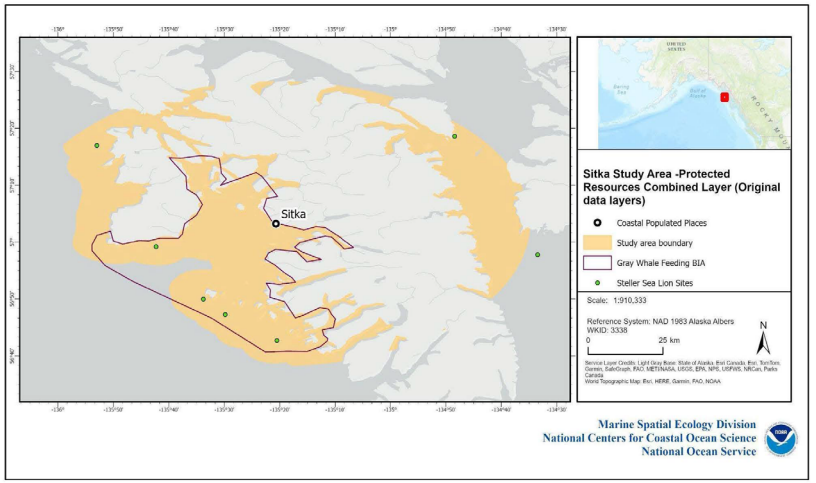


Figure 6. Chart showing the overlay of all Alaska protected resources data layers that are included in the protected resources combined data layer in the Sitka study area.

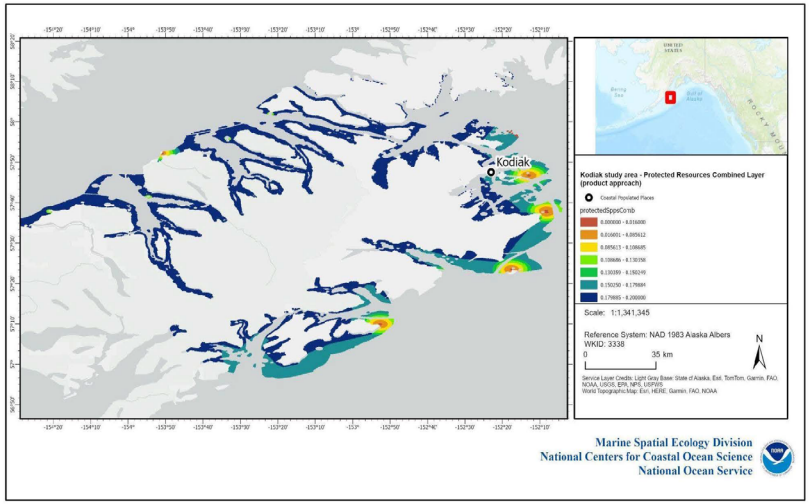


Figure 7. Draft combined scores from the protected resources combined data layer for the Kodiak study area, generated using the product method. Cooler colors closer to blue indicate areas that are more suitable for aquaculture based on anticipated presence of presence of protected species, whereas colors closer to red are less suitable.

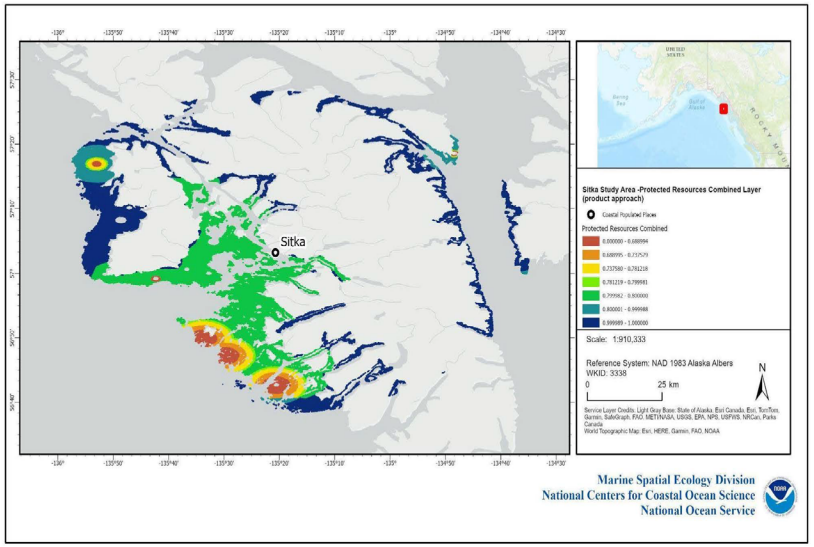


Figure 8. Draft combined scores from the protected resources combined data layer for the Sitka study area, generated using the product method. Cooler colors closer to blue are more suitable, whereas colors closer to red are less suitable. Note that for the Sitka study area, the maximum value is 1 as there are some areas that are not overlapped by a protected species data layer.

In the remaining eight study areas (Figures 9 through 14), the Steller sea lion spatial data layer is shown, and it did not overlap with other species data layers. The Steller sea lion spatial data layer was included as an individual layer within the study area natural resources submodel. These spatial data layers were scored following the scoring strategy outlined above (Table 4).

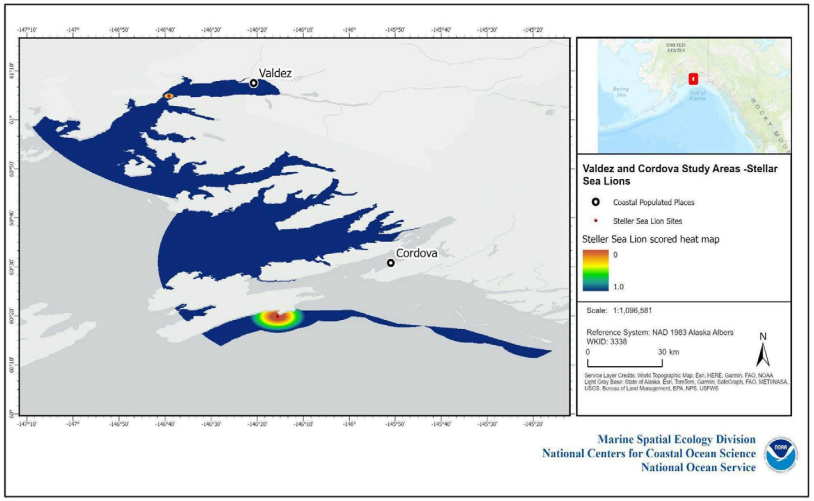


Figure 9. Map displaying the Steller sea lion haulout and rookeries data layer, overlaid on a heat map displaying scores for sites which fall within the Cordova and Valdez study areas. The heat map has scores from 0-1 in accordance with the scoring scheme outlined in Table 4.

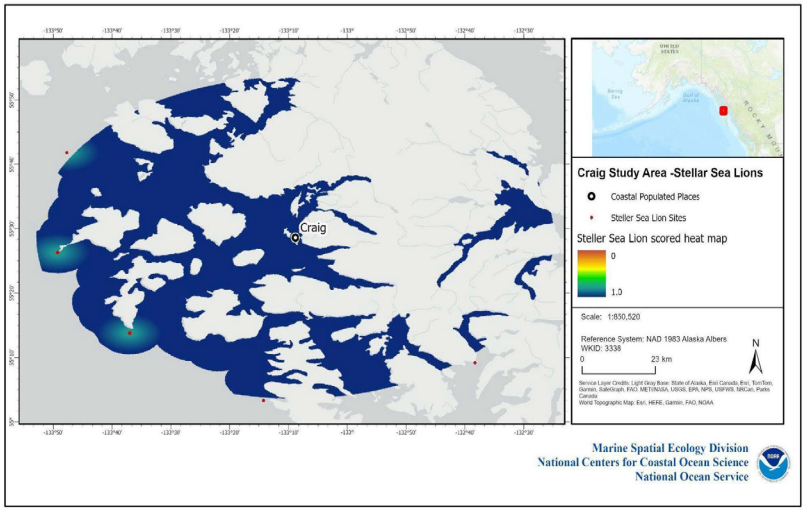


Figure 10. Map displaying the Steller sea lion haulout and rookeries data layer, overlaid on a heat map displaying scores for sites which fall within the Craig study area.

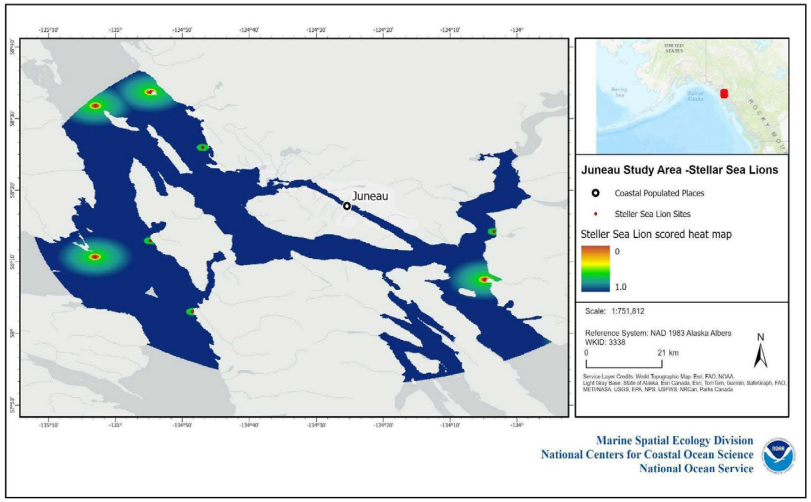


Figure 11. Map displaying the Steller sea lion haulout and rookeries data layer, overlaid on a heat map displaying scores for sites which fall within the Juneau study area.

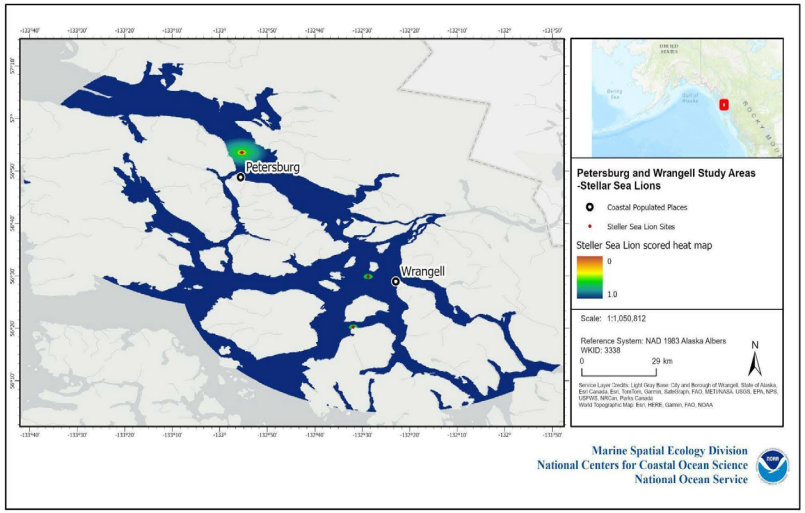


Figure 12. Map displaying the Steller sea lion haulout and rookeries data layer, overlaid on a heat map displaying scores for sites which fall within the Petersburg and Wrangell study areas.

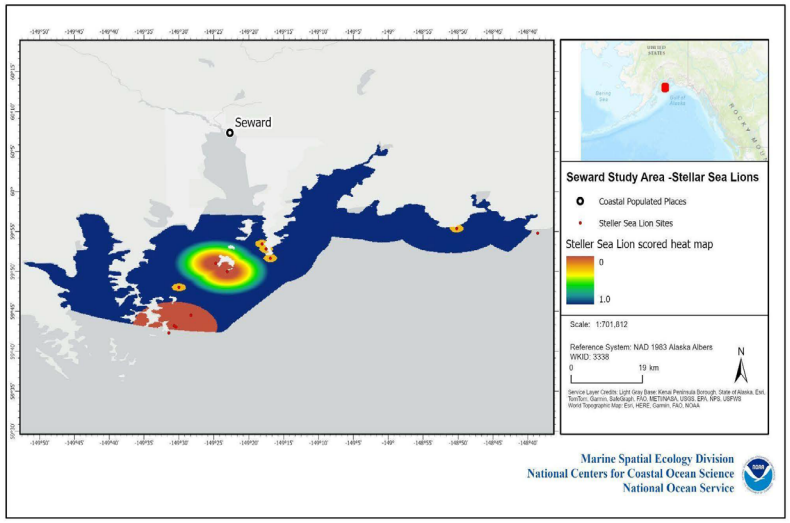


Figure 13. Map displaying the Steller sea lion haulout and rookeries data layer, overlaid on a heat map displaying scores for sites which fall within the Seward study area.

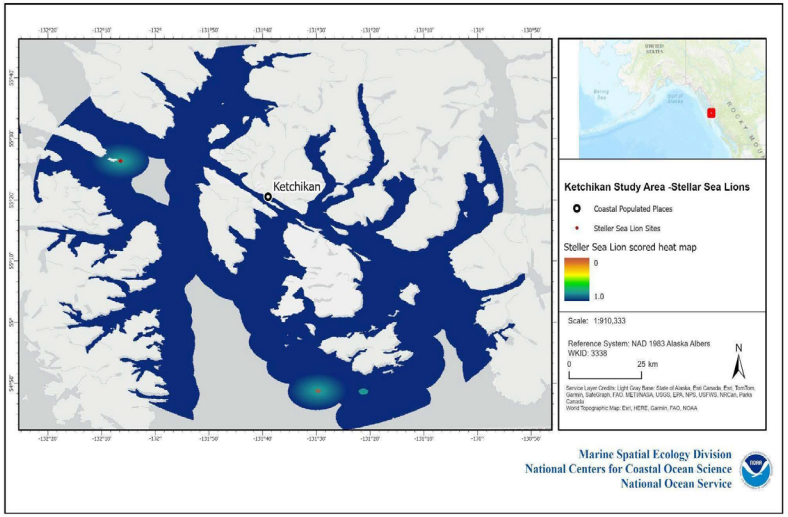


Figure 14. Map displaying the Steller sea lion haulout and rookeries data layer, overlaid on a heat map displaying scores for sites which fall within the Ketchikan study area.

Characterization

The following is a brief discussion of certain ESA-listed species and MMPA species that should be included within the site characterization with reference to available information on range and status of the species. Table 2 and Table 3 above provide a summary list of ESA-listed species and MMPA stocks. Here, AKR-PRD provides more specific information on some of these species and stocks. The following is not an exhaustive summary of species and information that should be considered, but details regarding selected vulnerable species that should be highlighted. For example, not all marine mammal stocks listed in Table 3 are discussed further below.

Currently, the range of all protected species in Alaska can be accessed at the NOAA Fisheries Alaska Endangered Species and Critical Habitat Mapper Web Application.[11] In addition to ESA-listed species, this Application provides distribution information for MMPA protected species and proposed ESA-listed species as well.

The following includes detailed sections for various species (western DPS Steller sea lion, North Pacific right whale, humpback whale, and harbor seal) and a PRD/NCCOS project to gather local knowledge on humpback whale high use areas in the AOA study areas.

Species-Specific Detailed Information

Western DPS Steller Sea Lion



The endangered western DPS Steller sea lion is distributed mainly along the coast around the North Pacific rim from Japan to northern Southeast Alaska and is known to inhabit the waters throughout the areas of the AOA Options (see Figure 1). Steller sea lions mate and give birth at consistent traditional sites called rookeries and rest and molt on other terrestrial sites called haul outs. Males establish territories on rookeries in early-May and remain until mid-July (Thorsteinson and Lensink 1962, Perlov 1971). Adult females come ashore on rookeries soon after the males have established territories, and the adult females give birth to a single pup

[11] https://alaskafisheries.noaa.gov/portal/apps/webappviewer/index.html?id=446543503a2e4660b0f5ee55e6407d27

between mid-May and mid-July with a peak in pupping occurring during June (Pitcher and Calkins 1981, Pitcher et al. 2001). Pups first enter the water 2-4 weeks after birth (Sandegren 1970) and once 2-3 months old, begin to disperse from the rookery with their mothers (Calkins and Pitcher 1982, Raum-Suryan et al. 2004). During the breeding season, Steller sea lions, especially adult females, typically return to their natal rookery or a nearby breeding rookery to breed and pup (Raum-Suryan et al. 2002, Hastings et al. 2017). Outside of the breeding season (late May to July), large numbers of individuals, especially juveniles and males, disperse widely, probably to access seasonally important prey resources (Raum-Suryan et al. 2002, Raum-Suryan et al. 2004, Jemison et al. 2018).

At-sea behavior of Steller sea lions varies greatly within and among individuals and is influenced by age, gender, time-of-day, weaning status (for juveniles), region, season, and lunar phase (Merrick and Loughlin 1997, Raum-Suryan et al. 2004, Fadely et al. 2005, Pitcher et al. 2005, Thornton et al. 2008, Lander et al. 2010, Lander et al. 2011) as well as the distribution and abundance (including the aggregation and predictability) of primary prey (Sigler et al. 2004, Womble et al. 2005, Womble and Sigler 2006, Sigler et al. 2009, Sigler et al. 2017). The amount of prey consumed and required by a Steller sea lion to maintain health and reproduce varies depending on sex, age, season, reproductive status, nutritional stress, and digestive efficiency (Rosen and Trites 1999, Rosen and Trites 2000, Winship and Trites 2003, Rosen 2009). Diet varies regionally and seasonally (Sinclair and Zeppelin 2002, Sinclair et al. 2013), and as a result of dive ability, sex, and age (Raum-Suryan et al. 2004, Fadely et al. 2005, Rehberg and Burns 2008). Steller sea lions are considered opportunistic predators and eat over a hundred species of fish and cephalopods, including species that are densely schooled in spawning or migratory aggregations on the continental shelf or along oceanographic boundary zones (Sinclair and Zeppelin 2002, Sinclair et al. 2013).

Harbor Seals



Harbor seals (*Phoca vitulina richardii*) are one of the most common marine mammals along the U.S. West and East Coasts. They live in temperate coastal habitats along the northern coasts of North America, Europe, and Asia, occurring as far north as 78° N. They occur along the U.S. East and West coasts and inhabit temperate coastal, estuarine, and sometimes freshwater habitats. West Coast harbor seals are found off the coast of Baja California; north along the coasts of California, Oregon, Washington, British Columbia, and Alaska. Alaska harbor seals are

found throughout Southeast Alaska; west through the Gulf of Alaska and Aleutian Islands; and in the Bering Sea north to Cape Newenham and the Pribilof Islands (Figure 15).

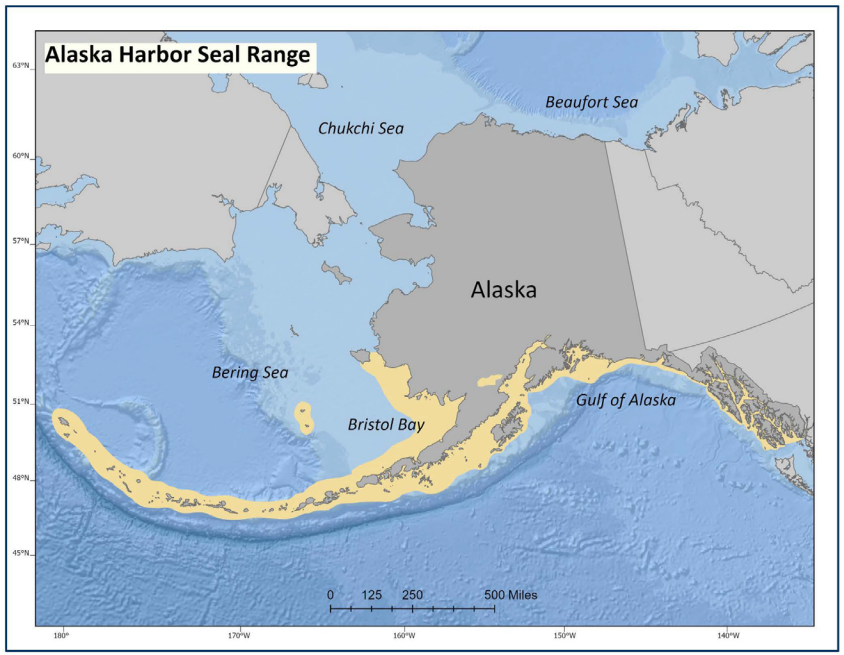


Figure 15. Map showing harbor seal range in Alaska (AFSC Marine Mammal Lab).

Harbor seals haul out on rocks, reefs, beaches, sandbars, and drifting glacial ice, and feed in marine, estuarine, and fresh waters. They are generally non-migratory, with local movements associated with such factors as tides, weather, season, food availability, and reproduction (Bigg 1981, Fisher 1952, Harvey et al. 2022, Hastings et al. 2004, Hauser et al. 2008). The results of satellite-tagging studies in Southeast Alaska, Prince William Sound, Kodiak Island, Cook Inlet, and the Aleutian Islands are also consistent with the conclusion that harbor seals are non-migratory (Boveng et al. 2012, Dahle and London 2016, Lowry et al. 2001, Small et al. 2003, Swain et al. 1996). However, some long-distance movements of tagged animals have been recorded in Alaska (Lowry et al. 2001, Pitcher and McAllister 1981, Small et al. 2003, Womble 2012, Womble and Gende 2013) and Canada (Florko et al. 2024). Strong fidelity of individuals for haulout sites during the breeding season has been documented in several populations (Härkönen and Harding 2001), including some regions in Alaska such as Kodiak Island, Prince William Sound, Glacier Bay/Icy Strait, Cook Inlet, and the Aleutian Islands (Boveng et al. 2012, Dahle and London 2016, Pitcher and McAllister 1981, Small et al. 2005, Womble 2012, Womble and Gende 2013).

Harbor seals are known to use various haulout locations seasonally throughout the Draft AOA Options, including during the pupping period in spring and early summer and during the molting period in late summer. It is important to note that the majority of data is collected during the latter period, therefore important information regarding haulout use during the pupping period may be lacking and something to consider in subsequent characterization steps.

North Pacific Right Whales



North Pacific right whales (NPRW) are one of the rarest of all large whale species and among the rarest of all marine mammal species. They were commercially harvested throughout the Pacific Ocean from the mid-1800s until the 1970s, when illegal Soviet whaling ended (Scarff 2001, Ivashchenko and Clapham 2012, Ivashchenko et al. 2017). There have been no signs of recovery of NPRW in the eastern North Pacific and based on limited sightings, NOAA Fisheries estimates that there are fewer than 50 NPRW remaining in the eastern population (Wade et al. 2011). Because of their extremely low population size, the eastern population of North Pacific right whales was listed as Critically Endangered by the IUCN red list (Cooke and Clapham 2018). There are still many unknowns about NPRW biology and ecology, such as where they mate and have their calves, population demographics, if and where they migrate, and if there are two subpopulations within the eastern population. Critical habitat was designated for the species in the Bering Sea and south of Kodiak Island in the Gulf of Alaska (Figure 16).

Eastern NPRWs can be found from the Northern Bering Sea in Alaska to Southern California and as far west as the Hawaiian Islands (Scarff 1986, Shelden et al. 2005, Ford et al. 2016, Crance and Kennedy 2024). Most sightings and acoustic detections of NPRW in Alaska occur from May through November, but there is evidence of year-round use of Alaskan waters (McDonald and Moore 2002, Munger et al. 2008, Crance and Kennedy 2024, Wright et al. 2024, 2025).

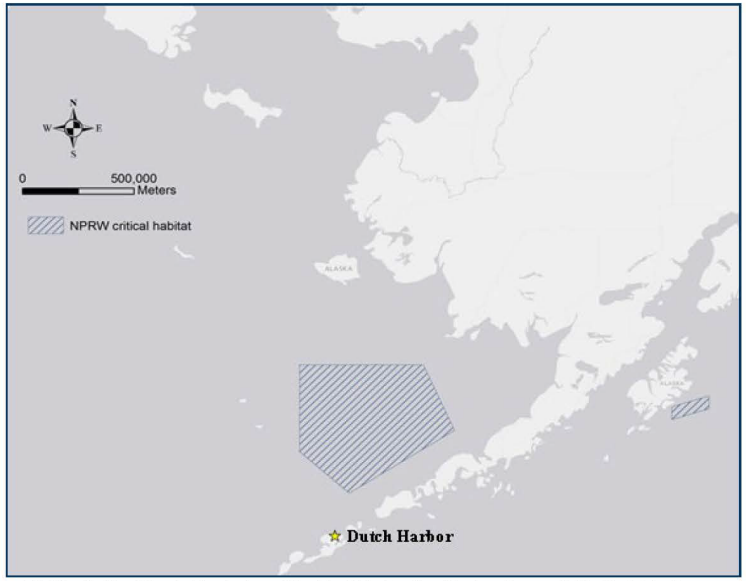


Figure 16. North Pacific right whale critical habitat in the Bering Sea and Gulf of Alaska.

Numerous sightings have occurred in critical habitat and the surrounding waters off the coast of Kodiak Island (Figure 17) (Crance and Kennedy 2014). While most sightings have been in summer or fall months during their known feeding season, passive acoustic monitoring has detected right whale calls in almost all months, indicating annual presence, albeit in low numbers (Wright et al. 2025). Further, sightings have been increasing in recent years, although it remains unknown if this represents any change in population size or an increase in public awareness (Crance and Kennedy 2024). NOAA has conducted outreach to solicit public reporting of this rare species[12].

The area to the south of Kodiak Island is also an important feeding area. Not only has feeding been documented with several sightings in the area (Wade et al. 2011, Crance and Kennedy 2024), but in 2023 the area was designated as a Biologically Important Area for feeding for North Pacific right whales (Wild et al. 2023). In particular, Barnabas Trough (within the critical habitat) and Chiniak Trough are known for having high concentrations of their primary prey, *Calanus* copepods (Kimmel et al. 2024). Altogether these data suggest low-level, intermittent right whale use of the areas around Kodiak Island, and possible overlap with AOA study areas.

[12] https://www.fisheries.noaa.gov/resource/outreach-materials/how-identify-north-pacific-right-whale

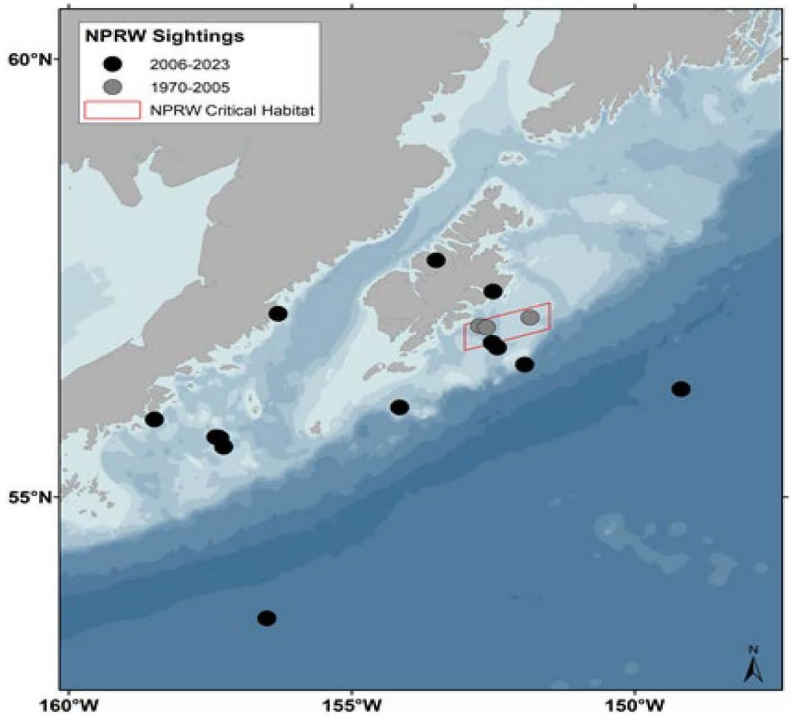


Figure 17. North Pacific right whale sightings in the vicinity of Kodiak Island (adapted with permission from Crance and Kennedy 2024).

Humpback Whale



Humpback whales (*Megaptera novaeangliae*) live in all oceans around the world. The species is increasing in abundance throughout much of its range. Three distinct population segments (DPS) occur in waters of Alaska (Table 5), and potentially overlap with AOA study areas. The Western North Pacific DPS is listed as endangered under the ESA (recommended score 0.2; Table 3); the Mexico DPS is listed as threatened under the ESA (recommended score 0.4; Table 3); and the Hawaii DPS is not listed (recommended score 0.8; Table 3).

Whales from these three DPSs overlap on feeding grounds off Alaska, and are visually indistinguishable unless individuals have been photo-identified on breeding grounds and again on feeding grounds. All waters off the coast of Alaska may contain ESA-listed humpbacks and they are present year-round in Southeast Alaska and the Gulf of Alaska.

Gulf of Alaska

Humpback whales occur throughout the central and western Gulf of Alaska from Prince William Sound to the Shumagin Islands. Seasonal concentrations are found in coastal waters of Prince William Sound, Barren Islands, Kodiak Archipelago, Shumagin Islands, and south of the Alaska Peninsula. Large numbers of humpbacks have also been reported in waters over the continental shelf, extending up to 100 nm offshore in the western Gulf of Alaska (Rone et al. 2017, Wade 2021).

Southeast Alaska

Relatively high densities of humpback whales occur throughout much of Southeast Alaska and northern British Columbia, particularly during the summer months. Although migration timing varies among individuals, most whales depart for Hawaii or Mexico in fall or winter and begin returning to Southeast Alaska in spring, with continued returns through the summer and a peak occurrence in Southeast Alaska during late summer to early fall. However, there are significant overlaps in departures and returns (Baker et al. 1985, Straley 1990).

Table 5. Percent probability of encountering humpback whales from each DPS in the North Pacific Ocean (columns) in various feeding areas (on left; Wade 2021).

Summer Feeding Areas	North Pacific Distinct Population Segments (DPS) (percent)			
	Western North Pacific (endangered)	Hawaii (not listed)	Mexico (threatened)	Central America (endangered)
Gulf of Alaska	1	89	11	0
Southeast Alaska / Northern BC	0	98	2	0

Humpback Whale Critical Habitat

Critical habitat for the Mexico and Western North Pacific DPS humpback whales was designated effective May 21, 2021 (86 FR 21082, April 21, 2021; Figure 18). Critical habitat for the Western North Pacific DPS includes areas in the eastern Aleutian Islands, the Shumagin Islands, and around Kodiak Island, and for the Mexico DPS includes those same areas plus the Prince William Sound area (50 CFR 226.227).

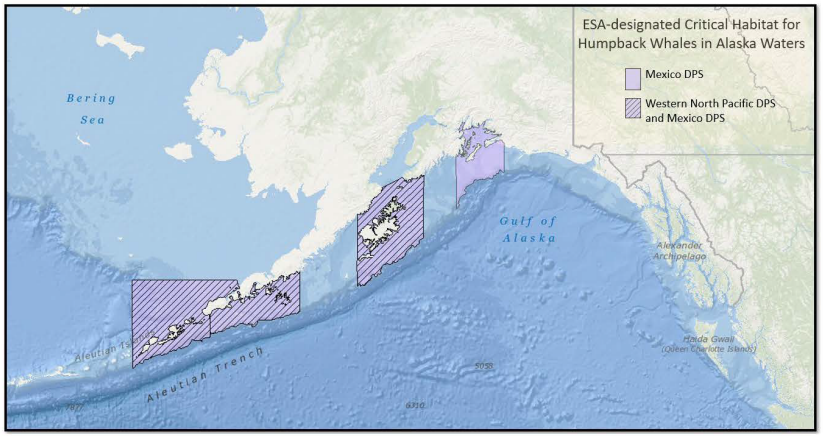


Figure 18. Critical habitat for Mexico DPS and Western North Pacific DPS humpback whales in waters off Alaska.

In an effort to share local knowledge about humpback whale high use areas in the Alaska AOA study areas, NCCOS and AKR-PRD collaborated to solicit information from humpback whale local knowledge holders in order to provide that information here for potential aquaculture farmers to consider (see following section).

Humpback Whale High Use Areas (HUAs)

In the absence of recent standardized surveys throughout the range of humpback whales in Alaska, we sought to capture Local Ecological Knowledge (LEK) from humpback whale biologists and other experienced mariners throughout the State to identify areas consistently used by humpback whales in Alaska. We solicited input from several LEK bearers and asked them to mark study area maps to flag the waters they would consider based on their experience to be humpback whale high use areas (HUAs) (see the detailed request for information in Attachment 2). The process for identifying LEK bearers to contribute to this study was not rigorous. We reached out to known LEK bearers and, in some cases, used a chain referral system to identify additional potential contributors. This mapping exercise was done for the ten AOA study areas (Cordova, Craig, Juneau, Ketchikan, Kodiak, Petersburg, Seward, Sitka, Valdez, Wrangell), as well as for one additional study area that was considered for analysis but was excluded after public comment (Metlakatla). Contributions from LEK bearers for the Metlakatla area were included in the Ketchikan area where the two areas overlapped, and where the LEK bearer had not already submitted information for the Ketchikan area.

Methods

Study area maps were circulated with 1,000-acre grid cells overlaid on each map. The target was for each contributor to select up to 20% of the grid cells, the number of which was denoted on each map for the user to reference. LEK contributors were encouraged to include any notes they felt were relevant to their submission. The grid cells that were filled in by each contributor were digitized to create polygons denoting HUA's within each AOA study area. The original instructions for the exercise can be found in Attachment 2 for a more detailed overview of the process.

The raw data were extracted from the contributed maps through digitization in ArcGIS Pro. Any notes written by the contributors were included in the attribute table of the raw data that was generated. Some contributors included gray whale information, as well as other important areas for humpback whales that were marked as supplemental to the humpback whale HUA's. The additional areas for gray and humpback whales were not included in the final humpback whale HUA layer.

Once the data were digitized from the original maps, the polygons were clipped to remove any areas overlapping with an island or on land, as well as clipped to be within the AOA study areas. The clipped polygons were smoothed to create a final layer, which includes all clipped and smoothed polygons for each study area showing all of the contributors' submissions. The size of the grid cells used (1,000 acres) resulted in the total area of the grid cells for a given study area to be larger than the total area of the final study area polygons used in the AOA analysis. As a result, when calculating the final study area coverage, the values on average were between 5-10% higher compared to the percent coverage calculated when using the 1,000-acre grid cell area, depending on the study area. A 10% margin of error when assessing the percent coverage was applied to account for this overestimation.

A majority of the submissions met the target of having a submission at or below 20% (± 10% margin of error) coverage of the given study area. Three submissions fell above the study area percent coverage range. This could skew the results of identifying HUA's in certain areas if these submissions are considered of equal weight compared to other submissions that stayed within an acceptable range of the percent coverage.

In order to visualize the HUAs, an approach was used where any area that has multiple overlapping contributors' HUA layers will be darker on the map. It is important to note that not all study areas have more than one author submission, so a map that shows a uniform color may be a result of a single submission. However, in areas where more than one person submitted a response, darker regions show areas in which more than one contributor has identified a HUA. The number of submissions is denoted in the figure captions below each map.

It is also important to consider the comments made by multiple contributors regarding surveying efforts. Due to surveying efforts being different between and within study areas, the absence of a HUA polygon does not necessarily guarantee that certain areas are not important for humpback whales. This may be a result of insufficient or consistent surveying efforts across the region.

As stated earlier, the Metlakatla study area was not included in the final Alaska AOA analysis. As a result, the final humpback whale HUA data product does not include areas that fall within the Metlakatla study area. Any HUA that was submitted for the Metlakatla study area that fell within the Ketchikan study area was clipped and included in the Ketchikan study area HUA layer. If a contributor submitted responses for both the Ketchikan and Metlakatla study areas, the submission was not double counted. Of the two submissions for the Metlakatla study area, only one met these requirements and was added to the Ketchikan study area.

Results

The exercise was completed by seventeen LEK bearers, with a total of twenty-three entries (some contributors submitted maps for multiple study areas). After rounding the percent coverage values of each LEK contributor's submission for each study area, eight submissions were at or below 20% coverage. Eleven submissions were between 20-30%, and three study areas were over 30% coverage. The percent coverage for each study area by contributor can be found in Table 6.

Each LEK contributor has different experiences informing the areas they have identified. Therefore, areas where multiple contributors identify the same area, we can interpret this with increased confidence in it being high use.

Table 6. Total percent coverage of selected HUA's over the unconstrained study areas by contributor for each study area where the contributor filled out a map. Percentages calculated after the HUA was clipped to the study area.

Submission number	Study Area	Total coverage (%)
1	Petersburg	4.52
2	Ketchikan	6.31
3	Petersburg	6.91
4	Sitka	8.79
5	Seward	10.27
6	Seward	14.99
7	Wrangell	16.77
8	Ketchikan	17.9
9	Valdez	21.58
10	Juneau	22.16
11	Cordova	22.55
12	Wrangell	23.23
13	Craig	23.3
14	Sitka	23.73
15	Craig	24.85
16	Juneau	26.55
17	Kodiak	27.53
18	Cordova	27.54
19	Petersburg	29.61
20	Juneau	31.25*
21	Sitka	37.72*
22	Petersburg	42.49*

* Contributor submission fell above the 20% (± 10% margin of error) study area coverage limit for submissions.

Humpback Whale High Use Area Maps

The following maps (Figures 19-29) show the results of the responses received in the AKR-PRD/NCCOS request for Local Ecological Knowledge regarding humpback whale high use areas.

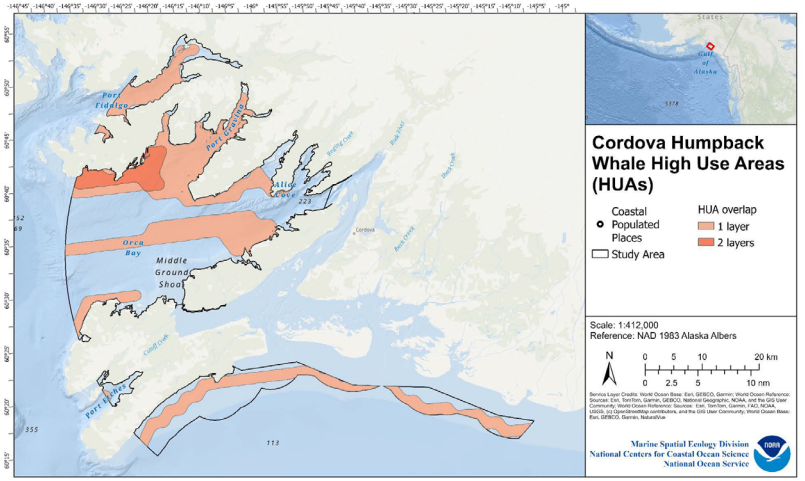


Figure 19. HUA polygons clipped to the Cordova AOA study area boundary. Darker areas denote overlap of more than one submission. A maximum number of two polygons overlap in this study area, where two contributors submitted responses.

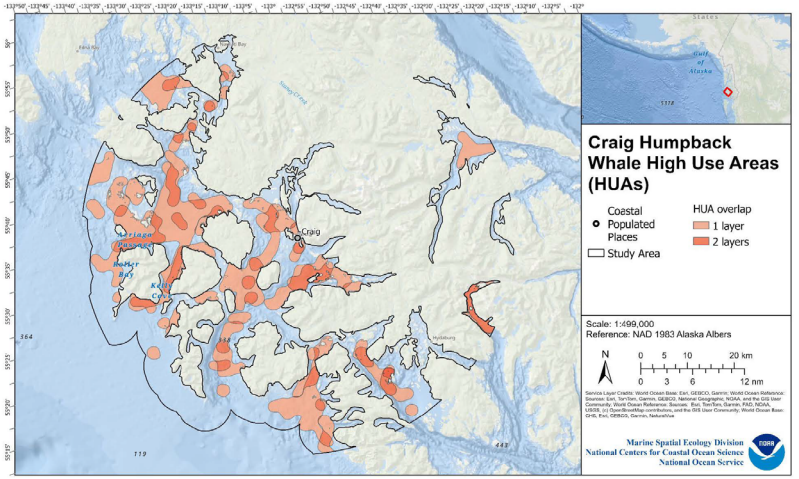


Figure 20. HUA polygons clipped to the Craig AOA study area boundary. Darker areas denote overlap of more than one submission. A maximum number of two polygons overlap in this study area, where two contributors submitted responses.

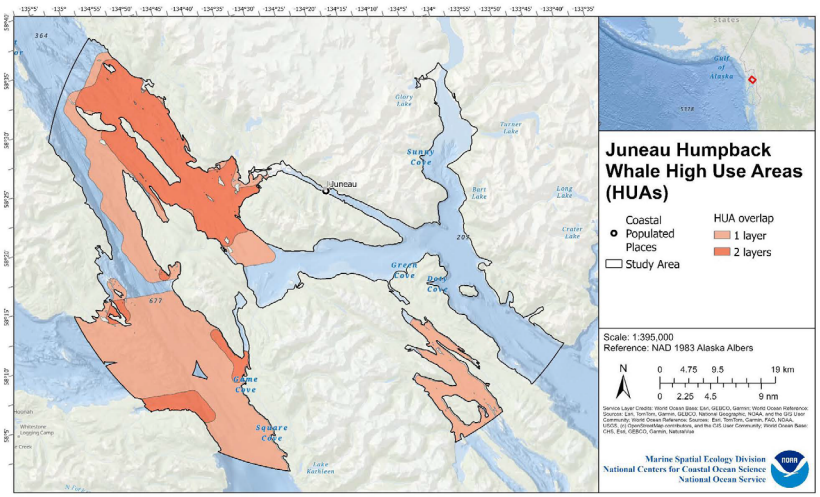


Figure 21. HUA polygons clipped to the Juneau AOA study area boundary. Darker areas denote overlap of more than one submission. A maximum number of two polygons overlap in this study area, where three contributors submitted responses.

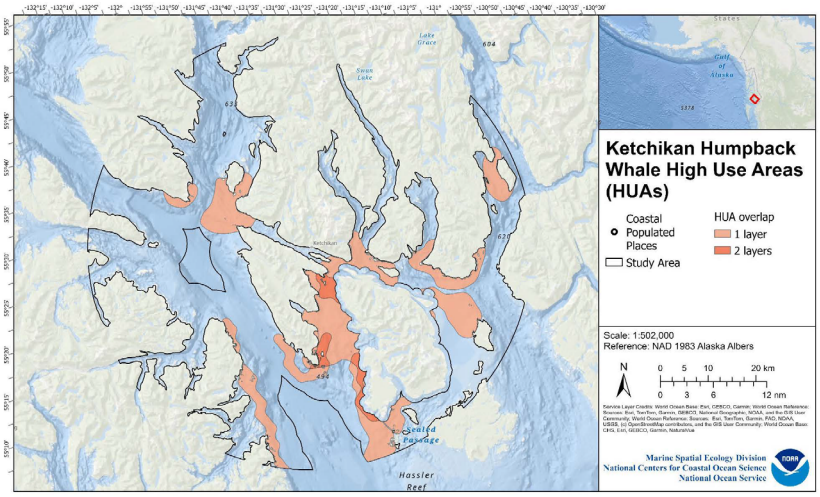


Figure 22. HUA polygons clipped to the Ketchikan AOA study area boundary. Darker areas denote overlap of more than one submission. A maximum number of two polygons overlap in this study area, where two contributors submitted responses.

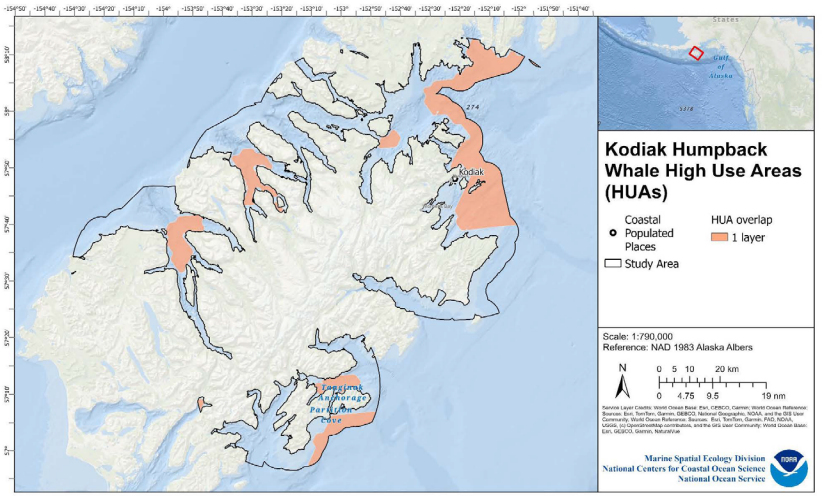


Figure 23. HUA polygons clipped to the Kodiak AOA study area boundary. There is no HUA overlap between contributors in this study area as there was one submission.

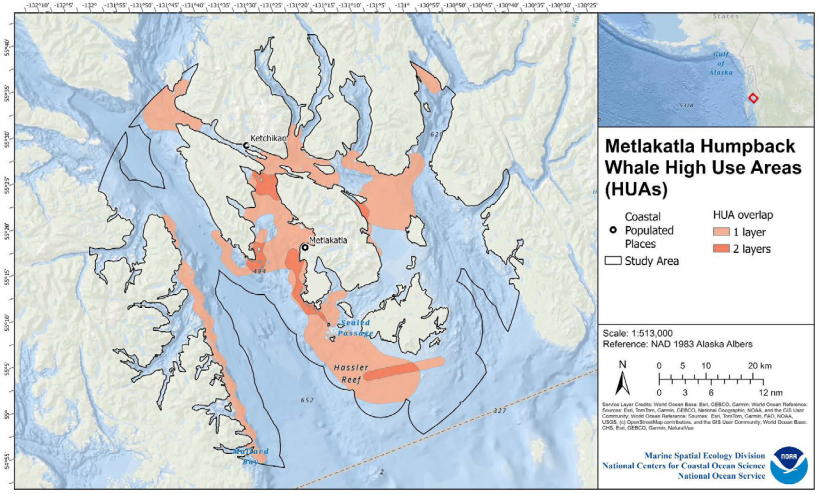


Figure 24. HUA polygons clipped to the Metlakatla AOA proposed study area boundary. Darker areas denote overlap of more than one submission. A maximum number of two polygons overlap in this study area, where two contributors submitted responses. This study area was not included in the final AOA analysis, but responses were still included in the HUA dataset for future reference.

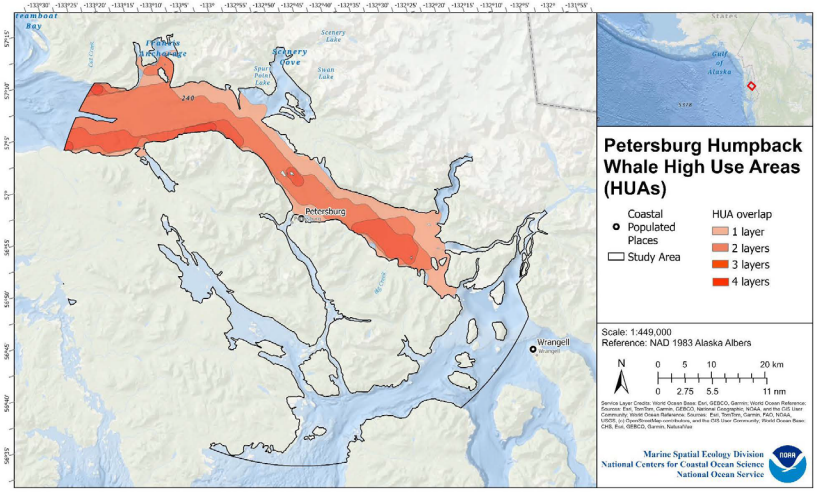


Figure 25. HUA polygons clipped to the Petersburg AOA study area boundary. Darker areas denote overlap of more than one submission. A maximum number of four polygons overlap in this study area, where four contributors submitted responses.

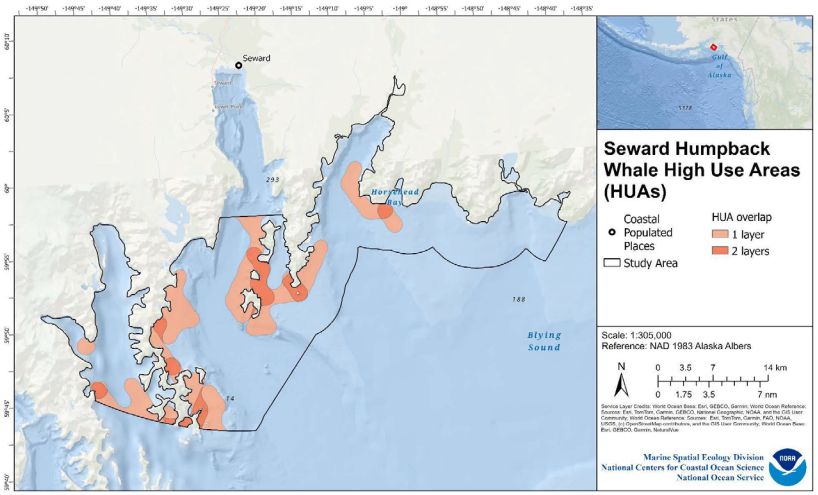


Figure 26. HUA polygons clipped to the Seward AOA study area boundary. Darker areas denote overlap of more than one submission. A maximum number of two polygons overlap in this study area, where two contributors submitted responses.

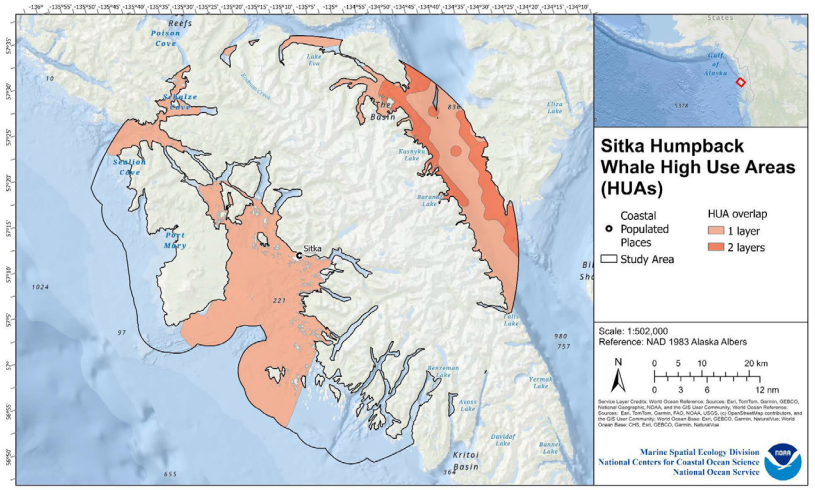


Figure 27. HUA polygons clipped to the Sitka AOA study area boundary. Darker areas denote overlap of more than one submission. A maximum number of two polygons overlap in this study area, where three contributors submitted responses.

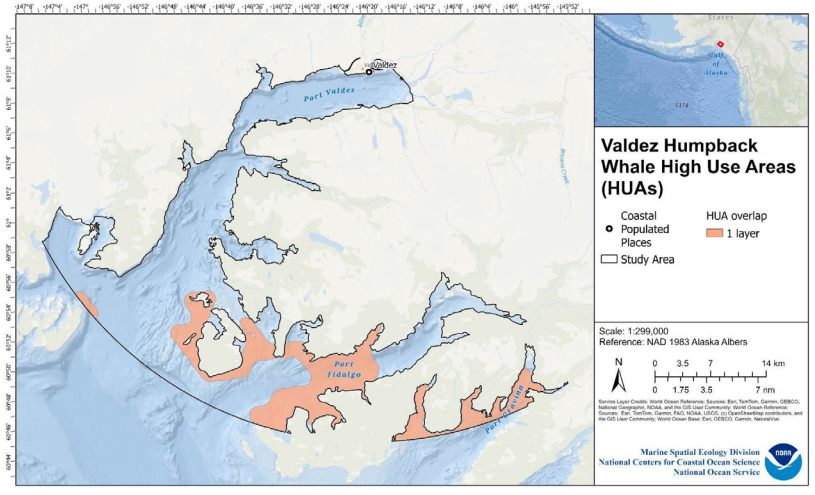


Figure 28. HUA polygons clipped to the Valdez AOA study area boundary. There is no HUA overlap between contributors in this study area as there was one submission.

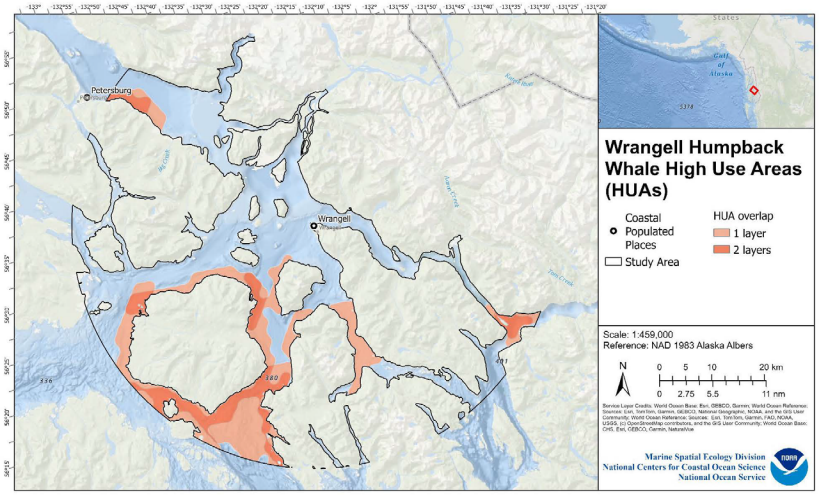


Figure 29. HUA polygons clipped to the Wrangell AOA study area boundary. Darker areas denote overlap of more than one submission. A maximum number of two contributor polygons overlap in this study area.

Other Large Baleen Whales

While the second data layer used in the Alaska AOA spatial analysis is the BIA II layers for North Pacific Right whale, gray whale, and fin whale feeding areas (Wild et al. 2023), additional information is provided below on the gray whale, fin whale, and minke whale. As noted above, sperm whales were not included because they are anticipated to primarily occur in waters greater than 61 meters (i.e., outside the Alaska AOA study areas).

Gray Whales

The gray whale (*Eschrichtius robustus*) is divided into two DPSs. The ENP DPS is not listed under the ESA (recommended score 0.8; Table 3), and the WNP is listed as endangered (recommended score 0.1; Table 3). Critical habitat has not been designated for WNP DPS gray whales. Some WNP DPS gray whales spend part of their time in U.S. waters in the Bering Sea and are known to migrate down the Pacific West Coast to California, but are not anticipated to overlap with Alaska AOA study areas. The non-listed ENP population of gray whales feed mainly in the Chukchi, Beaufort, and northwestern Bering seas, with the exception of a small number of whales that summer and feed along the Pacific coast between Kodiak Island, Alaska and northern California (Carretta et al. 2022).

While the gray whale feeding BIA II layer was included in the Alaska AOA spatial analysis, we note that migration BIA II layer overlaps with some AOA study areas as well (Figure 30).

Migratory BIAs represent areas and times within which a substantial portion of a species is known to migrate (Wild et al. 2023).

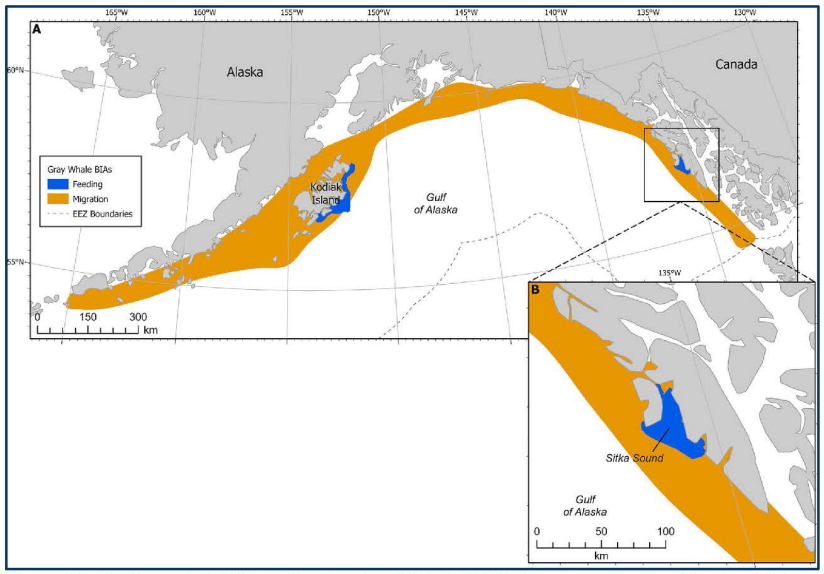


Figure 30. (A) Gray whale BIAs with migratory BIA (M-BIA) shown in orange and feeding BIA shown in blue. Inset (B) shows Sitka Sound F-BIA. EEZ refers to the US Exclusive Economic Zone, defined as 200 nm from shore (Wild et al. 2023).

Fin Whales

The fin whale (*Balaenoptera physalus)* is the second-largest whale species on earth, second only to the blue whale. It is found throughout the world's oceans. The fin whale is listed as endangered under the ESA (recommended score 0.2; Table 3). Fin whales occur throughout the North Pacific, from the northeastern Chukchi Sea to the Tropic of Cancer. Fin whales are typically found in deep water (Matsuoka et al. 2013, Rone et al. 2017) away from the immediate coast (Clarke et al. 2020). However, they may enter coastal areas and potentially overlap with AOA study areas, particularly in the Kodiak region as described above. Critical habitat has not been designed for fin whales.

Minke Whales

The minke whale (*Balaenoptera acutorostrata*) is one of the most abundant rorqual whales in the world, and their population status is considered stable throughout almost their entire range. Minke whales in Alaskan waters are migratory, but animals in the inland waters of California/Oregon/Washington are considered "residents" because they establish home ranges.

Northern minke whales have a widespread distribution in the Northern Hemisphere and are found throughout the northern Atlantic and Pacific Oceans. Their range extends from the ice edge in the Arctic during the summer to near the equator during winter. So, few minke whales were seen during three offshore Gulf of Alaska surveys for cetaceans in 2009, 2013, and 2015 that a population estimate for the species in this area could not be determined (Rone et al. 2017). However, minke whales are considered common in the spring and summer in the Bering Sea and Gulf of Alaska. They are typically found in shallow areas, with most sightings occurring within 200 meters of the shoreline (Zerbini et al. 2006).

CONCLUSION

In conclusion, AKR-PRD is proposing that NCCOS include in the spatial modeling effort the data layers for Steller sea lion rookery and haulout information, and cetacean BIA II feeding data layers for North Pacific Right whale, gray whale, and fin whale. Fin whales are likely to be close to shore in Kodiak due to the steep sloped fjords that generate upwellings that concentrate food (Baraff 2006). In general, fin whales prefer deeper waters (Baraff 2006), and AKR-PRD recommends downscoring more in deeper waters, and downscoring less in shallower waters. Where these data layers overlap, AKR-PRD recommends NCCOS develop a combined data layer and calculate the product of the scores from overlaps between those layers for the Atlas process (Figures 7 and 8). These layers are intended for use in the Alaska Atlas mapping and siting process only. Future project or site-specific siting processes should benefit from consideration of other available information specific to that area and proposed activity.

AKR-PRD worked closely with NCCOS and the AKR Regional Aquaculture Coordinator to identify the best available information for protected species that is applicable and appropriate for analysis in the Alaska AOA spatial modeling effort. This memo details the data layers that are recommended for use in the spatial analysis/modeling effort being conducted by NCCOS. In addition, AKR-PRD worked with, and will continue to work with, NCCOS and the AKR Regional Aquaculture Coordinator to include additional protected species information during the site characterization phase of the Alaska Atlas development, including descriptions of protected species that occur in the Alaska AOA study areas. In particular, the data gathered in a joint effort to determine humpback whale high use areas in Alaska AOAs, BIA II *Watch List Areas*, humpback whale BIA II feeding areas, and distribution of other protected species will be incorporated into the Atlas via narrative/characterization. AKR-PRD stewards a regional whale entanglement database that could inform Atlas readers about historic line and net entanglements in or near the AOAs. All of this information, provided in a narrative, or characterization with pertinent range maps or other figures, will aid potential aquaculture farmers in understanding the potential for farm or facility overlap with protected species in Alaska.

We look forward to working with NCCOS and the AKR Regional Aquaculture Coordinator through the iterative development of the Atlas to ensure that the best available information for protected species is clear and meaningful for potential aquaculture farmers. This Atlas has the potential to be a helpful tool to assist aquaculture farmers in siting their farms. AKR-PRD will

consult under ESA section 7 for any planned operation that overlaps in time and space and may affect ESA-listed species. These consultations will provide fine scale information regarding potential interactions for each operation with protected species.

AKR-PRD has consulted on potential aquaculture farms and facilities in Alaska. These consultations included a review of potential effects of entanglement, vessel strike, and habitat displacement by aquaculture facilities and associated activities to whale species listed under the ESA, including humpback whales, North Pacific right whales, fin whales, western Pacific gray whales, and sperm whales. ESA section 7 consultations described that these potential stressors are more likely to overlap with species that forage and migrate in the nearshore environment, particularly humpback whales and gray whales. Fin whales and North Pacific right whales occasionally occur in the nearshore environment in the Kodiak region, and these stressors have been considered. Other whale species such as minke whales and eastern Pacific gray whales are not protected by the ESA, but occur in significant numbers in the AOA options. Mitigation measures to reduce the risk of harm and harassment to ESA-listed whales likely reduced risks for non-ESA-listed whale species as well.

Macroalgae and shellfish aquaculture in Alaska is currently categorized as a Category III fishery under the MMPA Section 118 List of Fisheries that classifies fisheries by their risk to marine mammals. Category III fisheries are those with remote likelihood of or no known interactions with marine mammals and is the classification with the lowest risk of entanglement. The Marine Mammal Authorization Program (MMAP), authorizes serious injury and mortality take of marine mammals incidental to commercial fishing so long as it is properly reported to NOAA Fisheries within 48 hours of the end of the fishing trip.

ESA section 7 consultations and the MMAP have also been applied to documenting and reducing potential harm and harassment to pinnipeds. When WDPS Steller sea lions have been considered in ESA section 7 consultations, any mitigation measures developed for that DPS have likely reduced risk to EDPS Steller sea lions and harbor seals. The primary potential stressors to pinnipeds considered in section 7 consultations from aquaculture facilities and associated activities were habitat exclusion, entanglement[13] (Raum-Suryan et al. 2009), increased predator-prey interactions (Hague et al. 2022), and behavioral alterations (e.g., attraction, harassment, avoidance) (Bath et al. 2023).

Additional details about the potential for protected species interactions with aquaculture facilities and associated activities will be provided in the PEIS for the AOA identification process. Aquaculture farmers can find additional information about protected species and the ESA section 7 consultation process here:

https://www.fisheries.noaa.gov/insight/endangered-species-act-section-7-alaska-region

[13] https://www.fisheries.noaa.gov/alaska/marine-life-distress/pinniped-entanglement-marine-debris

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ATTACHMENT 1

Guidance: Steller sea lion information for Aquaculture Opportunity Areas in Alaska

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Summary

This document was prepared for the National Centers for Coastal Ocean Science (NCCOS) in response to their request for Steller sea lion (SSL), *Eumetopias jubatus*, key vulnerability areas around rookeries (breeding areas) and haulouts (resting areas) using vulnerability levels and distance categories. NOAA Fisheries Protected Resources Division (PRD) and the Alaska Fisheries Science Center (AFSC) Marine Mammal Laboratory (MML) have provided data and information based on the best scientific information and our professional opinion regarding our concerns and considerations for western and eastern Distinct Population Segments (WDPS, EDPS) of the SSL, in relation to citing of future aquaculture farms in Alaska.

Data

The NOAA Marine Mammal Lab (MML; with data contributions from the Alaska Department of Fish and Game; ADF&G) has site locations and breeding season counts (and non-breeding season counts if available) within the proposed aquaculture opportunity site areas. We have analyzed these data to provide site vulnerability levels for each site: "very high", "high", "medium", and "low". The rookery distance categories (buffer zones) of **3 nm** are areas of **highest vulnerability** for adult female, young of the year, and juvenile SSLs based on habitat use derived from satellite telemetry research. The 3 nm buffer is also used in regulations that prohibit transit within 3 nm of many rookeries – see 50 CFR 224.103(d), emphasizing the importance of these buffer zones. All other distance categories are based on SSL critical habitat aquatic zones (see 58 FR 45269, August 27, 1993). MML site data include all known SSL sites that may contain multiple locations per site. Sites are often aggregated in different ways for reporting and monitoring analyses (e.g., parent sites). Site criteria described below were informed by historical counts for WDPS pups (since 1973) and non-pups (since 1978), and EDPS pups and non-pups (since 1971).

Note: Any aquaculture sites within the range of WDPS SSL sites may require an ESA section 7 consultation (potentially including sites east of 144° west longitude and north of Sumner Strait where some WDPS SSLs occur; see Hastings et al. 2020), and sites with buffers may have special mitigation and monitoring recommendations to avoid harm and harassment.

See Table 7 for a summary of site criteria and buffer categories described below.

Site Criteria

Rookeries: Rookeries are coastal terrestrial sites preferred and traditionally used by SSLs for breeding, pupping, nursing dependent young, resting, early ontogenetic and social development, socializing of adults, and as refuges from predators.

Nearshore waters around rookeries - Nearshore waters around rookeries are all aquatic areas within 3 nm of the baseline or base point(s) of each specified rookery. Nearshore waters around rookeries allow for transit to and from the rookery, support pup development, provide refuge for animals displaced from land, and provide a natural buffer against anthropogenic disturbance of the animals using the rookery.

- Rookeries have at least one count of 50 newborn SSL pups. This includes sites commonly listed in publicly available data layers, in addition to two new sites that recently met this criterion in the WDPS (Aiktak and Cape St. Elias).

Major haulouts: Major haulouts are coastal terrestrial sites preferred and traditionally used by large numbers of SSLs for resting, nursing, ontogenetic and social development of young, socialization of all age classes, molting, and as refuges from predators. Major haulouts are sites that are not rookeries and have had significant historical counts of SSLs: at least one count of 200 or more SSLs during the breeding season or at least 100 SSLs during the non-breeding season.

Minor haulout sites: Minor haulout sites include those haulouts north of Sumner Strait where both WDPS SSLs and EDPS SSLs occur (a mixing zone of both DPS's; see Hastings et al. 2020) and WDPS sites that do not meet major haulout or rookery criteria listed above. We also show EDPS minor haulout sites south of Sumner Strait in Southeast Alaska.

Known haulout sites near reliable SSL foraging habitats: SSLs rest on known haulout sites near areas for regular reliable foraging habitats for on eulachon, herring, and salmon.

Steller sea lion Critical habitat

All categories of SSL critical habitat are listed below, but **only aquatic zones were used as suggested buffer zones for SSL haulouts**.

- **All Steller sea lion rookeries and major haulouts** (i.e., haulouts supporting > 200 SSLs) located within state and federally managed waters off Alaska
- **An aquatic zone that extends 3,000 feet** (0.9 km) seaward in State and Federally managed waters from the baseline or basepoint of each major rookery and major haulout in Alaska east of 144° W. longitude
- **An aquatic zone that extends 20 nm** (37 km) seaward in State and Federally managed waters from the baseline or basepoint of each major rookery and major haulout in Alaska that is west of 144° W. longitude
- A terrestrial zone that extends 3,000 feet (0.9 km) landward from the baseline or base point of each major rookery and major haulout in Alaska ***(not used in analysis)***

- An air zone that extends 3,000 feet (0.9 km) above the terrestrial zone of each major rookery and major haulout in Alaska, measured vertically from sea level ***(not used in analysis)***
- And three special aquatic foraging areas in Alaska, including the Shelikof Strait area, the Bogoslof area, and the Seguam Pass area ***(not used in analysis)***

Site and Buffer Categories:

- **WDPS rookeries:** 3 nm buffer, **red**, very high (rookeries are most vulnerable; based on telemetry data of highest observed use by adult female, young of the year, and juvenile SSLs)
- **WDPS major haulouts:** 3 nm buffer, **orange**, high (major haulouts are the second most vulnerable – there are large numbers of animals that use these sites and a small number of pups are sometimes born on major haulouts)
- **WDPS minor haulouts:** 3,000 ft buffer, **dark yellow**, medium (based on SSL critical habitat distance)
- **WDPS rookery and major haulout site critical habitat:** 20nm buffer, **blue**, low (SSL critical habitat distance)
- **EDPS rookeries (north of Sumner Strait):** 3 nm buffer, **red**, very high (sites north of Sumner Strait are where WDPS SSL can occur; Hastings et al. 2020)
- **EDPS major haulouts (north of Sumner Strait):** 3 nm buffer, **orange**, high (sites north of Sumner Strait are where WDPS SSL can occur; Hastings et al. 2020)
- **EDPS minor haulouts:** 3,000 ft buffer, **light blue**, low (we still want to ensure some protection from disturbance)
    - **Note:** *there are no EDPS minor haulouts north of Sumner Strait and east of 144° W longitude that are within the proposed AOAs*
- **Known haulouts near reliable foraging habitat for SSLs:** These haulouts are indicated as they are resting sites near reliable foraging habitats for SSLs (i.e., areas with eulachon runs, herring runs, salmon runs) and are particularly vulnerable areas for overlap with aquaculture sites.

Caveats:

- Distances from sites to AOA areas are in meters (projected coordinate system: NAD 1983 [2011] Alaska Albers [Meters]).
- Distances from AOA were calculated for all sites within 20 nm of AOA polygons for all sites.
- Distances are the shortest, straight line from the AOA polygon perimeter to the SSL site and do not account for land features.
- SSL sites within AOA polygons have distance of "0".
- Some SSL sites were moved slightly (i.e., LAT/LON may differ from publicly available SSL site locations) in order to calculate distances more accurately.

- The EDPS worksheet (*contact Katie Sweeney for access*) includes a column for N/S of Sumner Strait (spatially corresponding to Hastings et al. 2020 WDPS apportionment paper). Sites south of Sumner Strait are depicted in PDF maps as 'minor sites', whereas sites north of Sumner Strait are classified via the same definitions (as outlined in first section of document) as WDPS sites.
- Non-breeding site count data are limited in general.
- This does not represent spatial foraging areas—it's more focused on SSL presence at known rookery and haulout sites during the breeding season and near important foraging areas during the non-breeding season.

Considerations and Concerns

- We suggest that NOAA initiate or support additional research to evaluate the vulnerability of SSLs at certain distances from rookeries and haulouts. We also suggest a study designed to determine if farms are an attractant to sea lions because farms artificially concentrate prey, thus having the potential for increased interactions with SSLs.
- Farms sited close to fish hatcheries may have increased numbers of pinnipeds and pinniped interactions.
- **Potential impacts to SSLs from aquaculture farms:** increased boat traffic and noise, entanglement risk, increased amount of marine debris from farms that could be lost or abandoned, artificial increase in fish around kelp, which could artificially concentrate SSLs around kelp farms causing greater conflicts with humans.

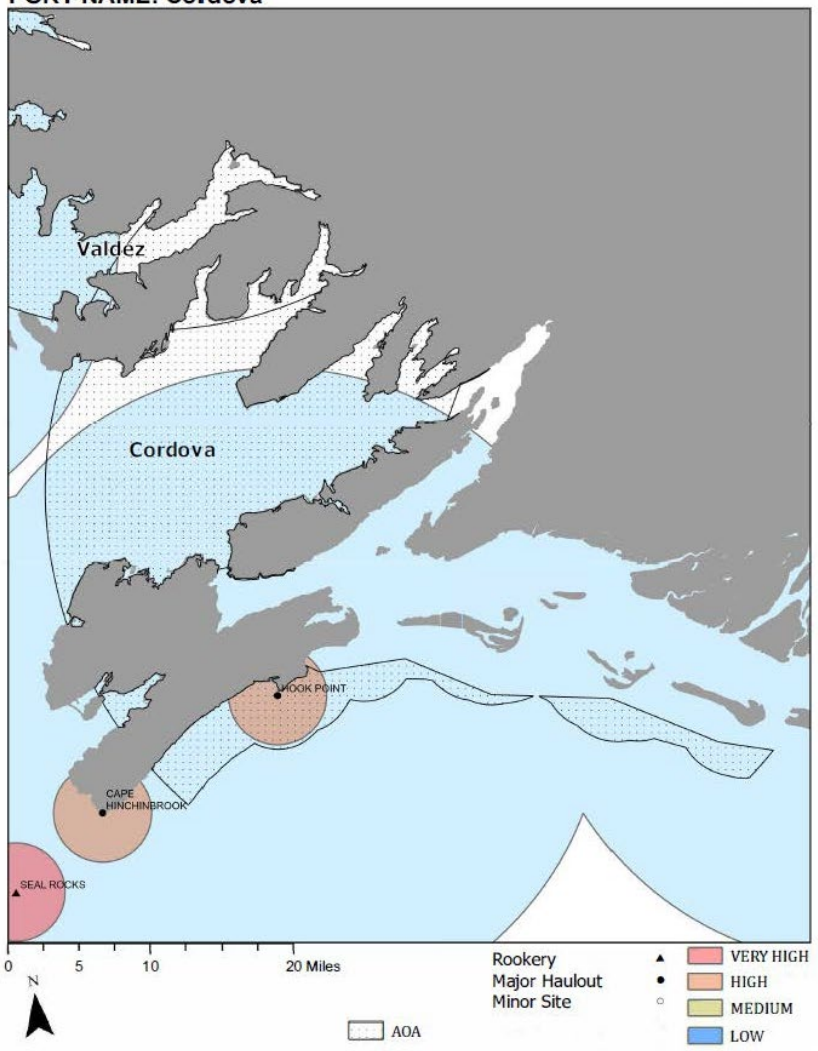
References

Hastings, K.K., Rehberg, M.J., O'Corry-Crowe, G.M., Pendleton, G.W., Jemison, L.A. and Gelatt, T.S., 2020. Demographic consequences and characteristics of recent population mixing and colonization in Steller sea lions, *Eumetopias jubatus*. Journal of Mammalogy, 101(1), pp.107-120. https://doi.org/10.1093/jmammal/gyz192

Table 7. Site Criteria, Vulnerability, and Buffer Table created in response to request from NCCOS for Steller sea lion vulnerability areas using distance categories.

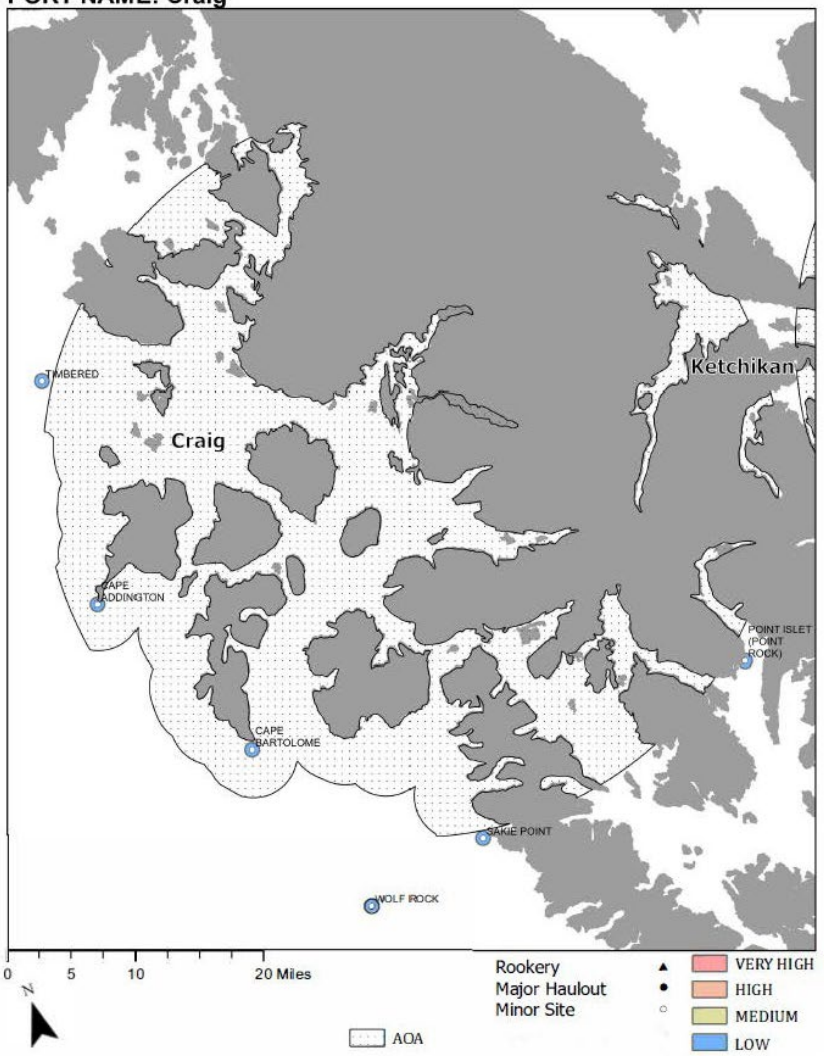
Buffer: Vulnerability: Buffer Color:	3nm Very High Red	3nm High Orange	3,000ft Medium Yellow	20nm Low Blue	3,000ft Low Light Blue	Site Criteria
wDPS Rookeries listed in 50 CFR 224.103(d)	✓			✓		• Pup ≥ 50; in: 50 CFR 224.103(d) – 3 nm no-transit zone
wDPS Rookeries not listed in 50 CFR 224.103(d)	✓			✓		• Pup ≥ 50; not listed in 50 CFR 224.103(d)
wDPS Major Haulouts		✓		✓		• Breeding Season: Non-Pup ≥ 200 • Non-Breeding Season: Non-Pup ≥ 100
wDPS Minor Haulouts			✓			• Remaining sites
eDPS Rookeries	✓					Sites north of Sumner Strait (have wDPS SSLs): • Pup ≥ 50
eDPS Major Haulouts		✓				Sites north of Sumner Strait (where wDPS SSLs can occur): • Breeding Season: Non-Pup ≥ 200 • Non-Breeding Season: Non-Pup ≥ 100
eDPS Minor Sites					✓	• Remaining sites north of Sumner Strait • All sites south of Sumner Strait
Foraging Area Haulouts						• Indicated on map (no buffer)

PORT NAME: Cordova



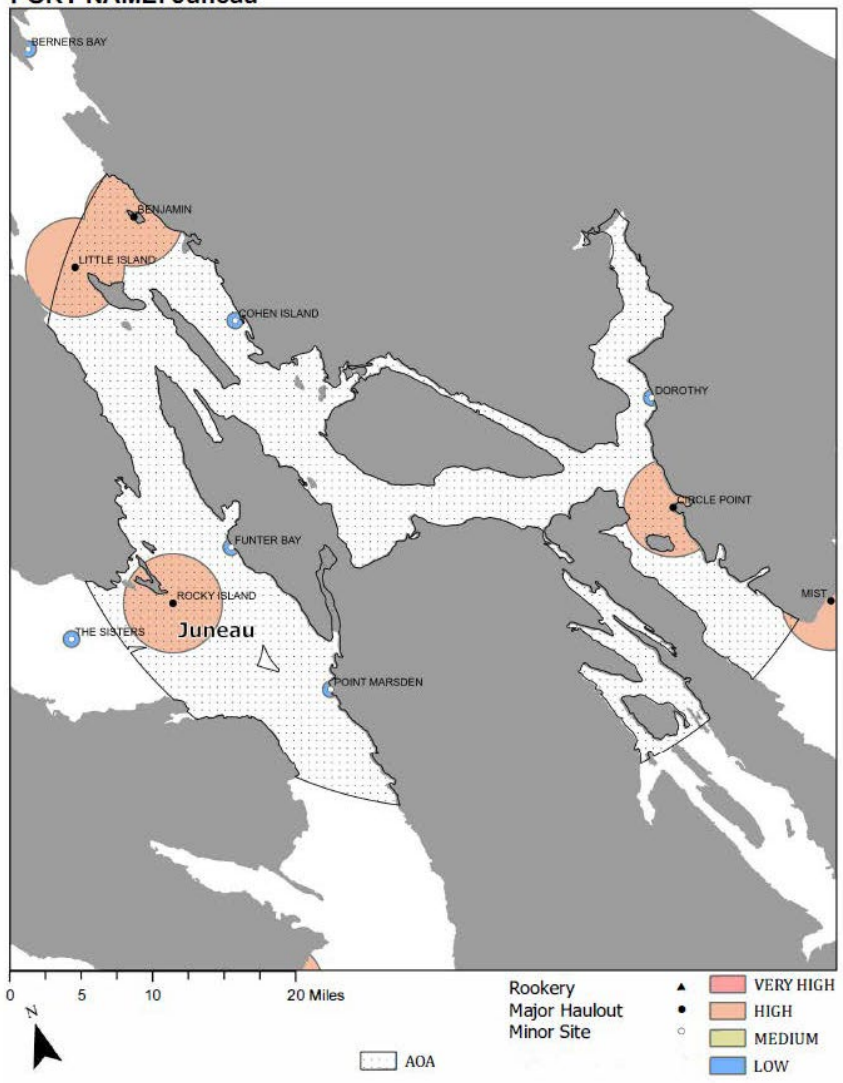
53

PORT NAME: Craig



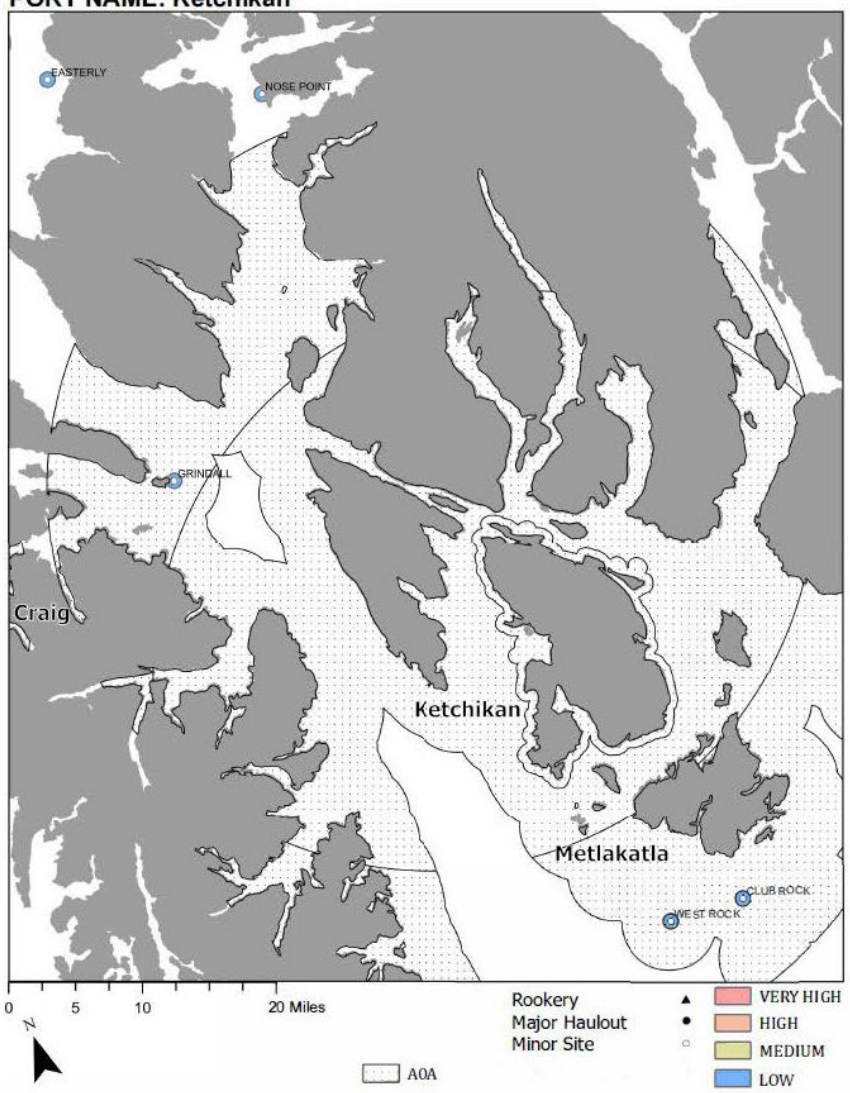
54

PORT NAME: Juneau



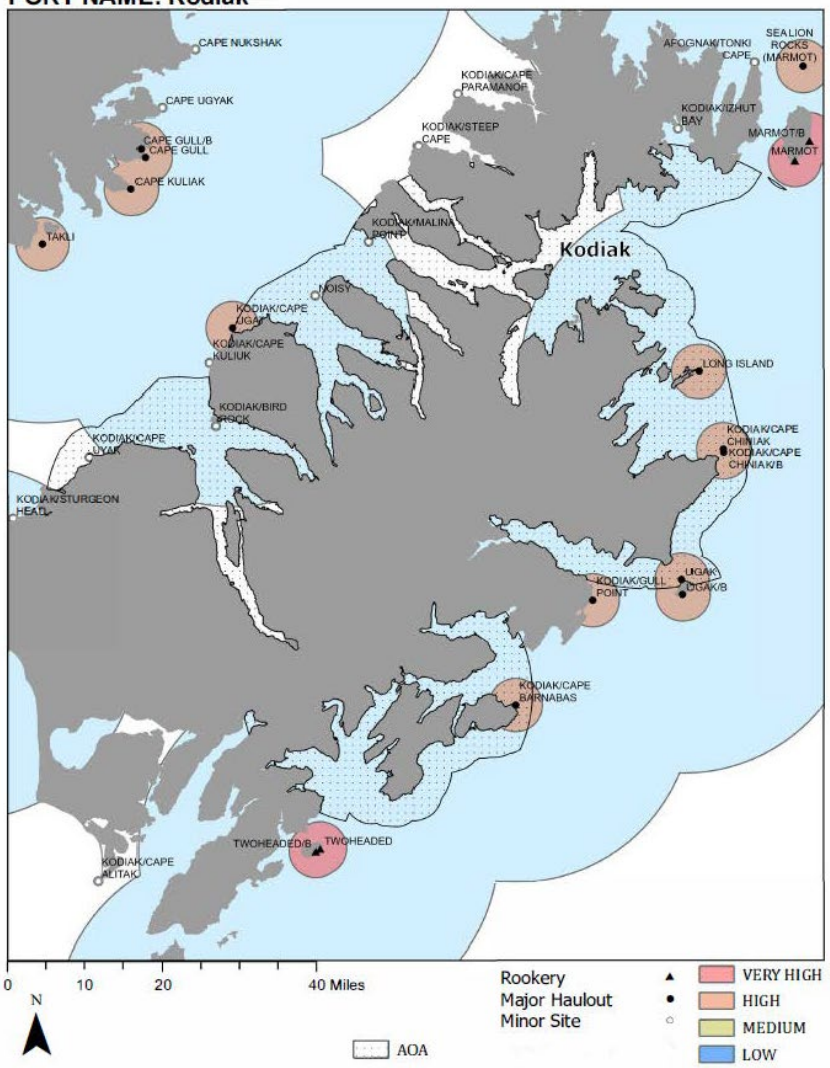
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PORT NAME: Ketchikan



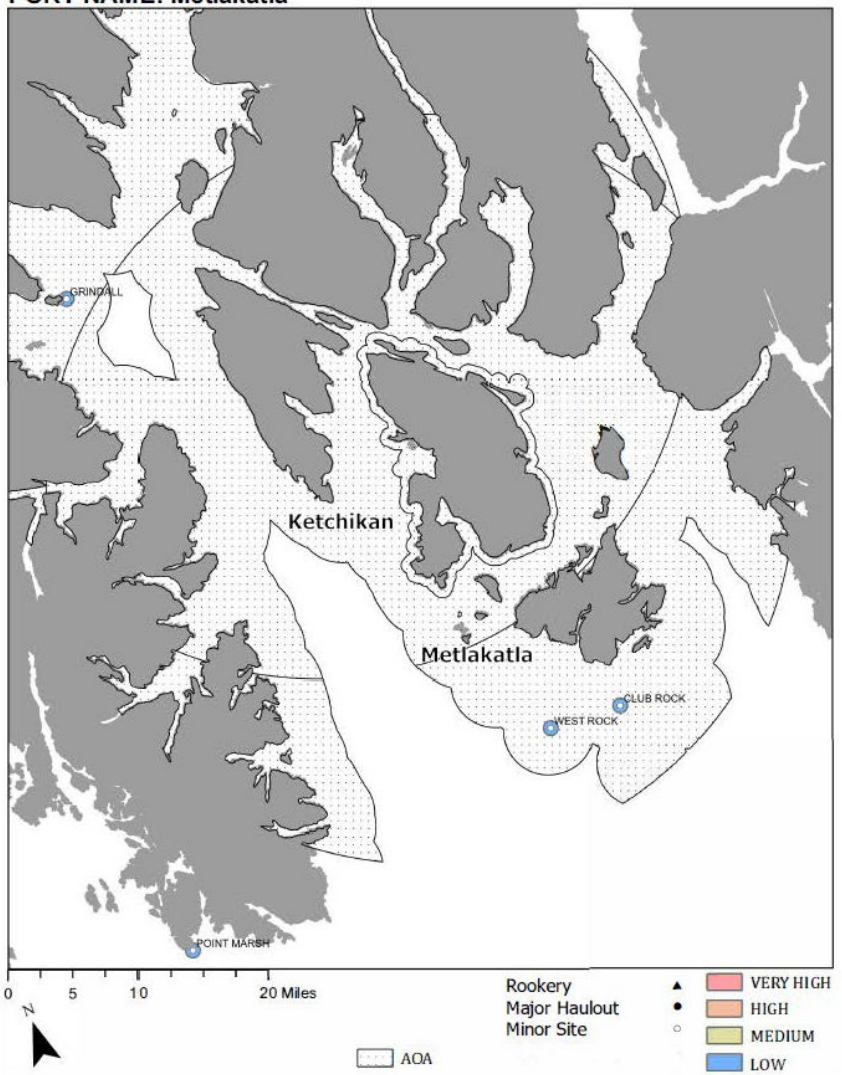
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PORT NAME: Kodiak



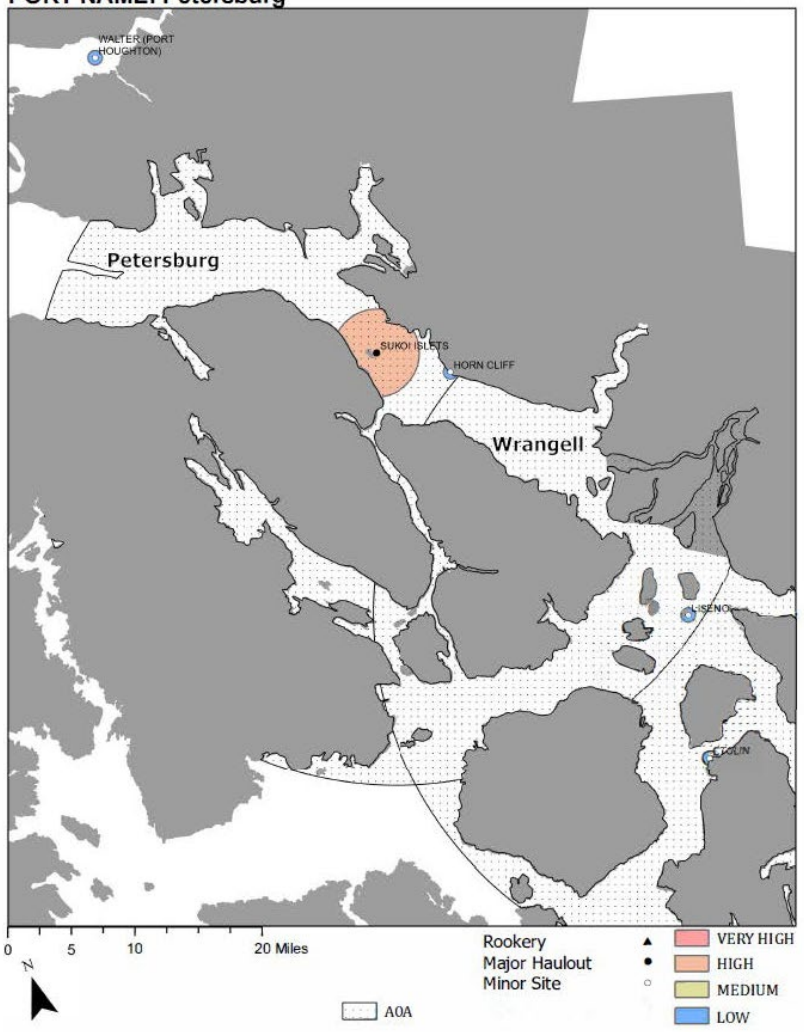
57

PORT NAME: Metlakatla



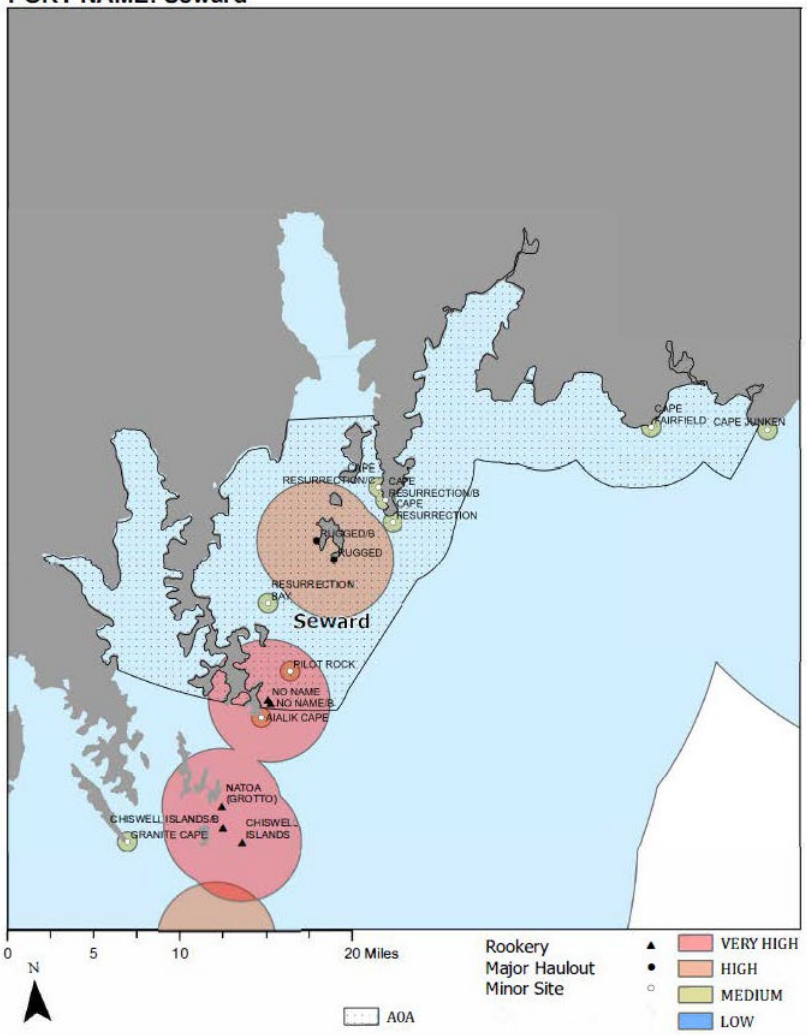
58

PORT NAME: Petersburg



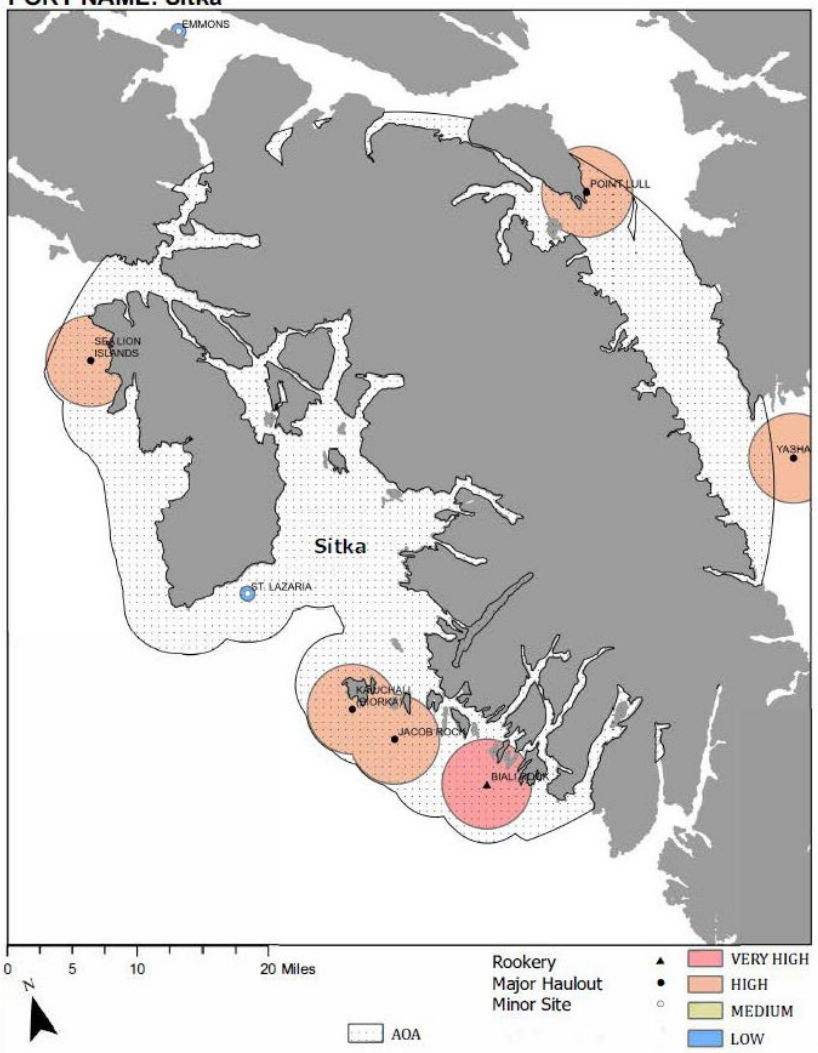
59

PORT NAME: Seward



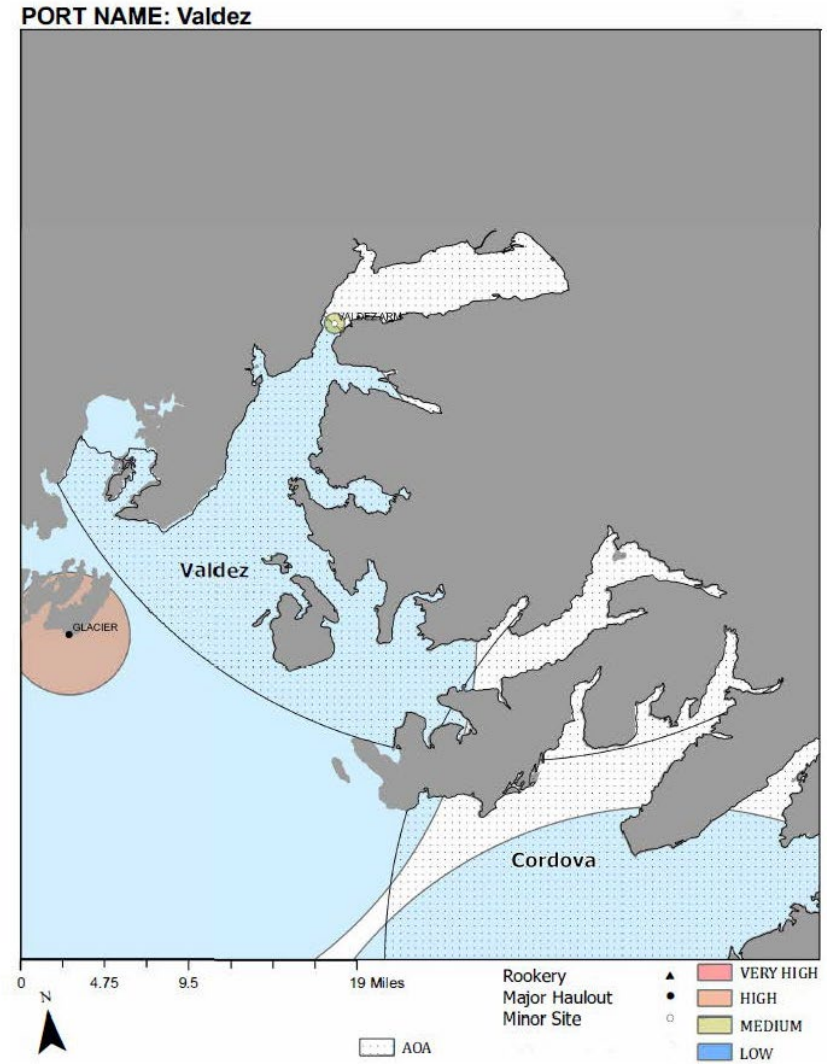
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PORT NAME: Sitka

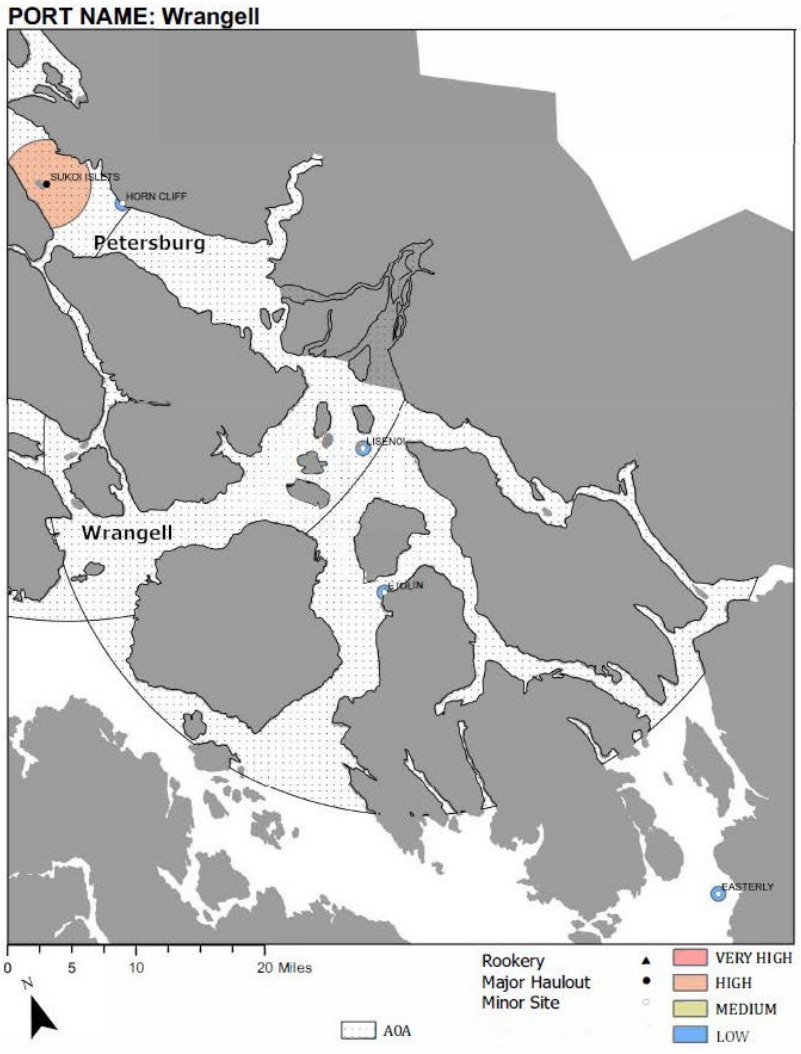


61

PORT NAME: Valdez



62

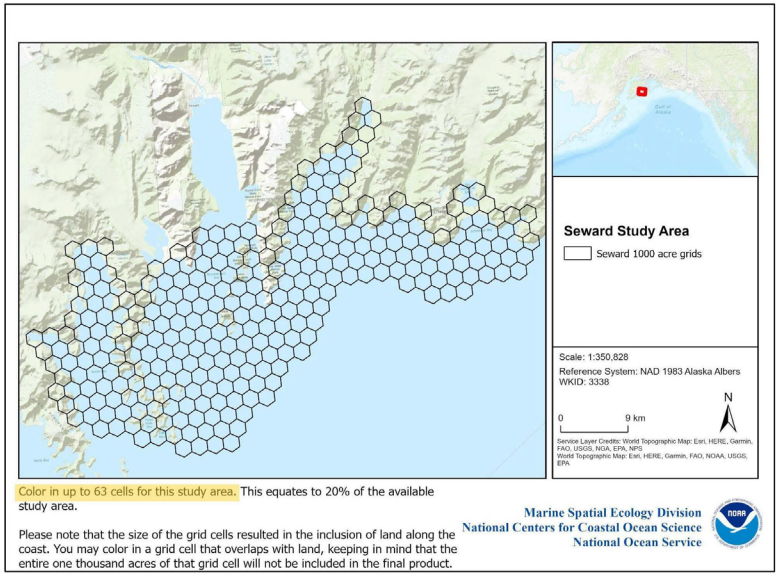


ATTACHMENT 2

Humpback Whale High Use Area Mapping Exercise

The objective of this mapping exercise is to identify High Use Areas (HUAs) for Humpback Whales.

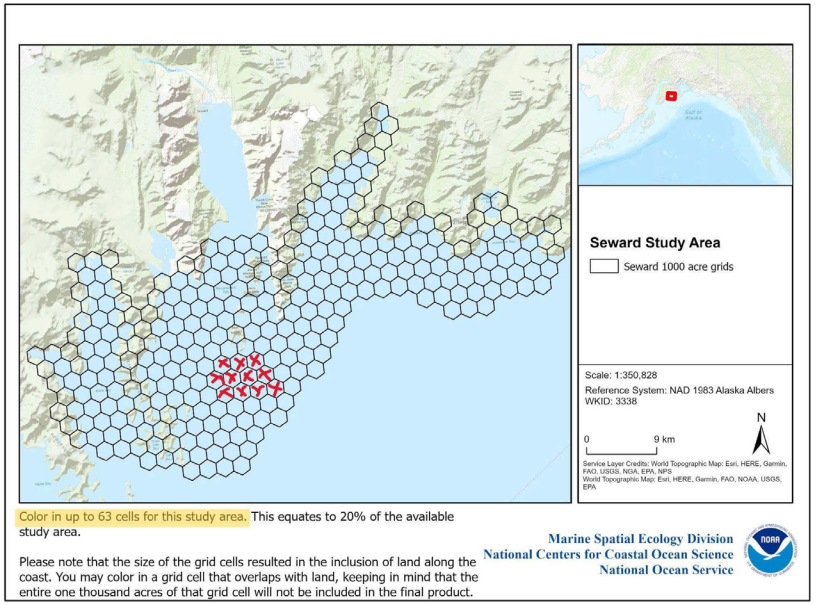
Each of the associated maps for this exercise represent Alaska Aquaculture Opportunity Area (AOA) Study Areas, separated into 1,000-acre grid cells. For the integration of these HUAs into the AOA modeling process, you will fill in 20% of the total grid cells within each of the study areas where you have local ecological knowledge of humpback whale patterns and distribution. The total number of cells that can be filled in for the given study area can be found underneath each map. You are not required to fill in up to the maximum number of cells for the study area you are working in.



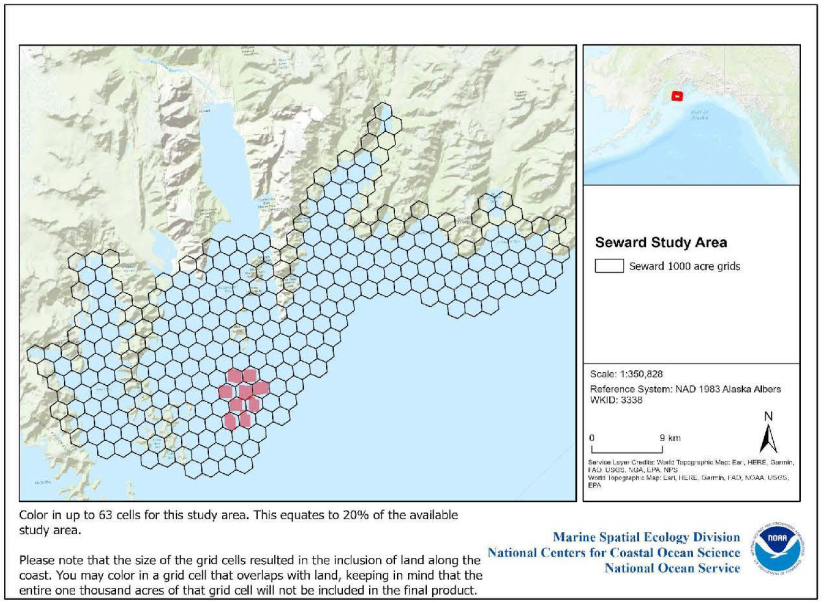
You can see highlighted in the example above that for Seward, 20% of the cells is equal to 63 total cells.

You will also see a note under the map regarding cells that call over land. Due to the size of the grid cells generated, some grid cells fall over land. If there are cells that include land in them, you may still fill them in if the waters that fall within the grid cell represent part of a HUA.

When annotating, you may fill in the full grid, or mark grid cells with an `X` using your preferred image editor.



This map was annotated using the photo viewer on Windows, by clicking on the `edit image` button and selecting the pen to draw.



This map was annotated by converting the map to a PDF for use in Adobe, and by using the `highlight text` function.

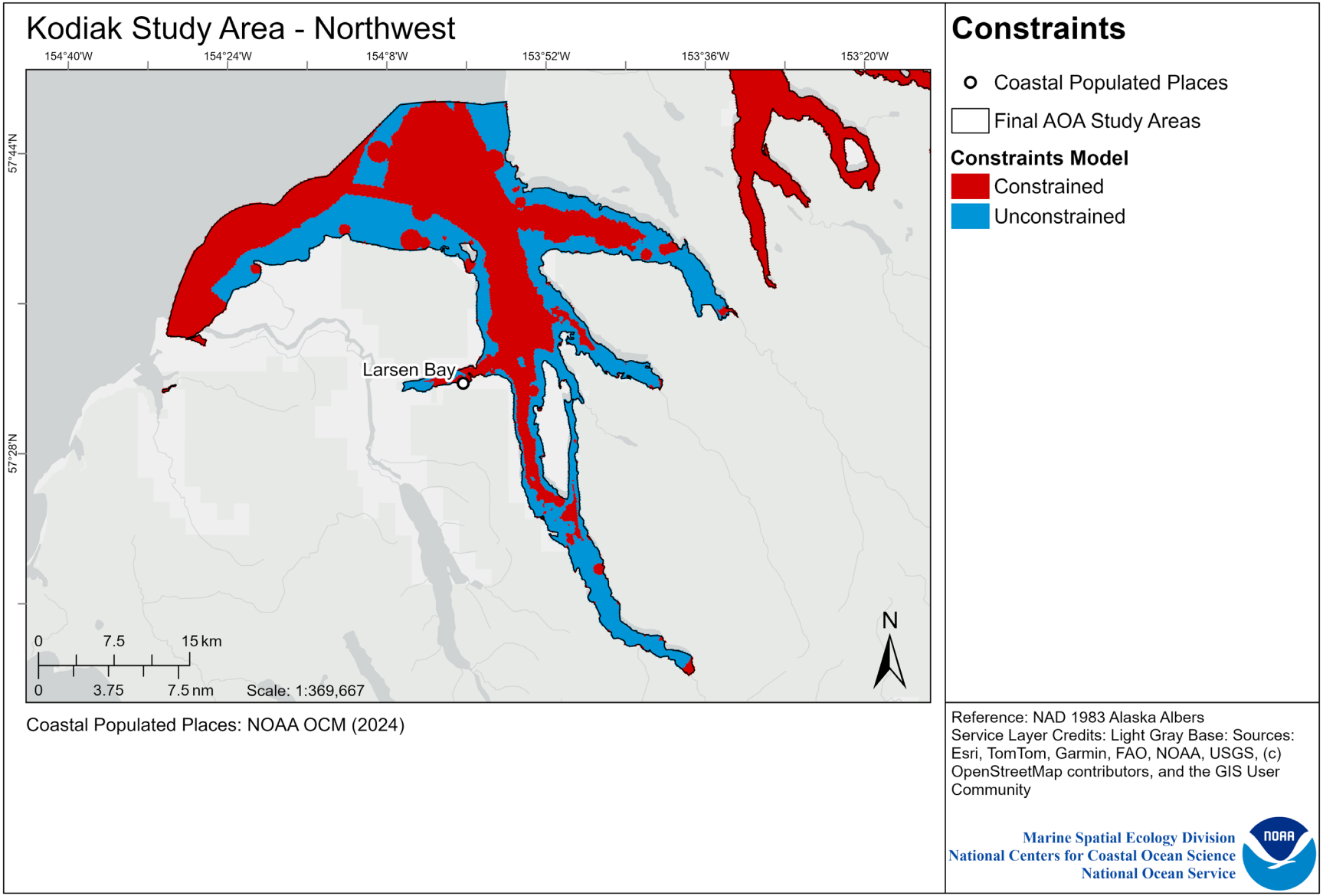
Once you mark up the cells representing HUAs within a single map, save your work and repeat the exercise for any study area you are providing your local ecological knowledge of.

Send your completed maps to sadie.wright@noaa.gov, suzie.teerlink@noaa.gov, and drew.resnick@noaa.gov.

Appendix C

Large format maps to aid in viewing and interpretation

Constraints Model Maps

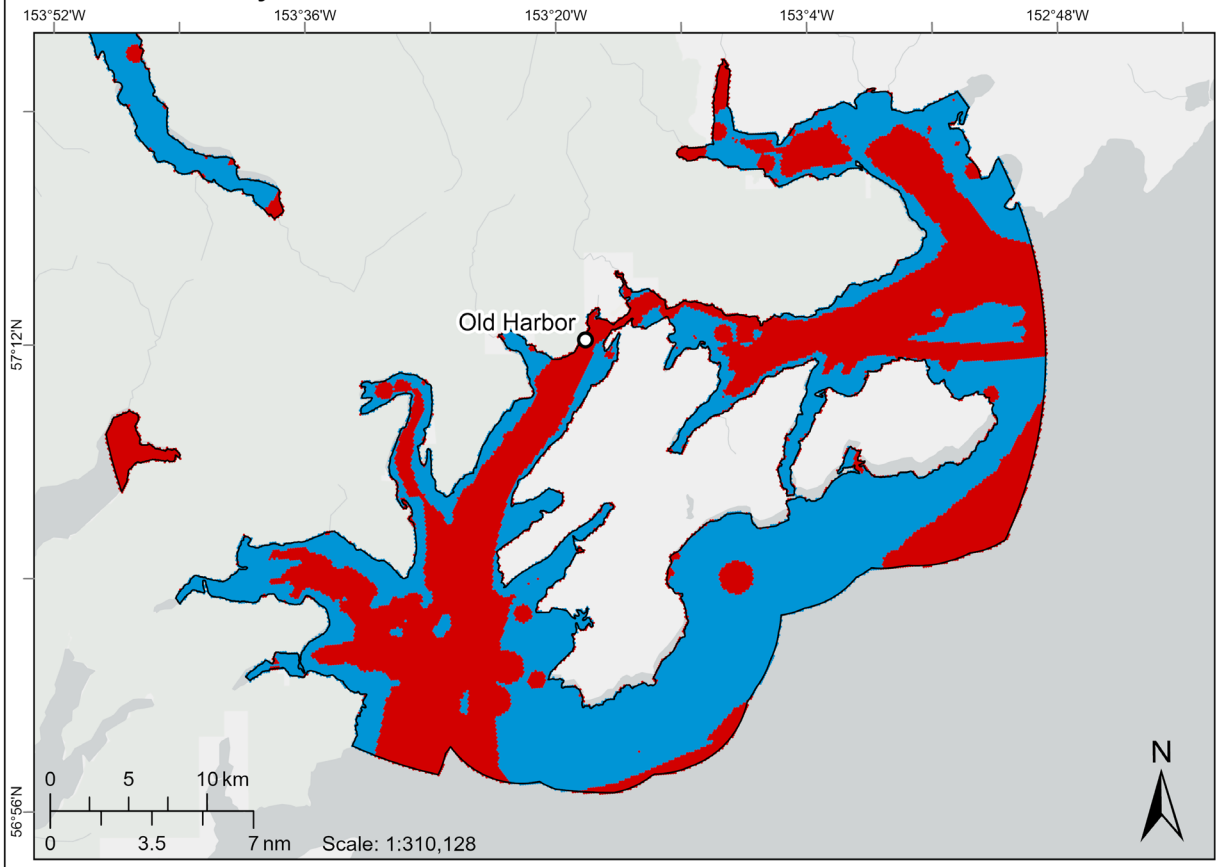


Coastal Populated Places: NOAA OCM (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)

Constraints

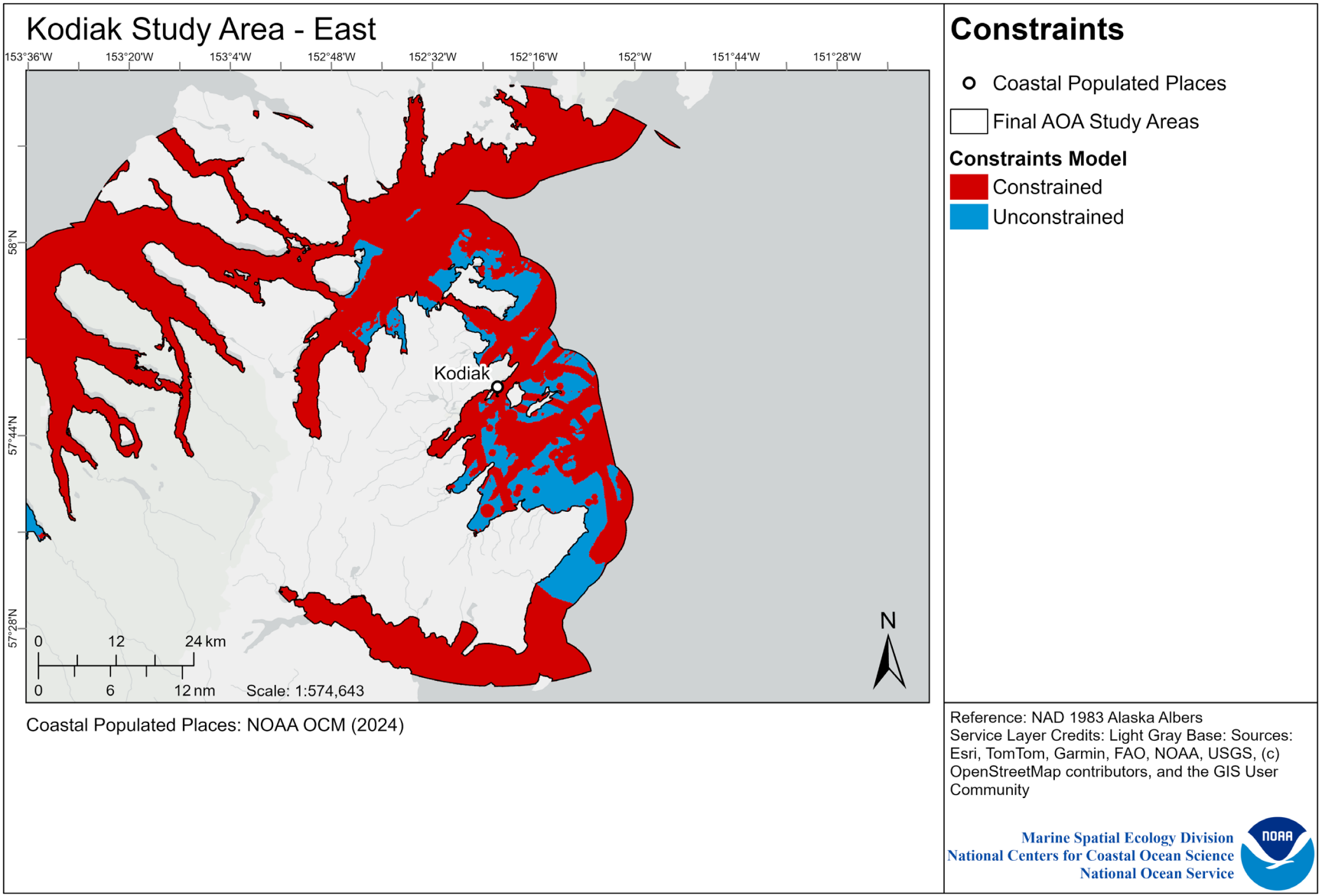
- Coastal Populated Places
- Final AOA Study Areas

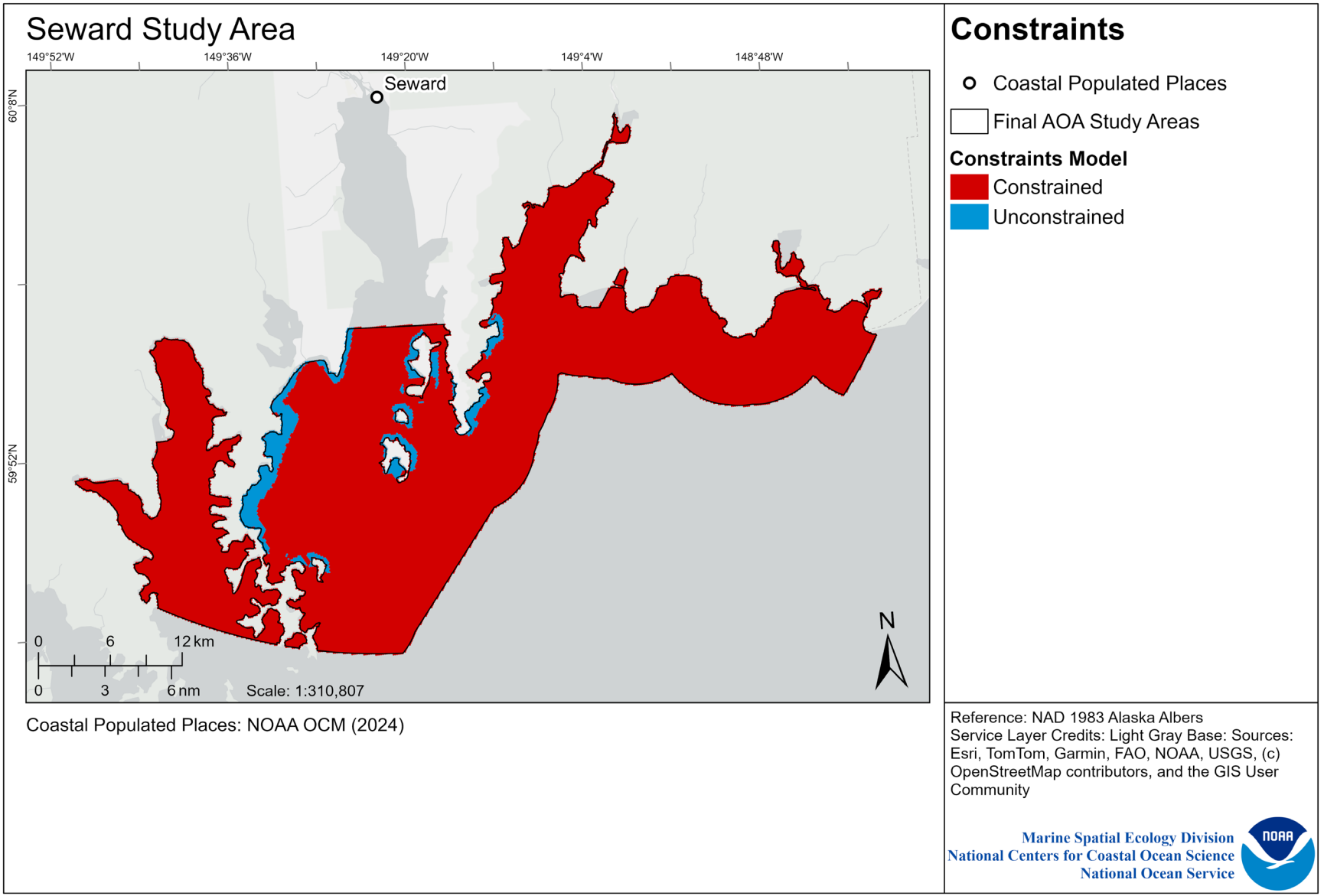
Constraints Model

- Constrained
- Unconstrained

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
Constraints
Coastal Populated Places
Final AOA Study Areas
Constraints Model
Constrained
Unconstrained
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

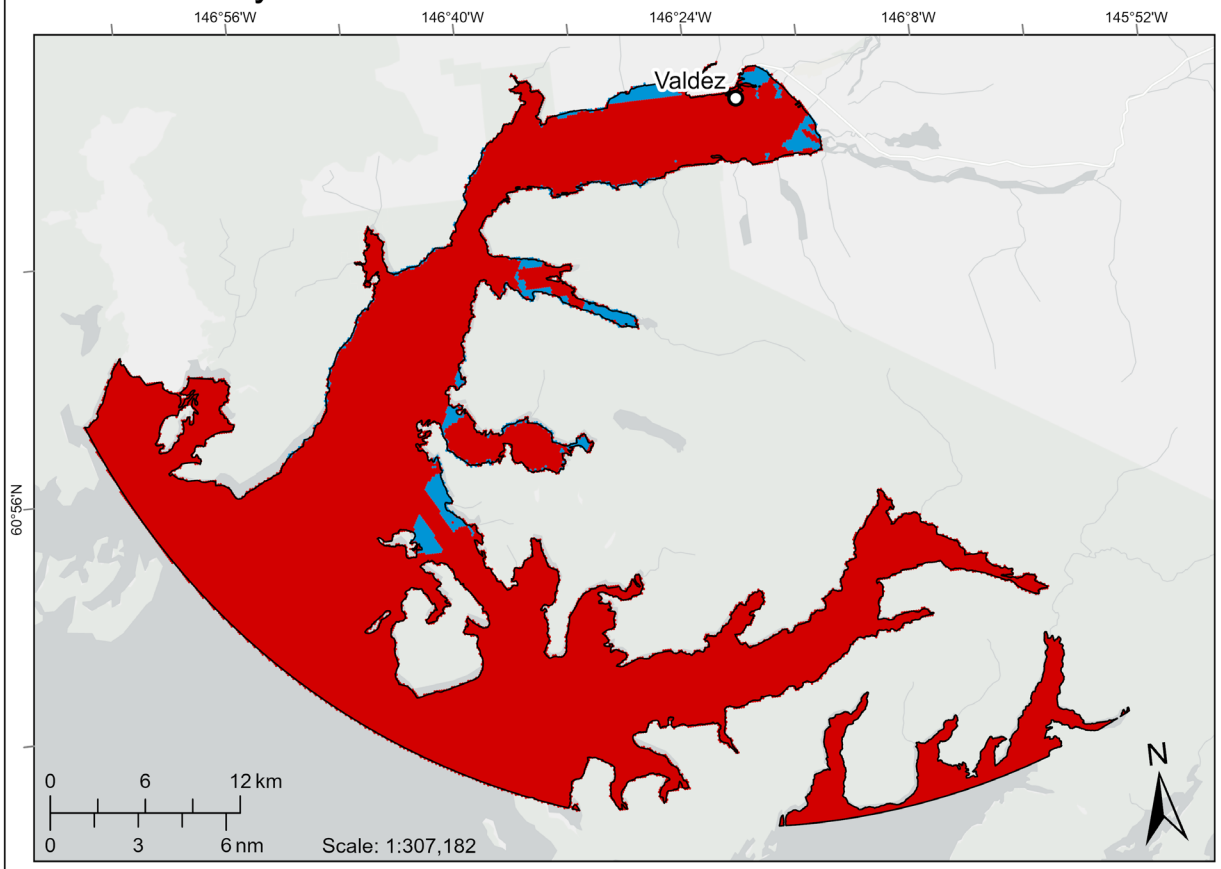


Coastal Populated Places: NOAA OCM (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Valdez Study Area



Coastal Populated Places: NOAA OCM (2024)

Constraints

- Coastal Populated Places
- Final AOA Study Areas

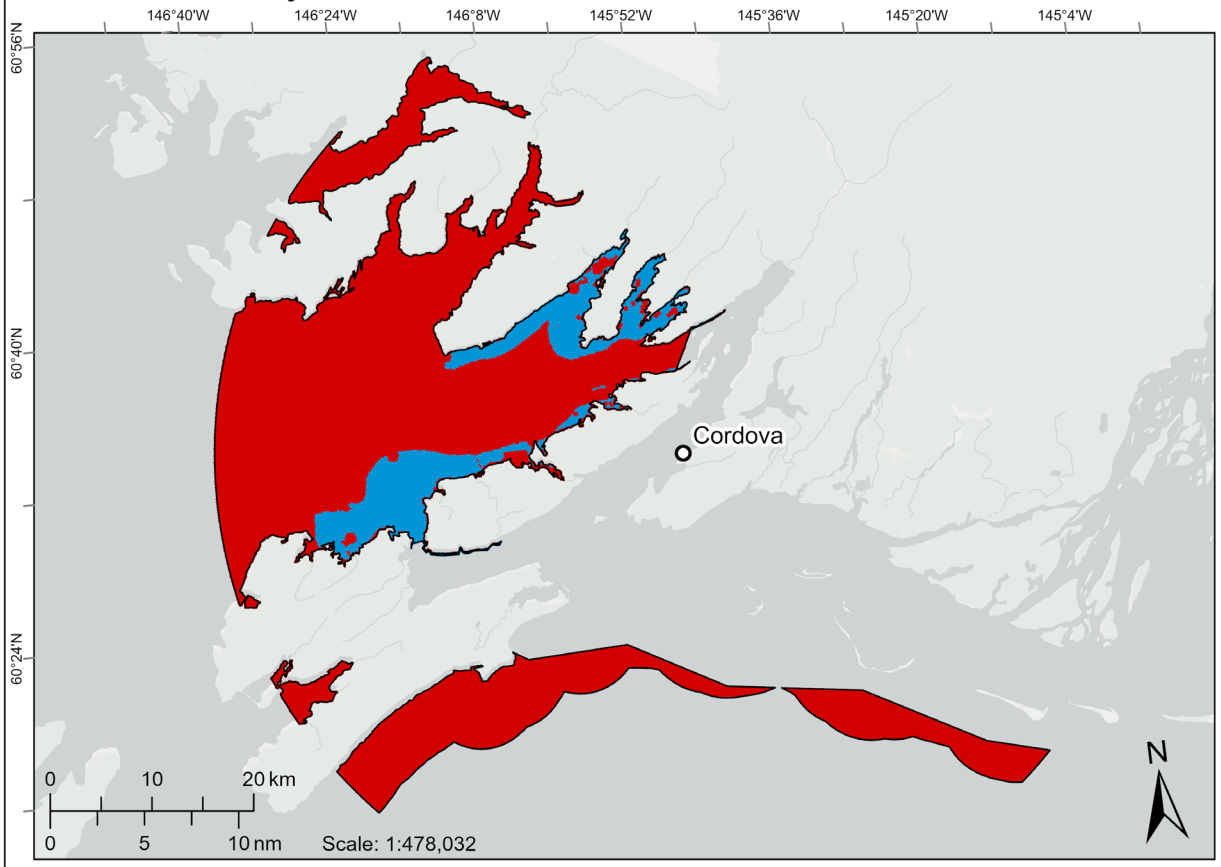
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Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)

Constraints

- Coastal Populated Places
- Final AOA Study Areas

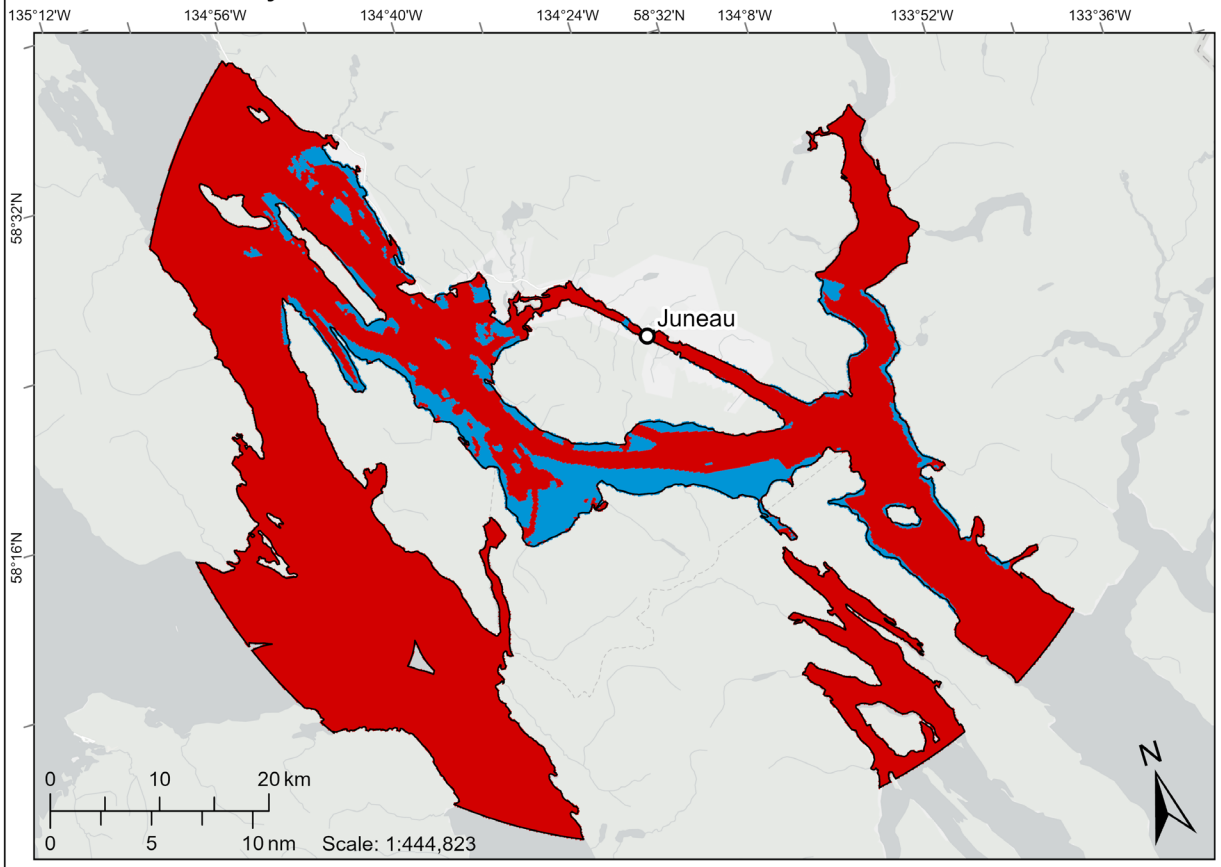
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Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Juneau Study Area



Coastal Populated Places: NOAA OCM (2024)

Constraints

- Coastal Populated Places
- Final AOA Study Areas

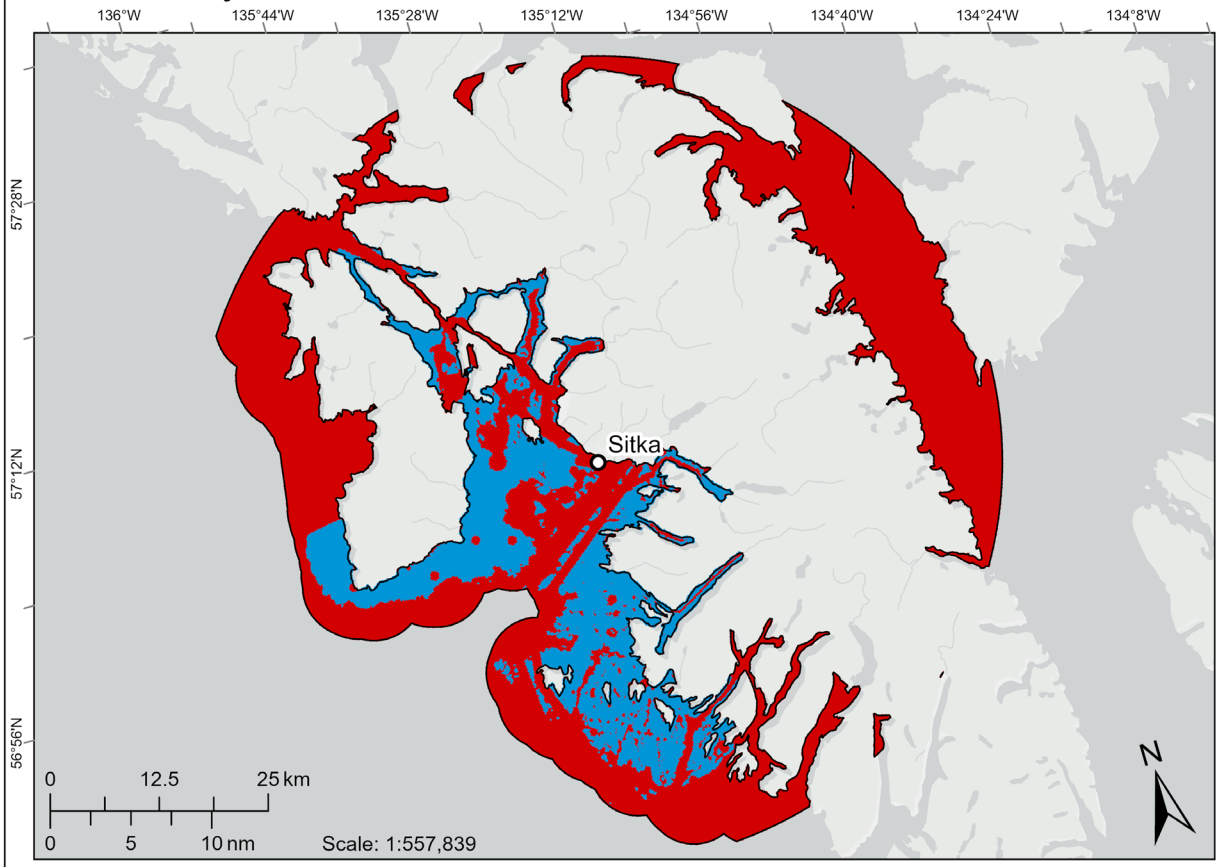
Constraints Model

- Constrained
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Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Sitka Study Area



Coastal Populated Places: NOAA OCM (2024)

Constraints

- Coastal Populated Places
- Final AOA Study Areas

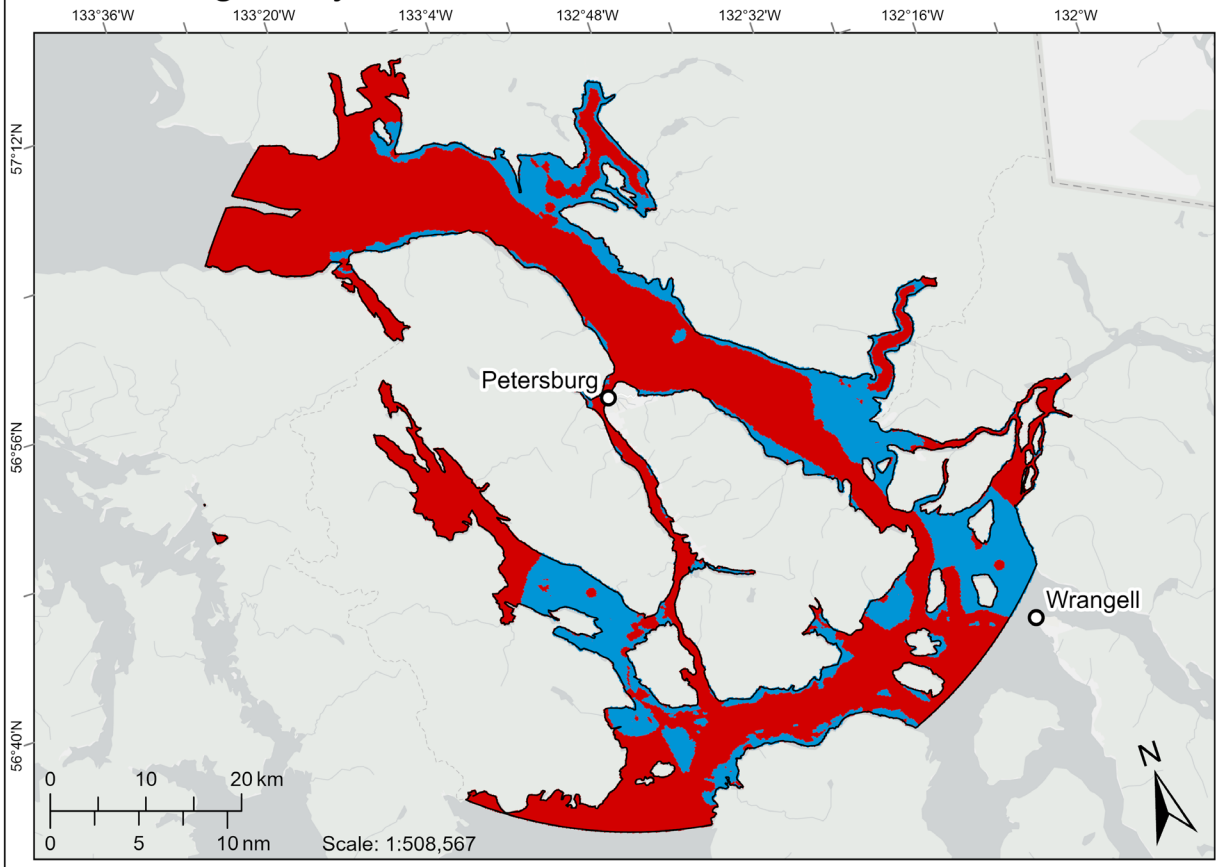
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Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)

Constraints

- Coastal Populated Places
- Final AOA Study Areas

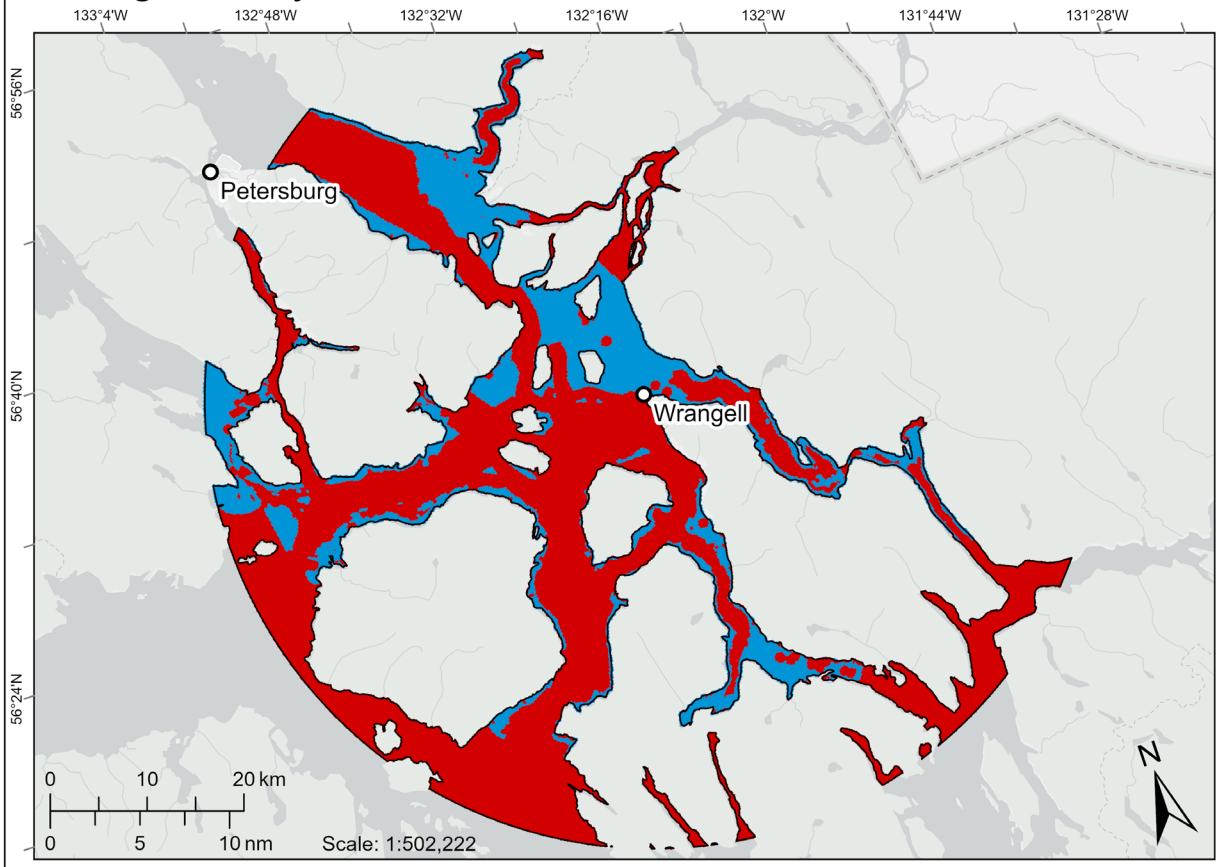
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Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Wrangell Study Area



Coastal Populated Places: NOAA OCM (2024)

Constraints

- Coastal Populated Places
- Final AOA Study Areas

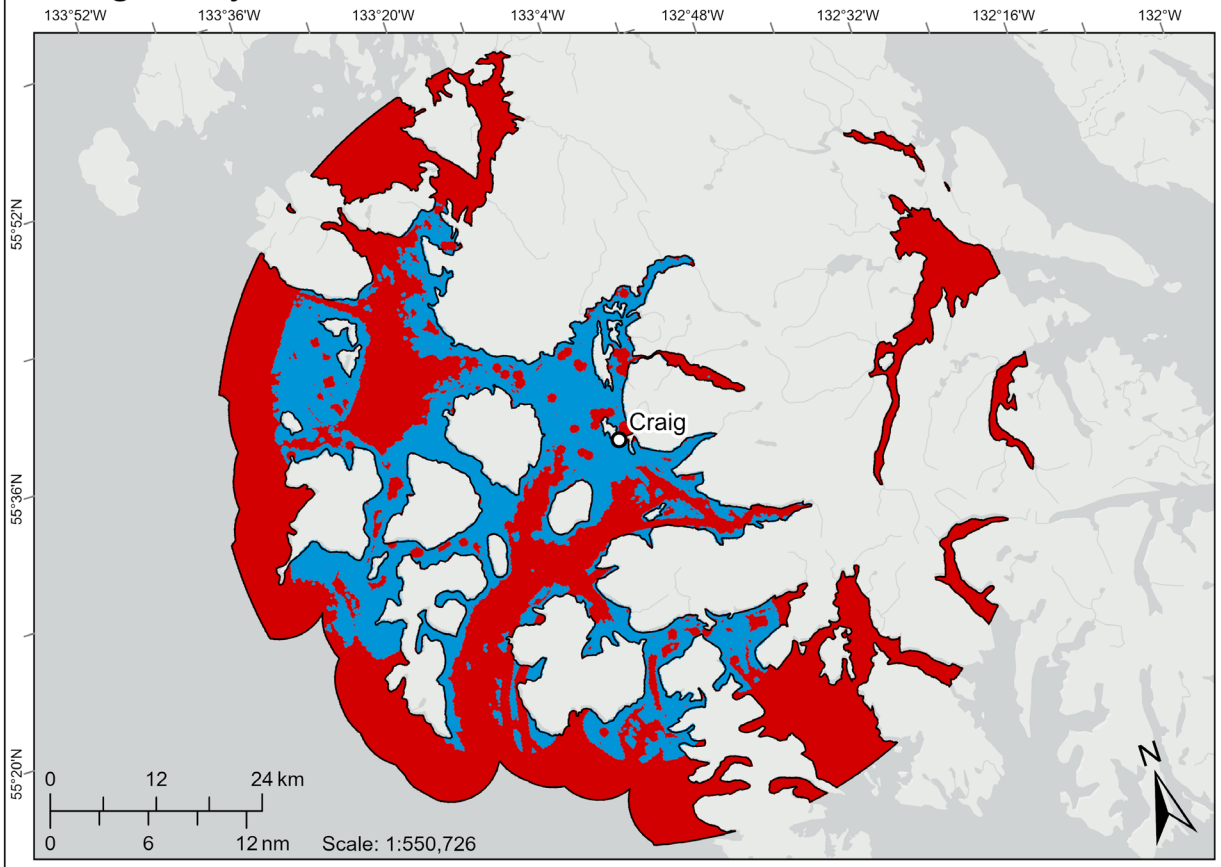
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Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Craig Study Area



Coastal Populated Places: NOAA OCM (2024)

Constraints

- Coastal Populated Places
- Final AOA Study Areas

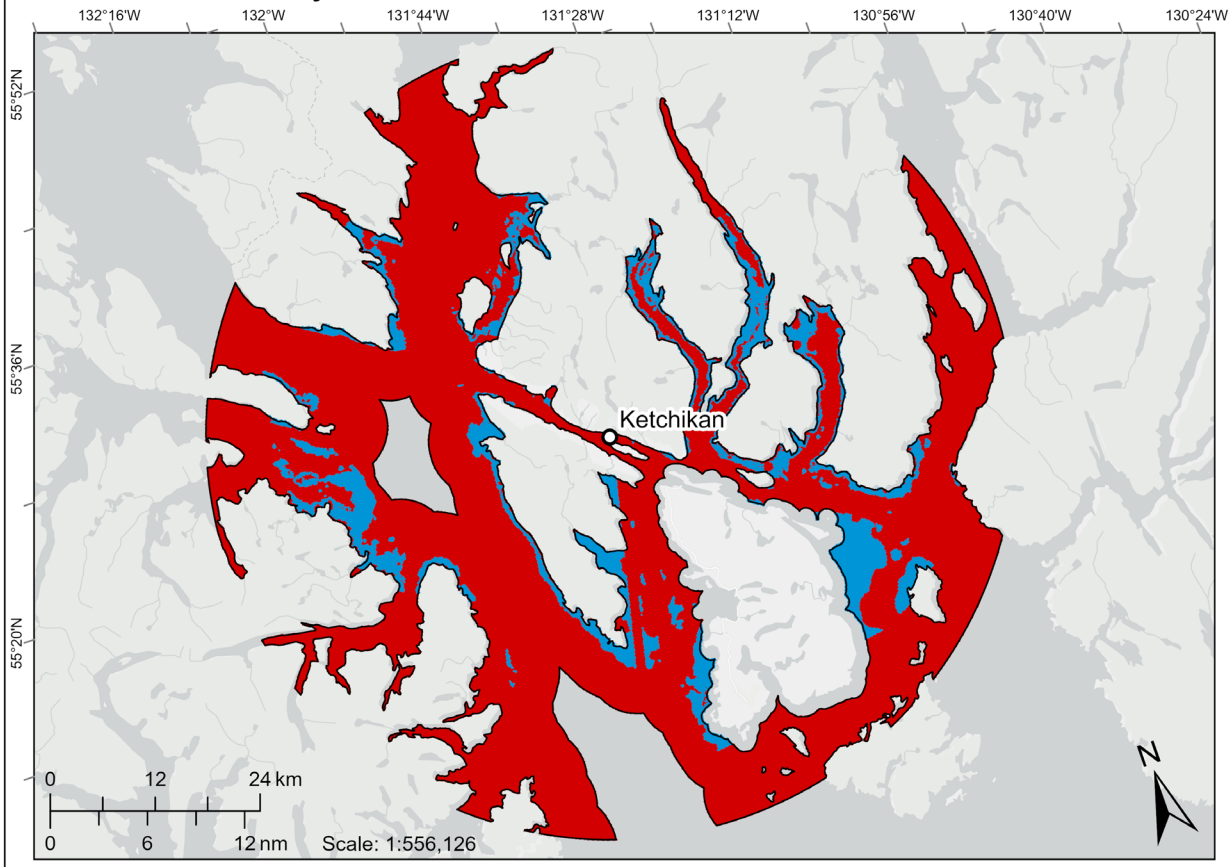
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Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)

Constraints

- Coastal Populated Places
- Final AOA Study Areas

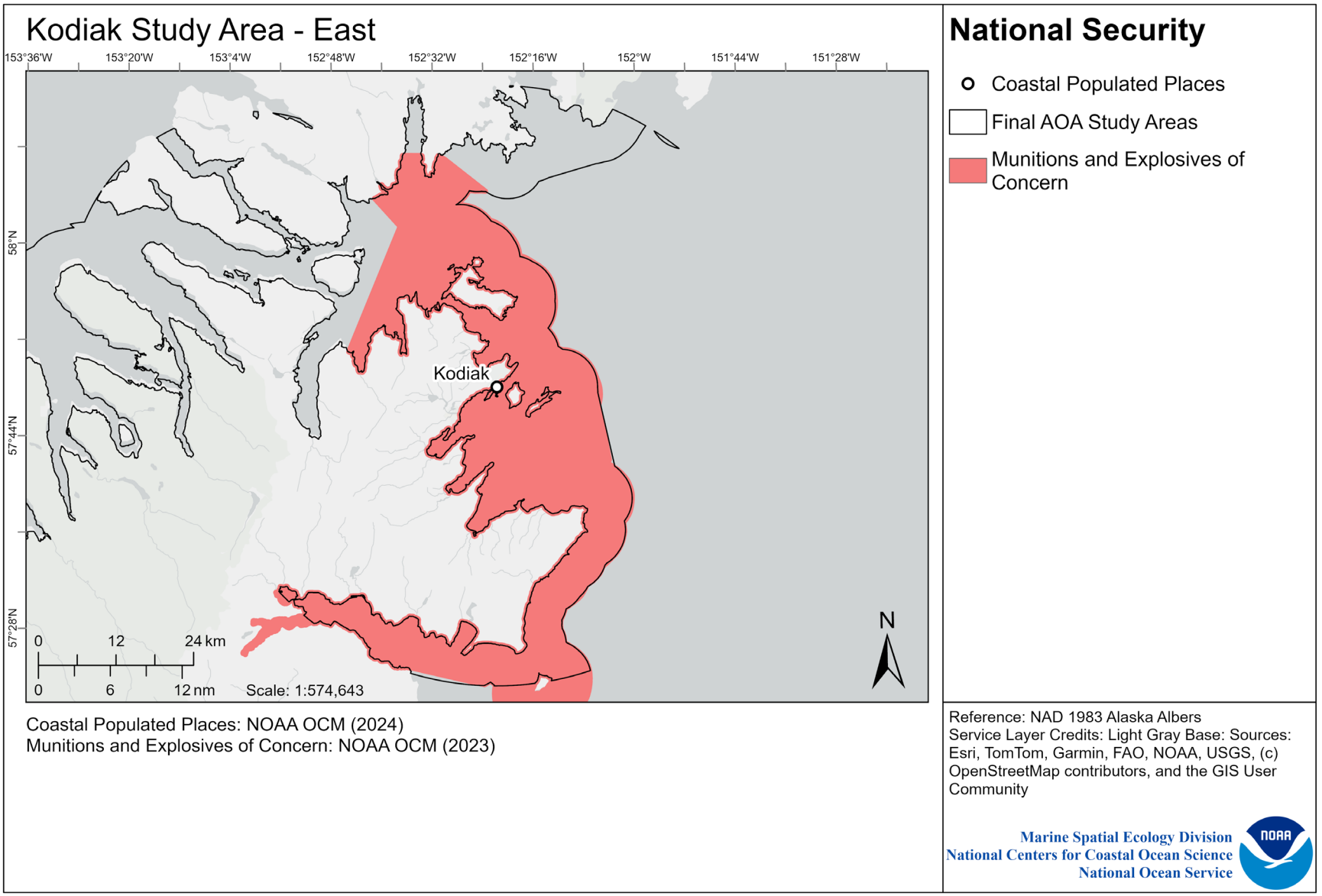
Constraints Model

- Constrained
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Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Security Submodel Maps

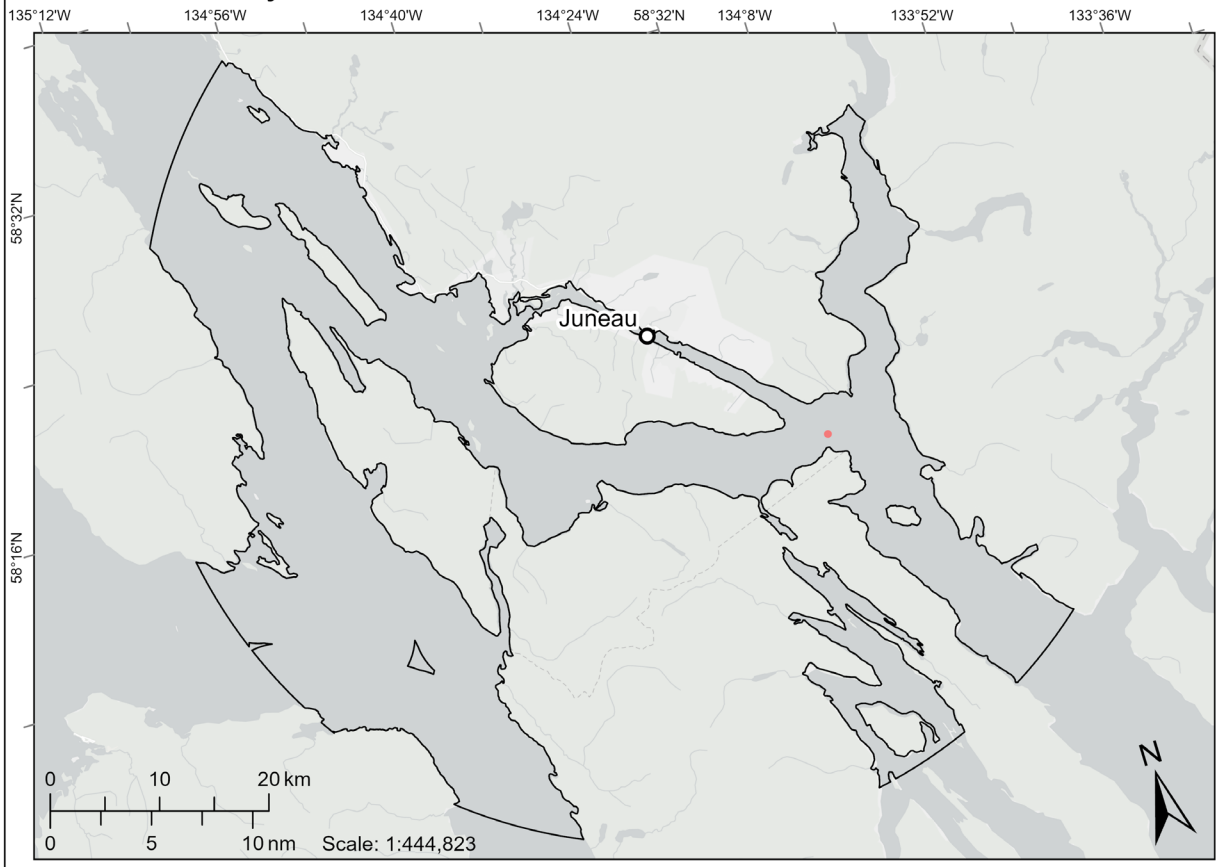


Coastal Populated Places: NOAA OCM (2024)
Munitions and Explosives of Concern: NOAA OCM (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Juneau Study Area



Coastal Populated Places: NOAA OCM (2024)
Munitions and Explosives of Concern: NOAA OCM (2023)

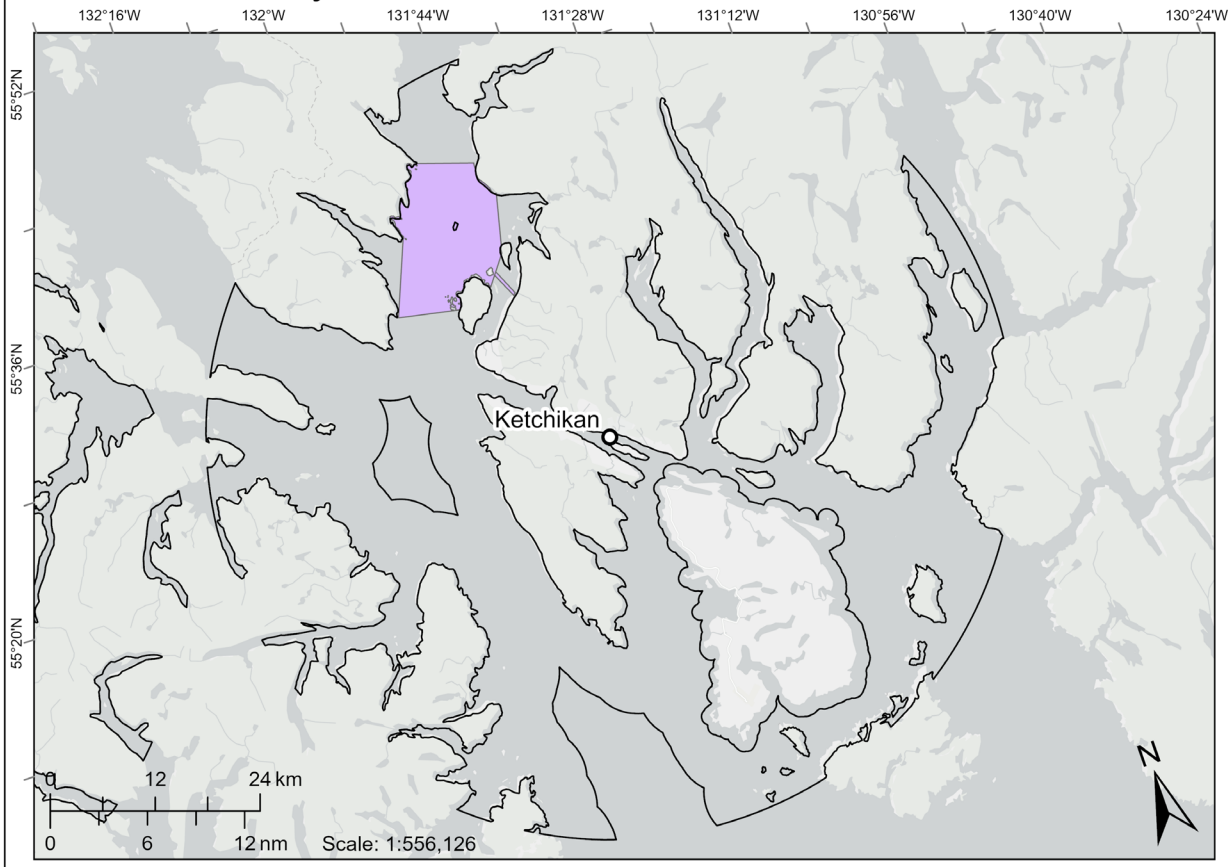
National Security

- Coastal Populated Places
- Final AOA Study Areas
- Munitions and Explosives of Concern

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Ketchikan Study Area



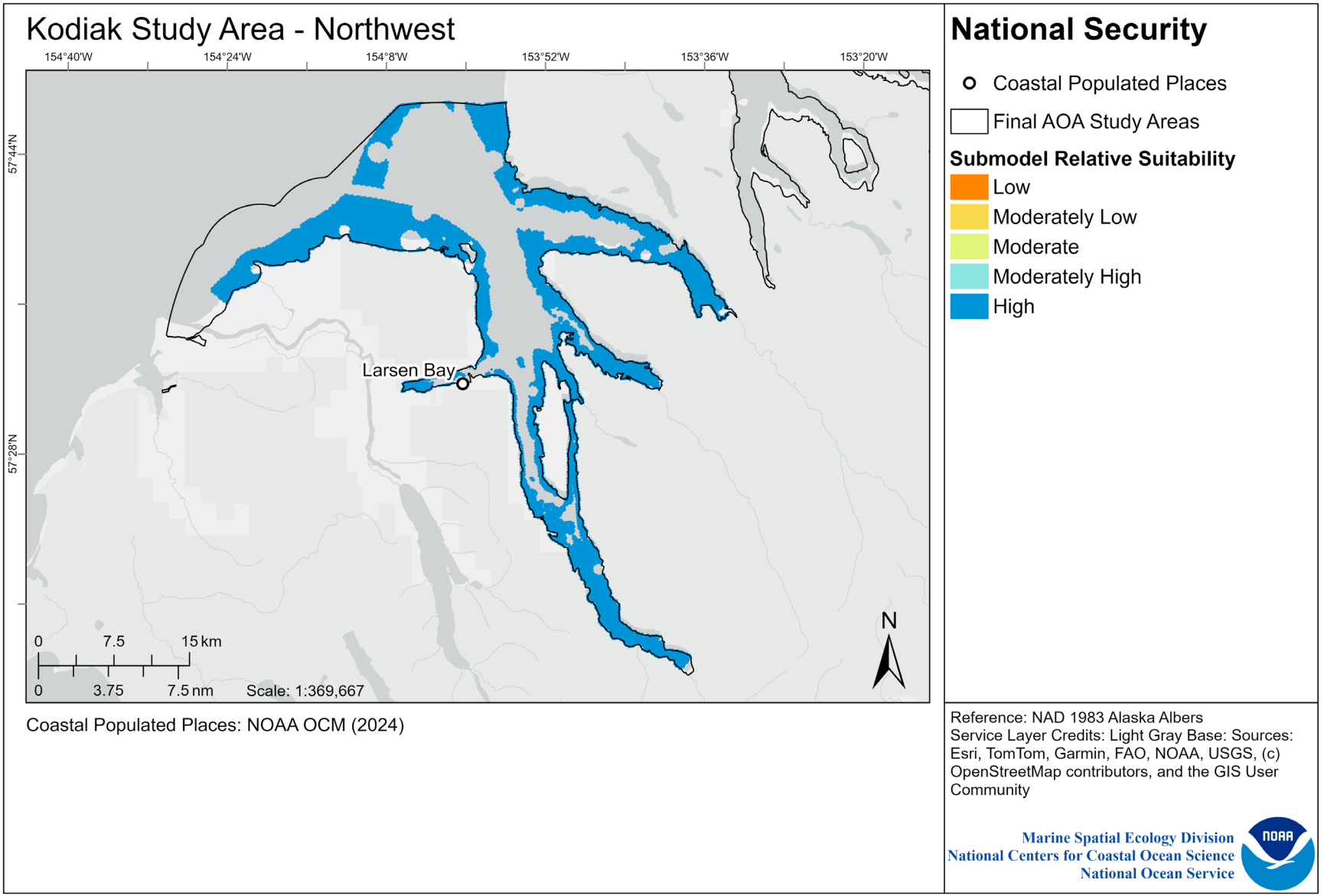
Coastal Populated Places: NOAA OCM (2024)
Danger Zones and Restricted Areas: NOAA OCM (2022)

National Security

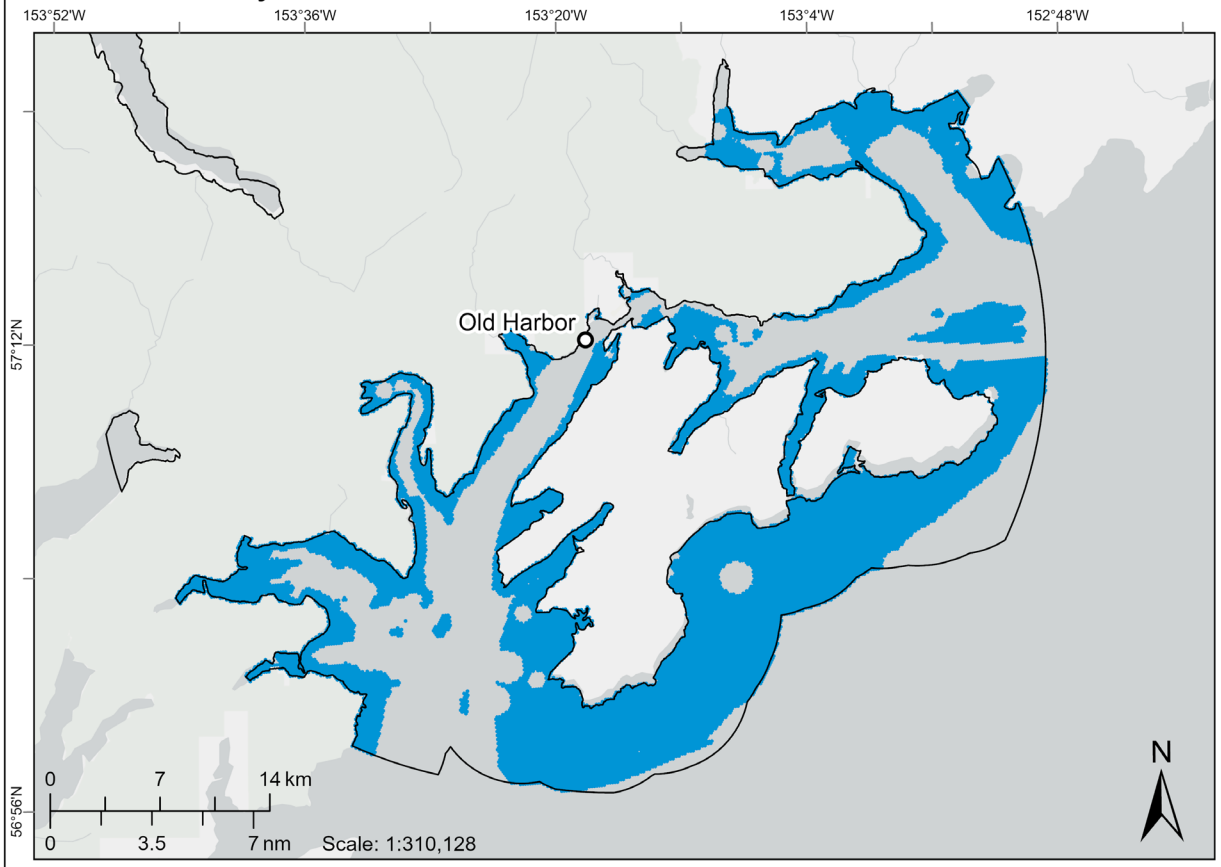
- Coastal Populated Places
- Final AOA Study Areas
- Danger Zones and Restricted Areas

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Northwest
154°40'W
154°24'W
154°8'W
153°52'W
153°36'W
153°20'W
57°44'N
57°28'N
Larsen Bay
0
7.5
15 km
0
3.75
7.5 nm
Scale: 1:369,667
N
National Security
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)

National Security

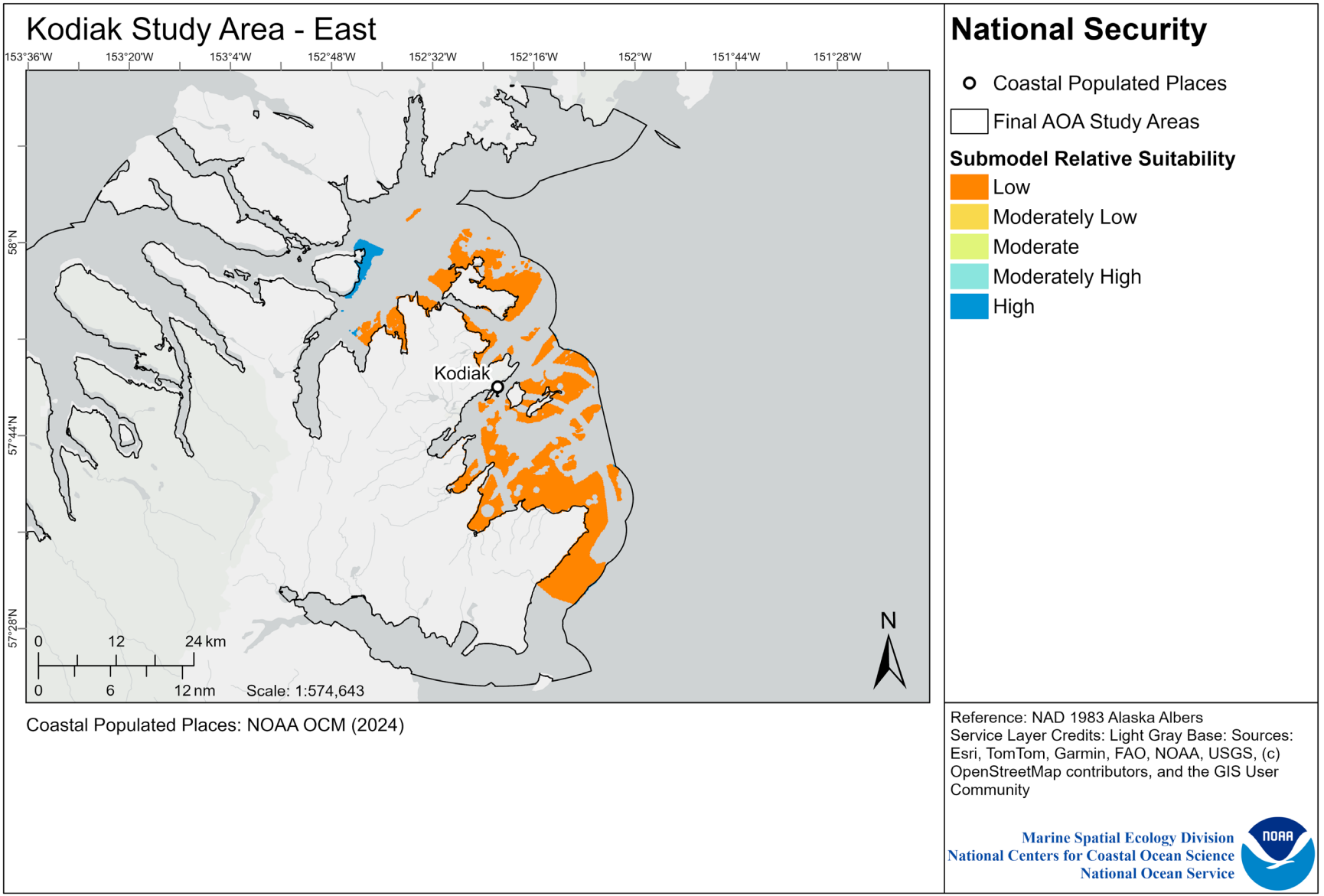
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

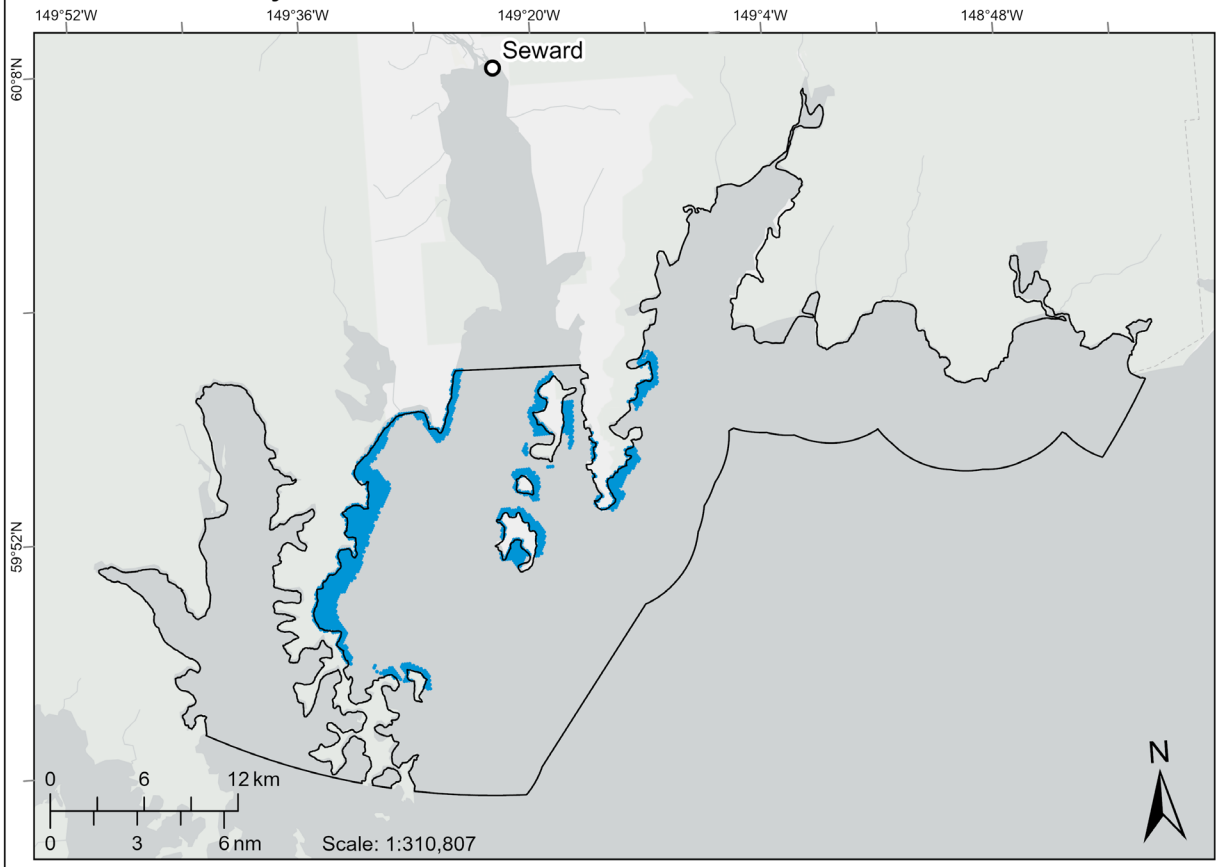
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
National Security
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Seward Study Area



Coastal Populated Places: NOAA OCM (2024)

National Security

- Coastal Populated Places
- Final AOA Study Areas

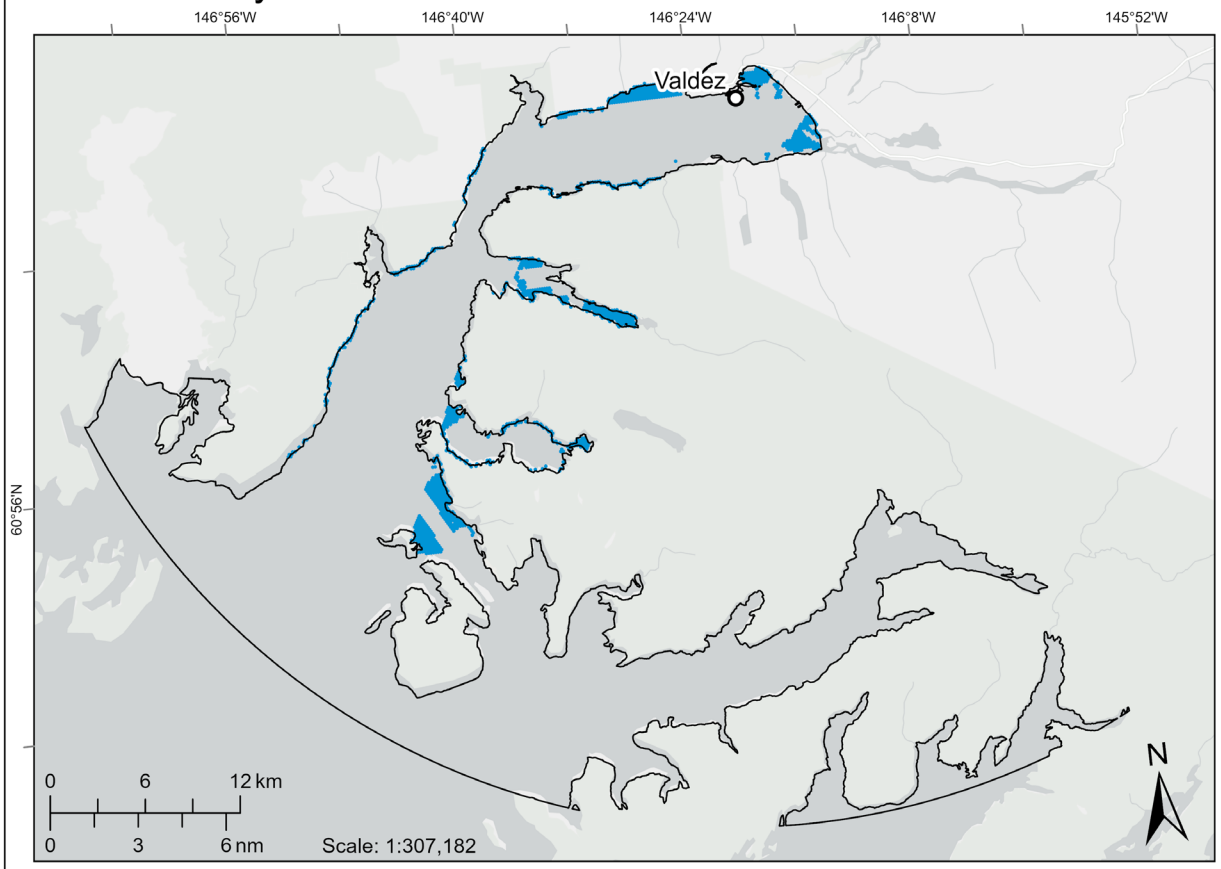
Submodel Relative Suitability

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- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Valdez Study Area



Coastal Populated Places: NOAA OCM (2024)

National Security

- Coastal Populated Places
- Final AOA Study Areas

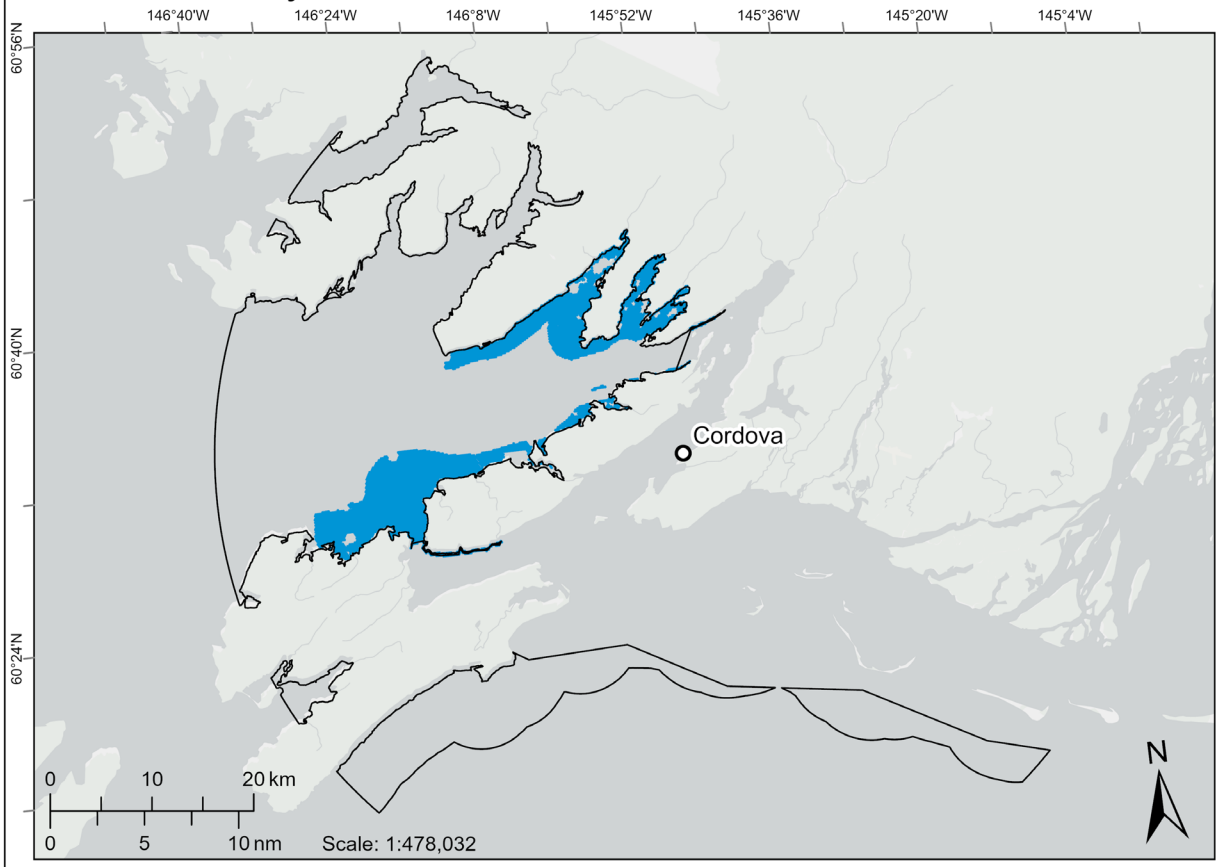
Submodel Relative Suitability

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- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)

National Security

- Coastal Populated Places
- Final AOA Study Areas

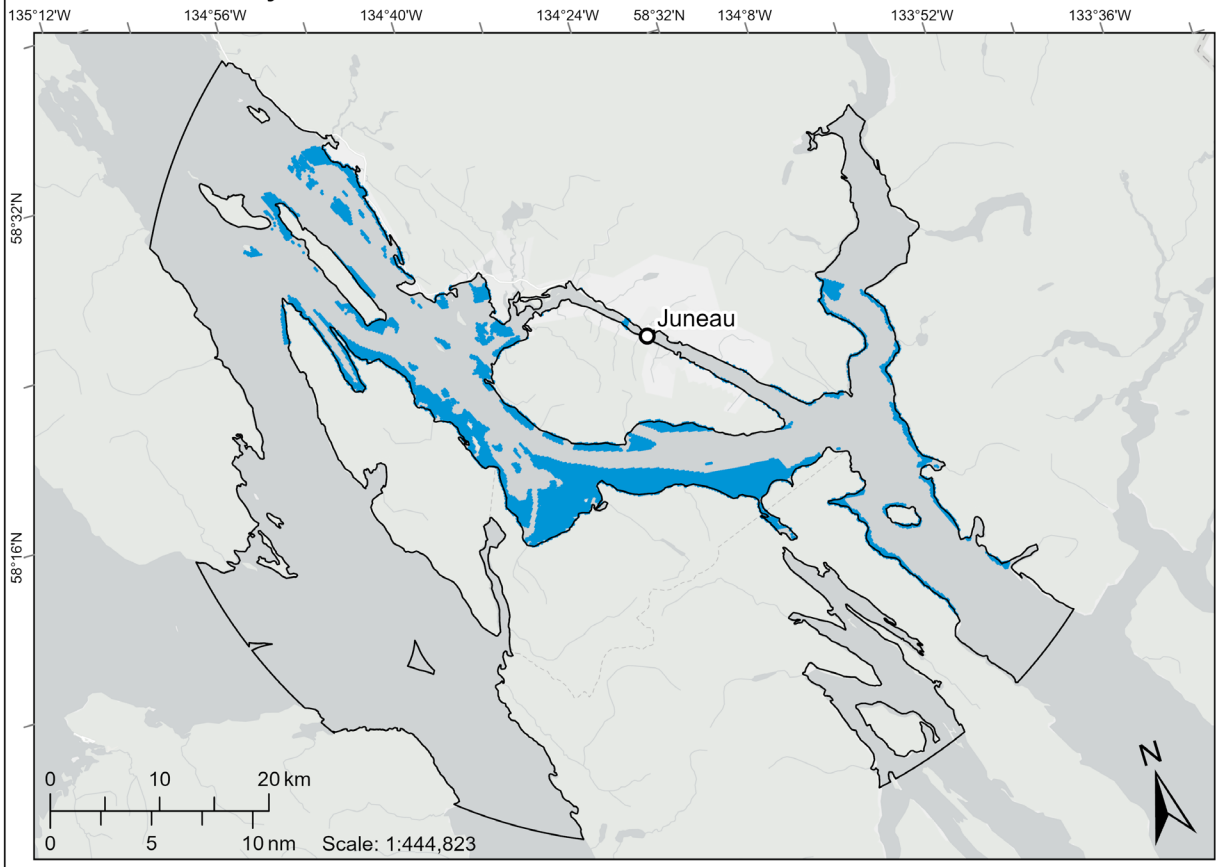
Submodel Relative Suitability

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- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Juneau Study Area



Coastal Populated Places: NOAA OCM (2024)

National Security

- Coastal Populated Places
- Final AOA Study Areas

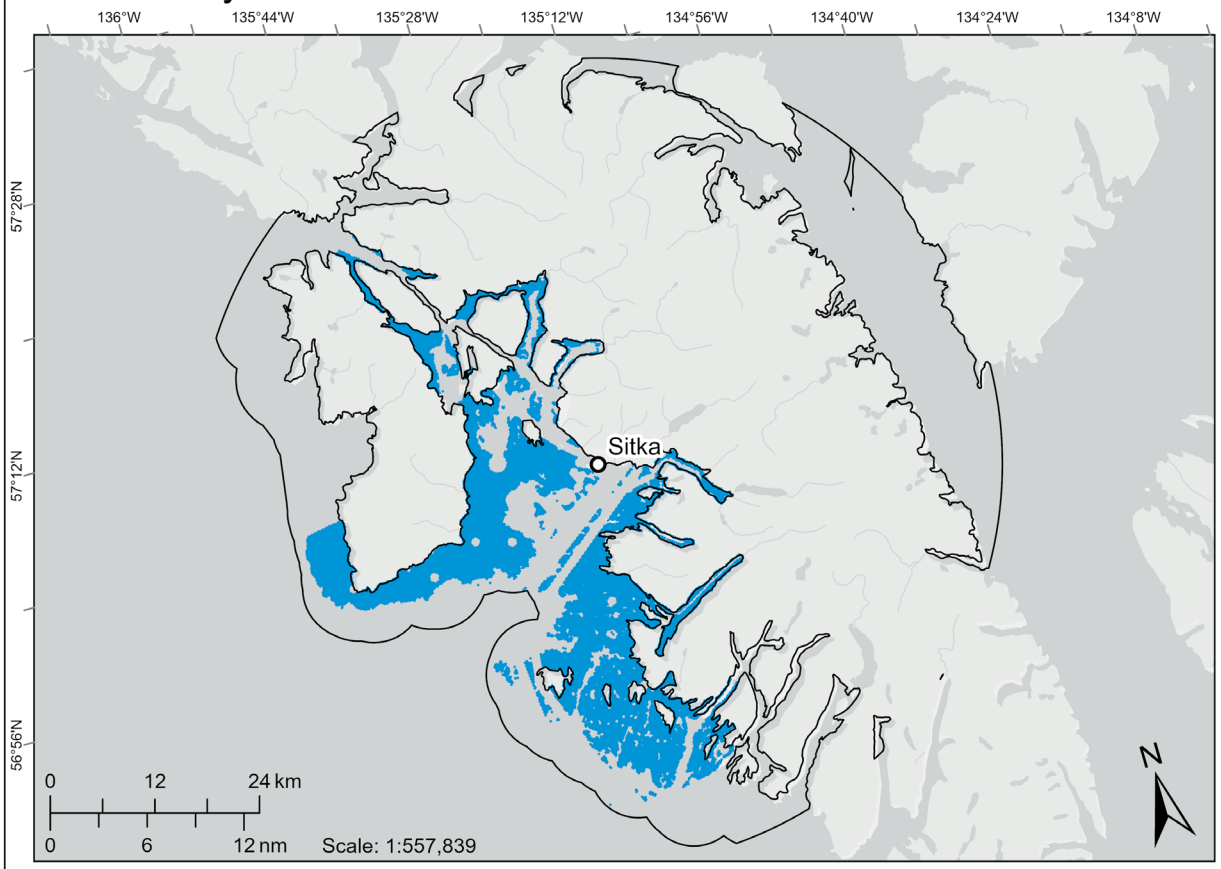
Submodel Relative Suitability

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- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Sitka Study Area



Coastal Populated Places: NOAA OCM (2024)

National Security

- Coastal Populated Places
- Final AOA Study Areas

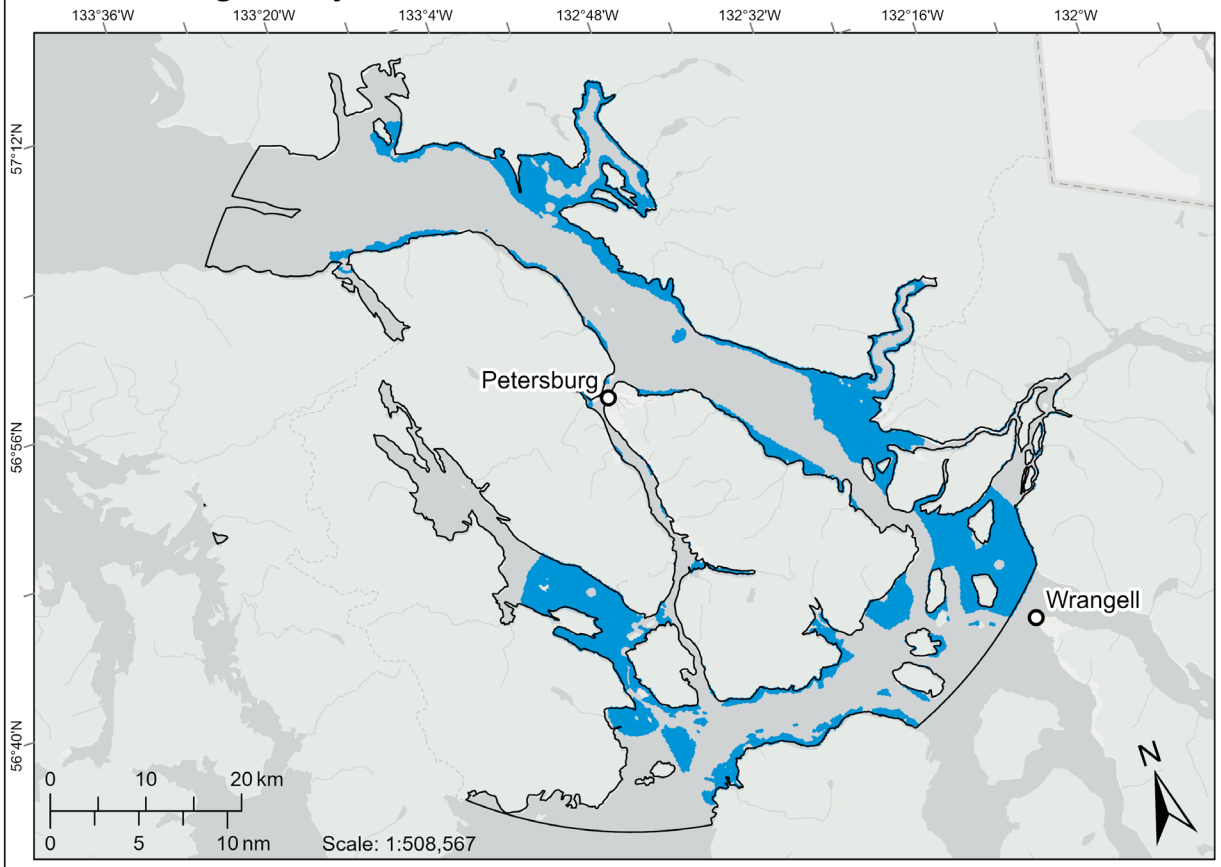
Submodel Relative Suitability

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- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)

National Security

- Coastal Populated Places
- Final AOA Study Areas

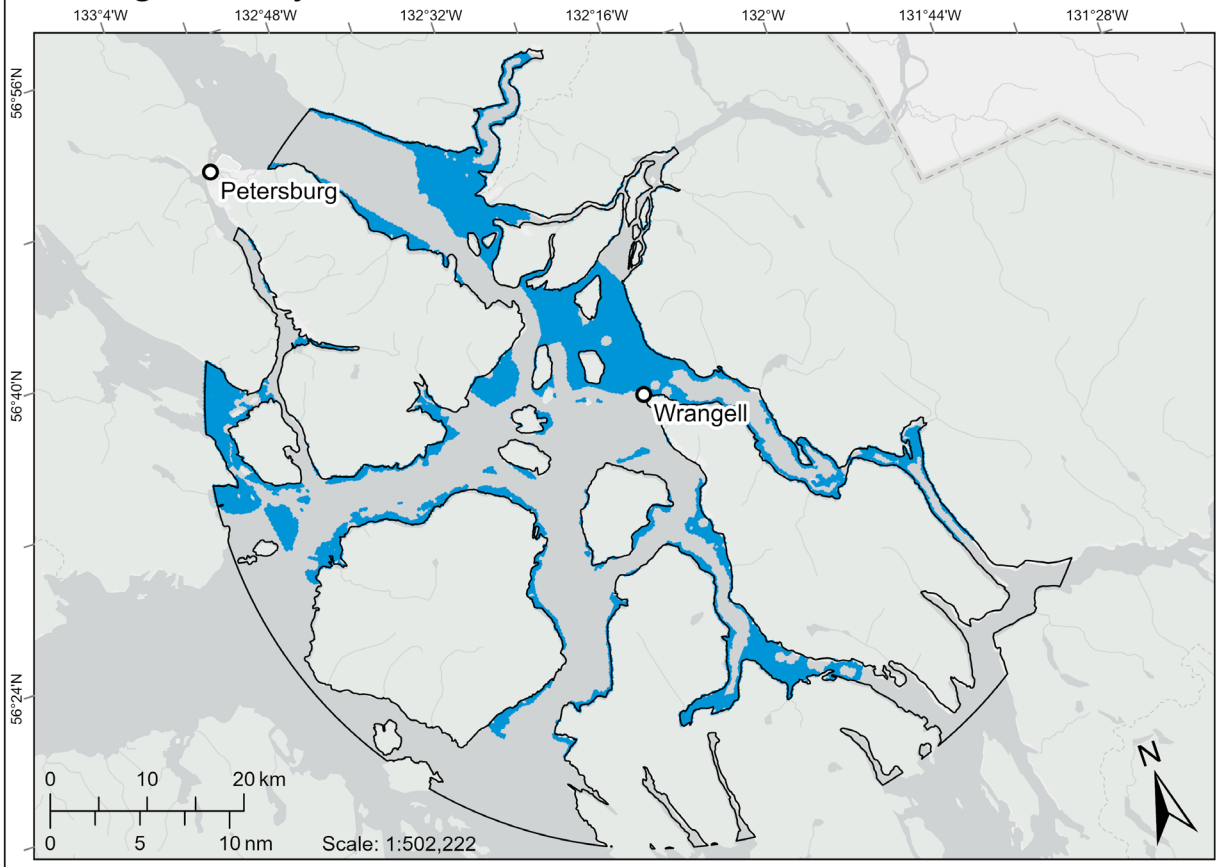
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Wrangell Study Area



Coastal Populated Places: NOAA OCM (2024)

National Security

- Coastal Populated Places
- Final AOA Study Areas

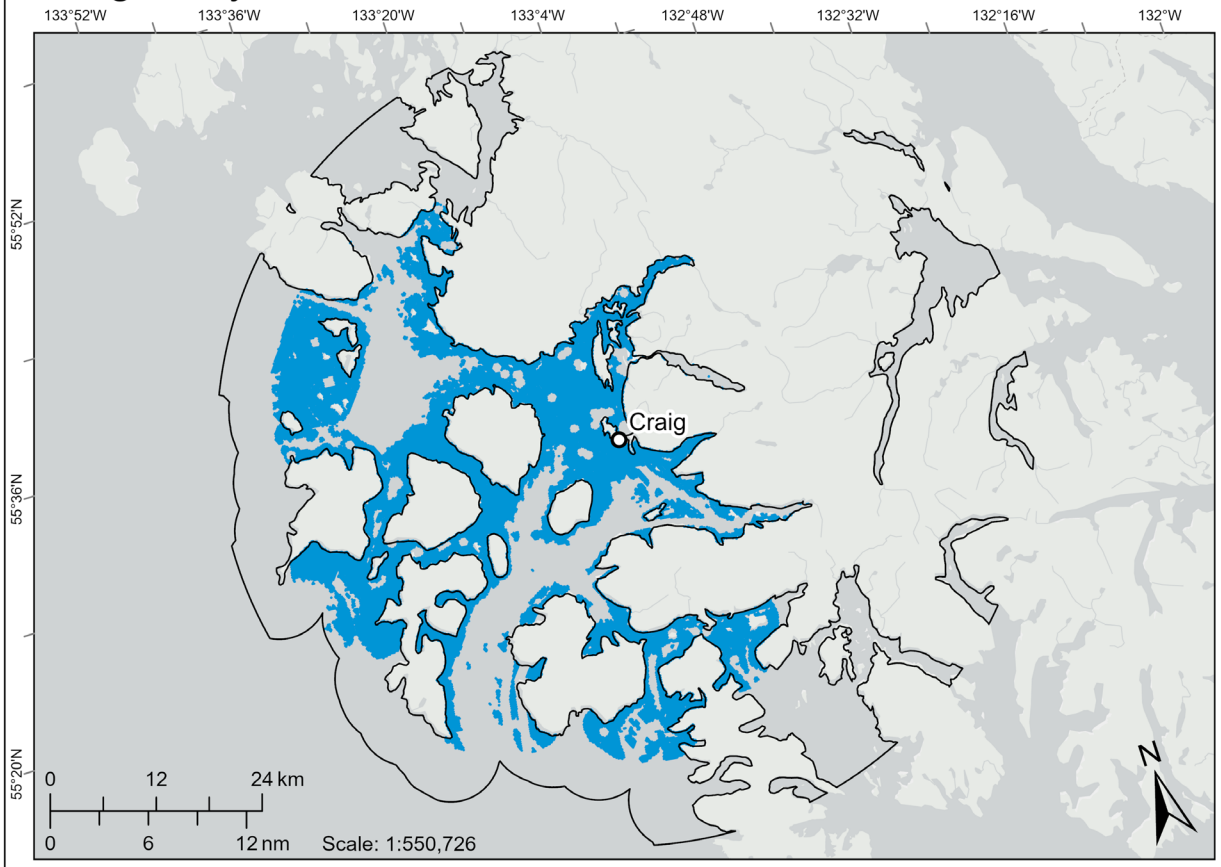
Submodel Relative Suitability

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- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)

National Security

- Coastal Populated Places
- Final AOA Study Areas

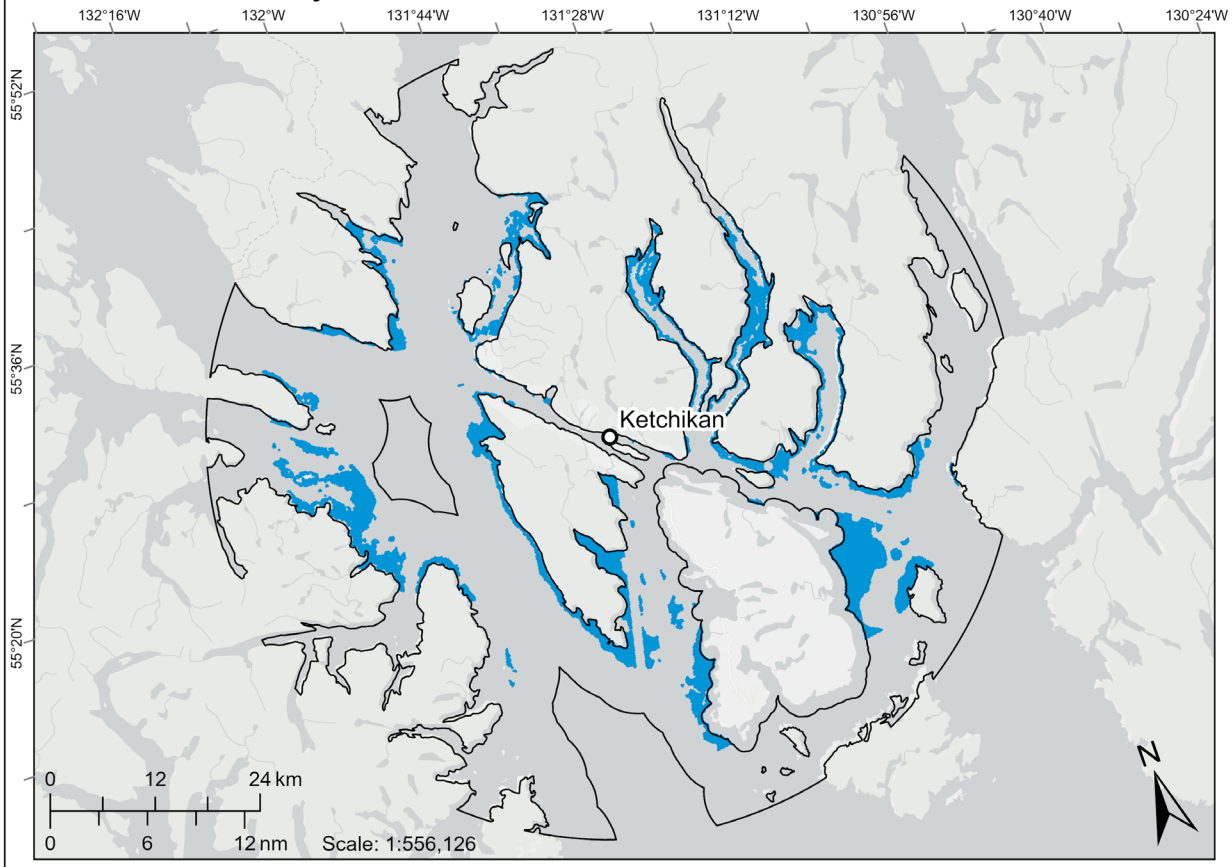
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)

National Security

- Coastal Populated Places
- Final AOA Study Areas

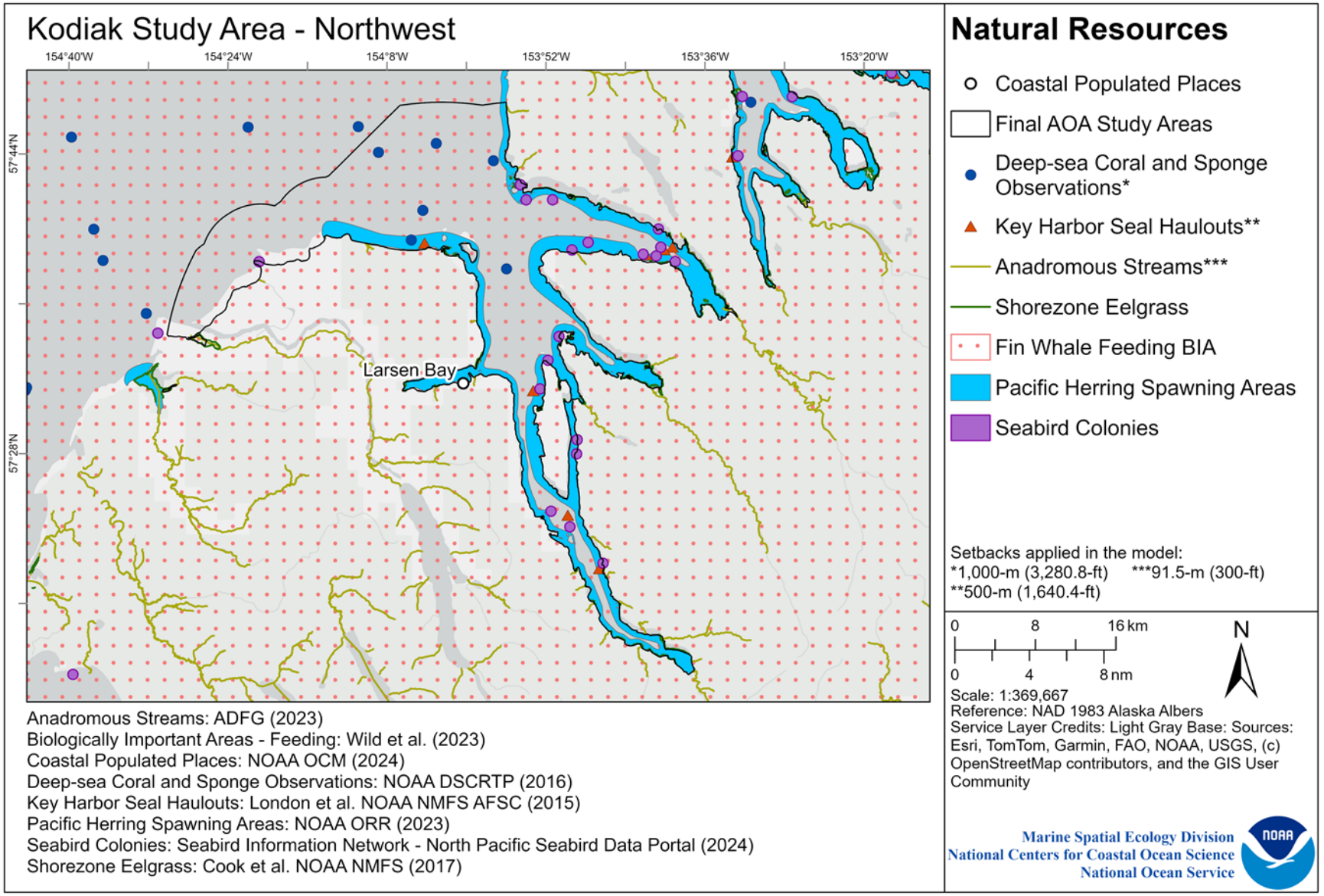
Submodel Relative Suitability

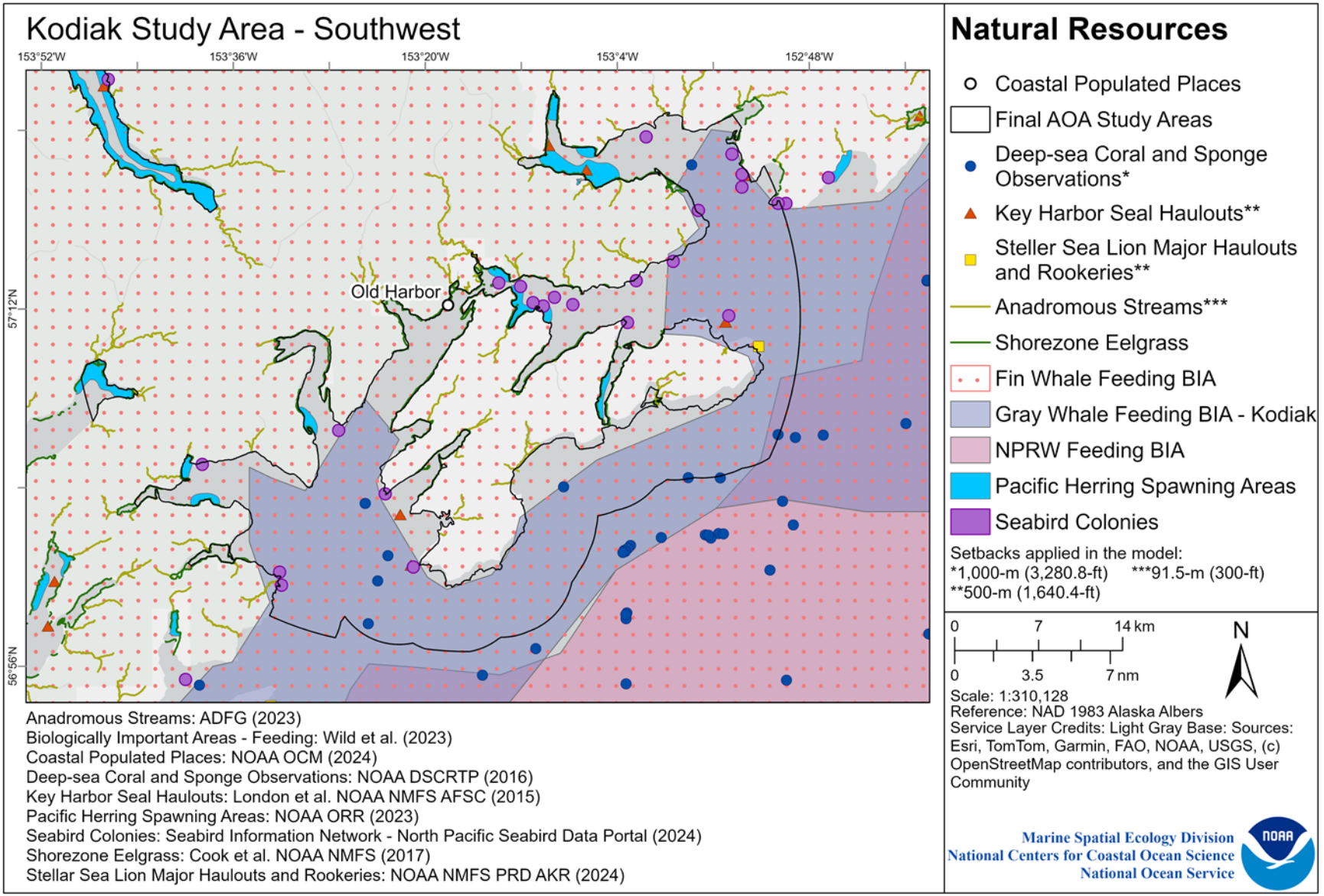
- Low
- Moderately Low
- Moderate
- Moderately High
- High

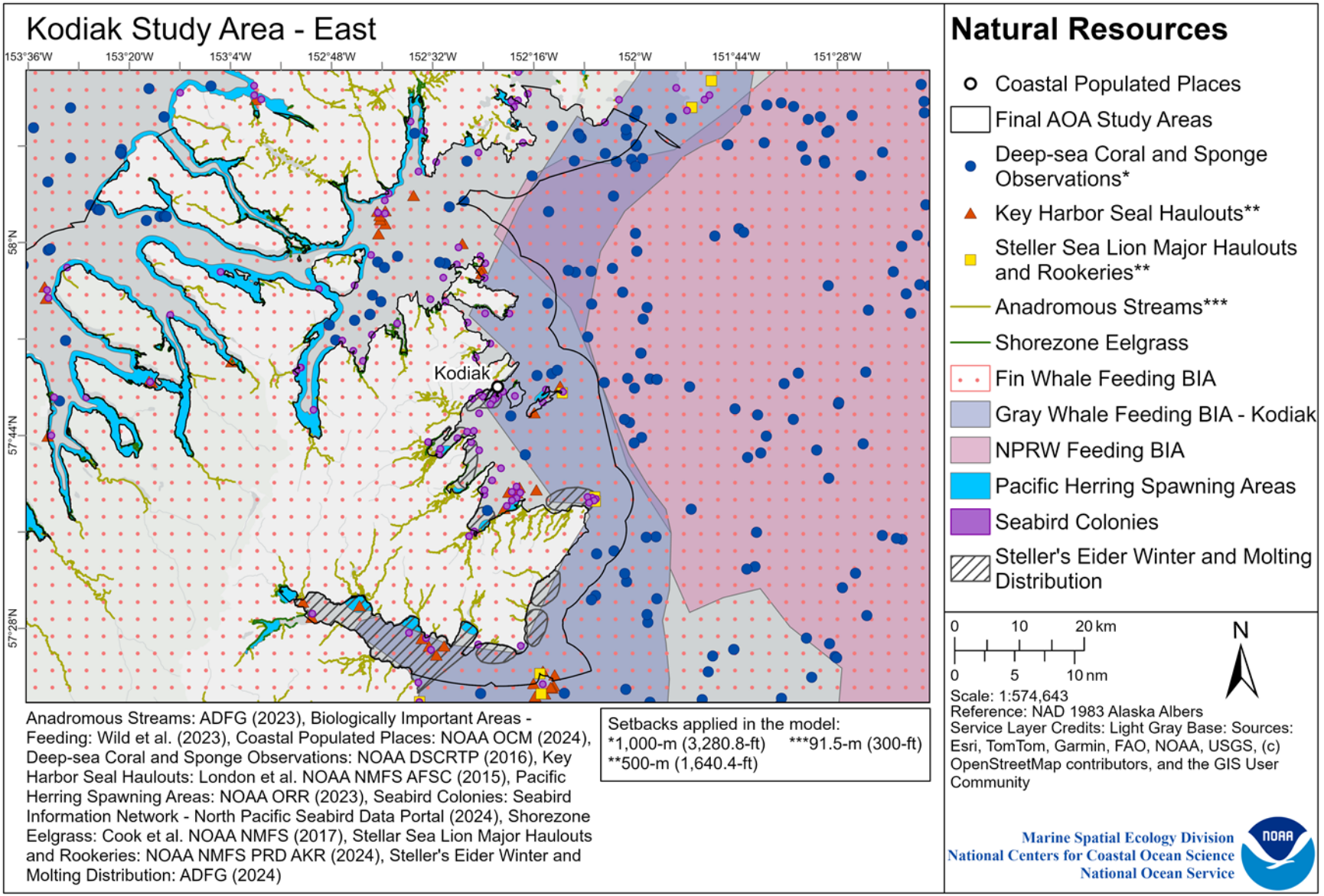
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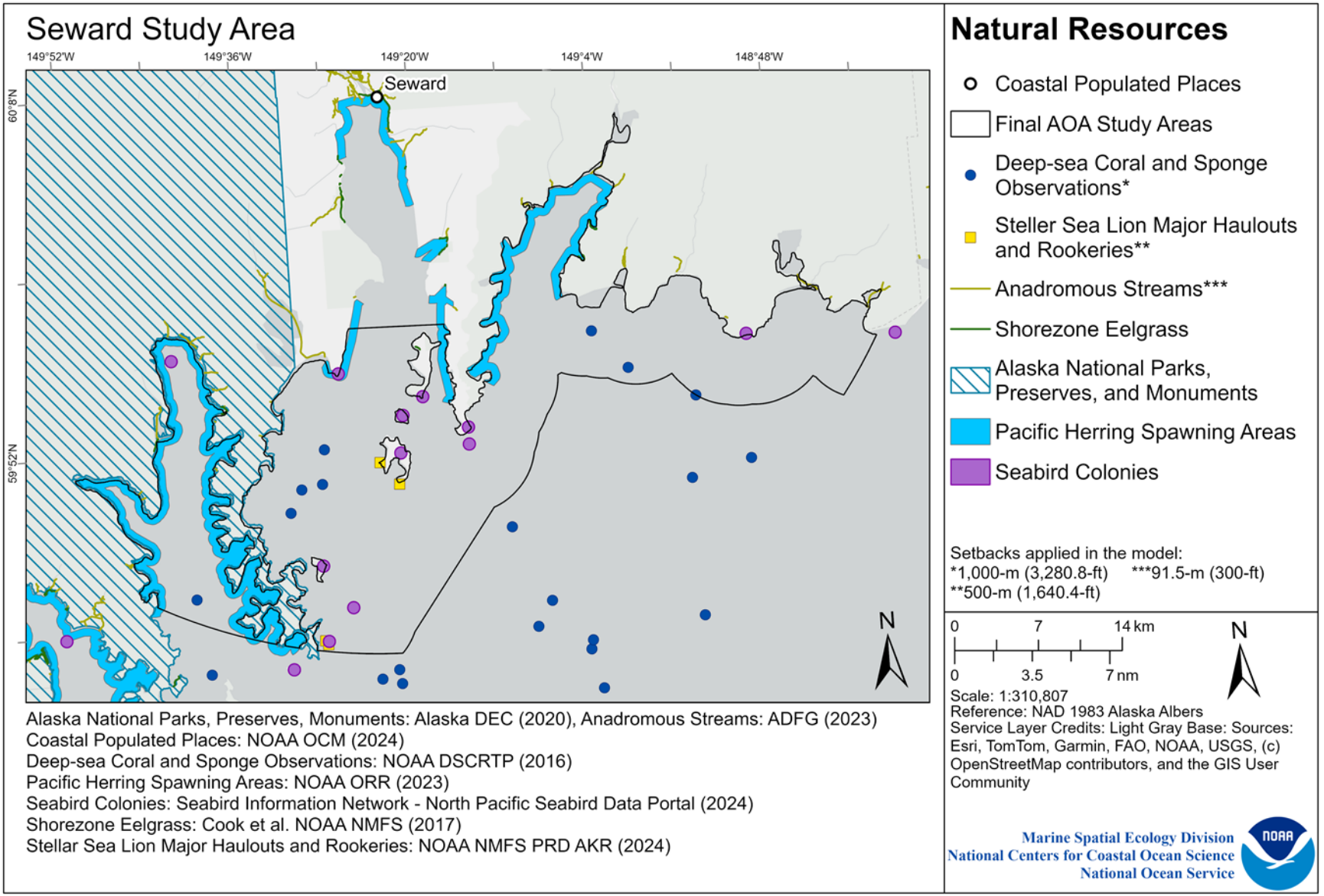
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National Centers for Coastal Ocean Science
National Ocean Service

Natural Resources Submodel Maps

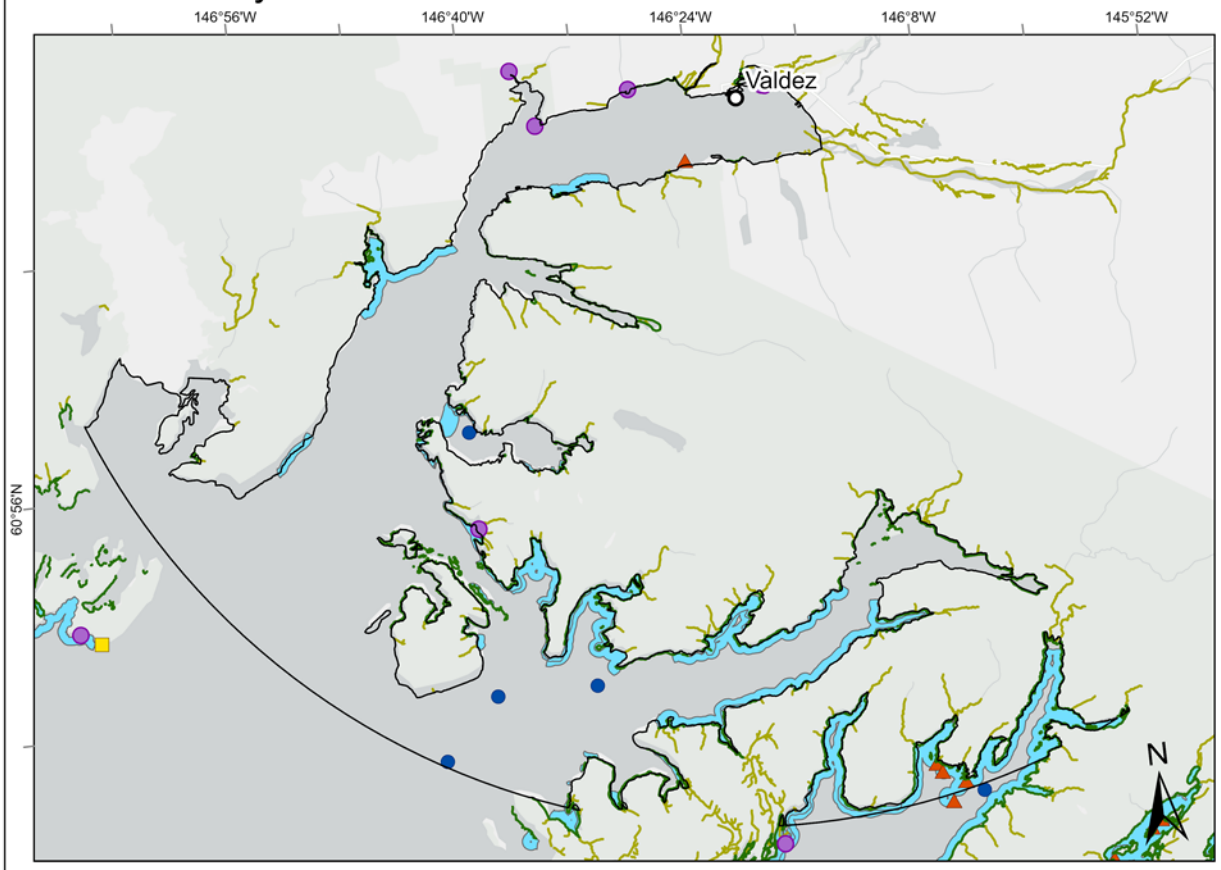



Kodiak Study Area - Southwest
153°52'W
153°36'W
153°20'W
153°4'W
152°48'W
57°12'N
56°56'N
Old Harbor
Natural Resources
Coastal Populated Places
Final AOA Study Areas
Deep-sea Coral and Sponge Observations*
Key Harbor Seal Haulouts**
Steller Sea Lion Major Haulouts and Rookeries**
Anadromous Streams***
Shorezone Eelgrass
Fin Whale Feeding BIA
Gray Whale Feeding BIA - Kodiak
NPRW Feeding BIA
Pacific Herring Spawning Areas
Seabird Colonies
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
0 7 14 km
0 3.5 7 nm
N
Scale: 1:310,128
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Anadromous Streams: ADFG (2023)
Biologically Important Areas - Feeding: Wild et al. (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
Natural Resources
Coastal Populated Places
Final AOA Study Areas
Deep-sea Coral and Sponge Observations*
Key Harbor Seal Haulouts**
Steller Sea Lion Major Haulouts and Rookeries**
Anadromous Streams***
Shorezone Eelgrass
Fin Whale Feeding BIA
Gray Whale Feeding BIA - Kodiak
NPRW Feeding BIA
Pacific Herring Spawning Areas
Seabird Colonies
Steller's Eider Winter and Molting Distribution
0 10 20 km
0 5 10 nm
N
Scale: 1:574,643
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Anadromous Streams: ADFG (2023), Biologically Important Areas - Feeding: Wild et al. (2023), Coastal Populated Places: NOAA OCM (2024), Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016), Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015), Pacific Herring Spawning Areas: NOAA ORR (2023), Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024), Shorezone Eelgrass: Cook et al. NOAA NMFS (2017), Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024), Steller's Eider Winter and Molting Distribution: ADFG (2024)
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Seward Study Area
149°52'W
149°36'W
149°20'W
149°4'W
148°48'W
60°8'N
59°52'N
Seward
N
Natural Resources
Coastal Populated Places
Final AOA Study Areas
Deep-sea Coral and Sponge Observations*
Steller Sea Lion Major Haulouts and Rookeries**
Anadromous Streams***
Shorezone Eelgrass
Alaska National Parks, Preserves, and Monuments
Pacific Herring Spawning Areas
Seabird Colonies
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
0 7 14 km
0 3.5 7 nm
N
Scale: 1:310,807
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Alaska National Parks, Preserves, Monuments: Alaska DEC (2020), Anadromous Streams: ADFG (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Valdez Study Area



Anadromous Streams: ADFG (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)

Natural Resources

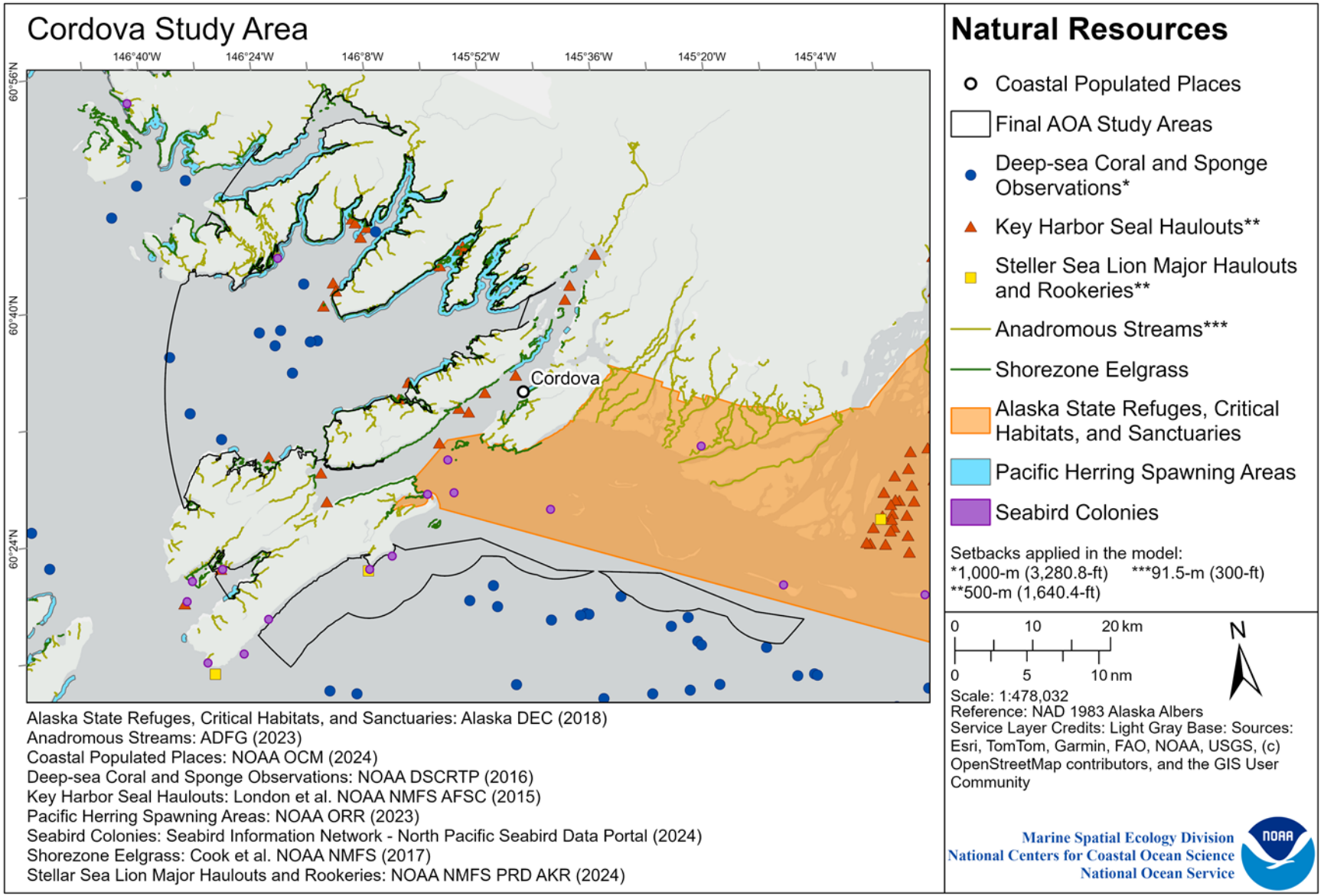
- Coastal Populated Places
- Final AOA Study Areas
- Deep-sea Coral and Sponge Observations*
- Key Harbor Seal Haulouts**
- Steller Sea Lion Major Haulouts and Rookeries**
- Anadromous Streams***
- Shorezone Eelgrass
- Pacific Herring Spawning Areas
- Seabird Colonies

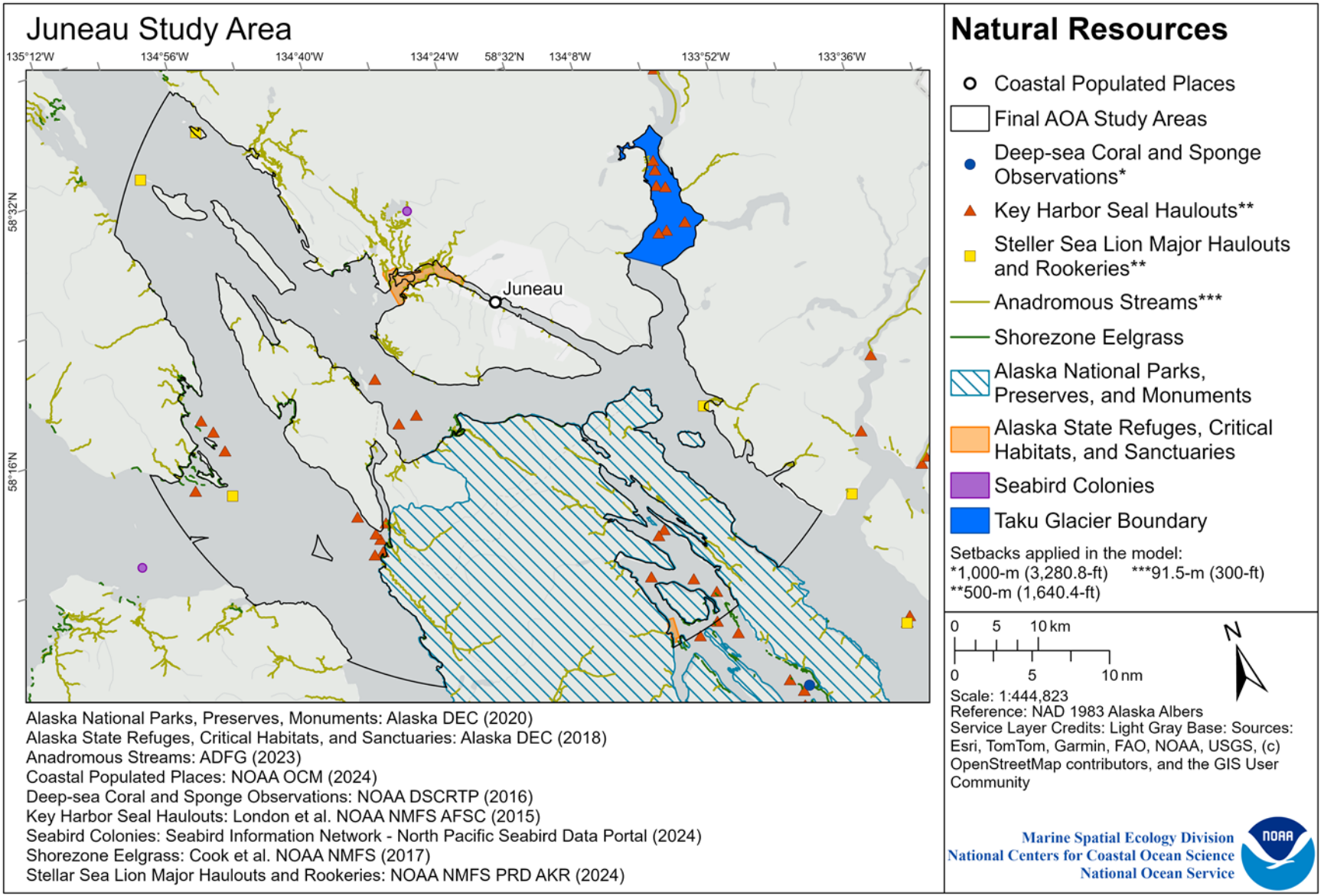
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0 7 14 km
0 3.5 7 nm
N

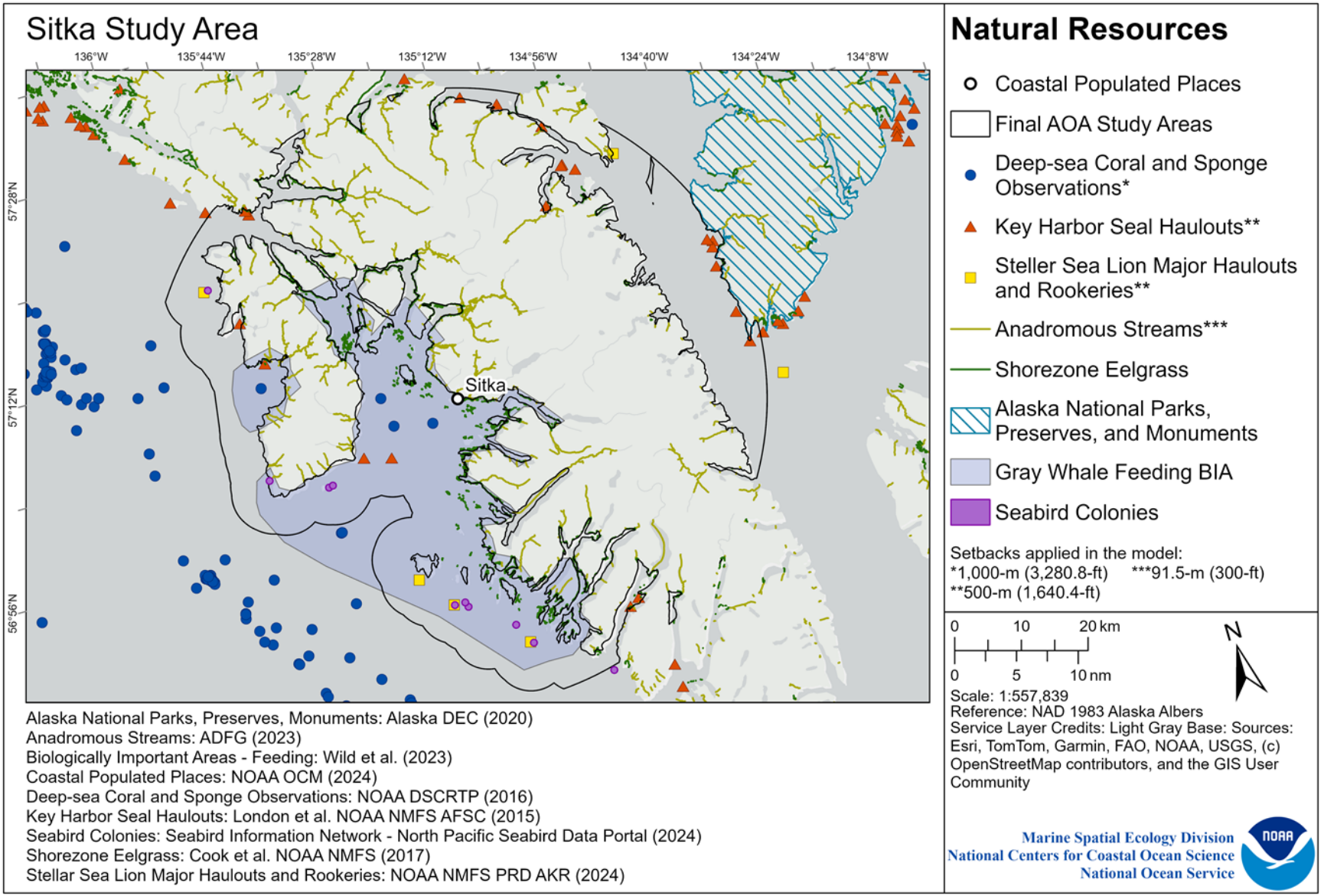
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Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

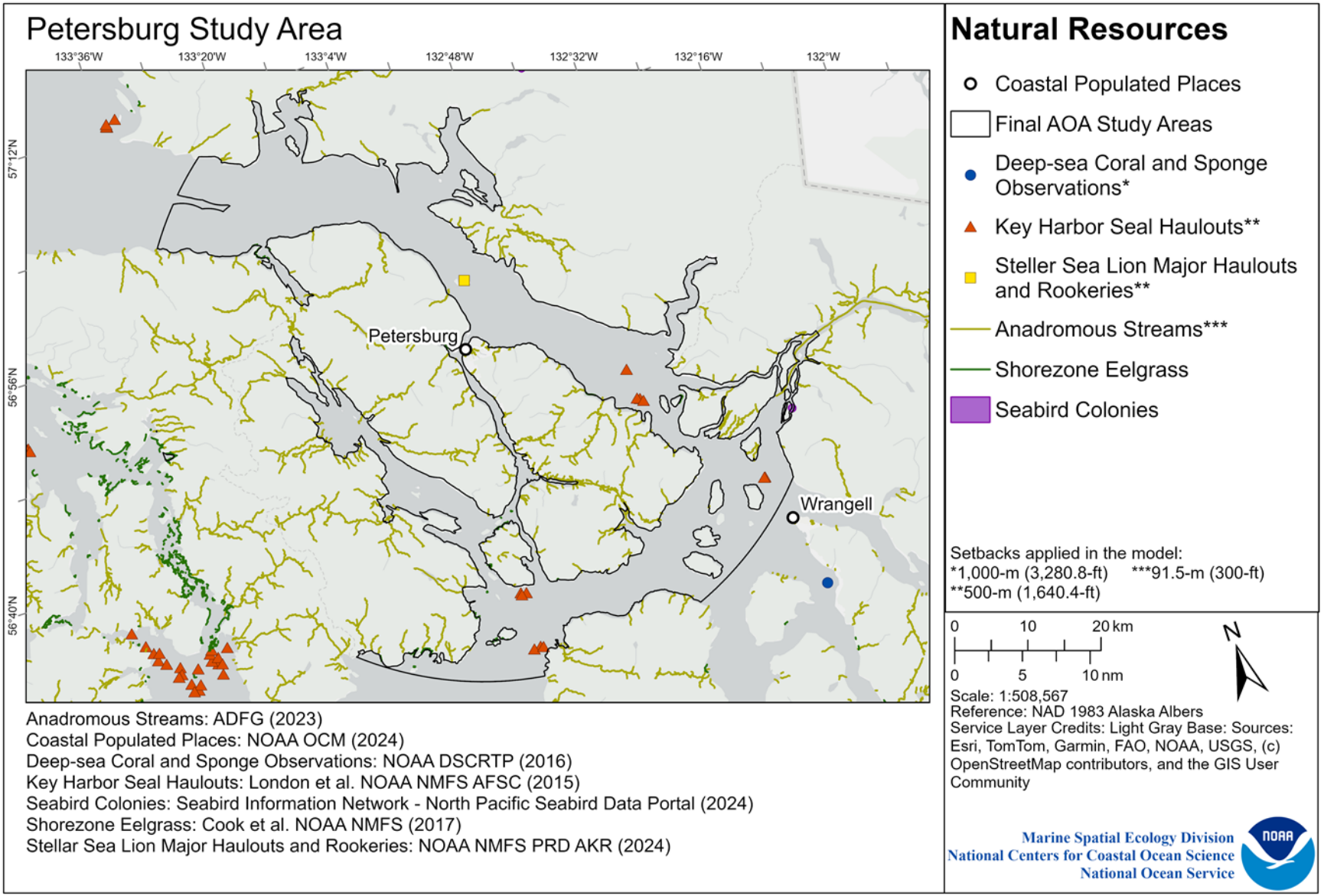
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Cordova Study Area
146°40'W
146°24'W
146°8'W
145°52'W
145°36'W
145°20'W
145°4'W
60°56'N
60°40'N
60°24'N
Cordova
Natural Resources
Coastal Populated Places
Final AOA Study Areas
Deep-sea Coral and Sponge Observations*
Key Harbor Seal Haulouts**
Steller Sea Lion Major Haulouts and Rookeries**
Anadromous Streams***
Shorezone Eelgrass
Alaska State Refuges, Critical Habitats, and Sanctuaries
Pacific Herring Spawning Areas
Seabird Colonies
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
0 10 20 km
0 5 10 nm
N
Scale: 1:478,032
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Alaska State Refuges, Critical Habitats, and Sanctuaries: Alaska DEC (2018)
Anadromous Streams: ADFG (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

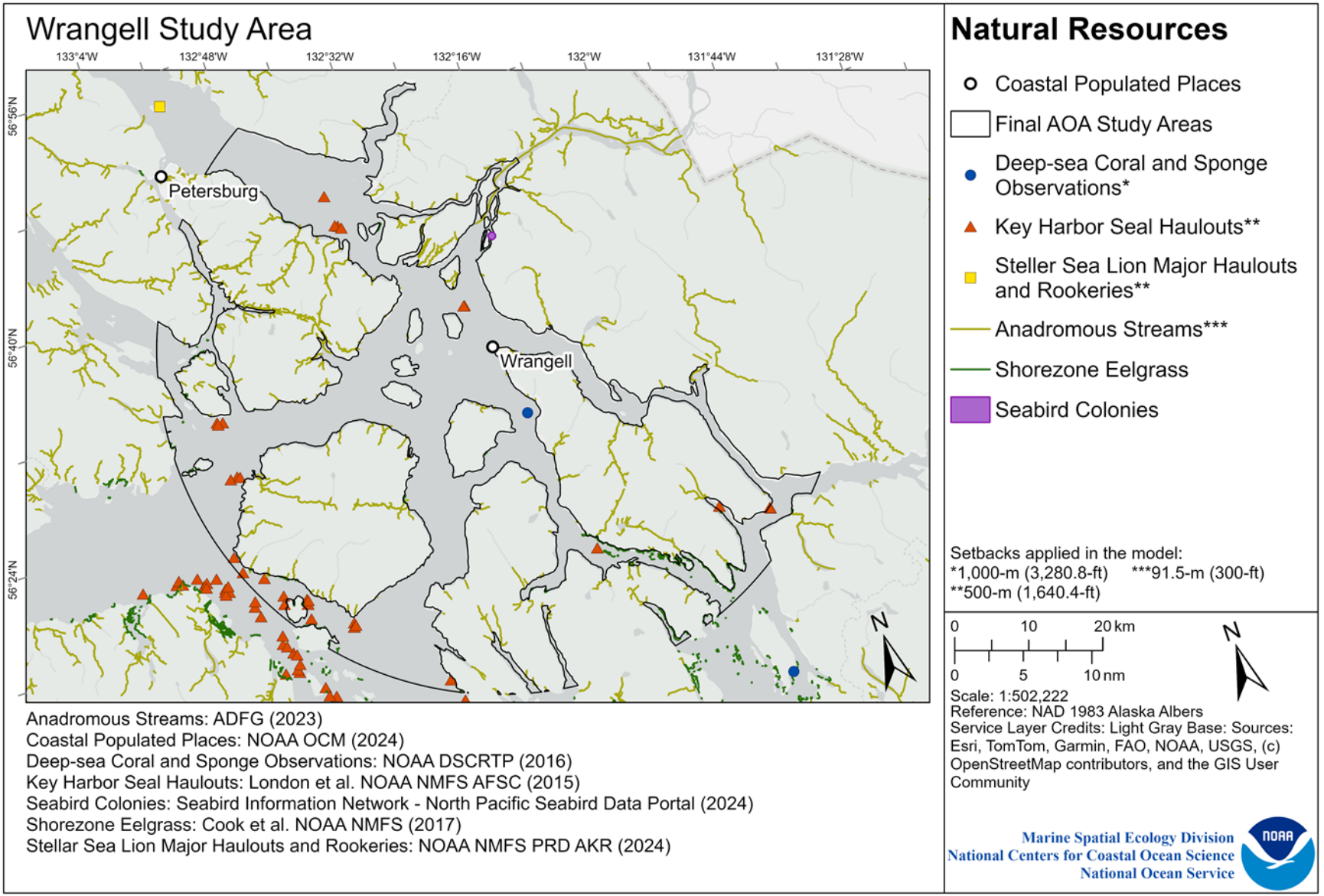


Alaska National Parks, Preserves, Monuments: Alaska DEC (2020)
Alaska State Refuges, Critical Habitats, and Sanctuaries: Alaska DEC (2018)
Anadromous Streams: ADFG (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)


Sitka Study Area
136°W
135°44'W
135°28'W
135°12'W
134°56'W
134°40'W
134°24'W
134°8'W
57°28'N
57°12'N
56°56'N
Sitka
Natural Resources
Coastal Populated Places
Final AOA Study Areas
Deep-sea Coral and Sponge Observations*
Key Harbor Seal Haulouts**
Steller Sea Lion Major Haulouts and Rookeries**
Anadromous Streams***
Shorezone Eelgrass
Alaska National Parks, Preserves, and Monuments
Gray Whale Feeding BIA
Seabird Colonies
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
0 10 20 km
0 5 10 nm
N
Scale: 1:557,839
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Alaska National Parks, Preserves, Monuments: Alaska DEC (2020)
Anadromous Streams: ADFG (2023)
Biologically Important Areas - Feeding: Wild et al. (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

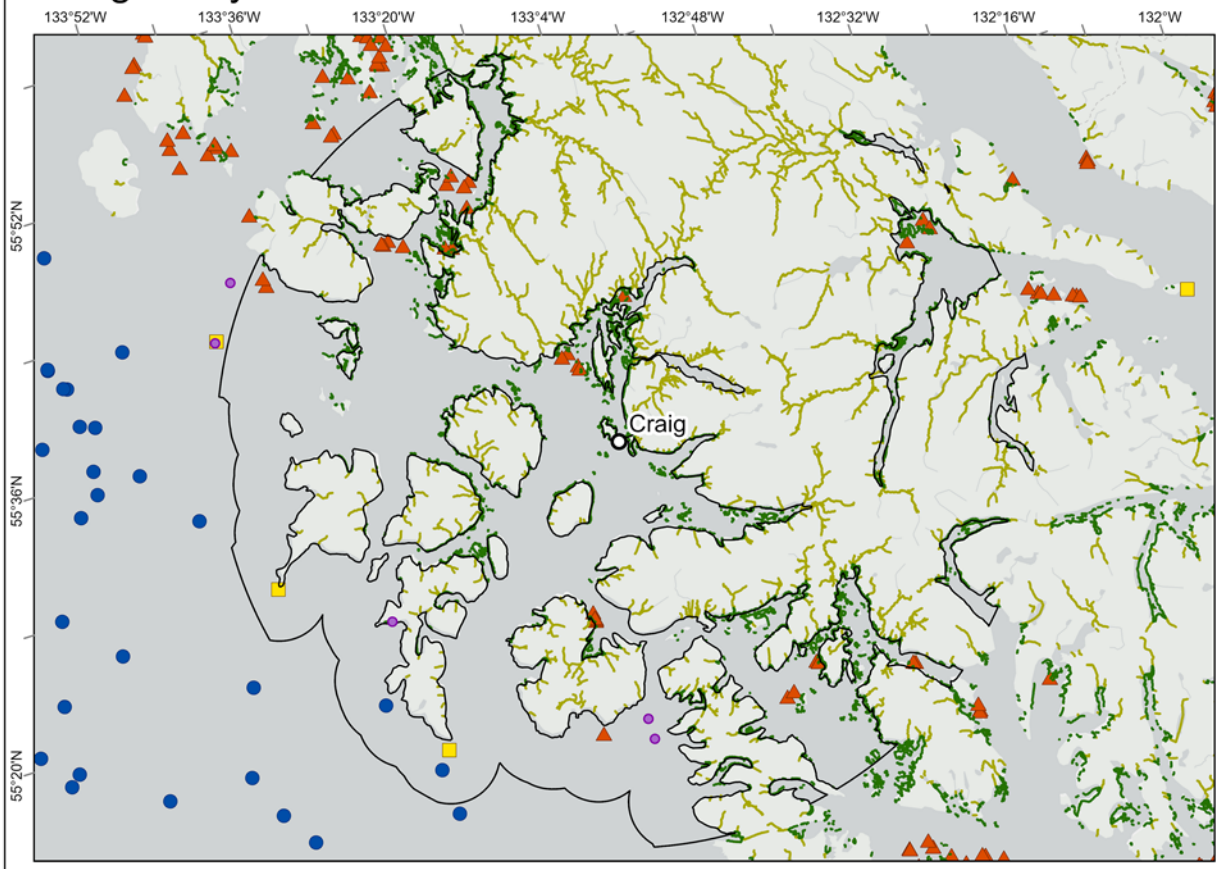


Anadromous Streams: ADFG (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)



Anadromous Streams: ADFG (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)

Craig Study Area



Anadromous Streams: ADFG (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)

Natural Resources

- Coastal Populated Places
- Final AOA Study Areas
- Deep-sea Coral and Sponge Observations*
- Key Harbor Seal Haulouts**
- Steller Sea Lion Major Haulouts and Rookeries**
- Anadromous Streams***
- Shorezone Eelgrass
- Seabird Colonies

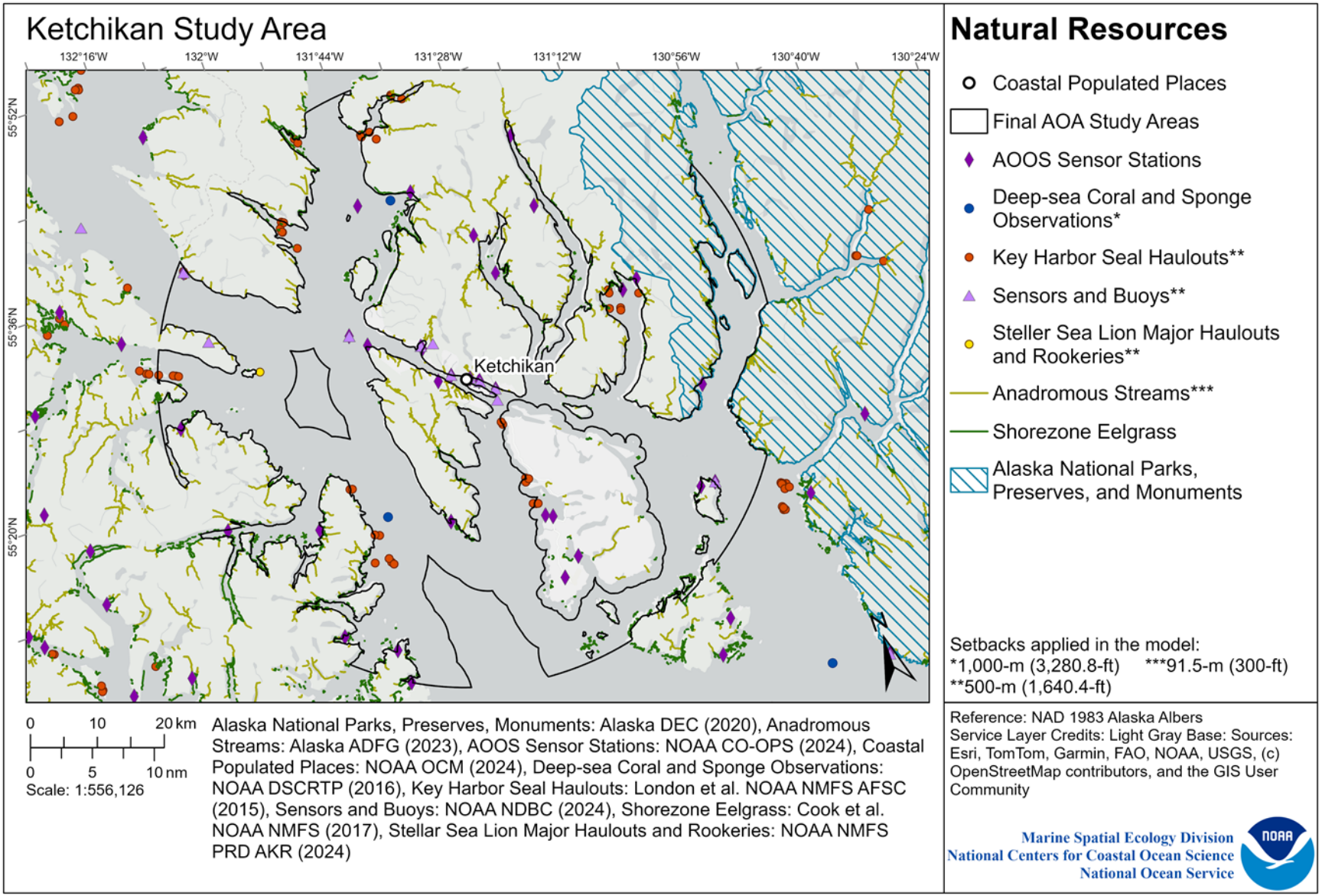
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)

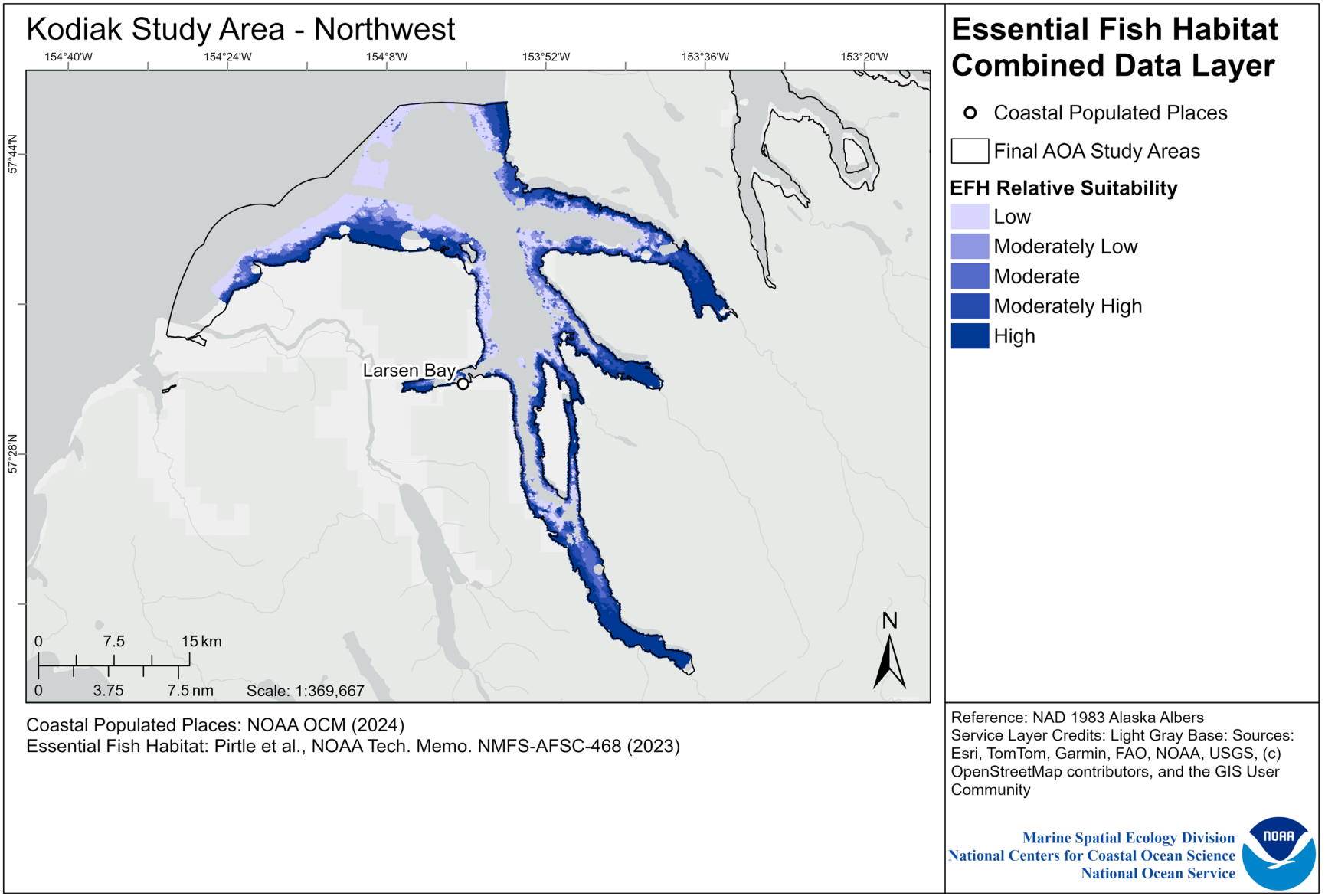
0 10 20 km
0 5 10 nm

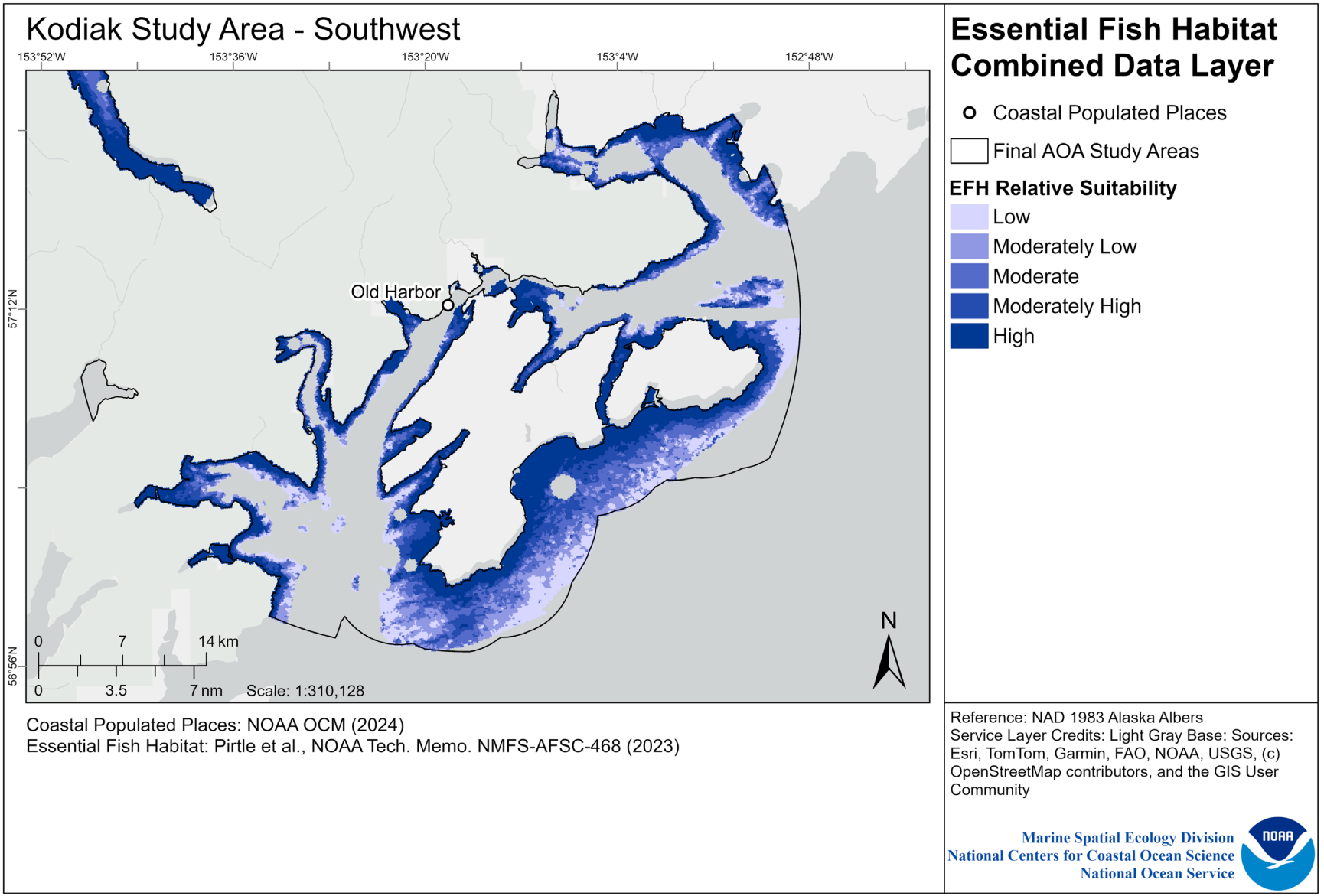
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Scale: 1:550,726
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Ketchikan Study Area
132°16'W
132°W
131°44'W
131°28'W
131°12'W
130°56'W
130°40'W
130°24'W
55°52'N
55°36'N
55°20'N
Ketchikan
Natural Resources
Coastal Populated Places
Final AOA Study Areas
AOOS Sensor Stations
Deep-sea Coral and Sponge Observations*
Key Harbor Seal Haulouts**
Sensors and Buoys**
Steller Sea Lion Major Haulouts and Rookeries**
Anadromous Streams***
Shorezone Eelgrass
Alaska National Parks, Preserves, and Monuments
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
0 10 20 km
0 5 10 nm
Scale: 1:556,126
Alaska National Parks, Preserves, Monuments: Alaska DEC (2020), Anadromous Streams: Alaska ADFG (2023), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016), Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015), Sensors and Buoys: NOAA NDBC (2024), Shorezone Eelgrass: Cook et al. NOAA NMFS (2017), Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

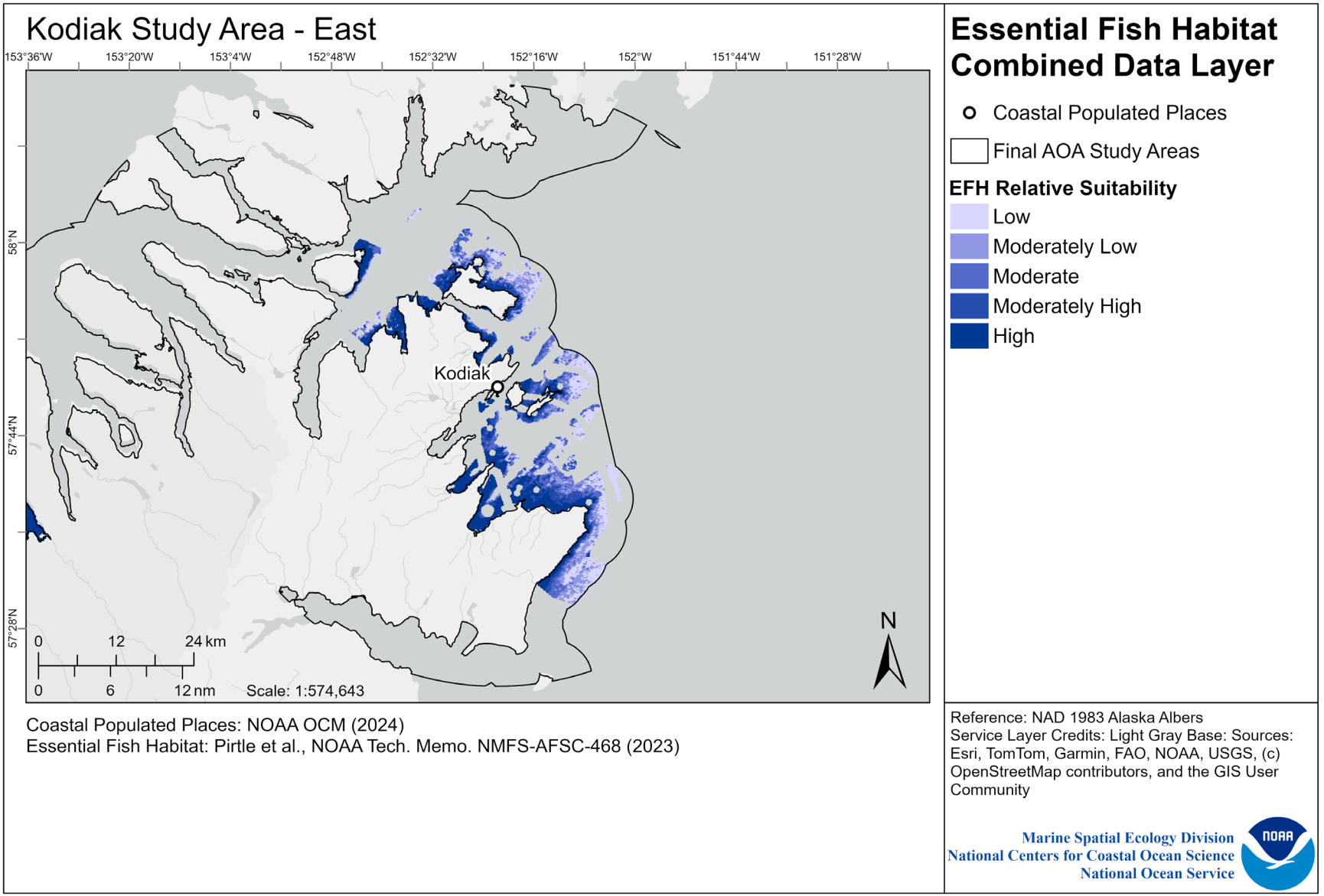

Kodiak Study Area - Northwest
154°40'W
154°24'W
154°8'W
153°52'W
153°36'W
153°20'W
57°44'N
57°28'N
Larsen Bay
0
7.5
15 km
0
3.75
7.5 nm
Scale: 1:369,667
N
Essential Fish Habitat Combined Data Layer
Coastal Populated Places
Final AOA Study Areas
EFH Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA



Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

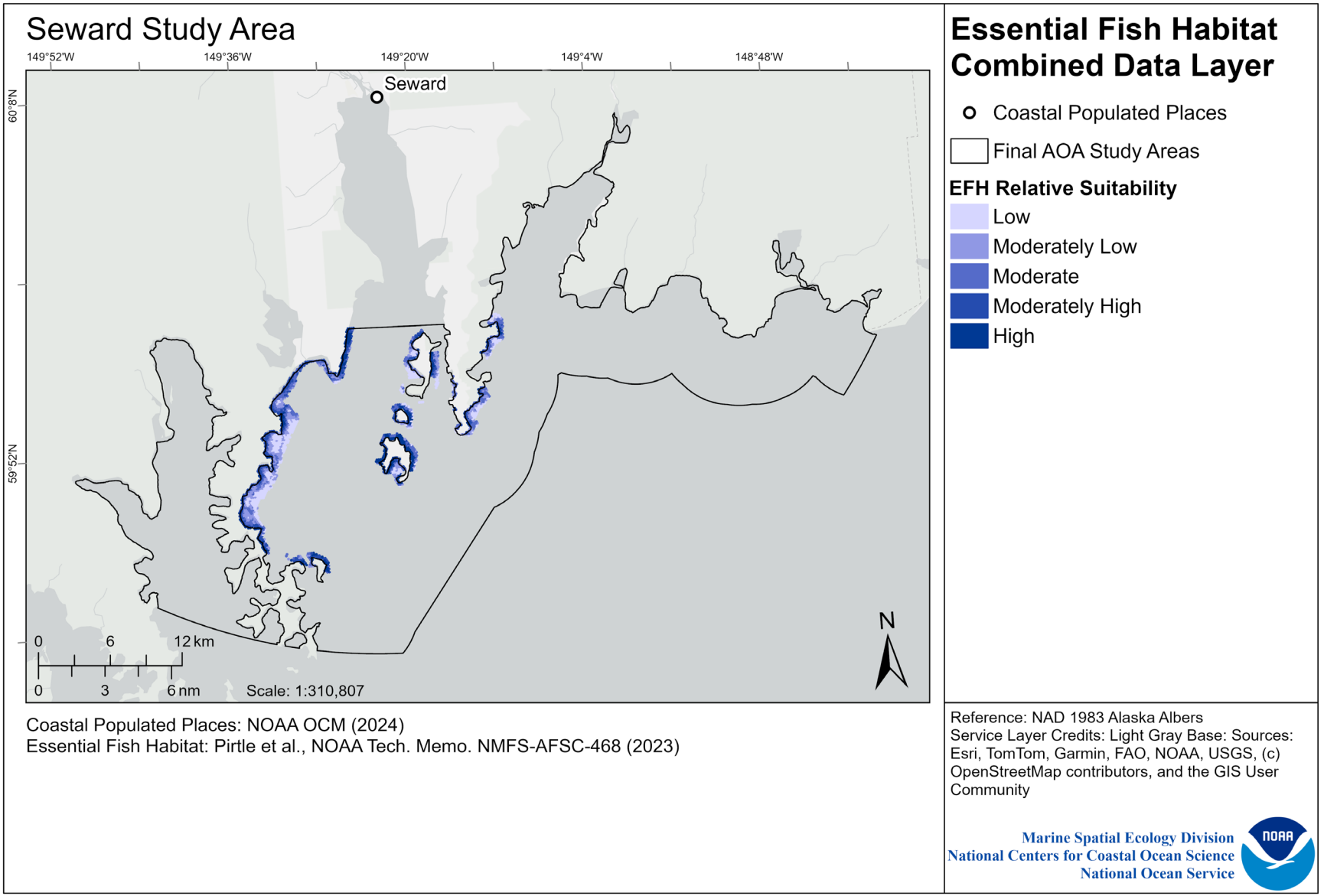
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

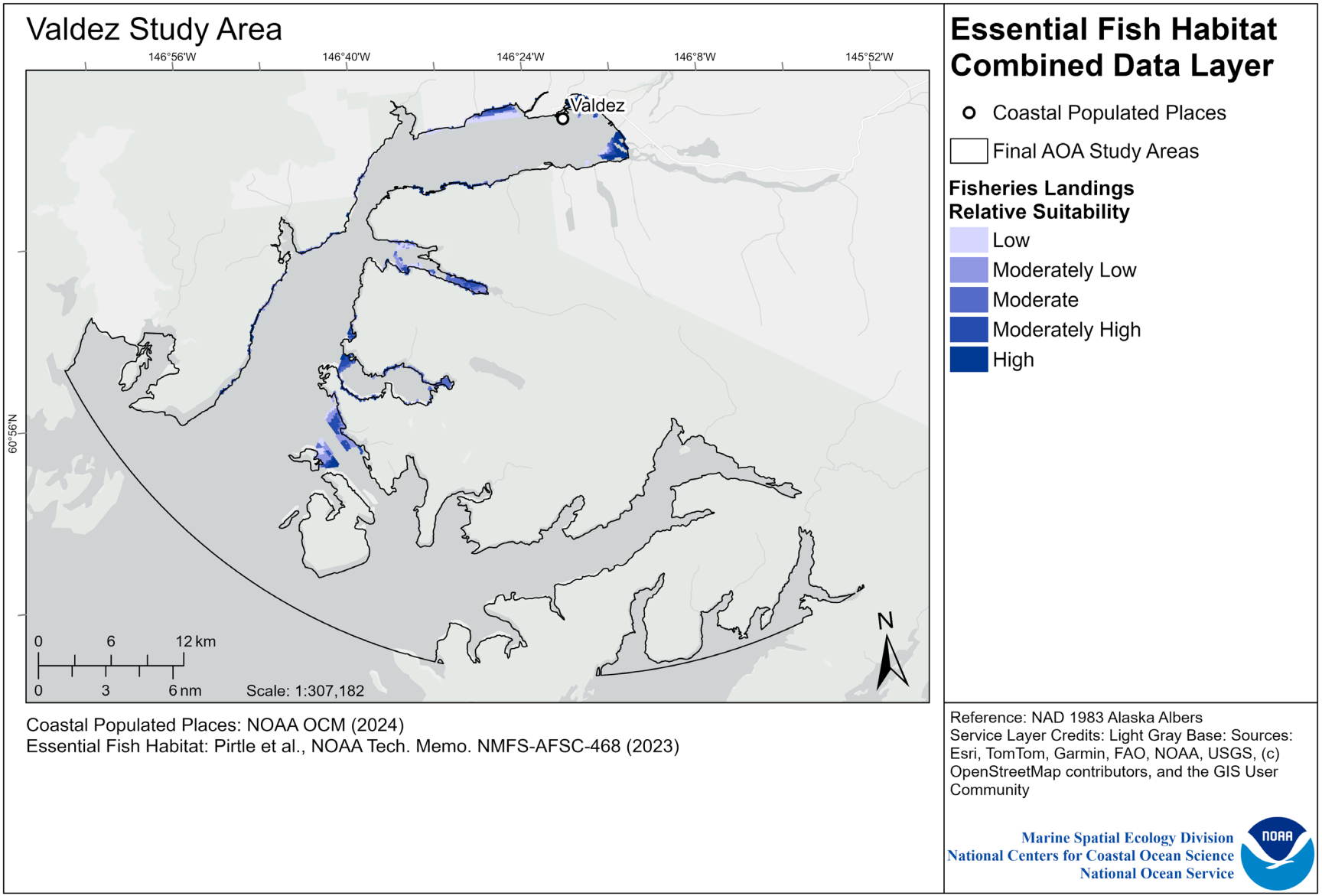
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

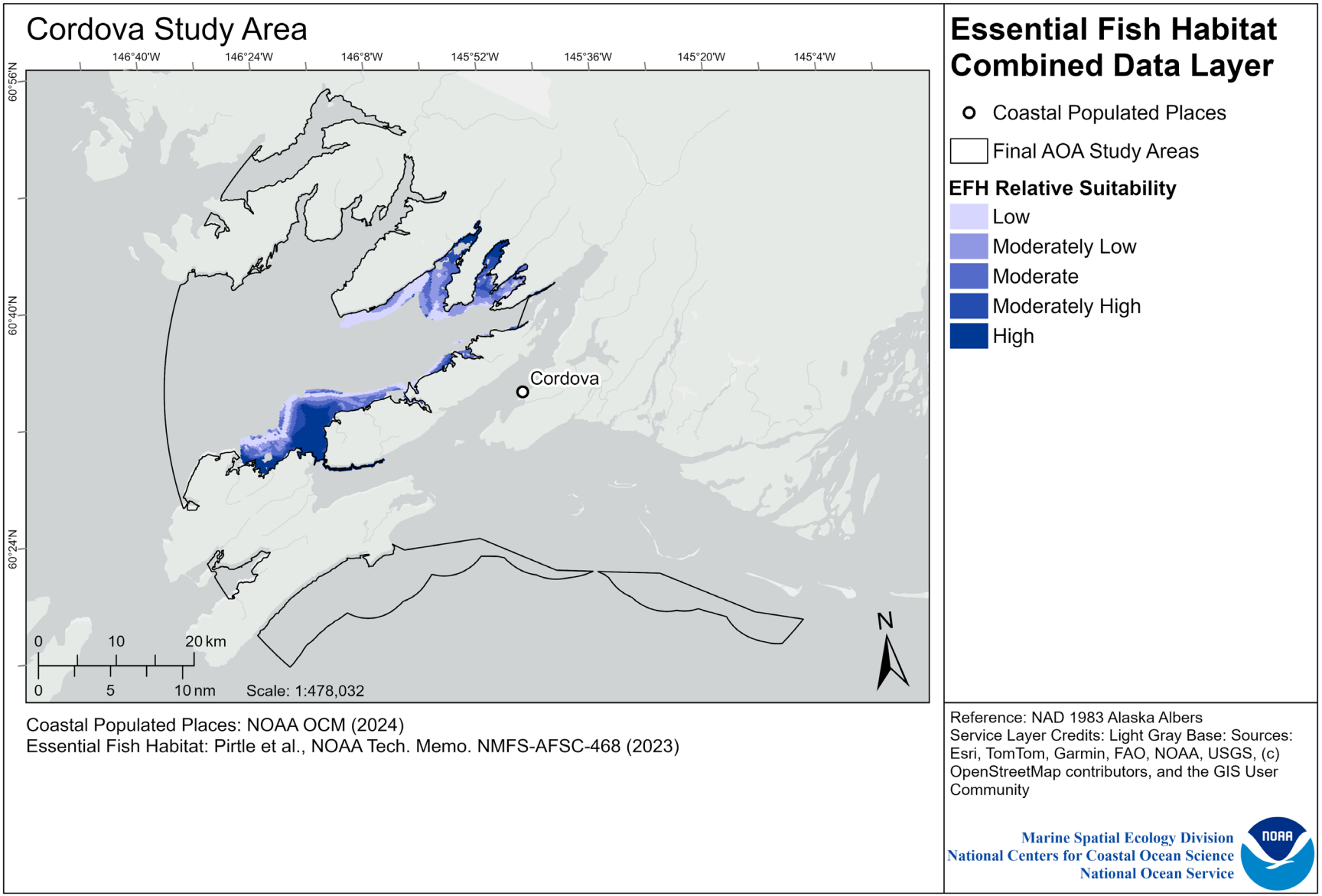
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
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National Ocean Service

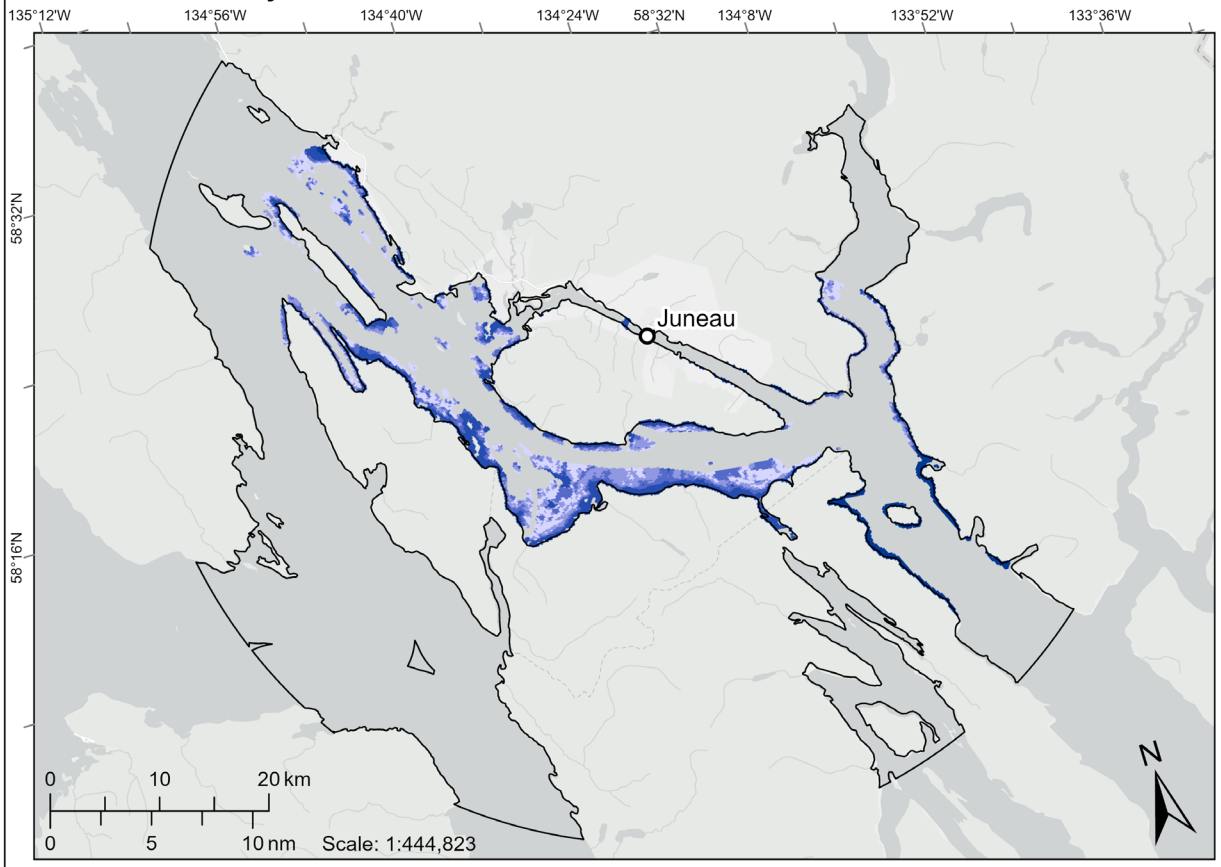


Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Juneau Study Area



Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)

Essential Fish Habitat Combined Data Layer

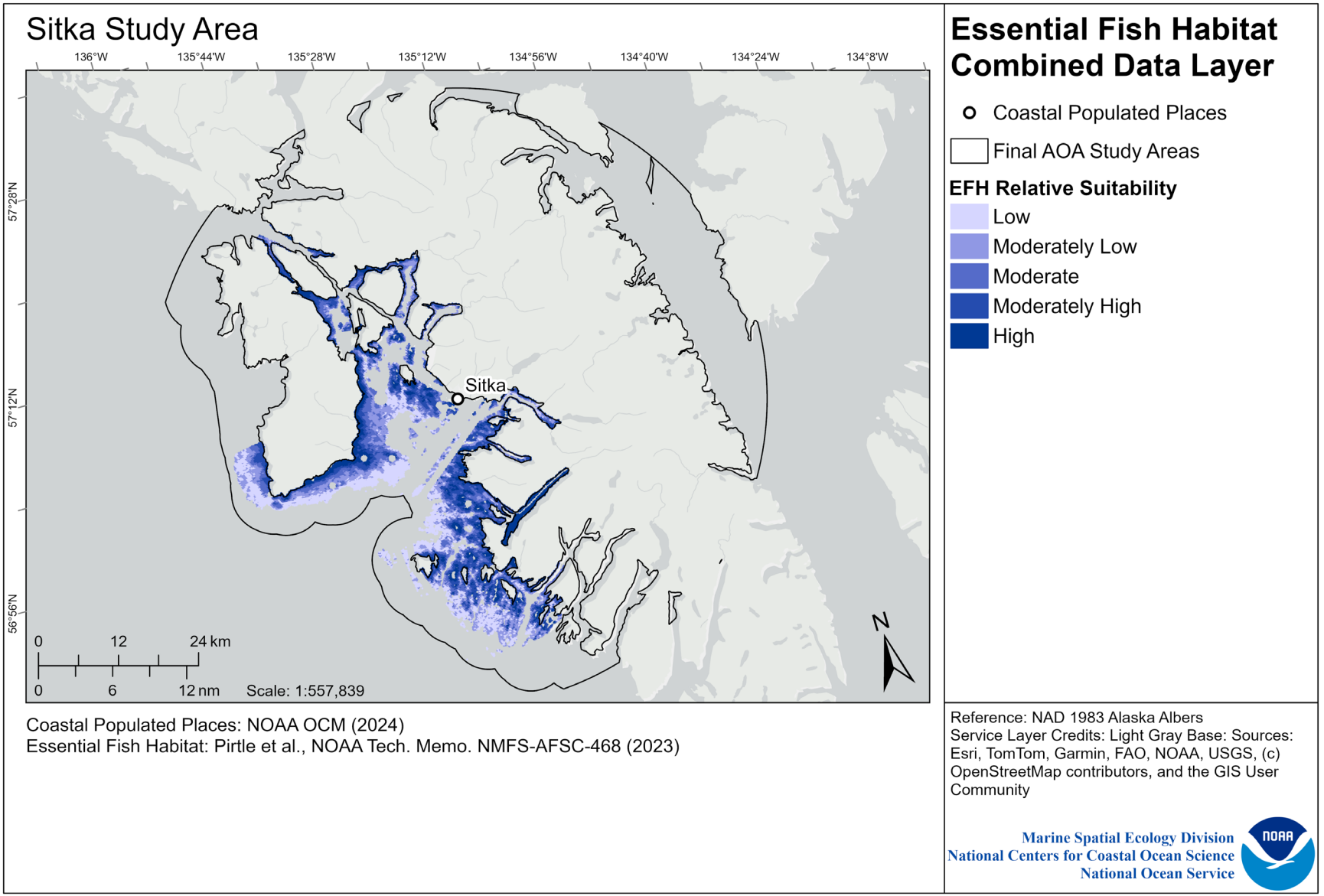
- Coastal Populated Places
- Final AOA Study Areas

EFH Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

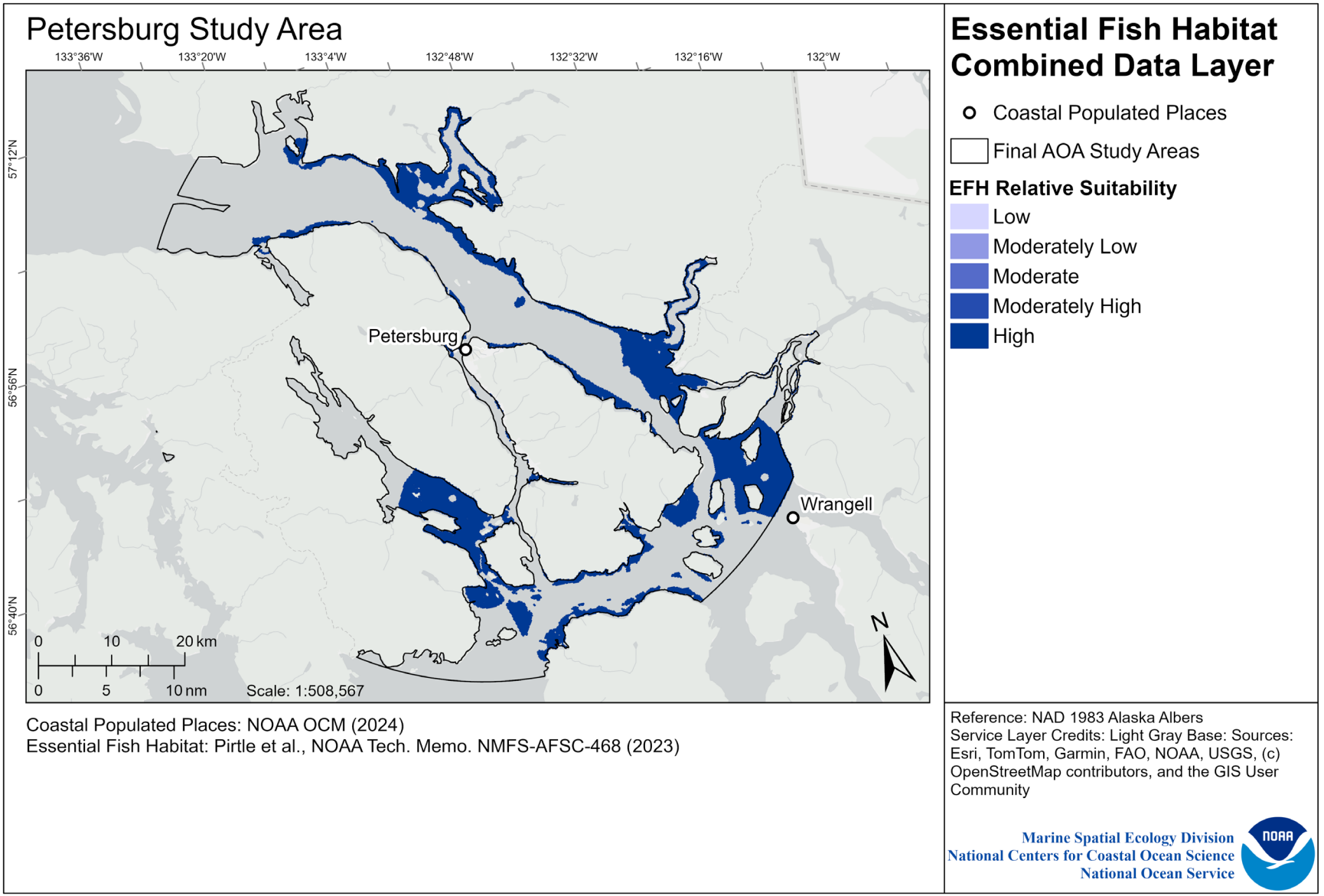
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



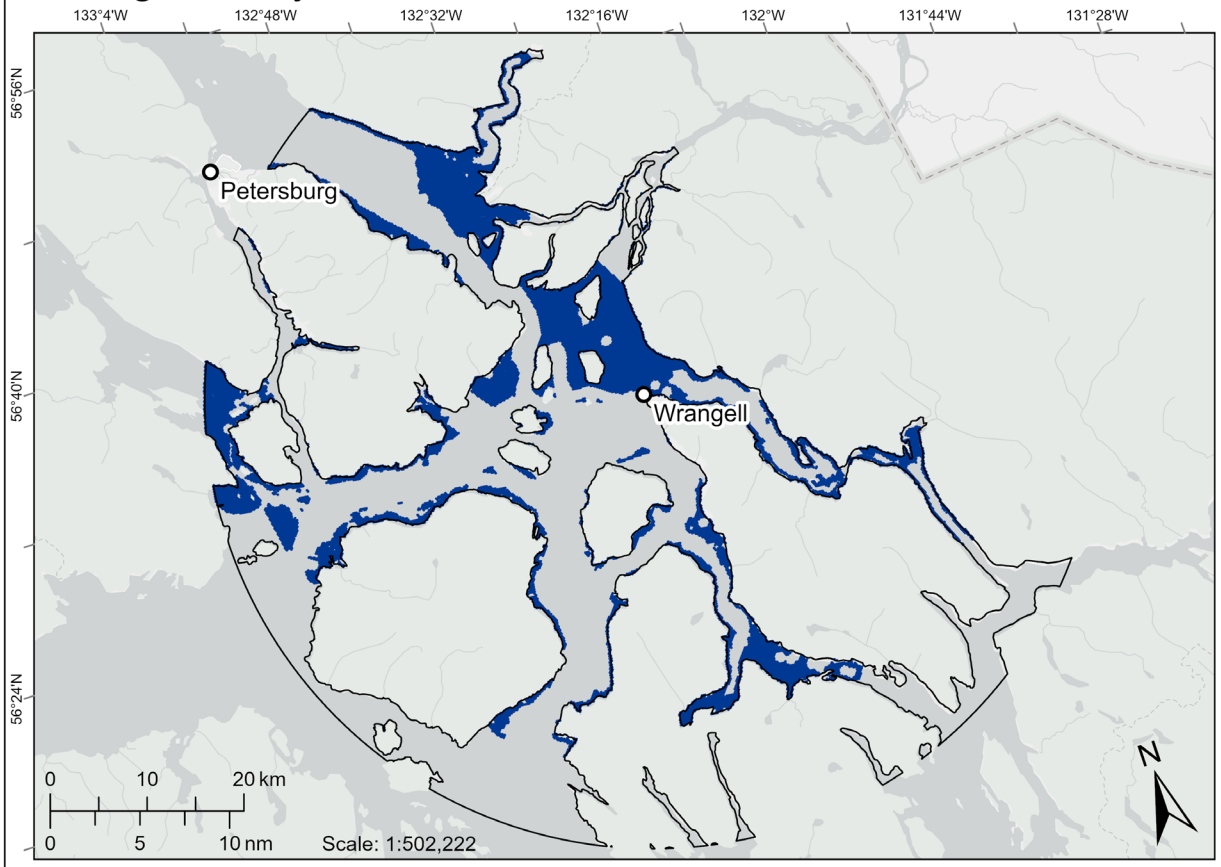
Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service


Petersburg Study Area
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
57°12'N
56°56'N
56°40'N
Petersburg
Wrangell
0
10
20 km
0
5
10 nm
Scale: 1:508,567
N
Essential Fish Habitat Combined Data Layer
Coastal Populated Places
Final AOA Study Areas
EFH Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Wrangell Study Area



Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)

Essential Fish Habitat Combined Data Layer

- Coastal Populated Places
- Final AOA Study Areas

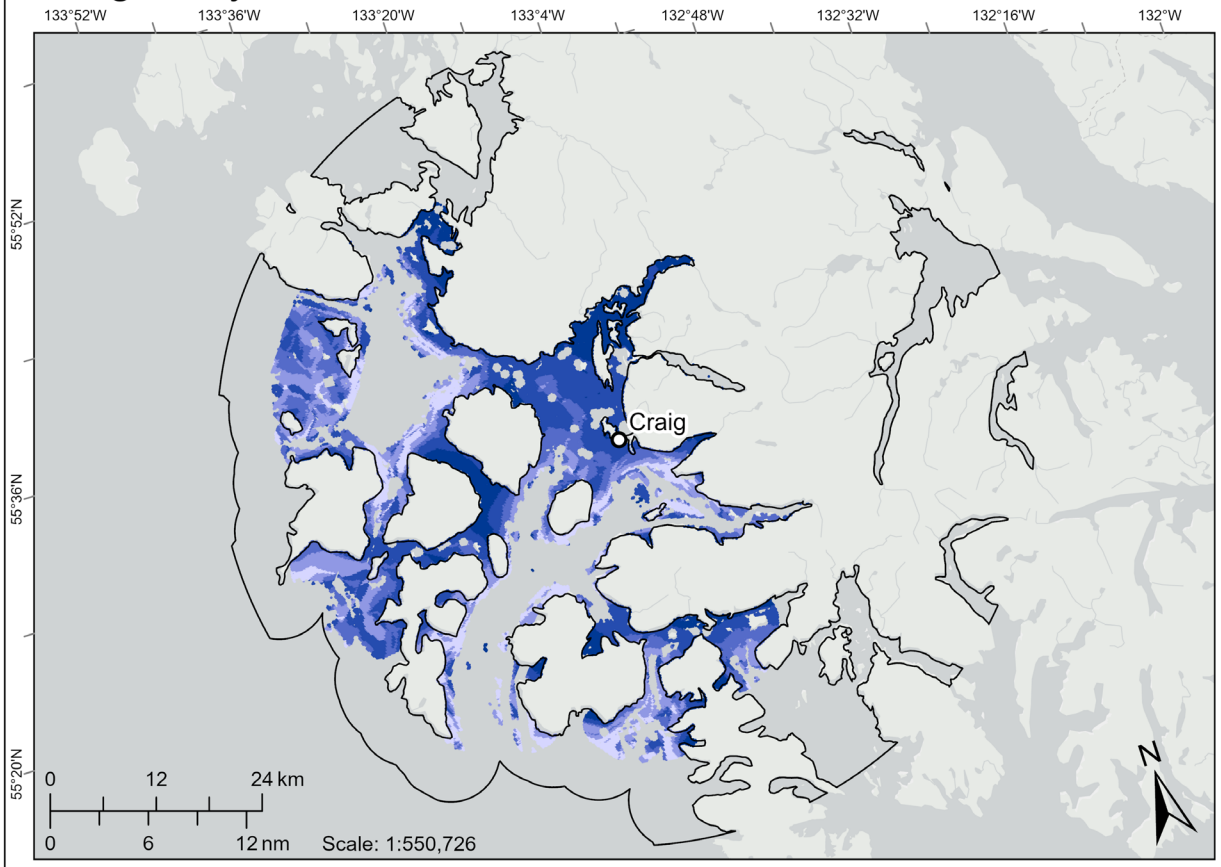
EFH Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)

Essential Fish Habitat Combined Data Layer

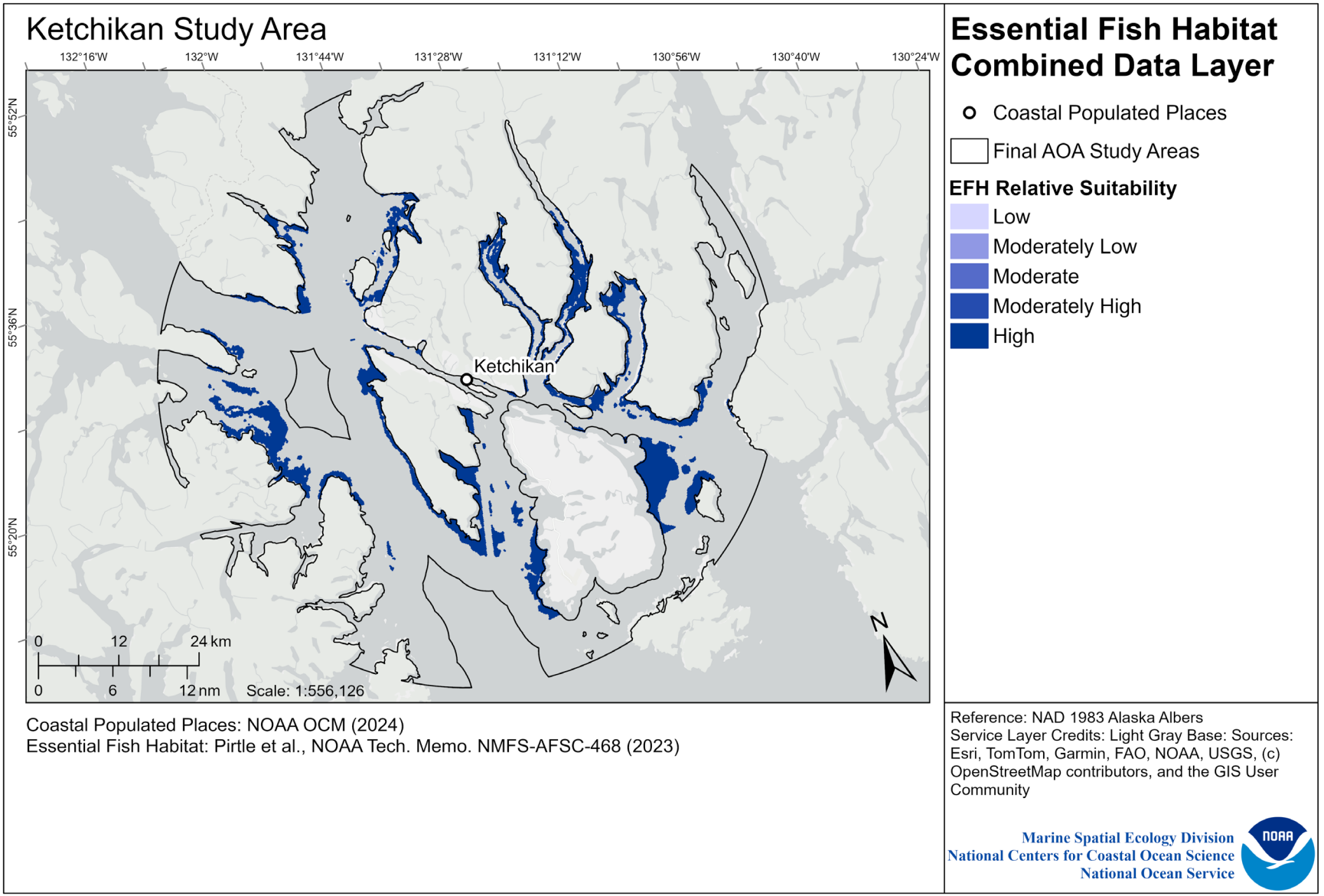
- Coastal Populated Places
- Final AOA Study Areas

EFH Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

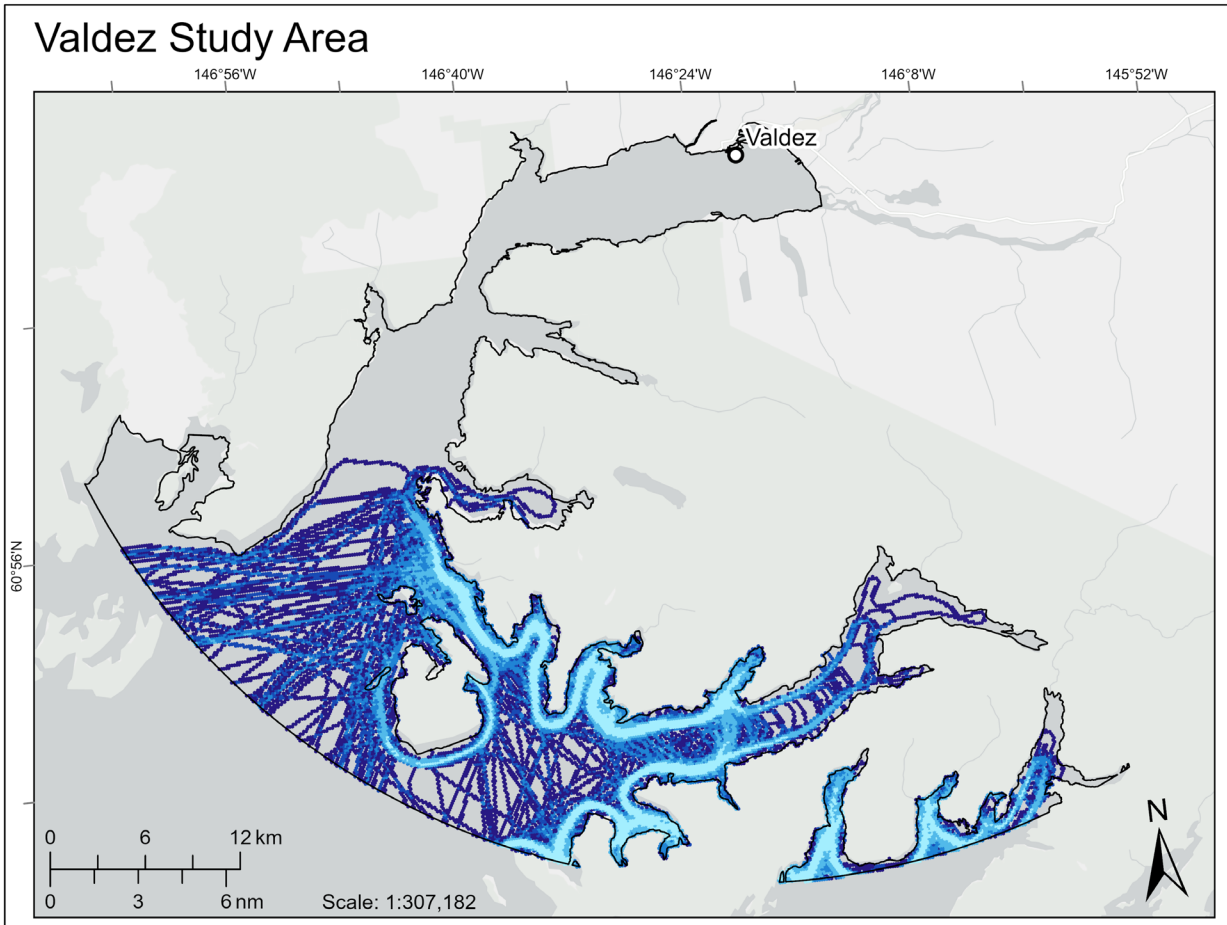
Marine Spatial Ecology Division
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National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Essential Fish Habitat: Pirtle et al., NOAA Tech. Memo. NMFS-AFSC-468 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Occurrence: Morella, J Aerial survey observations of Pacific herring spawn in Prince William Sound, Alaska, 1973-2021. (2023)

Pacific Herring Mean Occurrence Per Year

- Coastal Populated Places
- Final AOA Study Areas

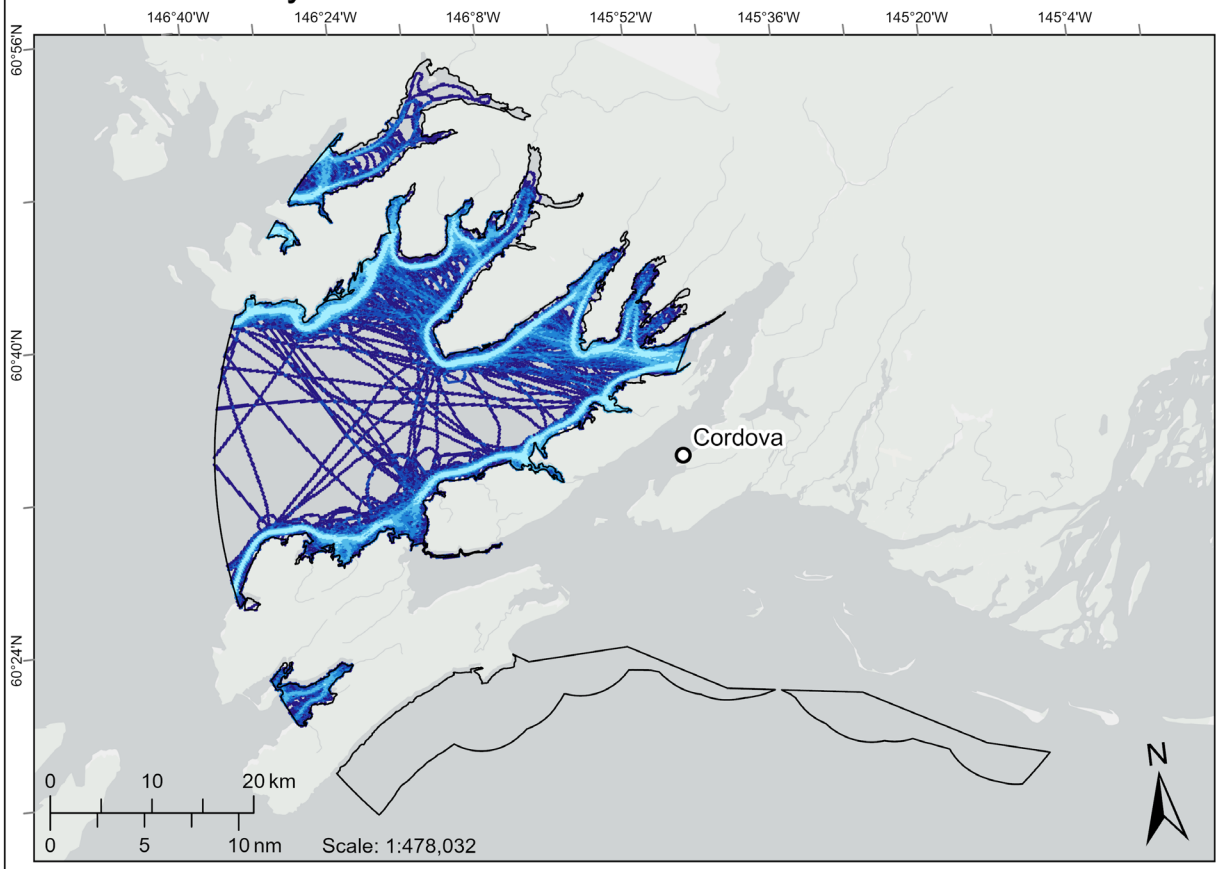
Recorded Occurrence Per Year

- 0.1
- 0.2
- 0.3 - 0.5
- 0.6 - 1.4
- 1.5 - 8.5
- None

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Occurrence: Morella, J Aerial survey observations of Pacific herring spawn in Prince William Sound, Alaska, 1973-2021. (2023)

Pacific Herring Mean Occurrence Per Year

- Coastal Populated Places
- Final AOA Study Areas

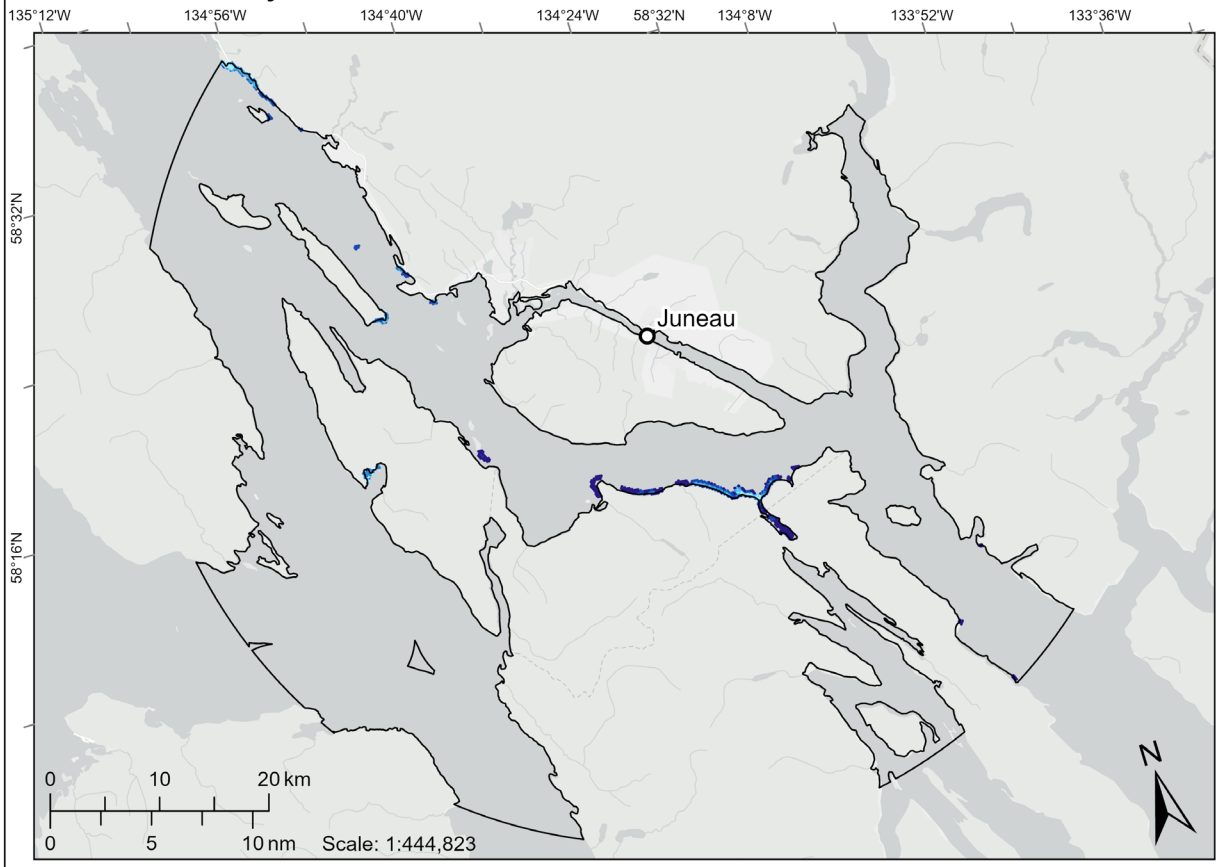
Recorded Occurrence Per Year

- 0.1
- 0.2 - 0.3
- 0.4 - 0.7
- 0.8 - 1.7
- 1.8 - 8.8
- None

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Juneau Study Area



Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Occurrence: ADFG, Southeast Alaska Surveys, 2020-2024. (2024)

Pacific Herring Mean Occurrence Per Year

- Coastal Populated Places
- Final AOA Study Areas

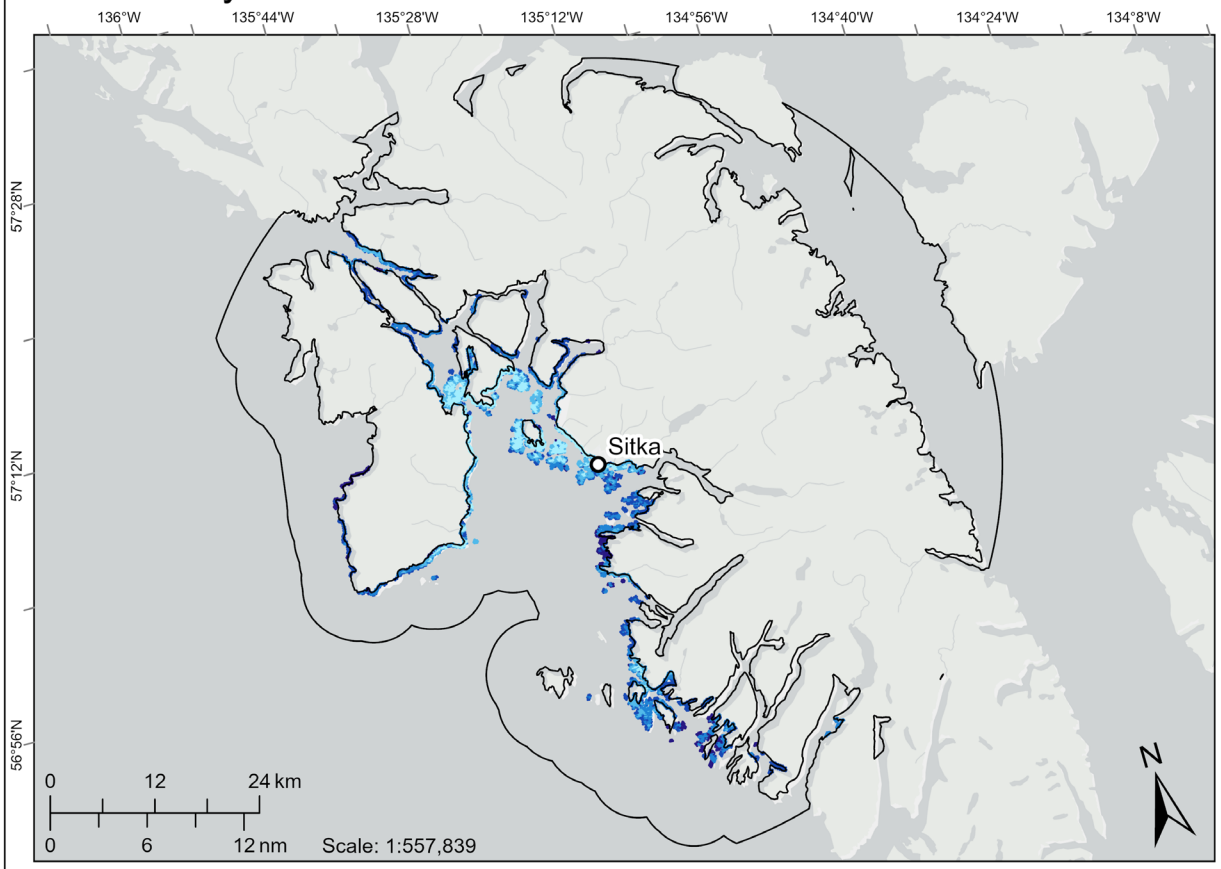
Recorded Occurrence Per Year

- 0.10
- 0.11 - 0.20
- 0.21 - 0.33
- 0.34 - 0.50
- 0.51 - 1.38
- None

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Sitka Study Area



Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Occurrence: ADFG, Southeast Alaska Surveys, 2020-2024. (2024)

Pacific Herring Mean Occurrence Per Year

- Coastal Populated Places
- Final AOA Study Areas

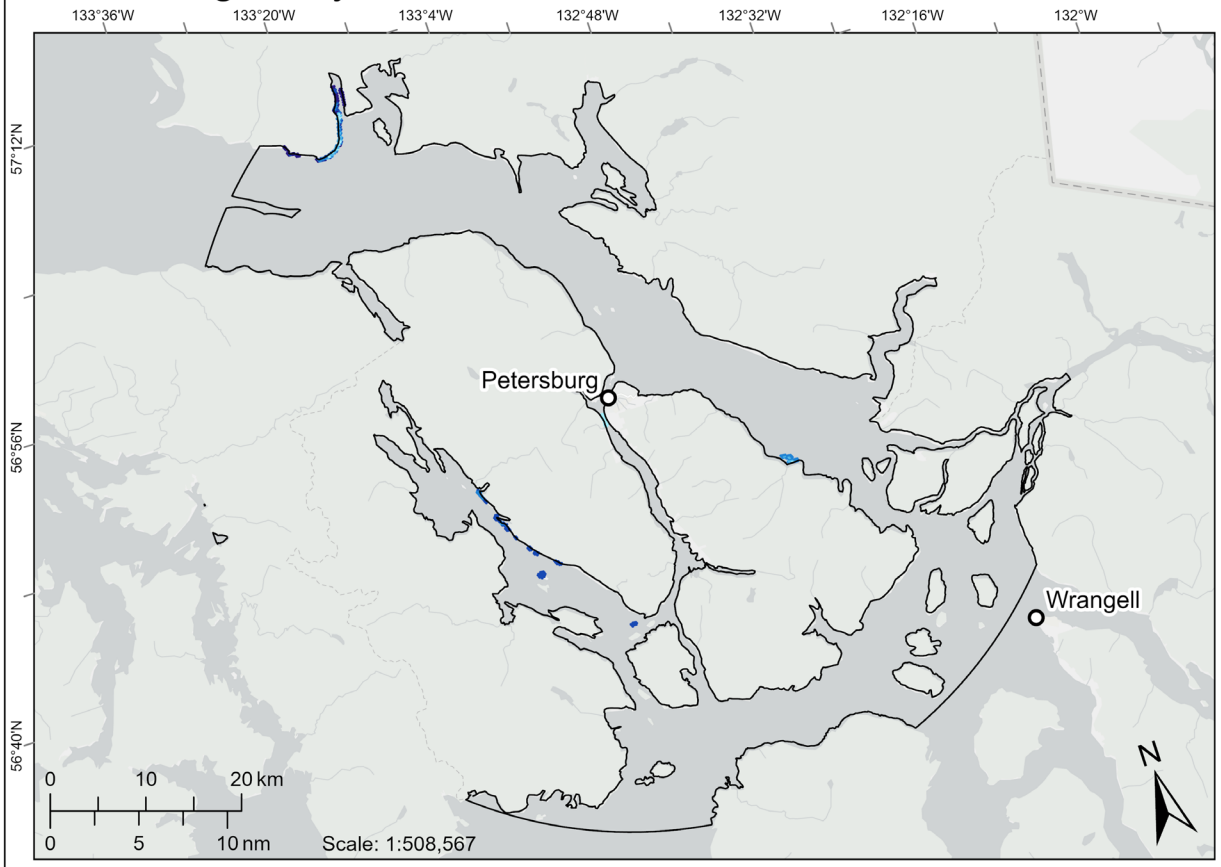
Recorded Occurrence Per Year

- 0.08 - 0.10
- 0.11 - 0.17
- 0.18 - 0.50
- 0.51 - 1.17
- 1.18 - 4.75
- None

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Occurrence: ADFG, Southeast Alaska Surveys, 2020-2024. (2024)

Pacific Herring Mean Occurrence Per Year

- Coastal Populated Places
- Final AOA Study Areas

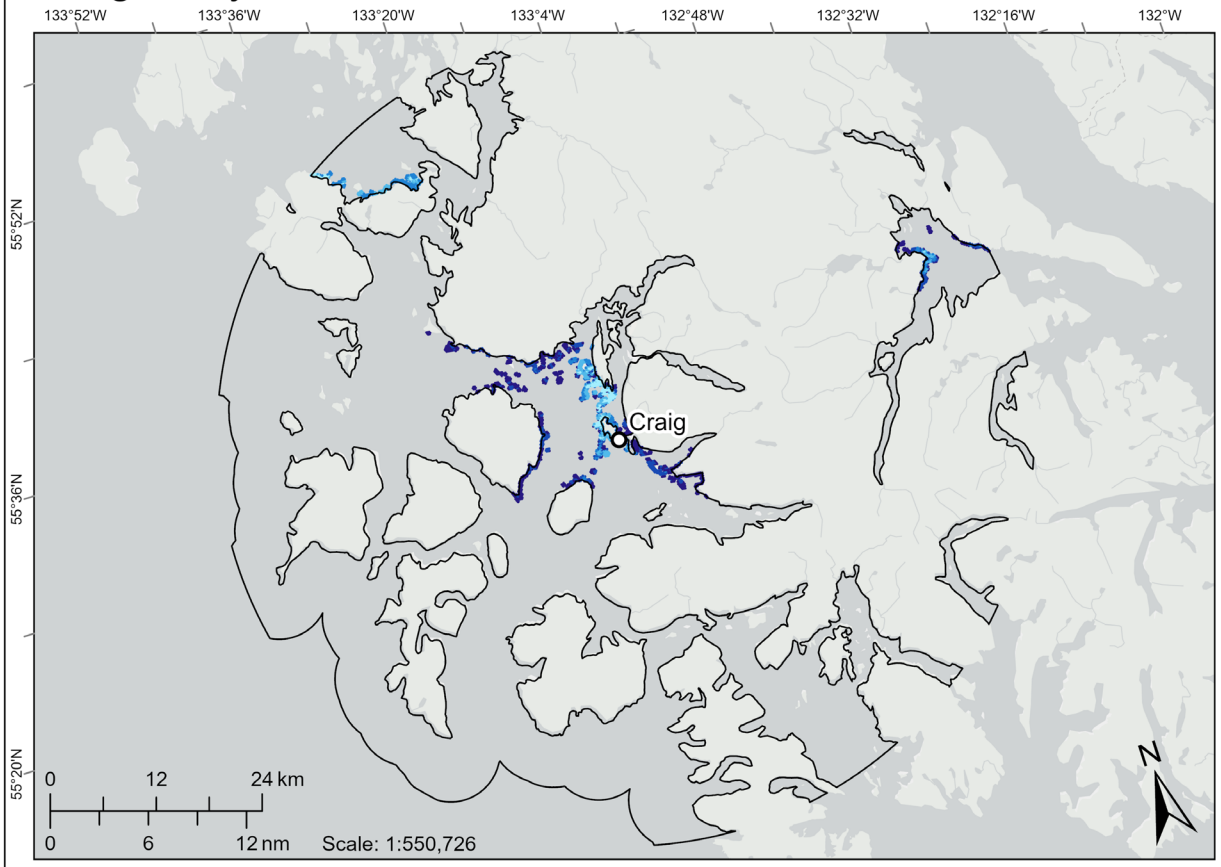
Recorded Occurrence Per Year

- 0.10
- 0.11 - 0.2
- 0.21 - 0.4
- 0.41 - 0.67
- 0.68 - 1.1
- None

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Occurrence: ADFG, Southeast Alaska Surveys, 2020-2024. (2024)

Pacific Herring Mean Occurrence Per Year

- Coastal Populated Places
- Final AOA Study Areas

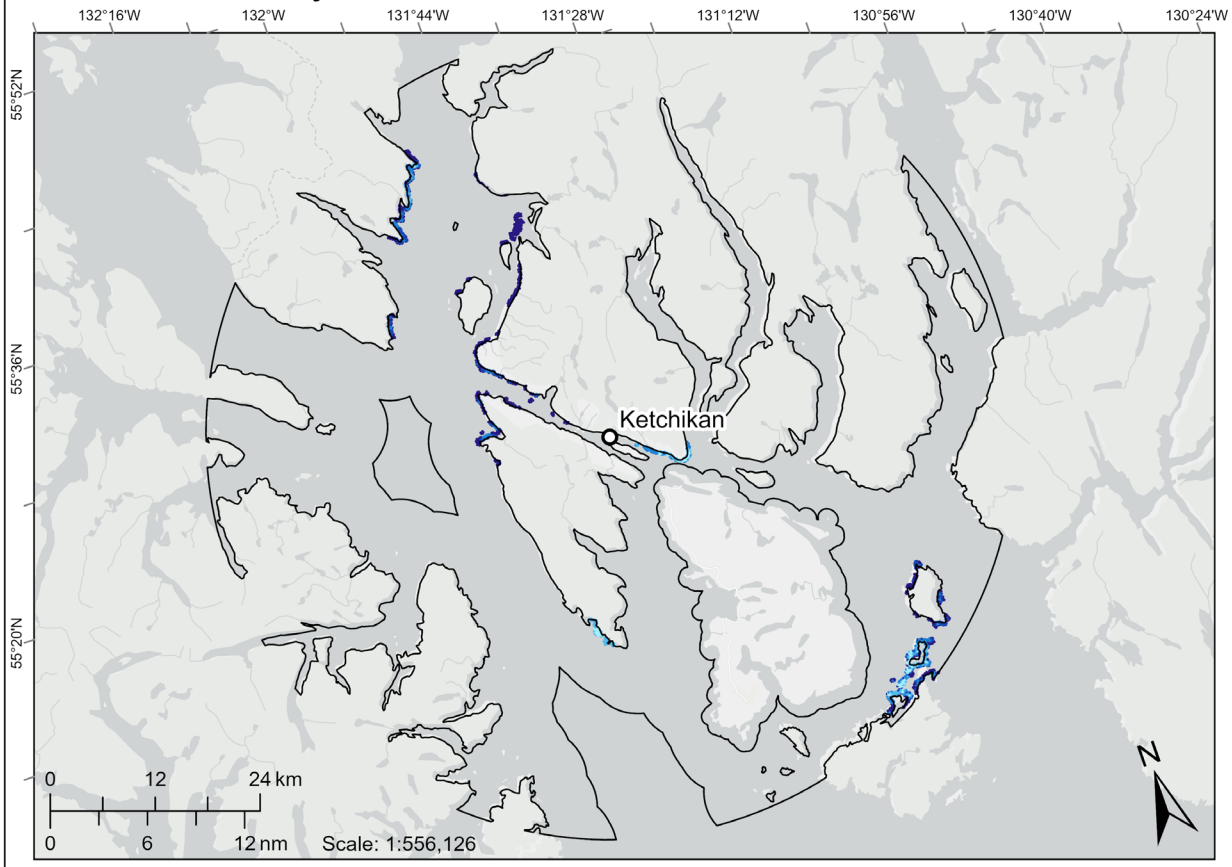
Recorded Occurrence Per Year

- 0.10
- 0.11 - 0.30
- 0.31 - 0.50
- 0.51 - 0.80
- 0.81 - 1.67
- None

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Occurrence: ADFG, Southeast Alaska Surveys, 2020-2024. (2024)

Pacific Herring Mean Occurrence Per Year

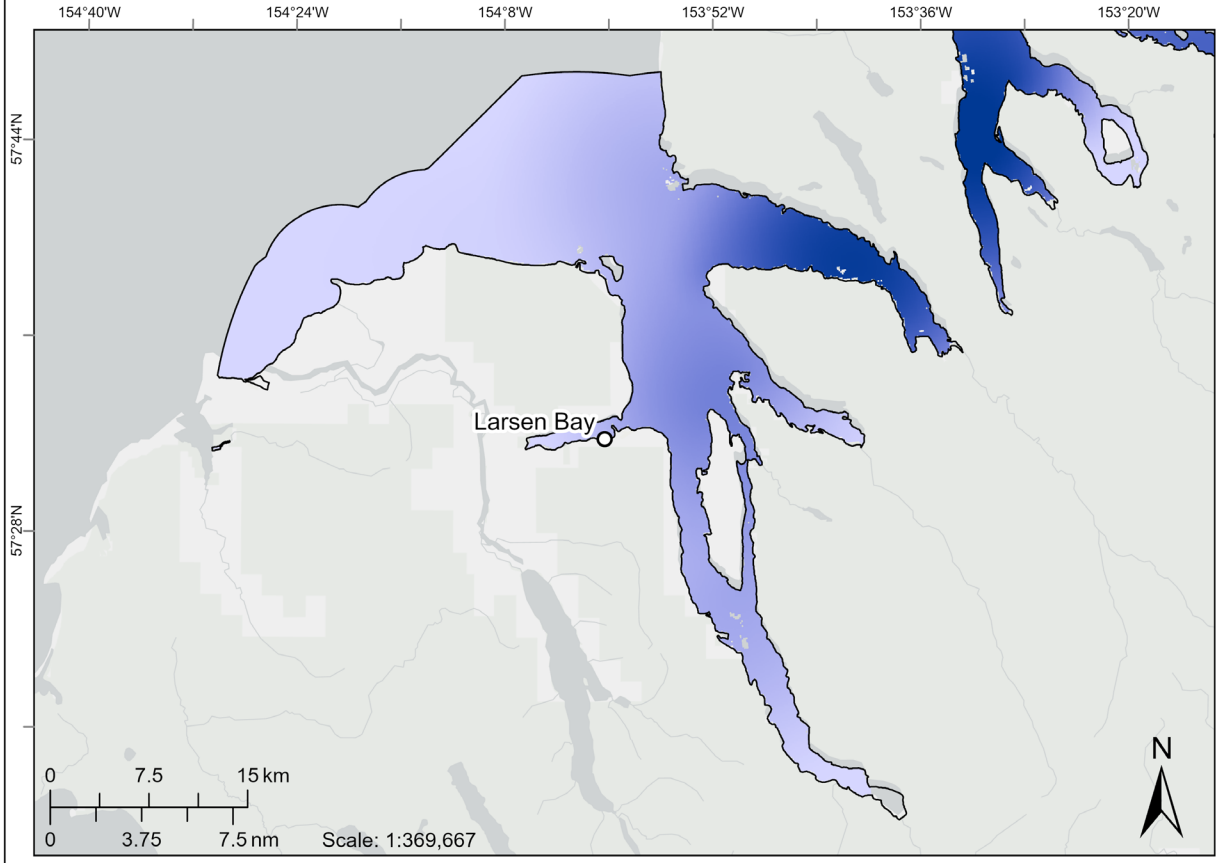
- Coastal Populated Places
- Final AOA Study Areas

Recorded Occurrence Per Year

- 0.10
- 0.11 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 4.50
- None

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Relative Population Density: Cobb M. Northern sea otter (Enhydra lutris) abundance and distribution on the Kodiak Archipelago. Refuge report 2018.2, Kodiak National Wildlife Refuge, USFWS. (2018)

Northern Sea Otter Relative Population Density Estimates

- Coastal Populated Places
- Final AOA Study Areas

Estimated Relative Density

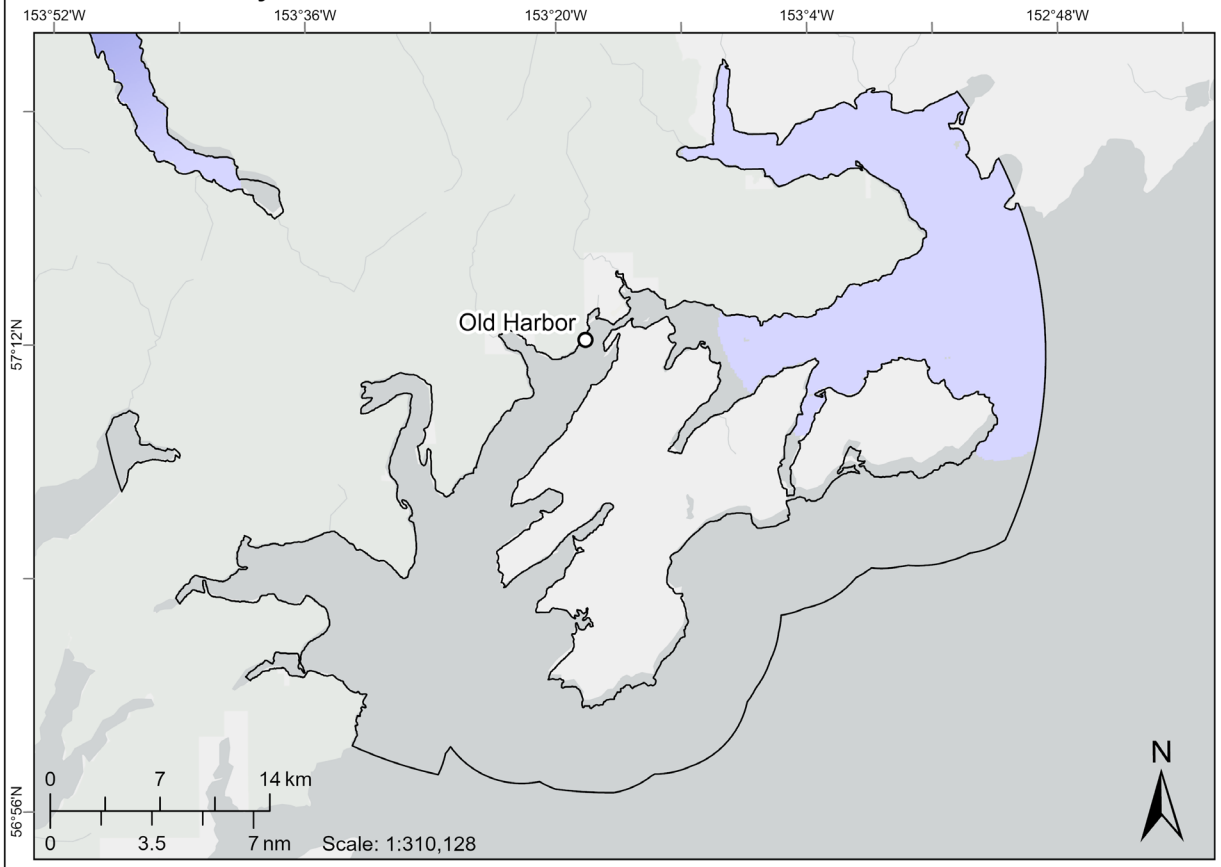
High

Low

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Kodiak Study Area - Southwest



Northern Sea Otter Relative Population Density Estimates

- Coastal Populated Places
- Final AOA Study Areas

Estimated Relative Density

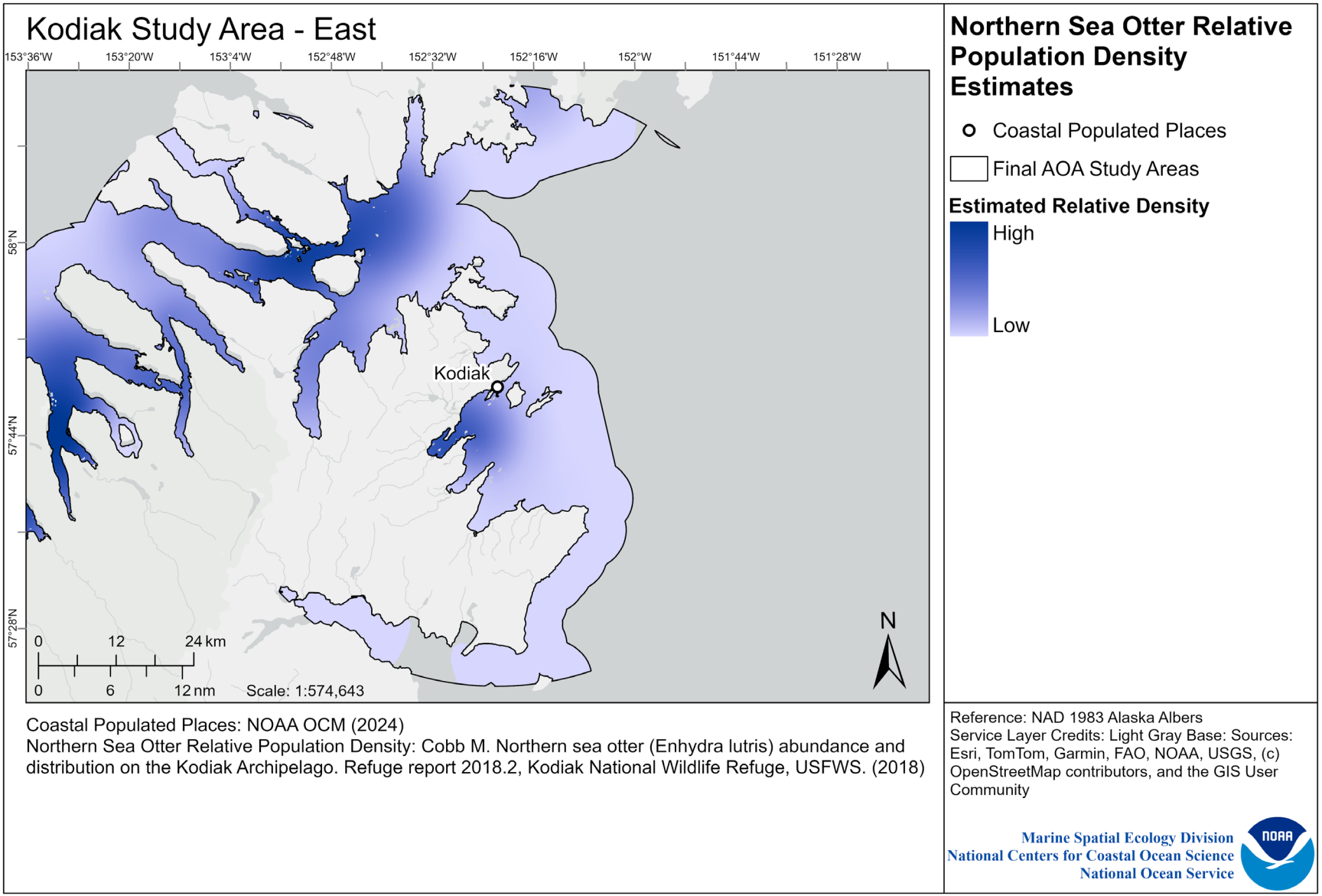
High

Low

Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Relative Population Density: Cobb M. Northern sea otter (Enhydra lutris) abundance and distribution on the Kodiak Archipelago. Refuge report 2018.2, Kodiak National Wildlife Refuge, USFWS. (2018)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

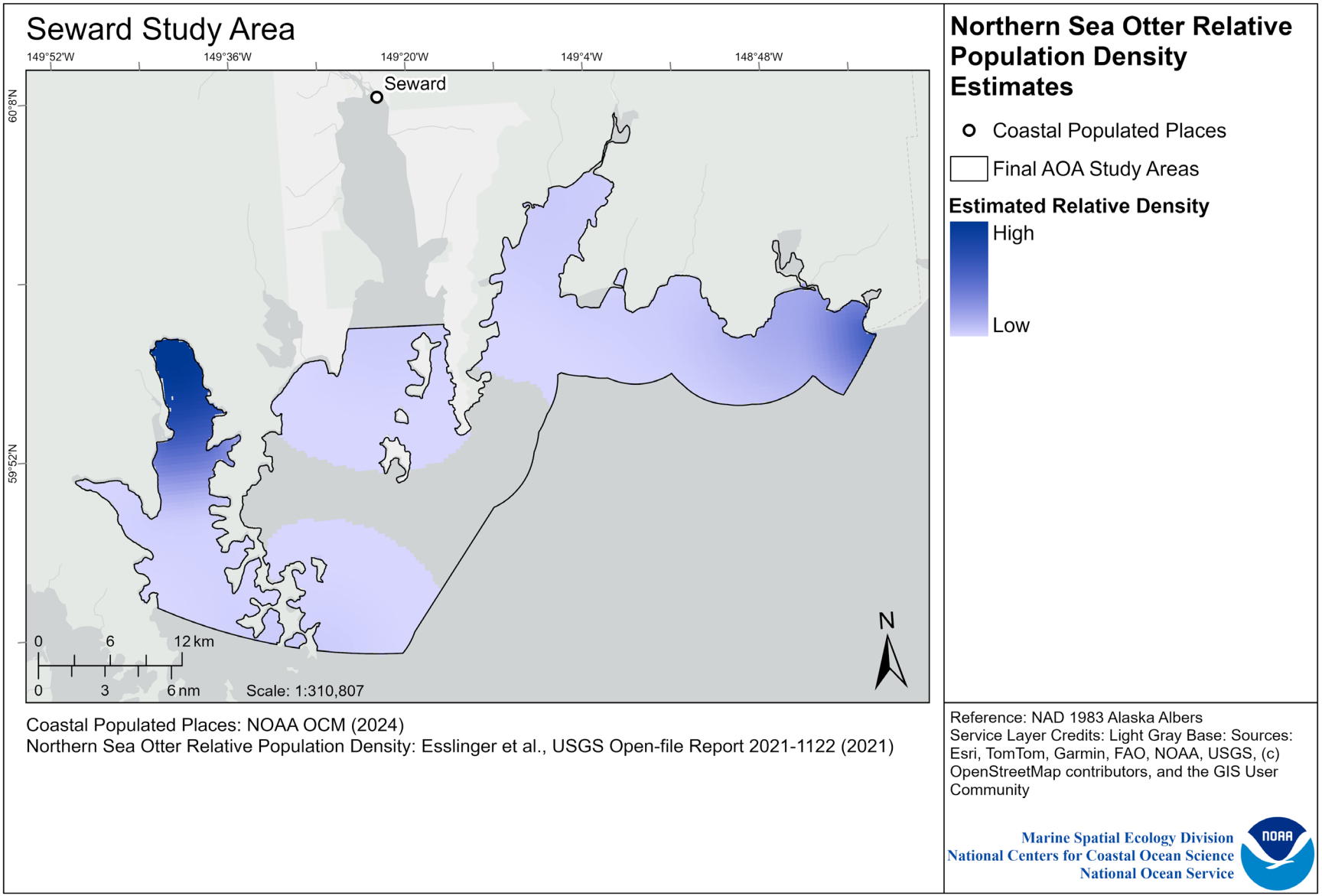
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Relative Population Density: Cobb M. Northern sea otter (Enhydra lutris) abundance and distribution on the Kodiak Archipelago. Refuge report 2018.2, Kodiak National Wildlife Refuge, USFWS. (2018)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

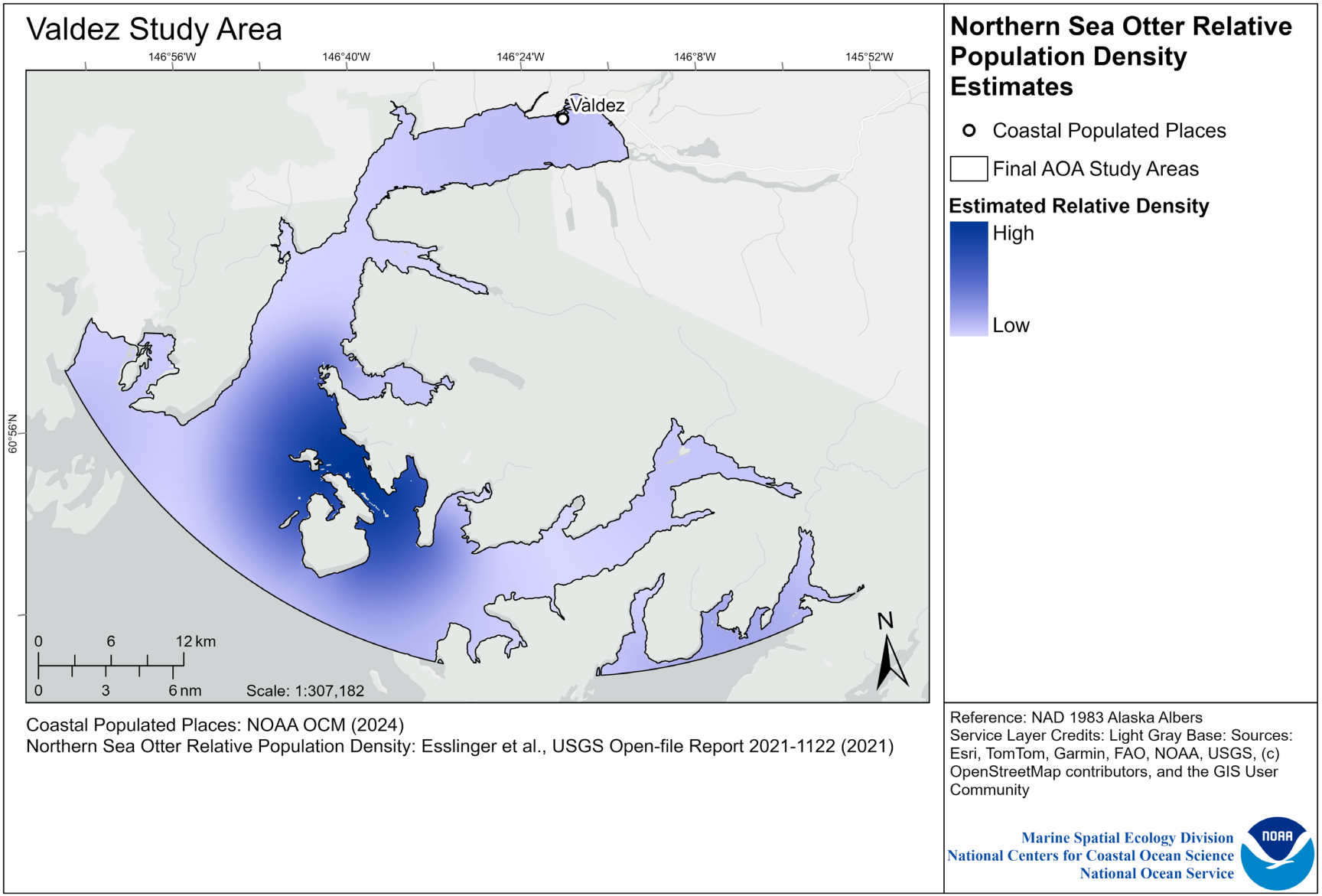
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

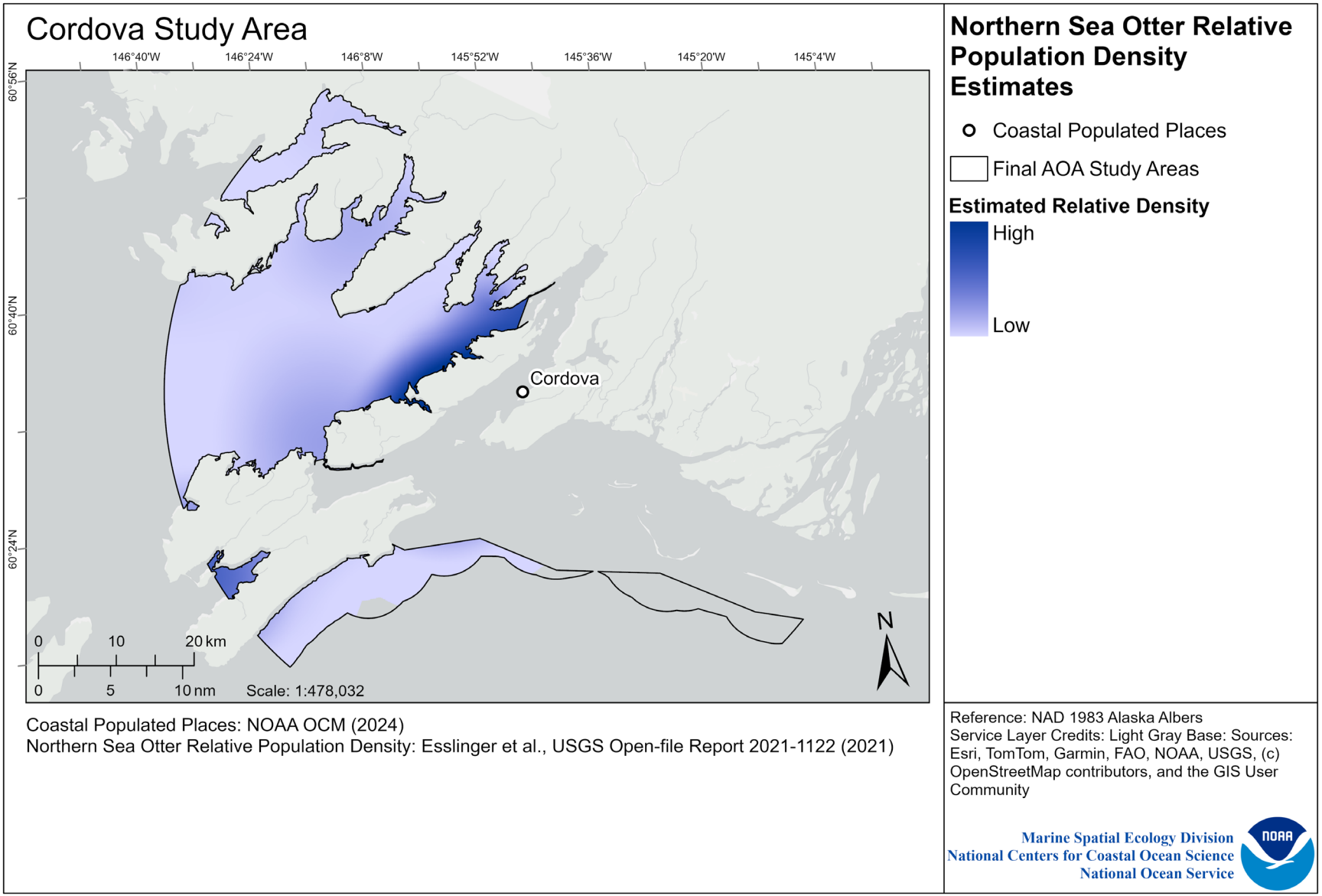


Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Relative Population Density: Esslinger et al., USGS Open-file Report 2021-1122 (2021)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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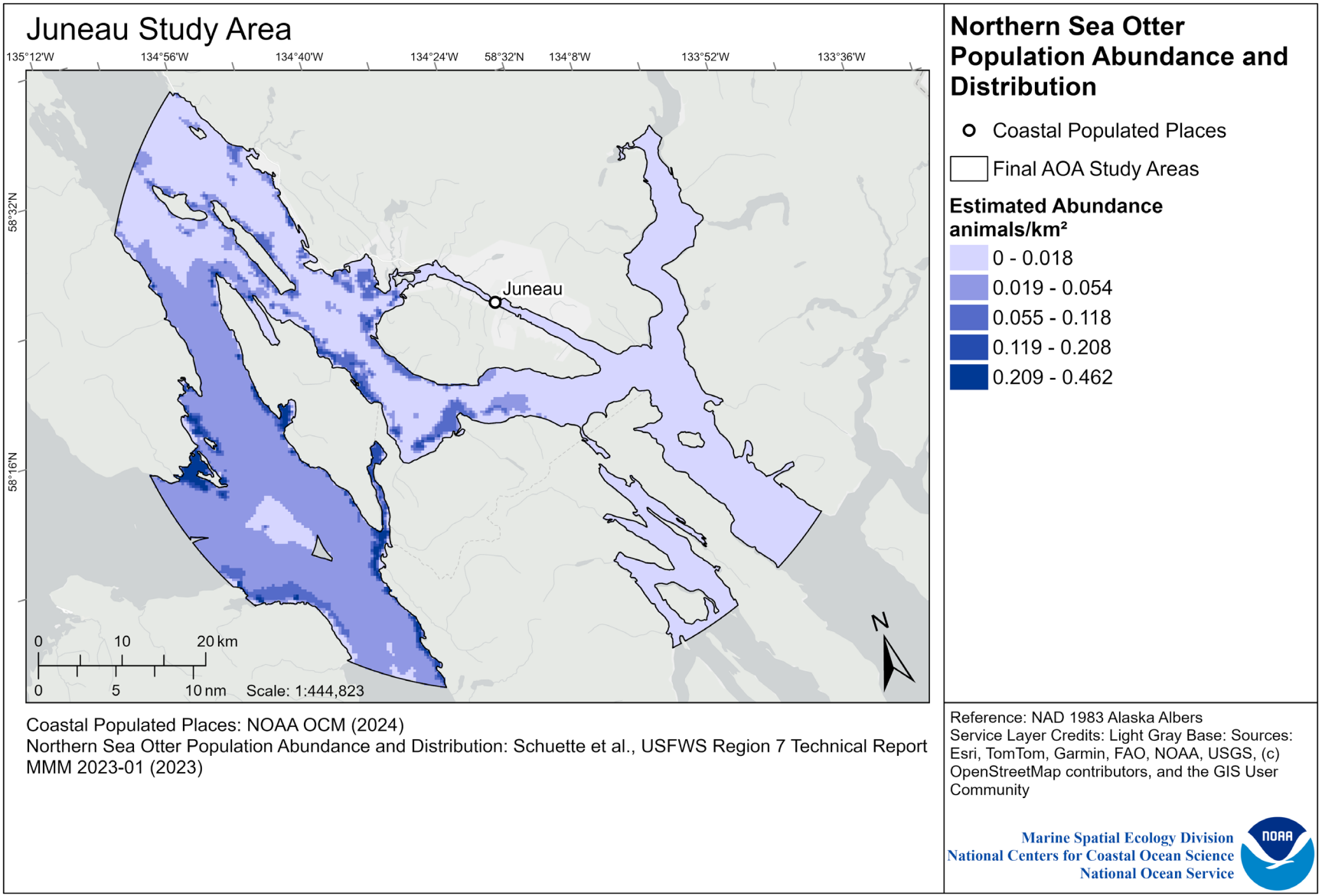

Valdez Study Area
146°56'W
146°40'W
146°24'W
146°8'W
145°52'W
60°56'N
Valdez
0
6
12 km
0
3
6 nm
Scale: 1:307,182
N
Northern Sea Otter Relative Population Density Estimates
Coastal Populated Places
Final AOA Study Areas
Estimated Relative Density
High
Low
Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Relative Population Density: Esslinger et al., USGS Open-file Report 2021-1122 (2021)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA



Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Relative Population Density: Esslinger et al., USGS Open-file Report 2021-1122 (2021)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

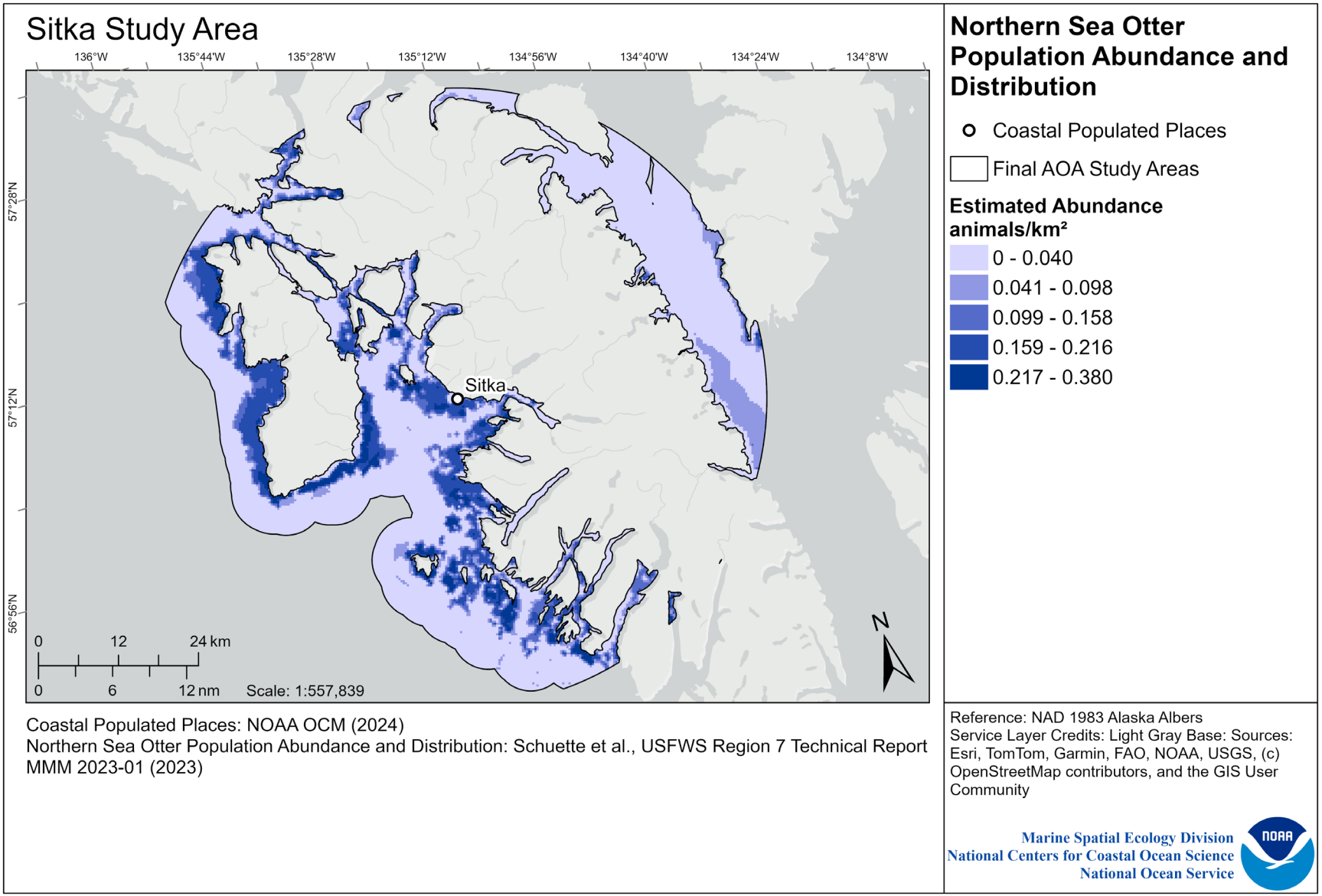
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Population Abundance and Distribution: Schuette et al., USFWS Region 7 Technical Report MMM 2023-01 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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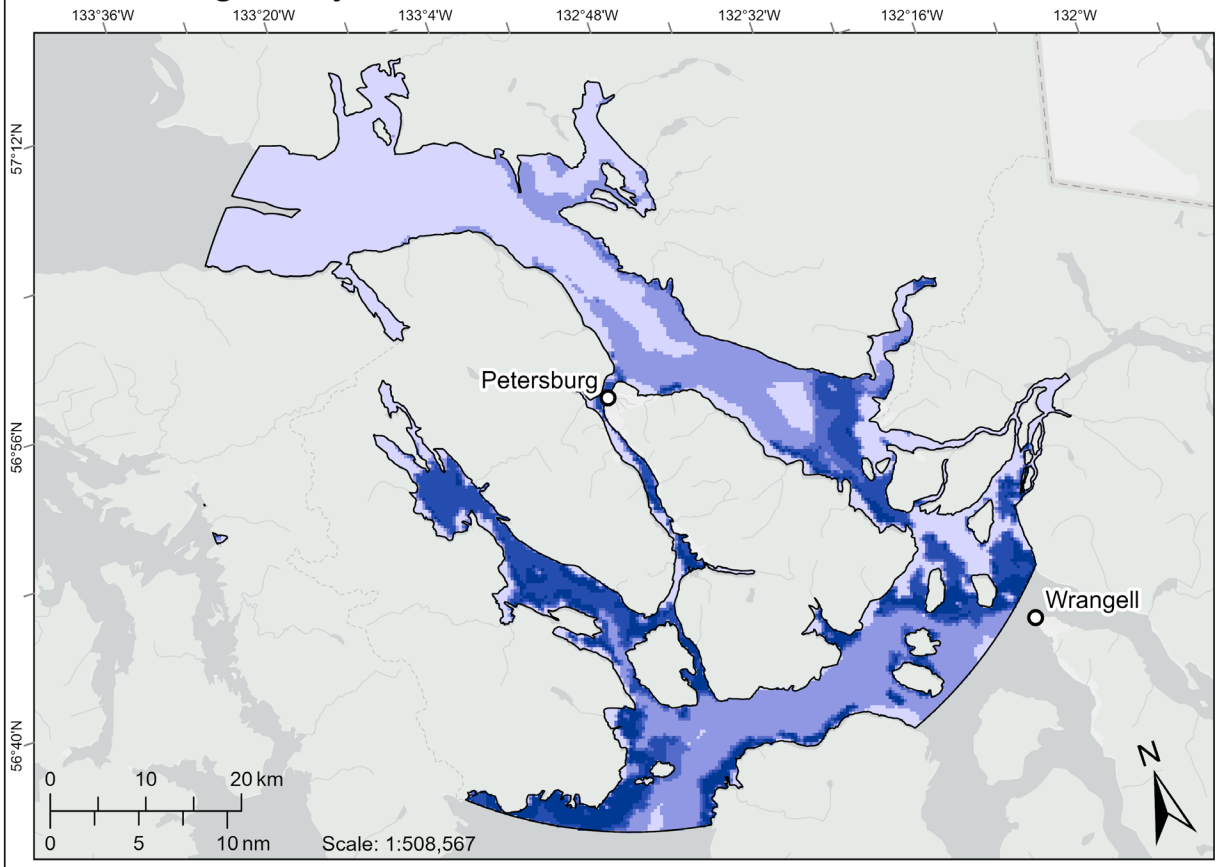


Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Population Abundance and Distribution: Schuette et al., USFWS Region 7 Technical Report MMM 2023-01 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Population Abundance and Distribution: Schuette et al., USFWS Region 7 Technical Report MMM 2023-01 (2023)

Northern Sea Otter Population Abundance and Distribution

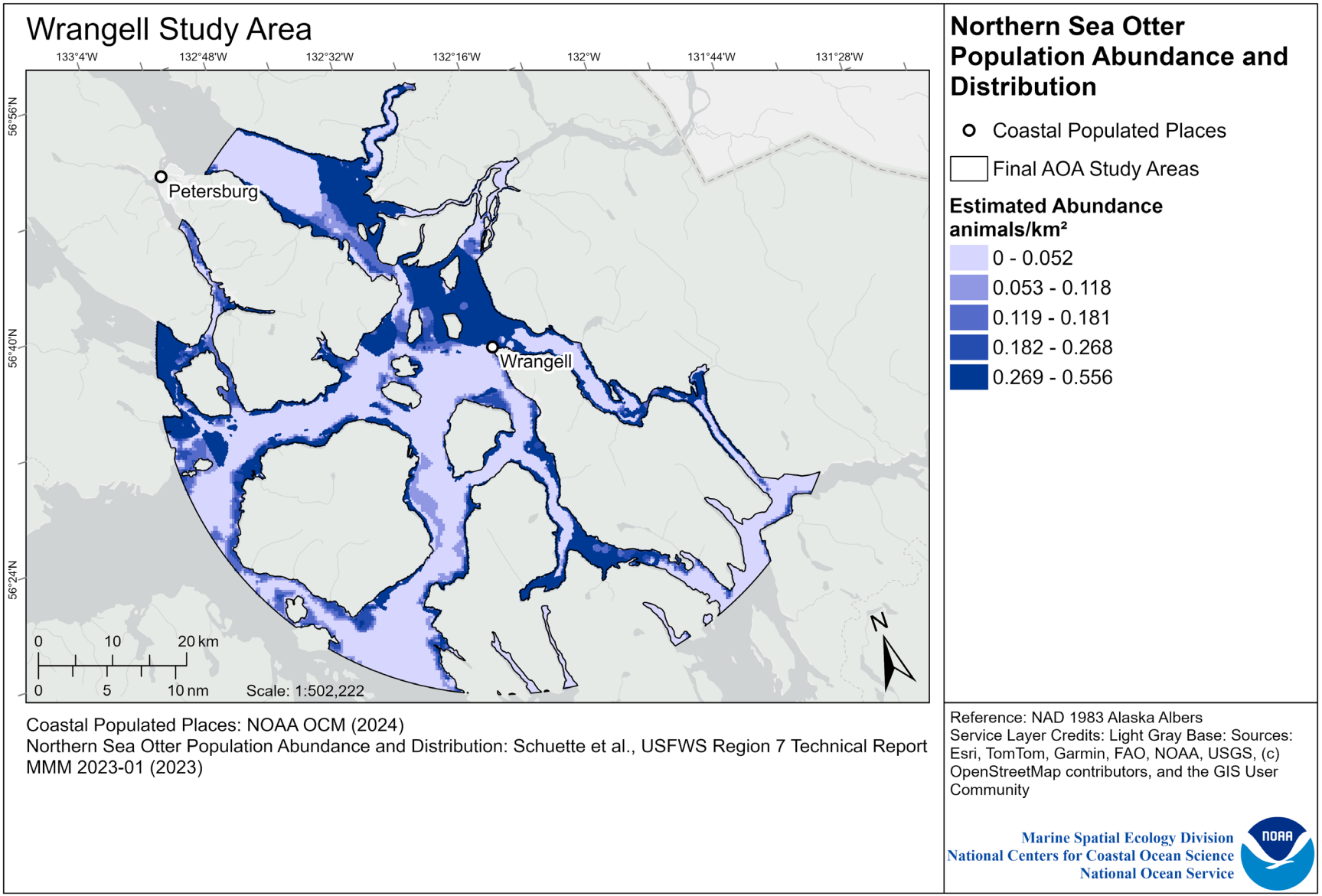
- Coastal Populated Places
- Final AOA Study Areas

Estimated Abundance animals/km²

- 0.001 - 0.014
- 0.015 - 0.059
- 0.060 - 0.120
- 0.121 - 0.172
- 0.173 - 0.332

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

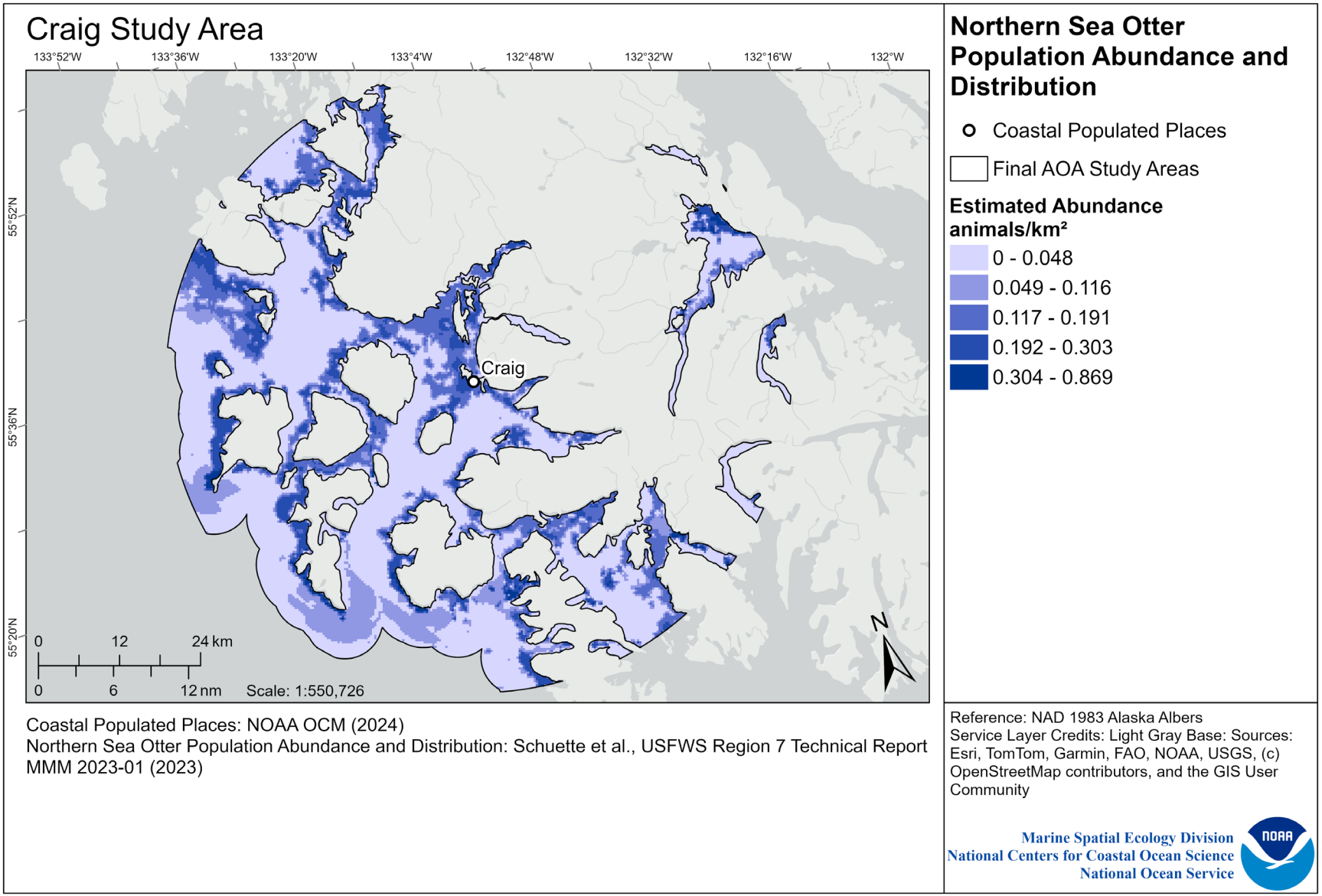
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National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Population Abundance and Distribution: Schuette et al., USFWS Region 7 Technical Report MMM 2023-01 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

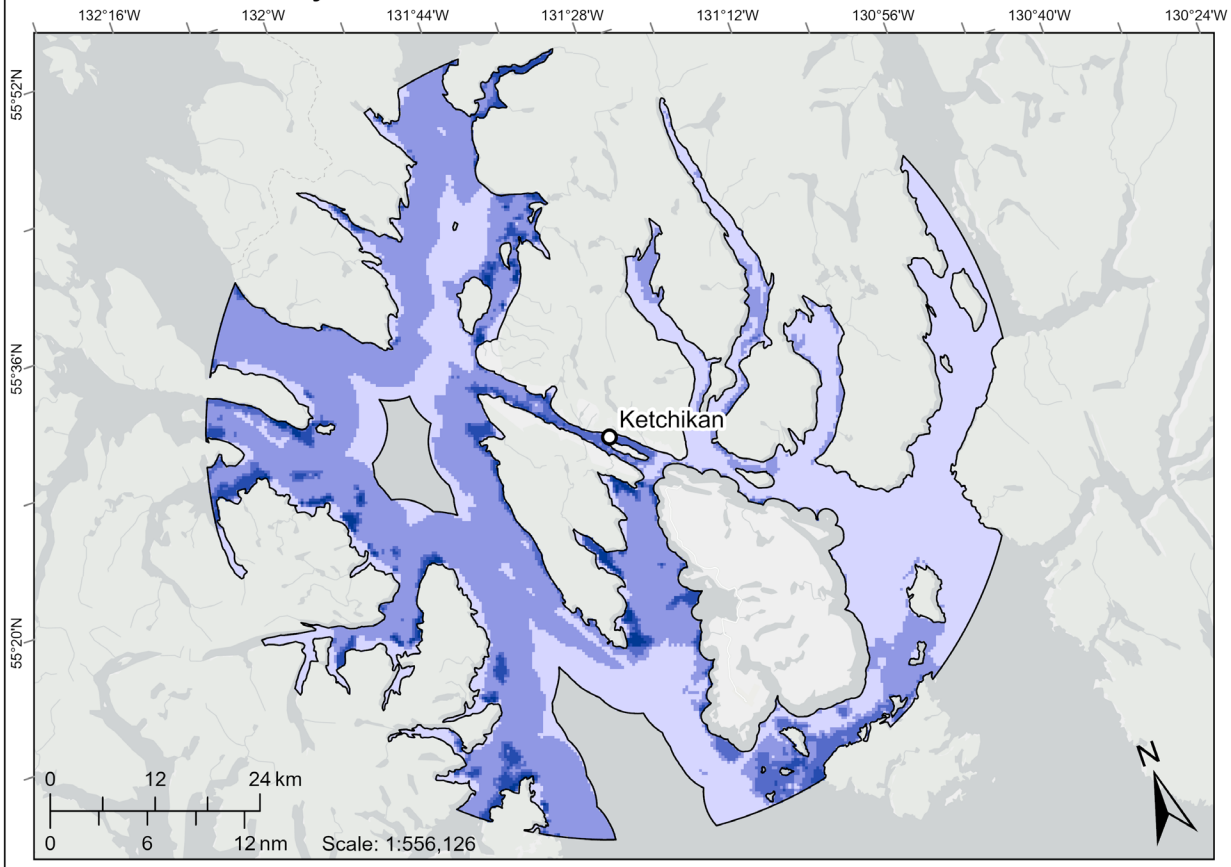


Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Population Abundance and Distribution: Schuette et al., USFWS Region 7 Technical Report MMM 2023-01 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Ketchikan Study Area



Northern Sea Otter Population Abundance and Distribution

- Coastal Populated Places
- Final AOA Study Areas

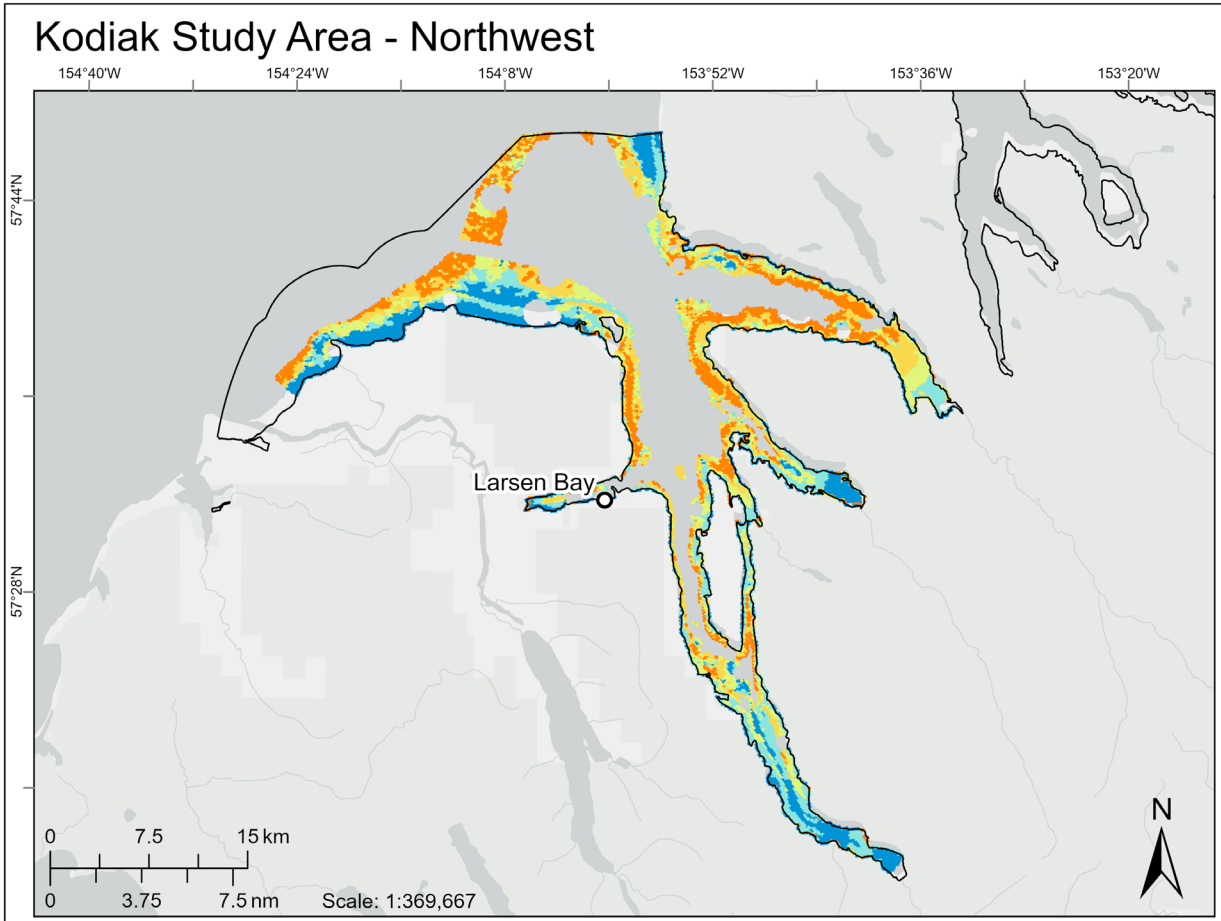
Estimated Abundance animals/km²

- 0 - 0.018
- 0.019 - 0.068
- 0.069 - 0.154
- 0.155 - 0.277
- 0.278 - 0.916

Coastal Populated Places: NOAA OCM (2024)
Northern Sea Otter Population Abundance and Distribution: Schuette et al., USFWS Region 7 Technical Report MMM 2023-01 (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service



Coastal Populated Places: NOAA OCM (2024)

Natural Resources

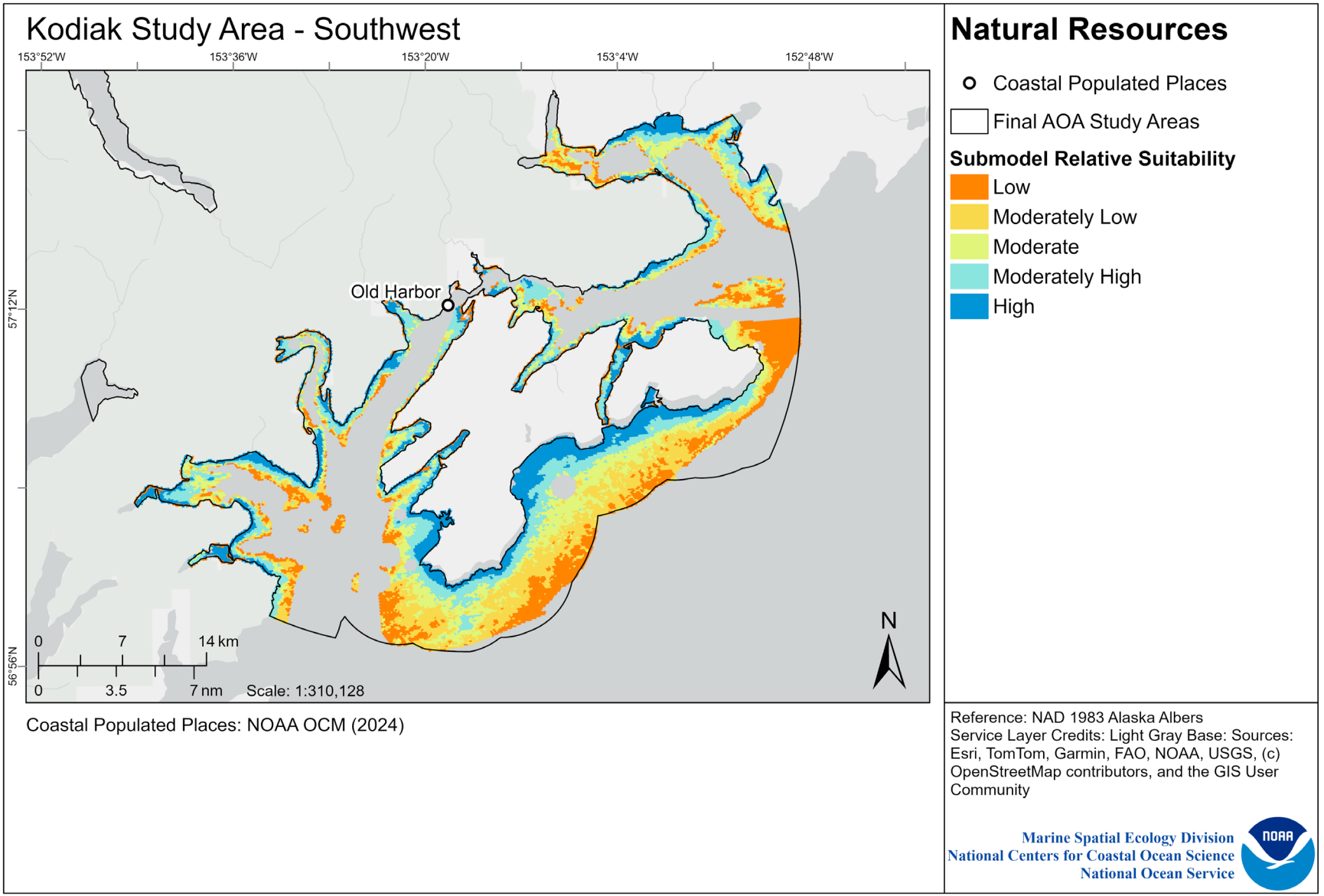
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

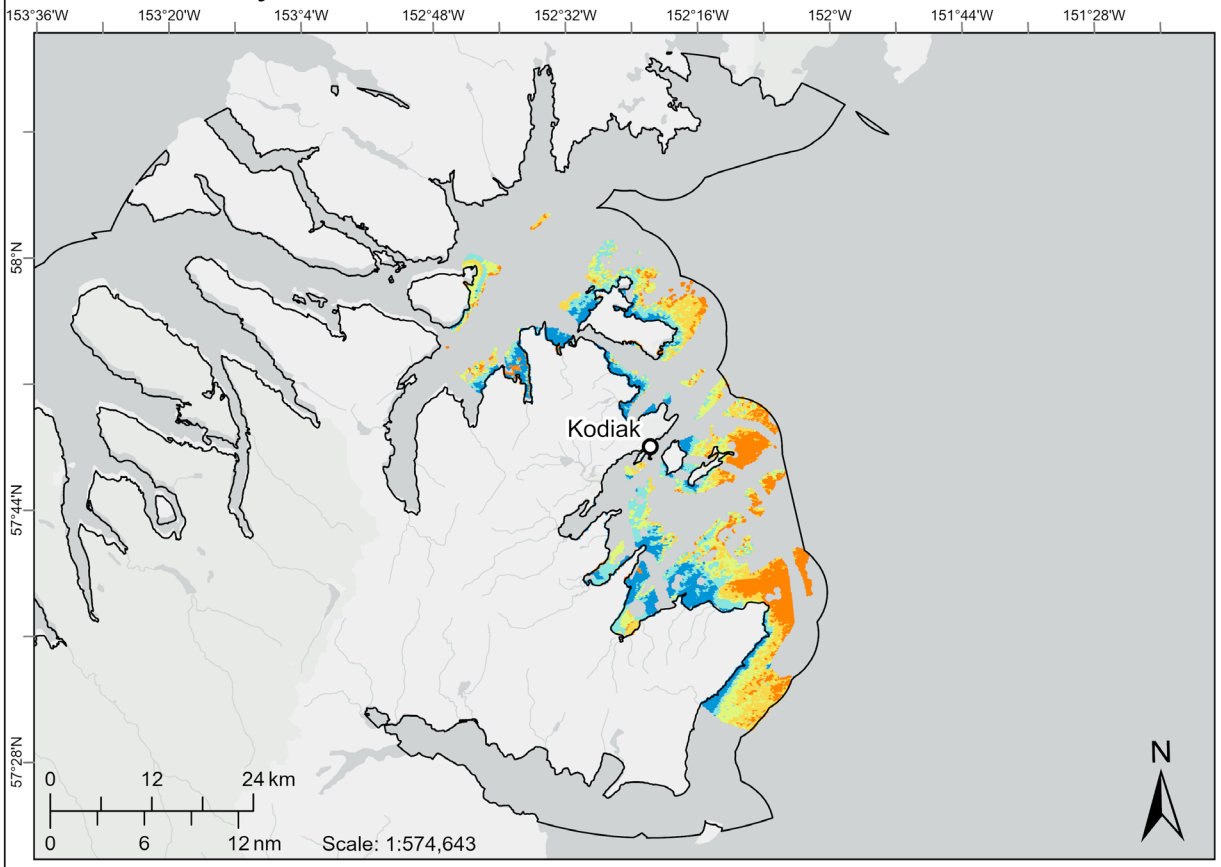


Coastal Populated Places: NOAA OCM (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Kodiak Study Area - East



Coastal Populated Places: NOAA OCM (2024)

Natural Resources

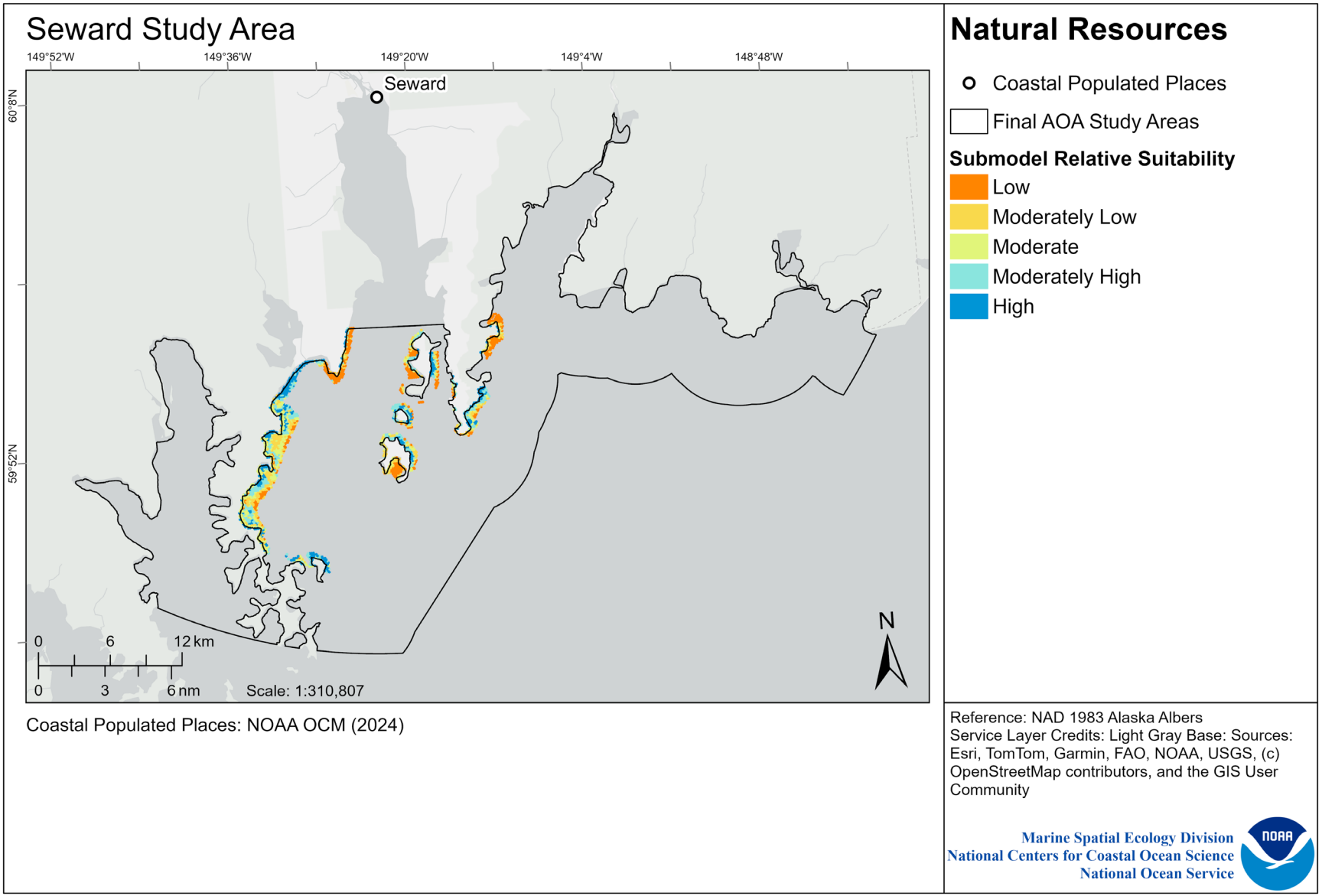
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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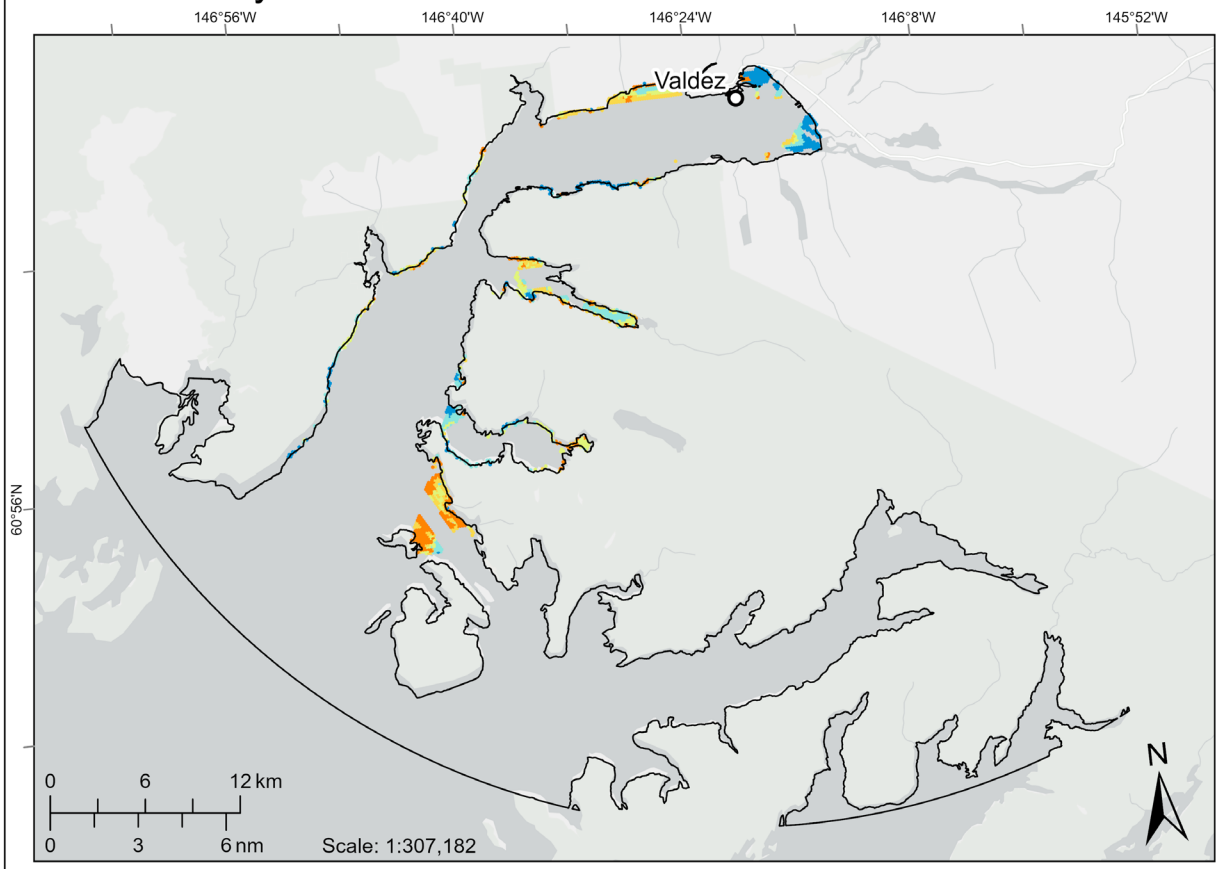


Coastal Populated Places: NOAA OCM (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Valdez Study Area



Coastal Populated Places: NOAA OCM (2024)

Natural Resources

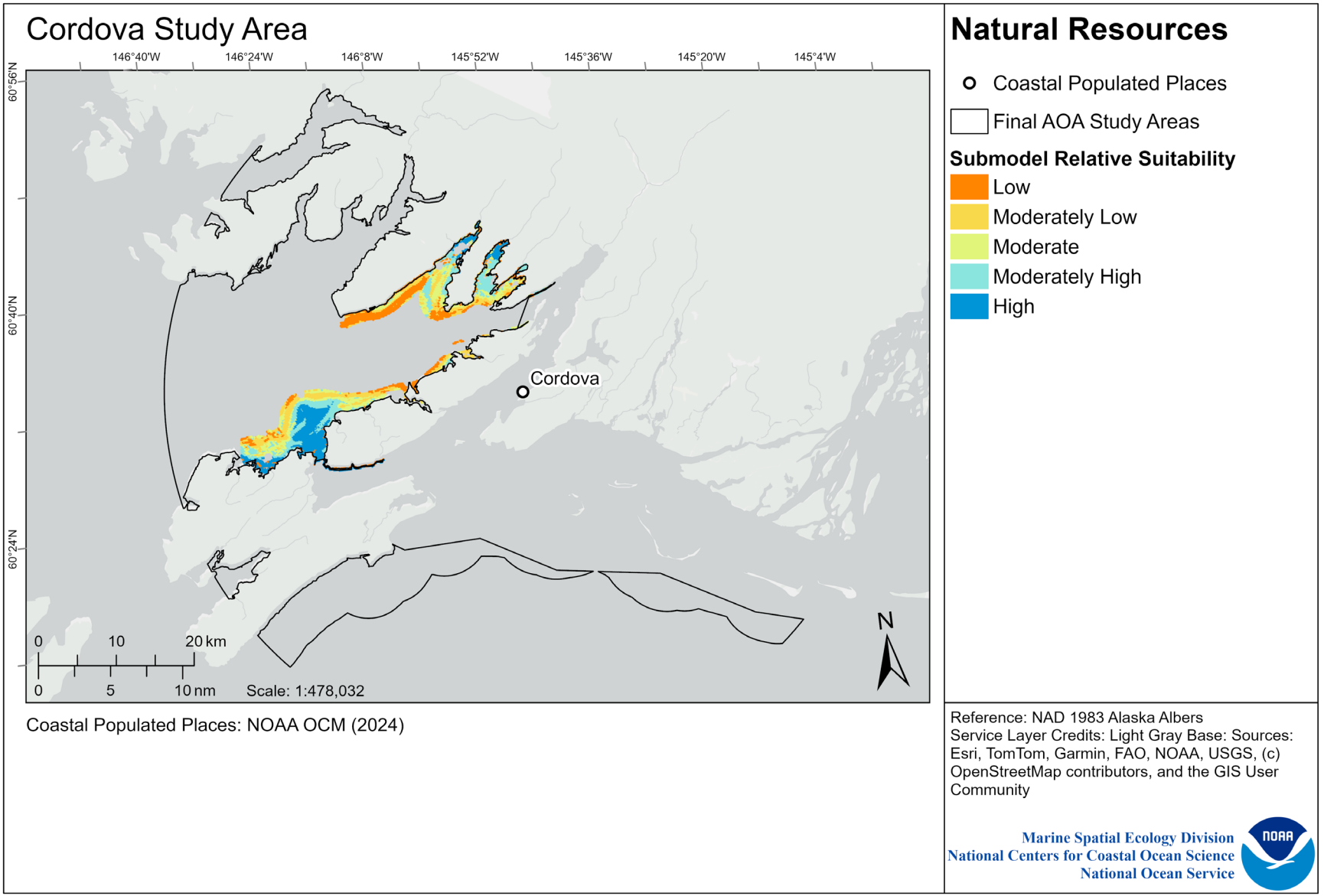
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

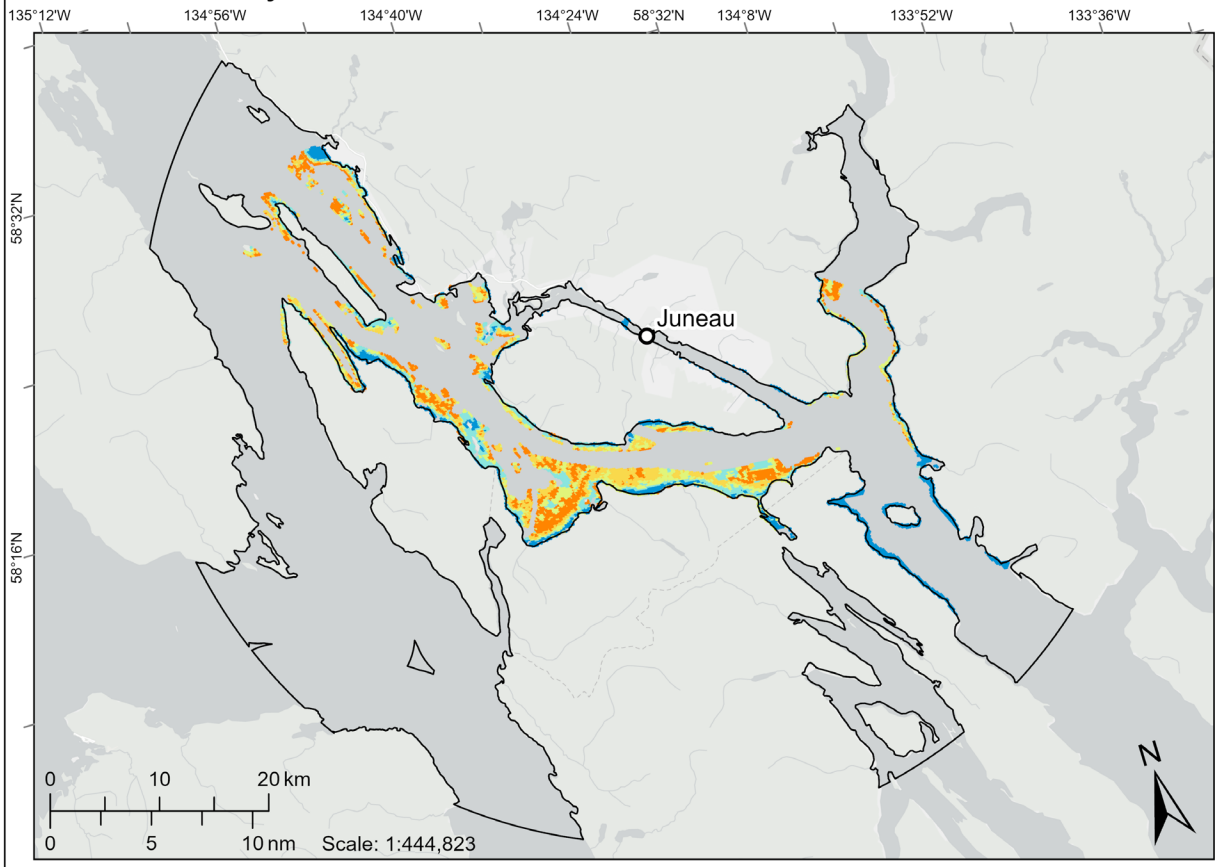
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service


Cordova Study Area
146°40'W
146°24'W
146°8'W
145°52'W
145°36'W
145°20'W
145°4'W
60°56'N
60°40'N
60°24'N
Cordova
0
10
20 km
0
5
10 nm
Scale: 1:478,032
N
Natural Resources
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Juneau Study Area



Coastal Populated Places: NOAA OCM (2024)

Natural Resources

- Coastal Populated Places
- Final AOA Study Areas

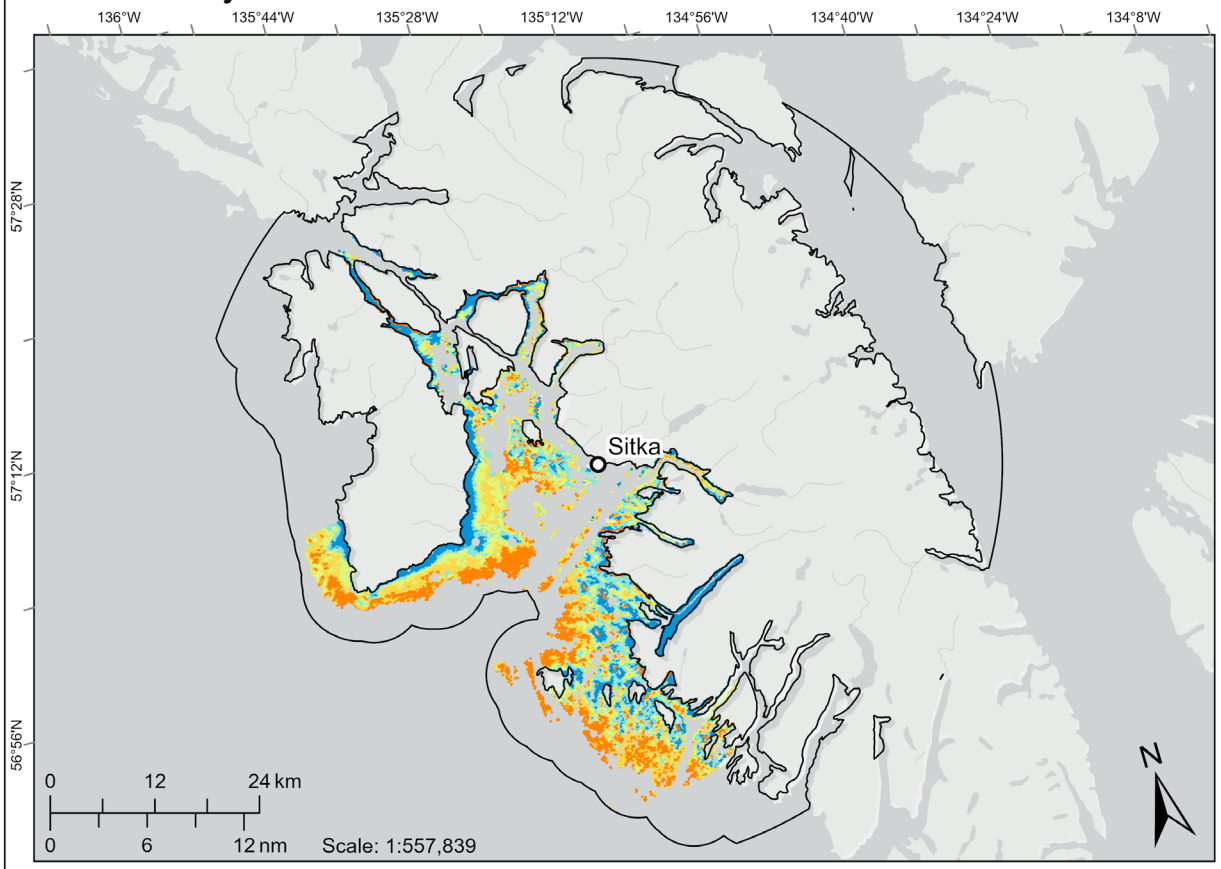
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Sitka Study Area



Coastal Populated Places: NOAA OCM (2024)

Natural Resources

- Coastal Populated Places
- Final AOA Study Areas

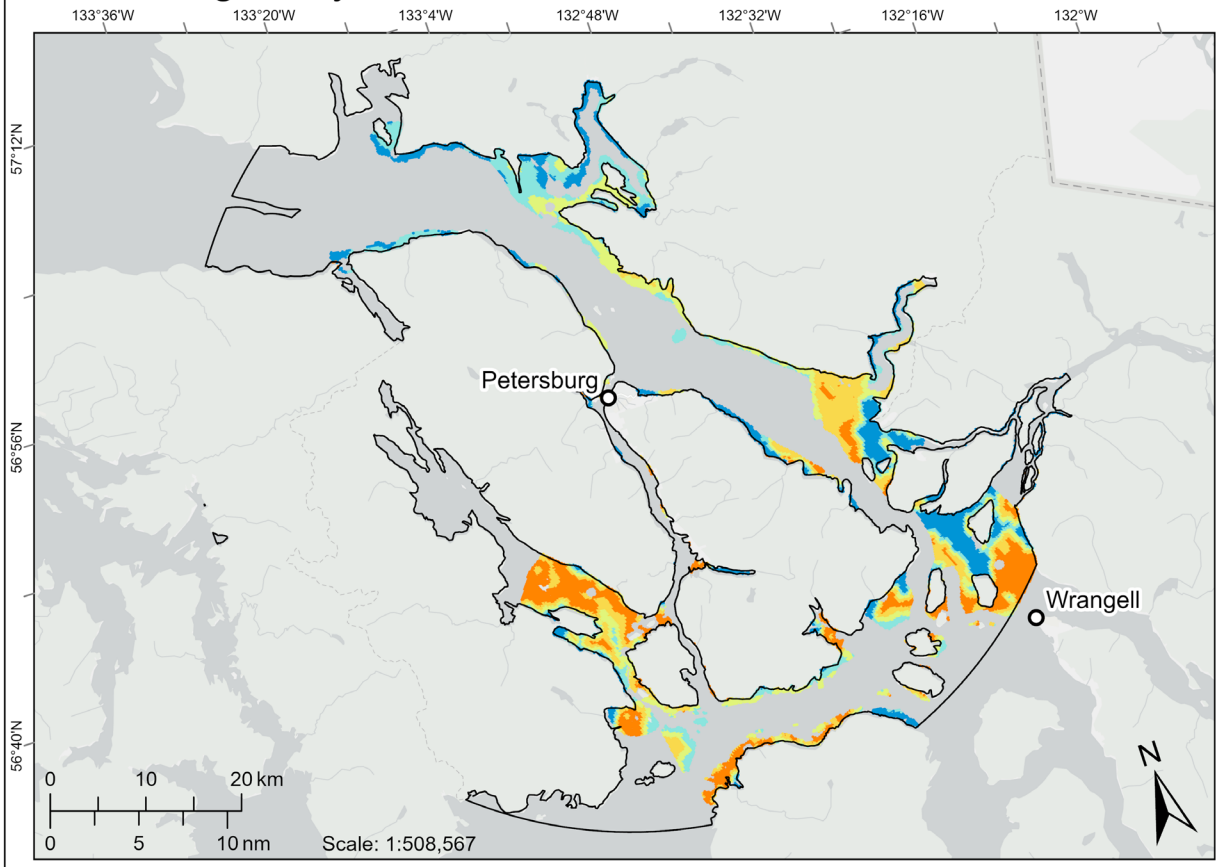
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)

Natural Resources

- Coastal Populated Places
- Final AOA Study Areas

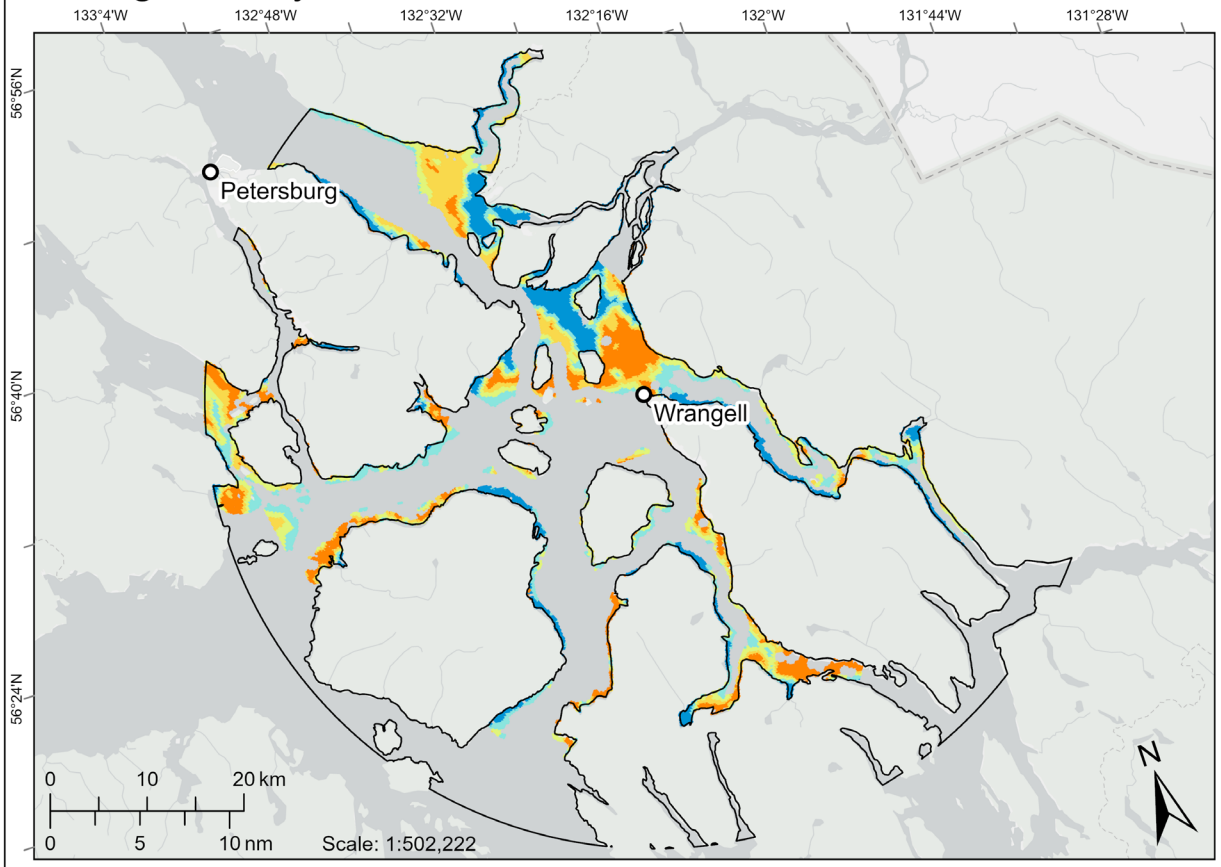
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Wrangell Study Area



Coastal Populated Places: NOAA OCM (2024)

Natural Resources

- Coastal Populated Places
- Final AOA Study Areas

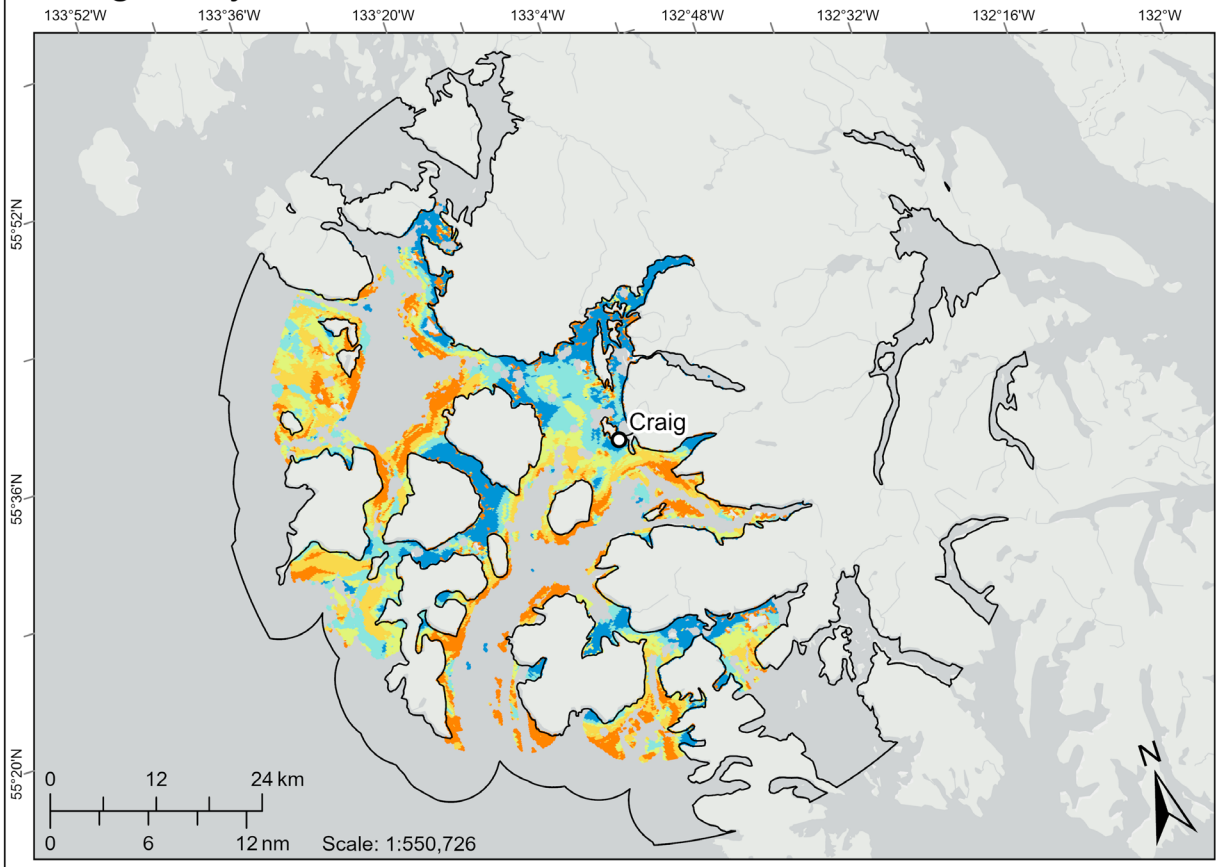
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)

Natural Resources

- Coastal Populated Places
- Final AOA Study Areas

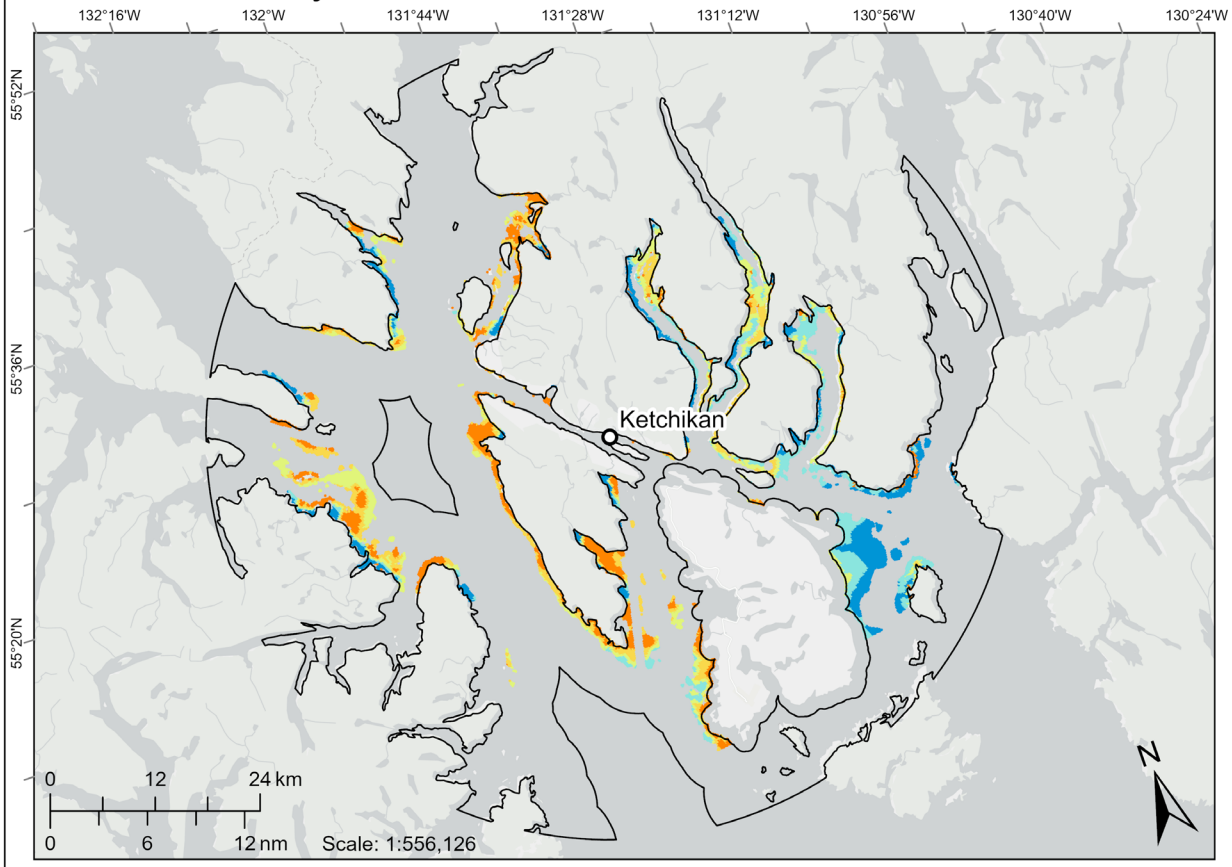
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)

Natural Resources

- Coastal Populated Places
- Final AOA Study Areas

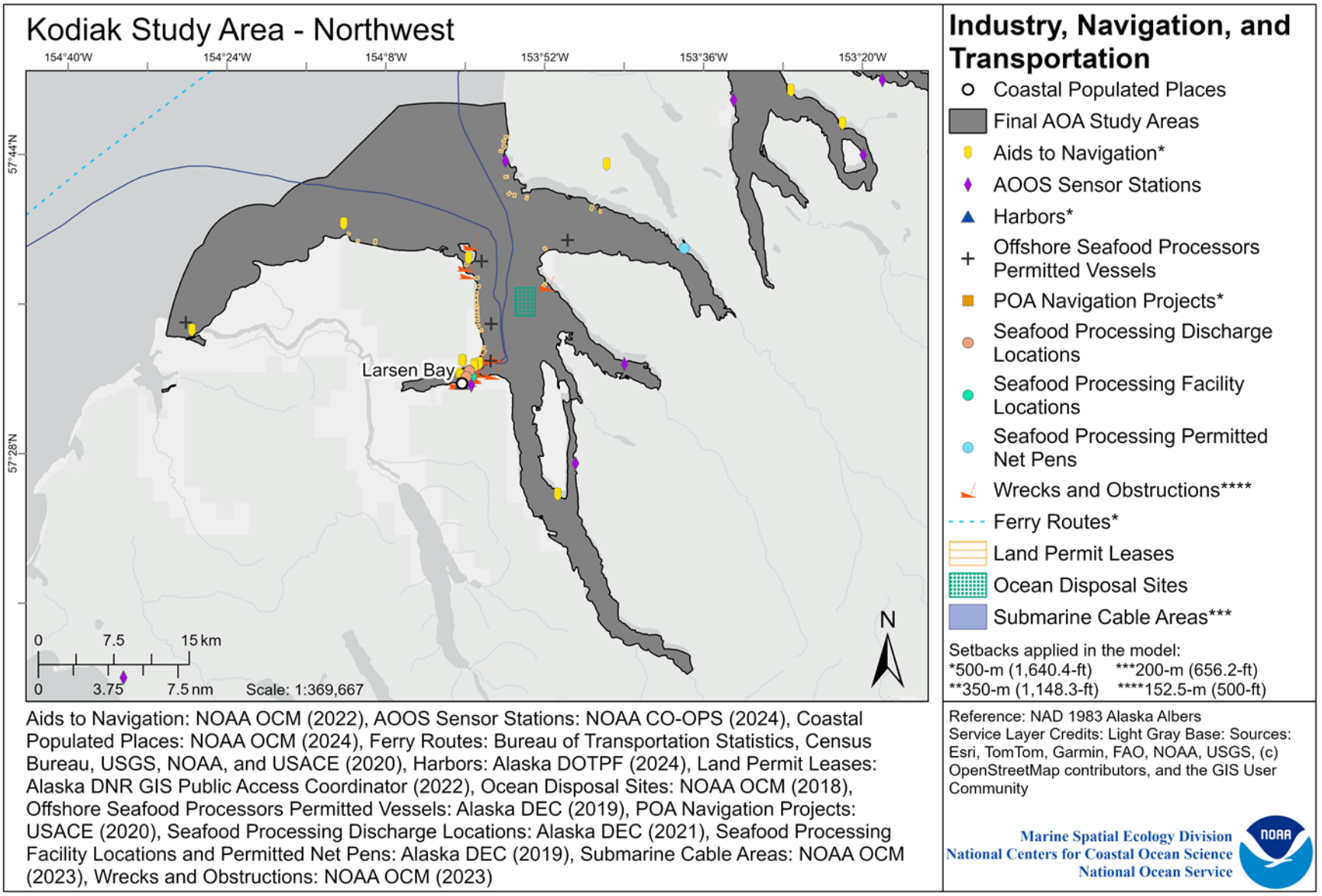
Submodel Relative Suitability

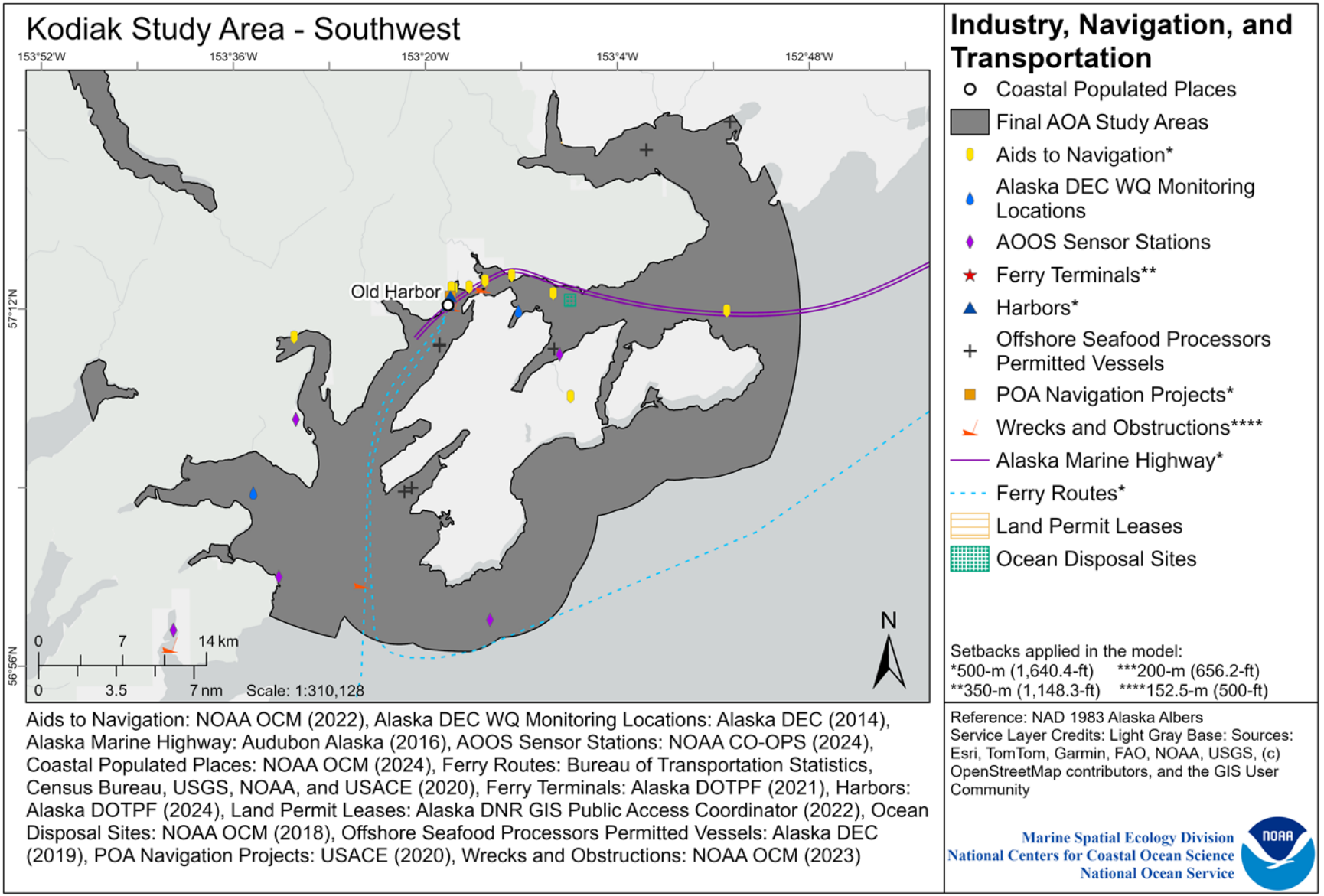
- Low
- Moderately Low
- Moderate
- Moderately High
- High

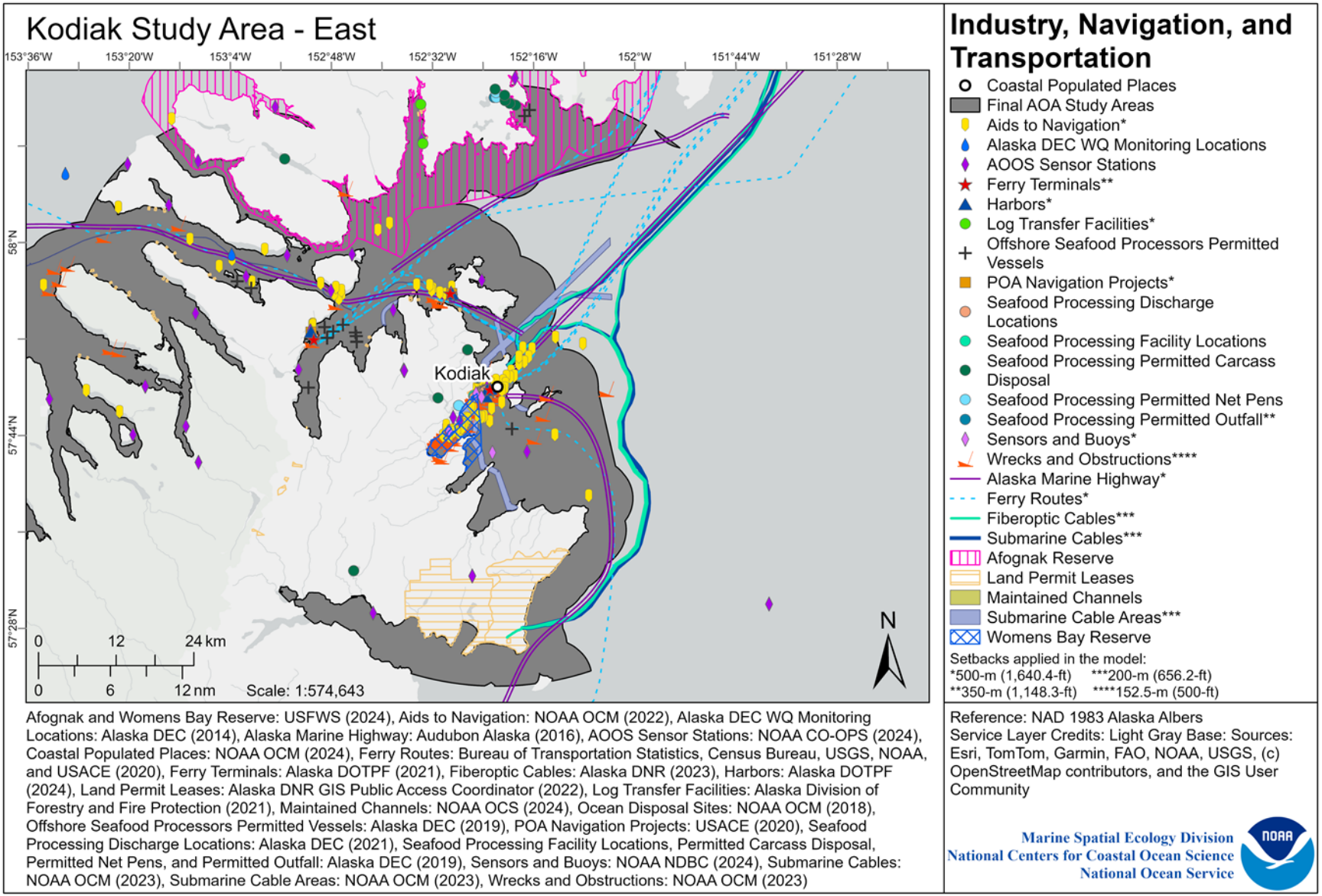
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Industry, Navigation, and Transportation Submodel Maps



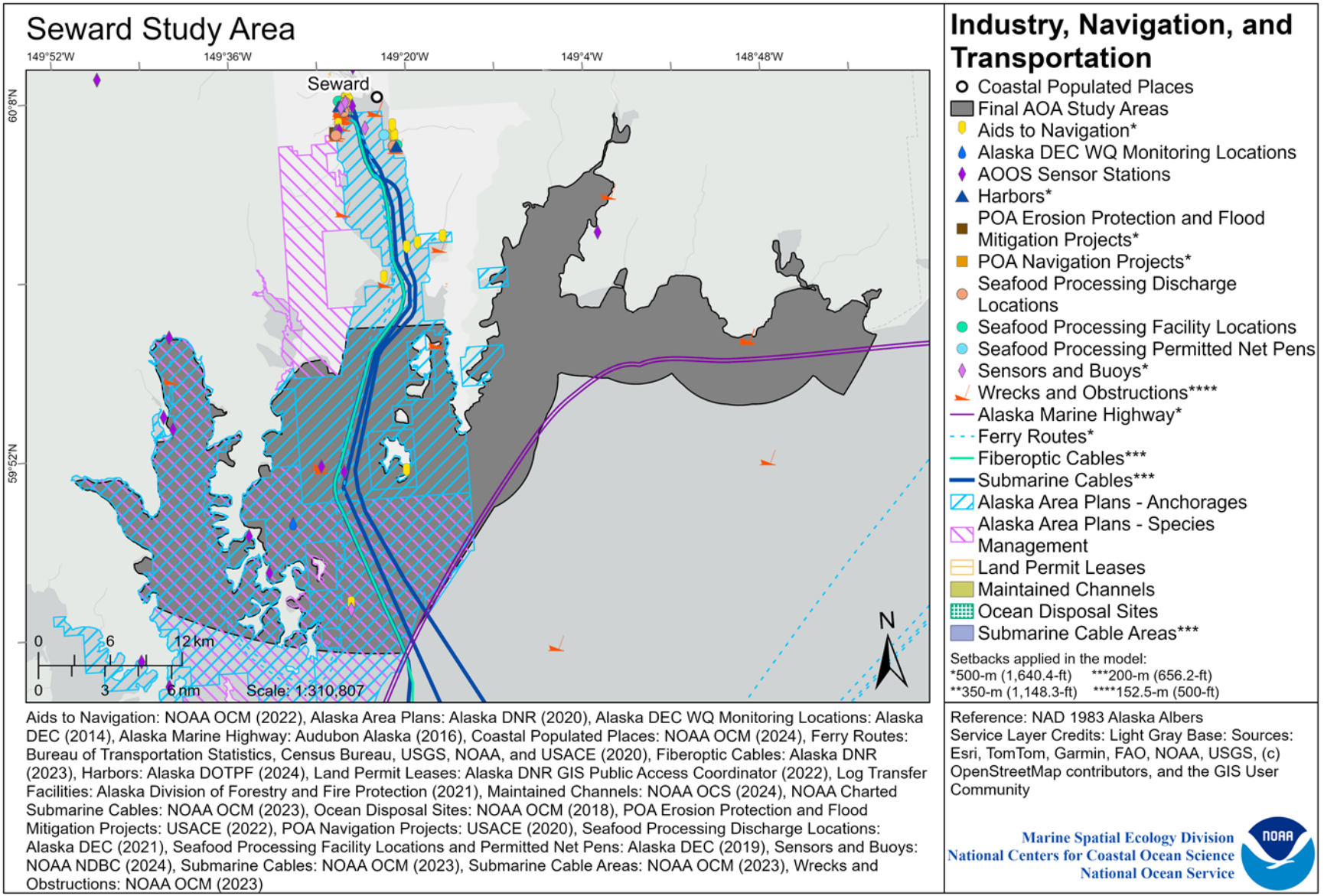

Kodiak Study Area - Southwest
153°52'W
153°36'W
153°20'W
153°4'W
152°48'W
57°12'N
56°56'N
Old Harbor
0
7
14 km
0
3.5
7 nm
Scale: 1:310,128
N
Industry, Navigation, and Transportation
Coastal Populated Places
Final AOA Study Areas
Aids to Navigation*
Alaska DEC WQ Monitoring Locations
AOOS Sensor Stations
Ferry Terminals**
Harbors*
Offshore Seafood Processors Permitted Vessels
POA Navigation Projects*
Wrecks and Obstructions****
Alaska Marine Highway*
Ferry Routes*
Land Permit Leases
Ocean Disposal Sites
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)
Aids to Navigation: NOAA OCM (2022), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Navigation Projects: USACE (2020), Wrecks and Obstructions: NOAA OCM (2023)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA



Afognak and Womens Bay Reserve: USFWS (2024), Aids to Navigation: NOAA OCM (2022), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Fiberoptic Cables: Alaska DNR (2023), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021), Maintained Channels: NOAA OCS (2024), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Carcass Disposal, Permitted Net Pens, and Permitted Outfall: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), Wrecks and Obstructions: NOAA OCM (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

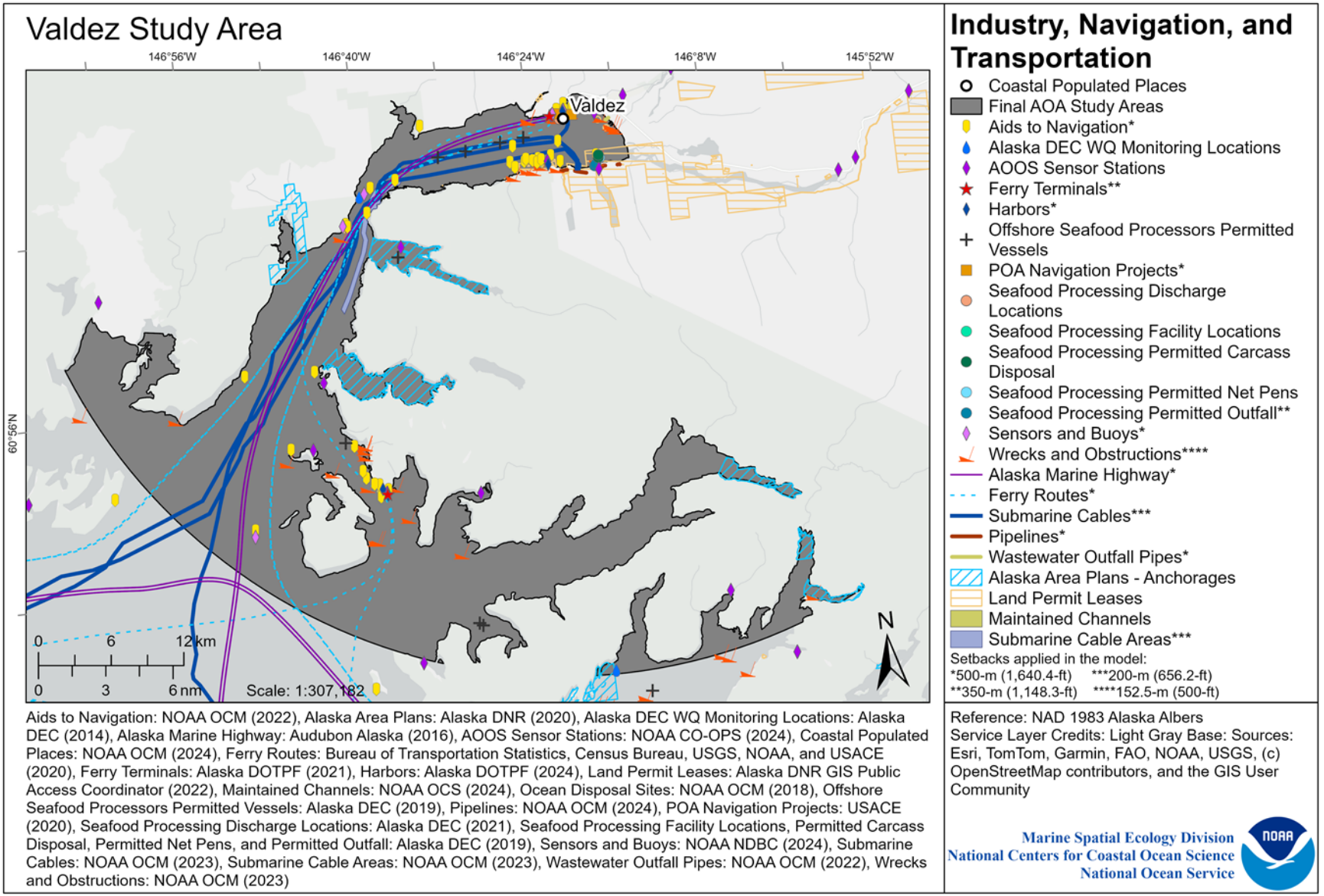
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Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Fiberoptic Cables: Alaska DNR (2023), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021), Maintained Channels: NOAA OCS (2024), NOAA Charted Submarine Cables: NOAA OCM (2023), Ocean Disposal Sites: NOAA OCM (2018), POA Erosion Protection and Flood Mitigation Projects: USACE (2022), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations and Permitted Net Pens: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), Wrecks and Obstructions: NOAA OCM (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

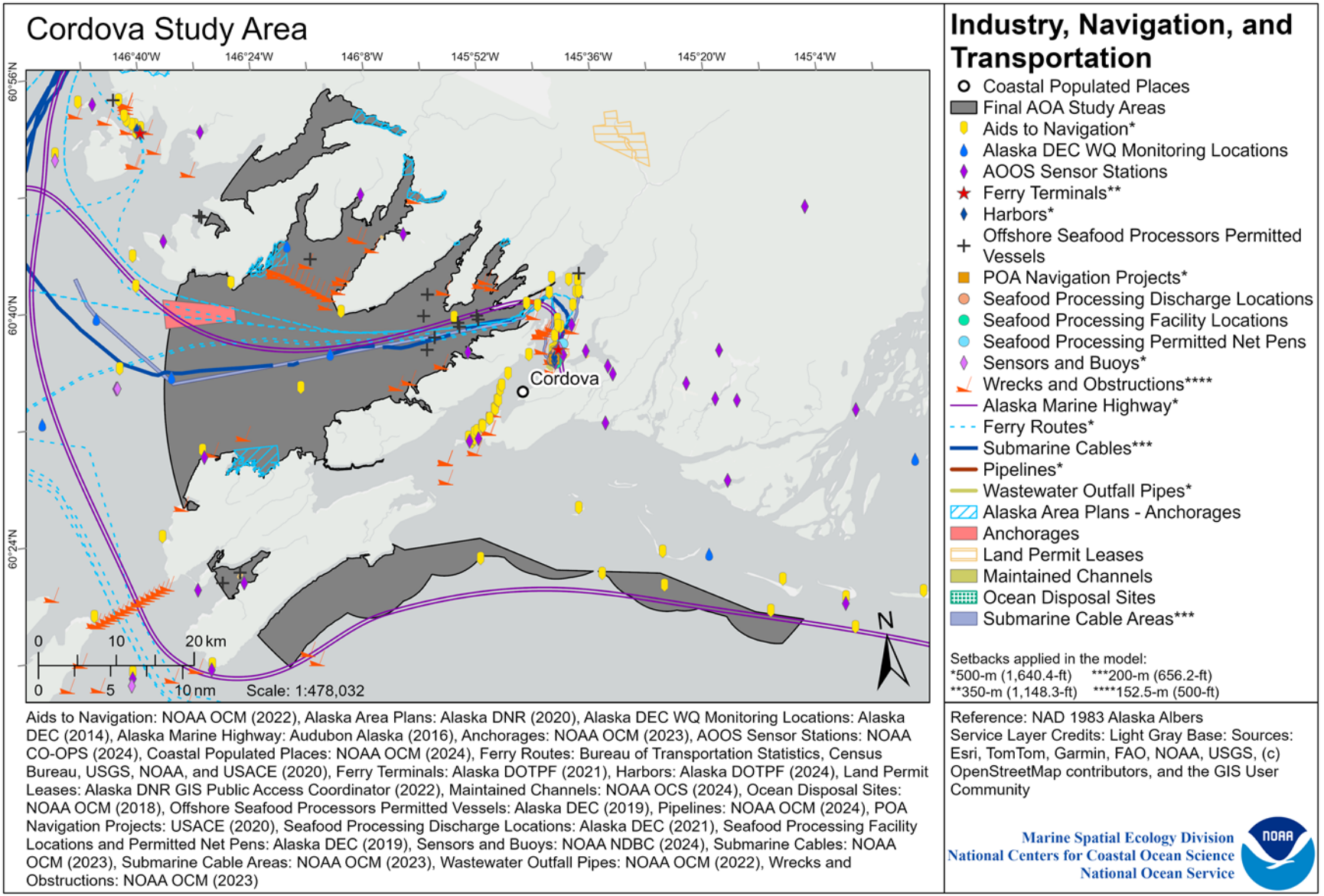
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Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Maintained Channels: NOAA OCS (2024), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), Pipelines: NOAA OCM (2024), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Carcass Disposal, Permitted Net Pens, and Permitted Outfall: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), Wastewater Outfall Pipes: NOAA OCM (2022), Wrecks and Obstructions: NOAA OCM (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

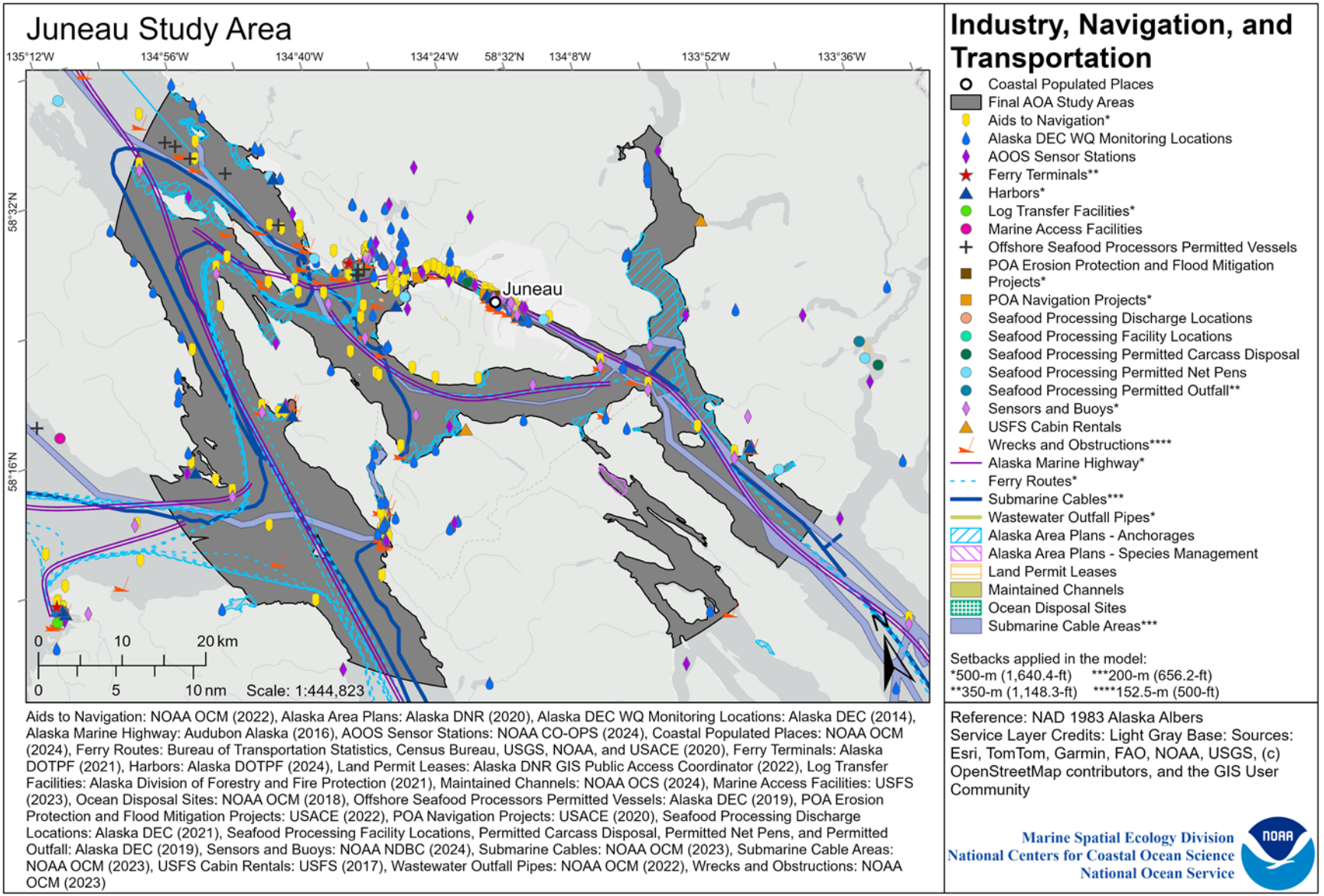
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Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), Anchorages: NOAA OCM (2023), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Maintained Channels: NOAA OCS (2024), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), Pipelines: NOAA OCM (2024), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations and Permitted Net Pens: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), Wastewater Outfall Pipes: NOAA OCM (2022), Wrecks and Obstructions: NOAA OCM (2023)

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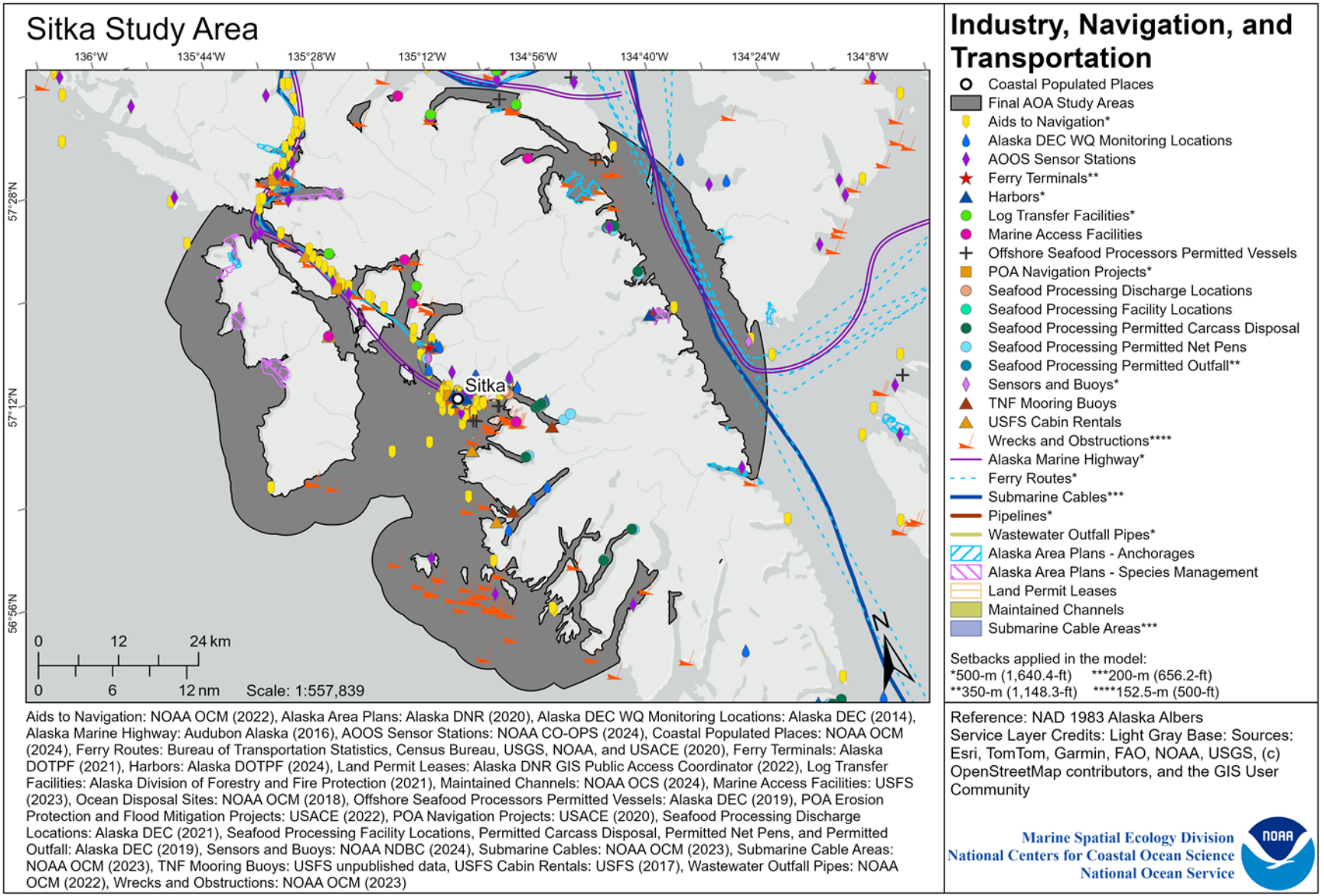
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Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021), Maintained Channels: NOAA OCS (2024), Marine Access Facilities: USFS (2023), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Erosion Protection and Flood Mitigation Projects: USACE (2022), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Carcass Disposal, Permitted Net Pens, and Permitted Outfall: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), USFS Cabin Rentals: USFS (2017), Wastewater Outfall Pipes: NOAA OCM (2022), Wrecks and Obstructions: NOAA OCM (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

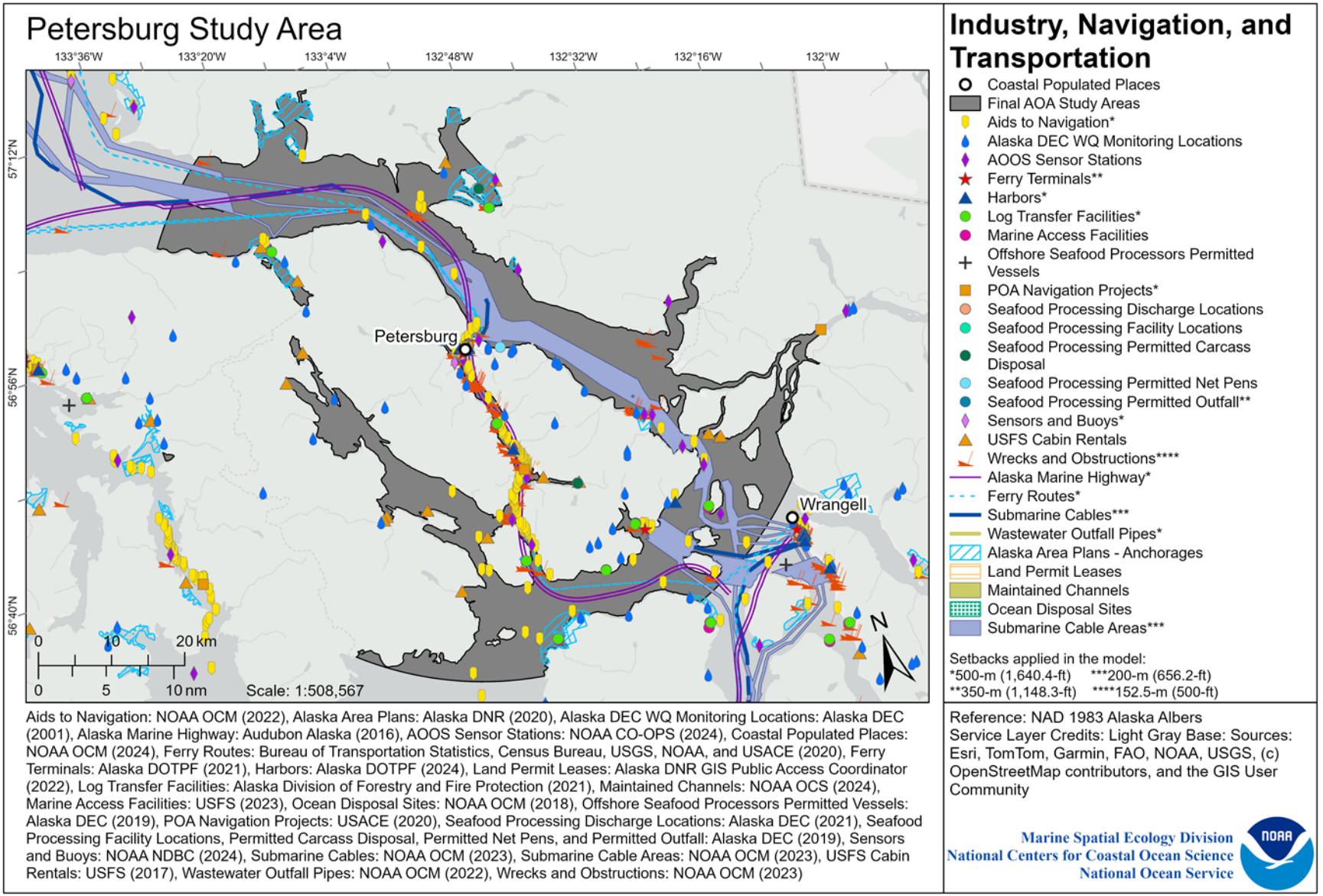
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Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021), Maintained Channels: NOAA OCS (2024), Marine Access Facilities: USFS (2023), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Erosion Protection and Flood Mitigation Projects: USACE (2022), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Carcass Disposal, Permitted Net Pens, and Permitted Outfall: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), TNF Mooring Buoys: USFS unpublished data, USFS Cabin Rentals: USFS (2017), Wastewater Outfall Pipes: NOAA OCM (2022), Wrecks and Obstructions: NOAA OCM (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

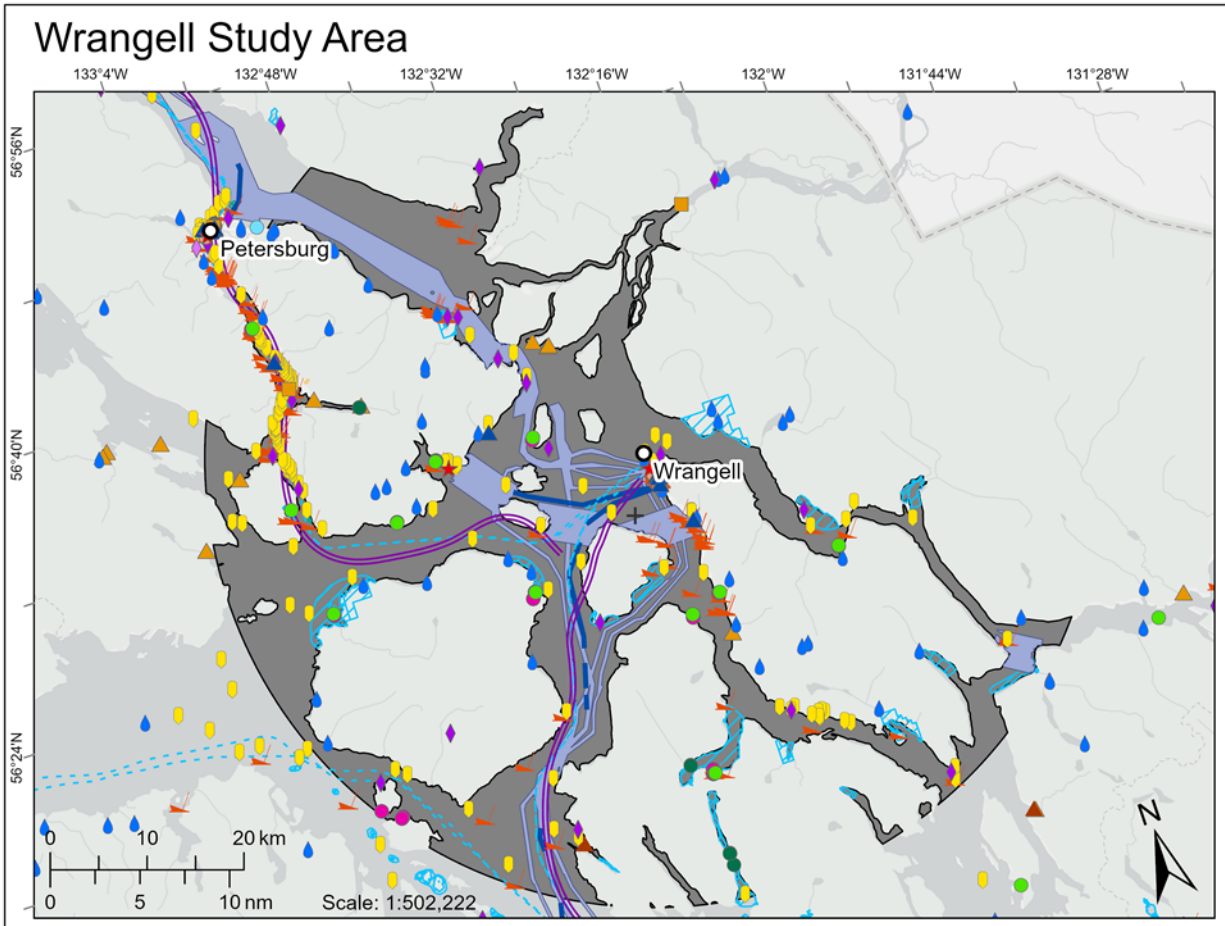
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Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2001), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021), Maintained Channels: NOAA OCS (2024), Marine Access Facilities: USFS (2023), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Carcass Disposal, Permitted Net Pens, and Permitted Outfall: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), USFS Cabin Rentals: USFS (2017), Wastewater Outfall Pipes: NOAA OCM (2022), Wrecks and Obstructions: NOAA OCM (2023)

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Industry, Navigation, and Transportation

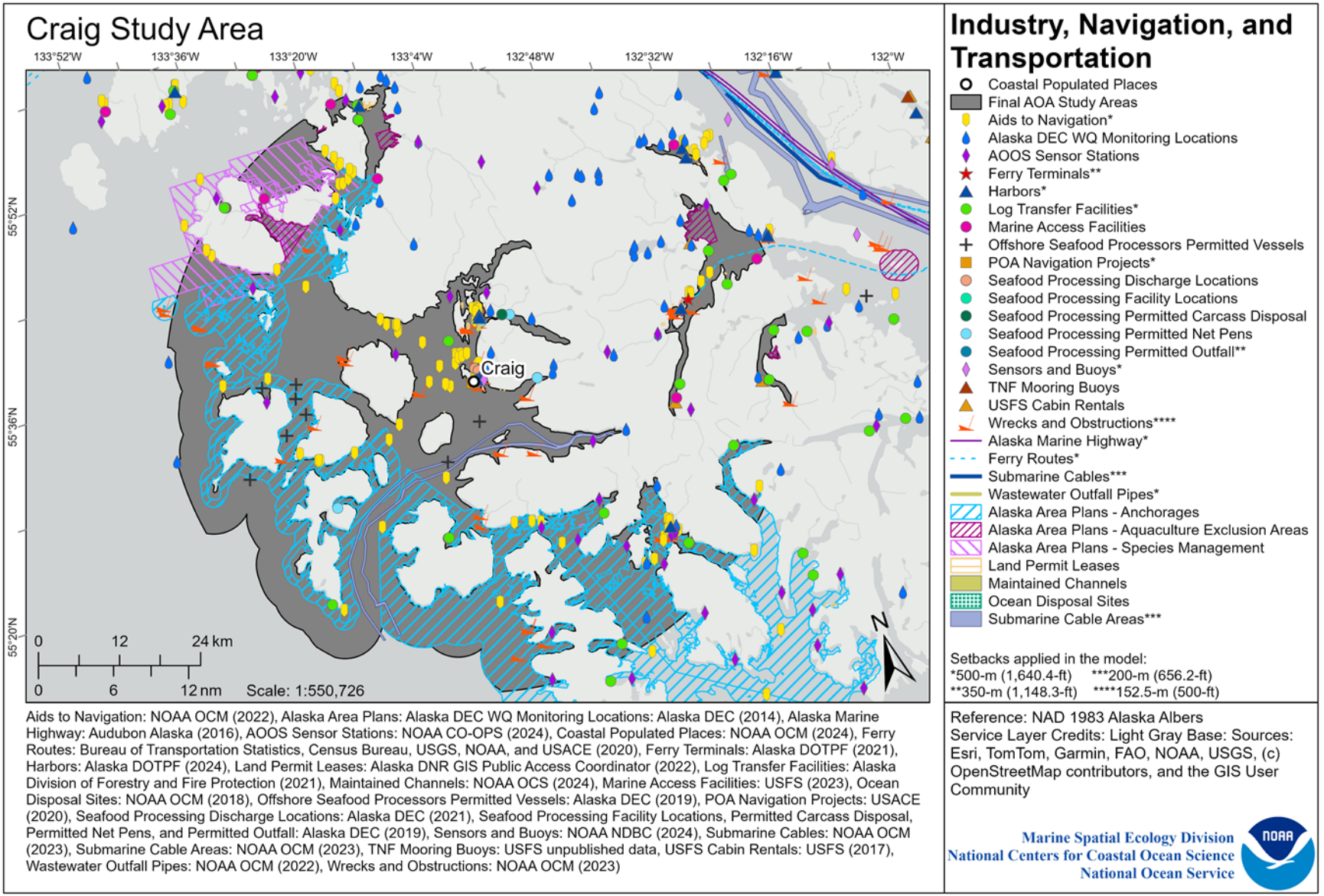
- Coastal Populated Places
- Final AOA Study Areas
- Aids to Navigation*
- Alaska DEC WQ Monitoring Locations
- AOOS Sensor Stations
- Ferry Terminals**
- Harbors*
- Log Transfer Facilities*
- Marine Access Facilities
- Offshore Seafood Processors Permitted Vessels
- POA Navigation Projects*
- Seafood Processing Discharge Locations
- Seafood Processing Facility Locations
- Seafood Processing Permitted Carcass Disposal
- Seafood Processing Permitted Net Pens
- Seafood Processing Permitted Outfall**
- Sensors and Buoys*
- TNF Mooring Buoys
- USFS Cabin Rentals
- Wrecks and Obstructions****
- Alaska Marine Highway*
- Ferry Routes*
- Submarine Cables***
- Wastewater Outfall Pipes*
- Alaska Area Plans - Anchorages
- Land Permit Leases
- Maintained Channels
- Ocean Disposal Sites
- Submarine Cable Areas***

Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)

Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021), Maintained Channels: NOAA OCS (2024), Marine Access Facilities: USFS (2023), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Carcass Disposal, Permitted Net Pens, and Permitted Outfall: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), TNF Mooring Buoys: USFS unpublished data, USFS Cabin Rentals: USFS (2017), Wastewater Outfall Pipes: NOAA OCM (2022), Wrecks and Obstructions: NOAA OCM (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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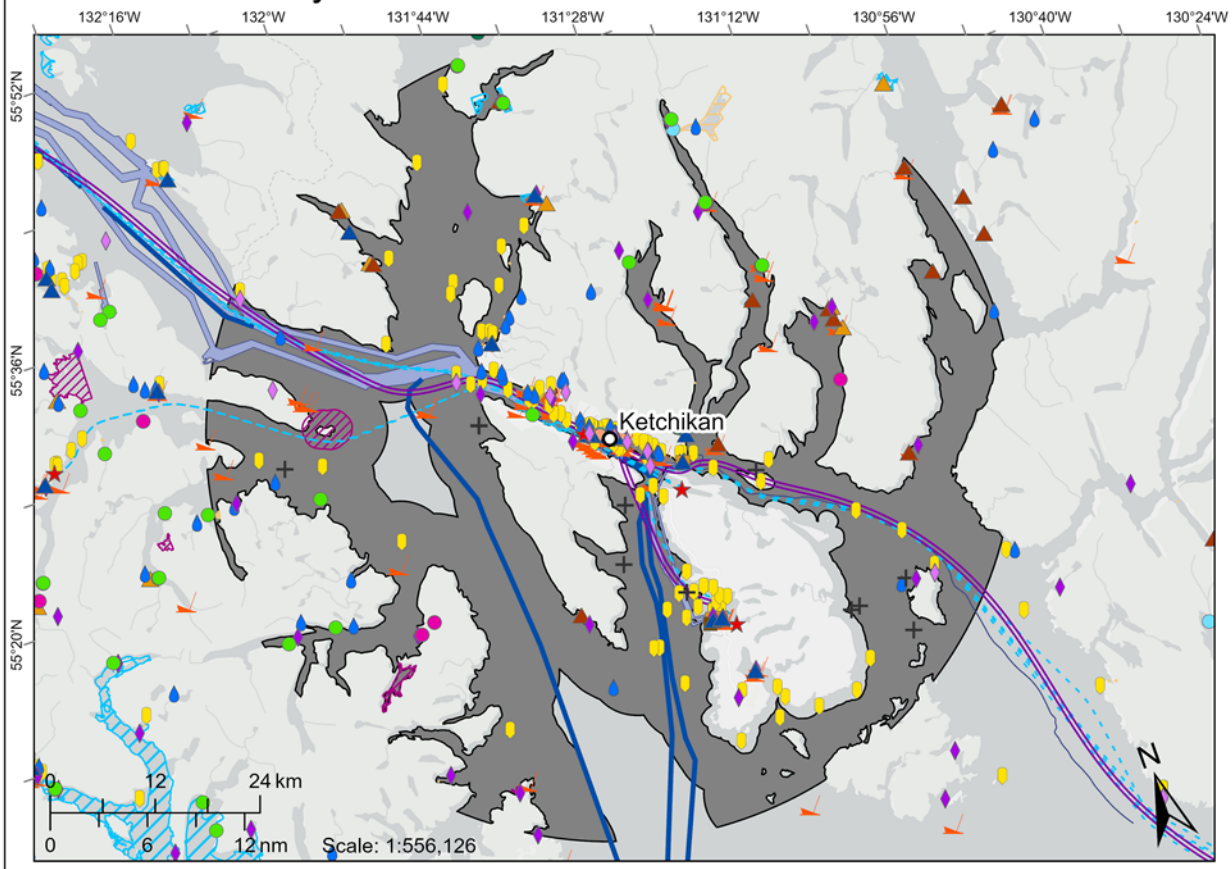


Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021), Maintained Channels: NOAA OCS (2024), Marine Access Facilities: USFS (2023), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Carcass Disposal, Permitted Net Pens, and Permitted Outfall: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), TNF Mooring Buoys: USFS unpublished data, USFS Cabin Rentals: USFS (2017), Wastewater Outfall Pipes: NOAA OCM (2022), Wrecks and Obstructions: NOAA OCM (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Ketchikan Study Area



Industry, Navigation, and Transportation

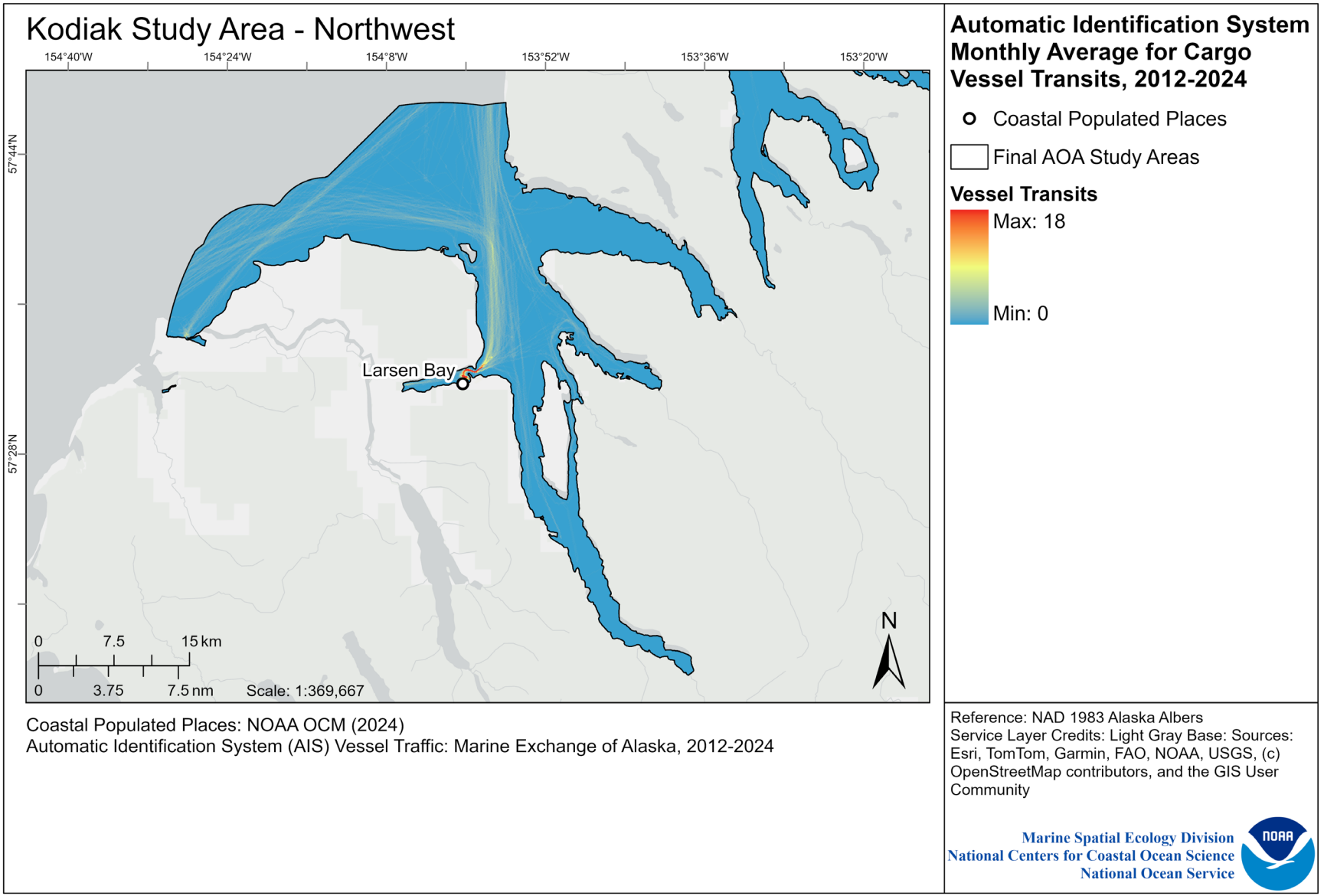
- Coastal Populated Places
- Final AOA Study Areas
- Aids to Navigation*
- Alaska DEC WQ Monitoring Locations
- AOOS Sensor Stations
- Ferry Terminals**
- Harbors*
- Log Transfer Facilities*
- Marine Access Facilities
- Offshore Seafood Processors Permitted Vessels
- POA Erosion Protection and Flood Mitigation Projects*
- POA Navigation Projects*
- Seafood Processing Discharge Locations
- Seafood Processing Facility Locations
- Seafood Processing Permitted Carcass Disposal
- Seafood Processing Permitted Net Pens
- Seafood Processing Permitted Outfall**
- Sensors and Buoys*
- TNF Mooring Buoys
- USFS Cabin Rentals
- Wrecks and Obstructions****
- Alaska Marine Highway*
- Ferry Routes*
- Submarine Cables***
- Alaska Area Plans - Anchorages
- Alaska Area Plans - Aquaculture Exclusion Areas
- Anchorages
- Land Permit Leases
- Maintained Channels
- Ocean Disposal Sites
- Submarine Cable Areas***

Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)

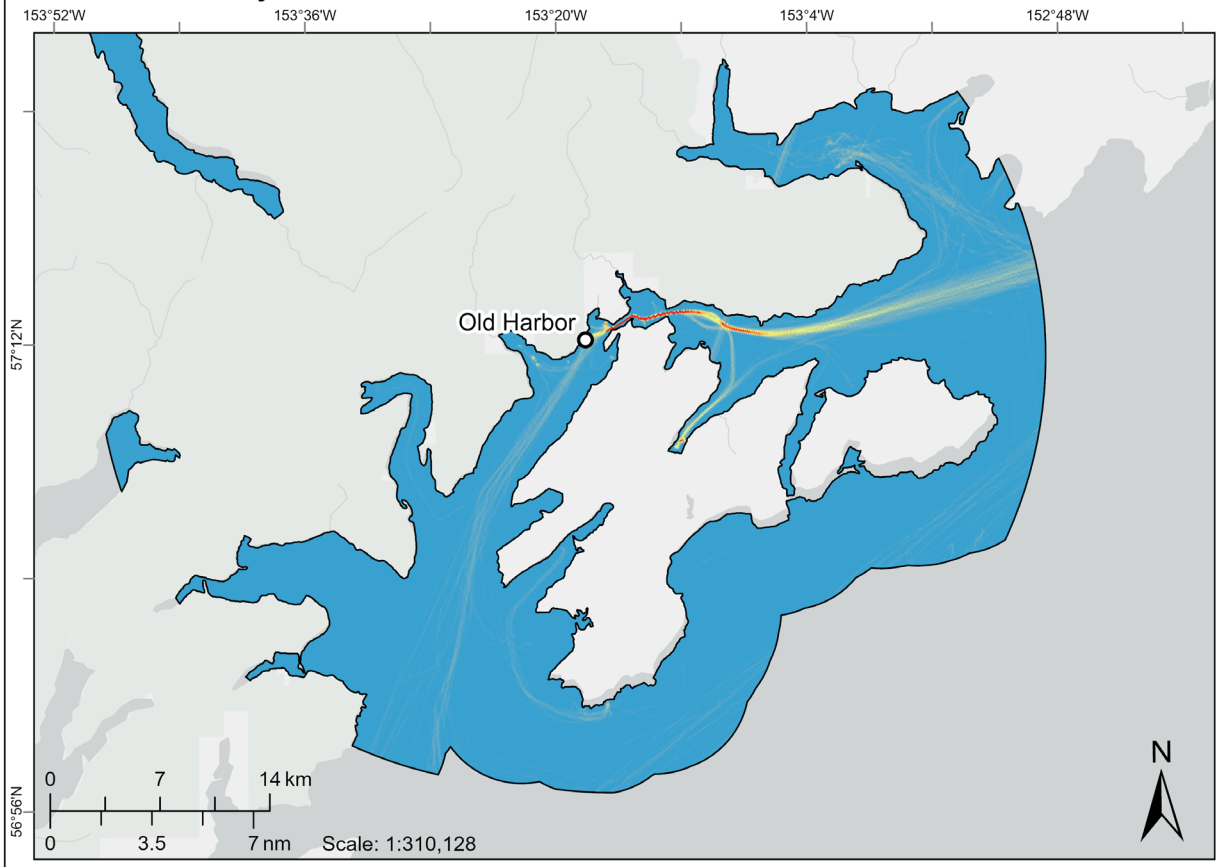
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Reference: NAD 1983 Alaska Albers
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Kodiak Study Area - Northwest
154°40'W
154°24'W
154°8'W
153°52'W
153°36'W
153°20'W
57°44'N
57°28'N
Larsen Bay
0
7.5
15 km
0
3.75
7.5 nm
Scale: 1:369,667
N
Automatic Identification System Monthly Average for Cargo Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 18
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Cargo Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

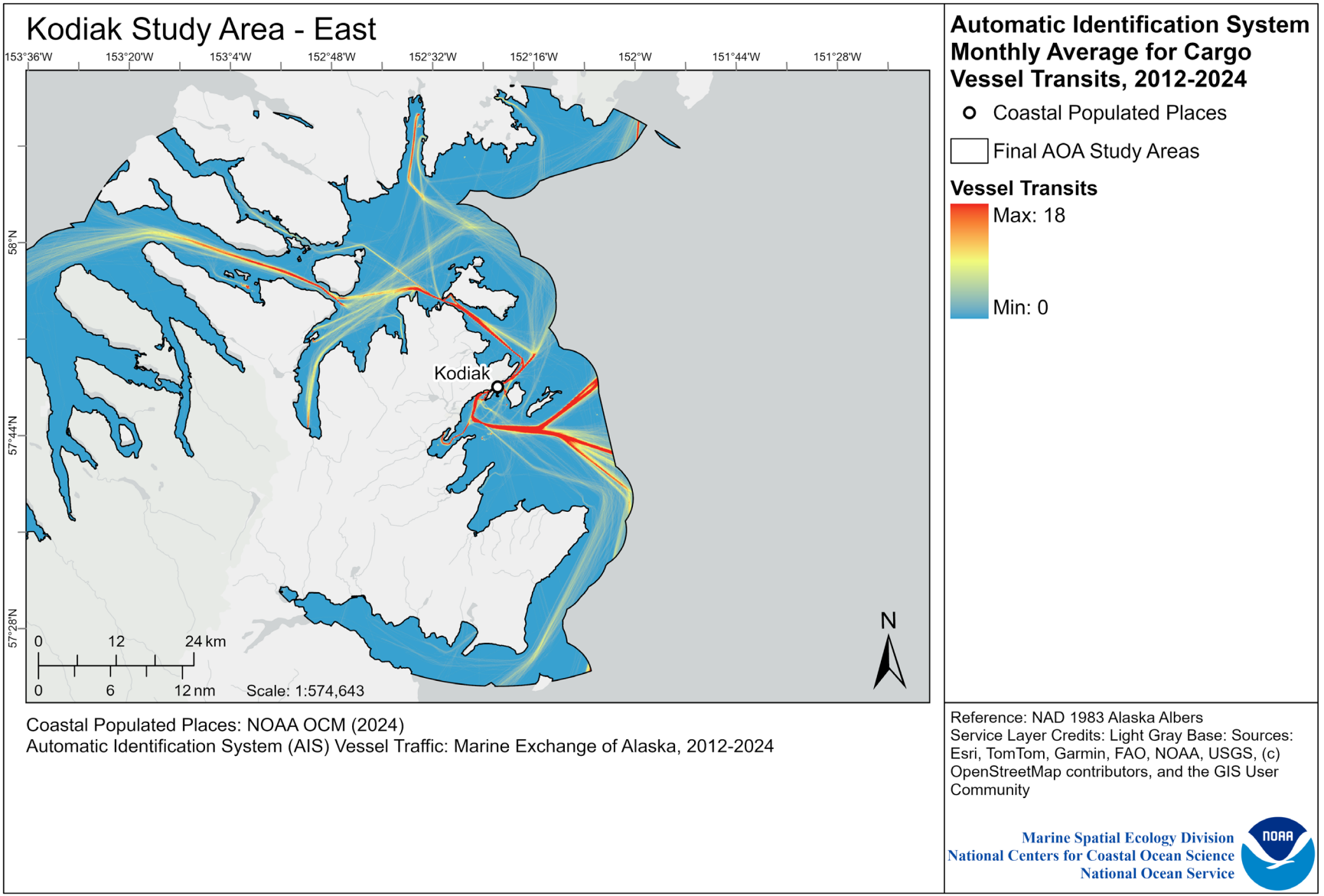
Vessel Transits

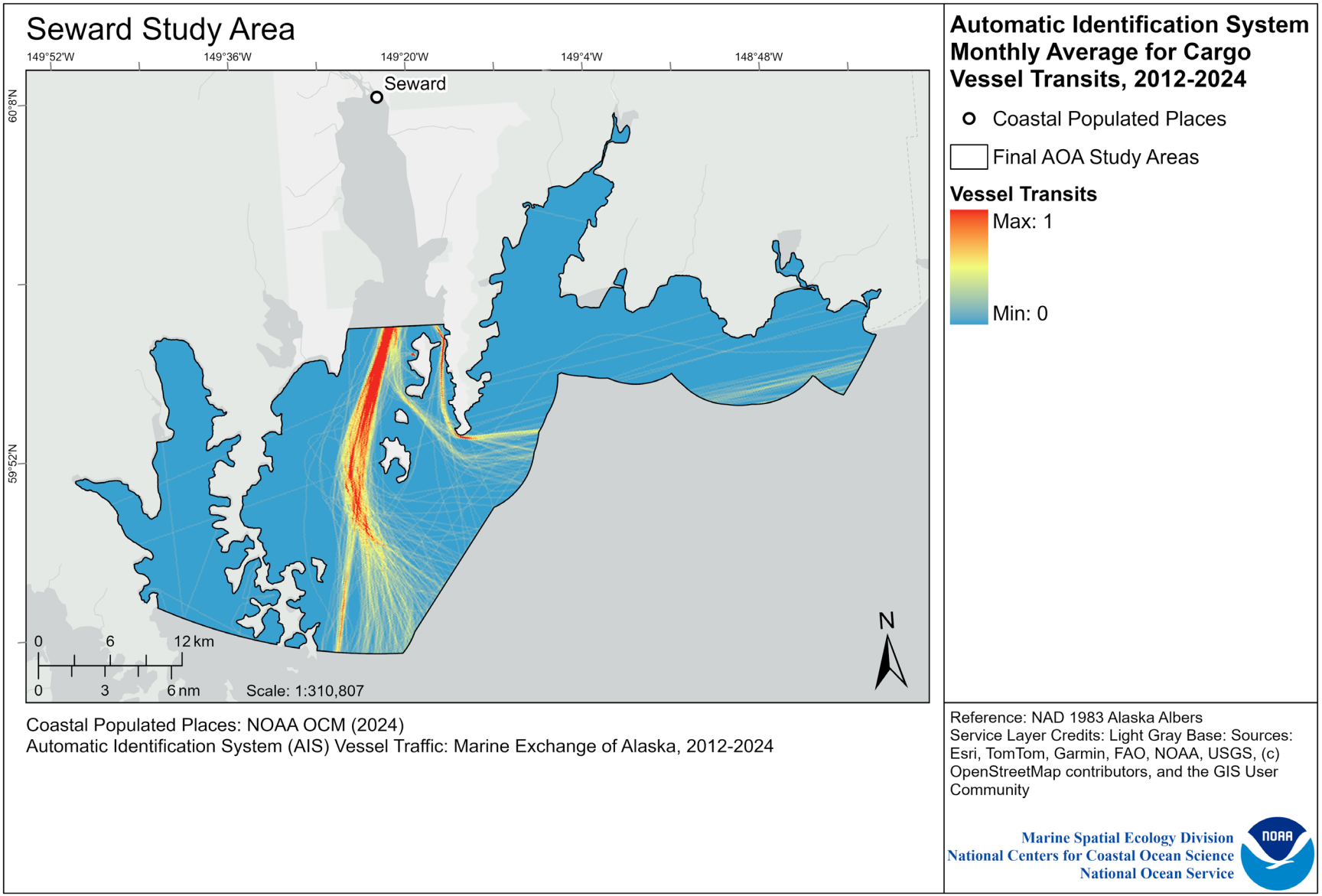
Max: 18

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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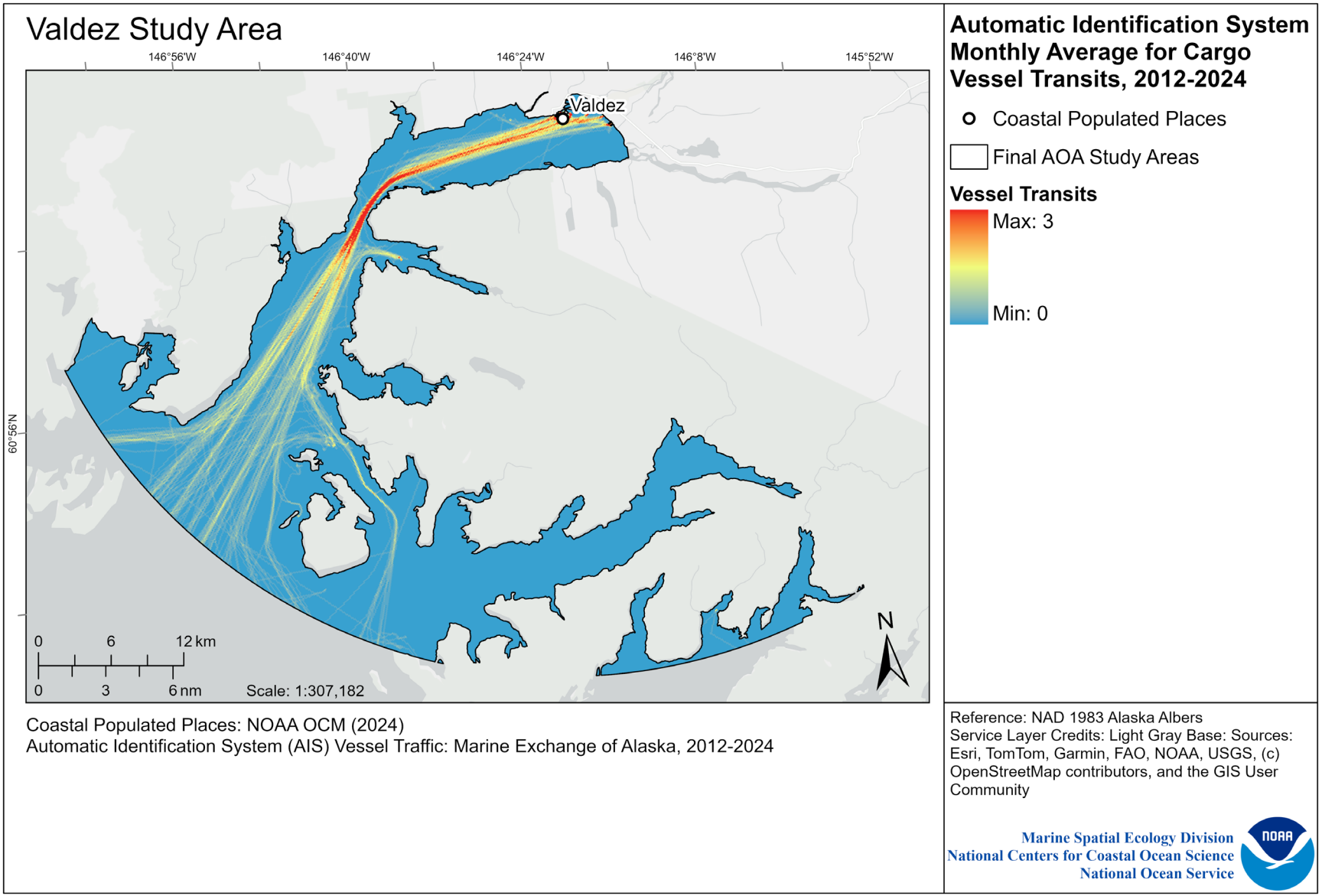

Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
Automatic Identification System Monthly Average for Cargo Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 18
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA



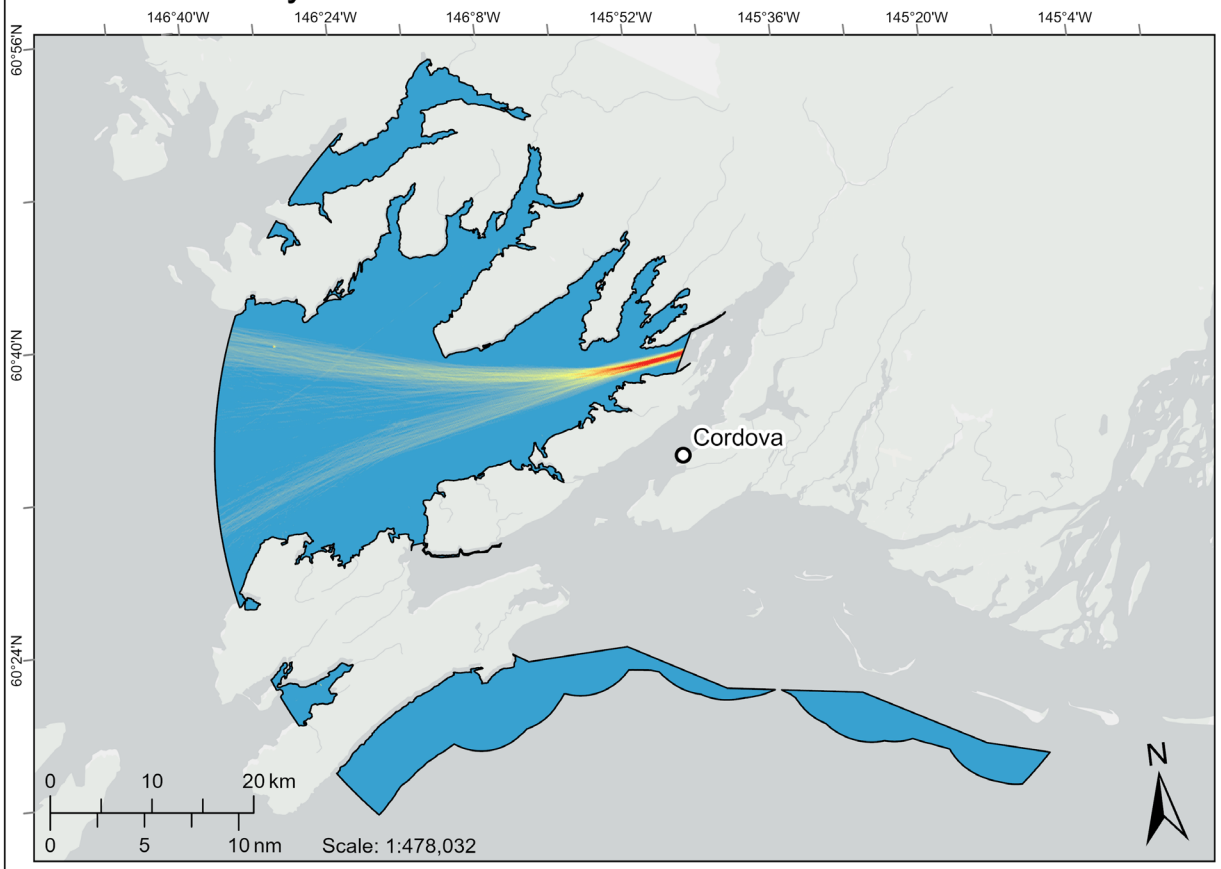
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Valdez Study Area
146°56'W
146°40'W
146°24'W
146°8'W
145°52'W
60°56'N
Valdez
0
6
12 km
0
3
6 nm
Scale: 1:307,182
N
Automatic Identification System Monthly Average for Cargo Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 3
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Cargo Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

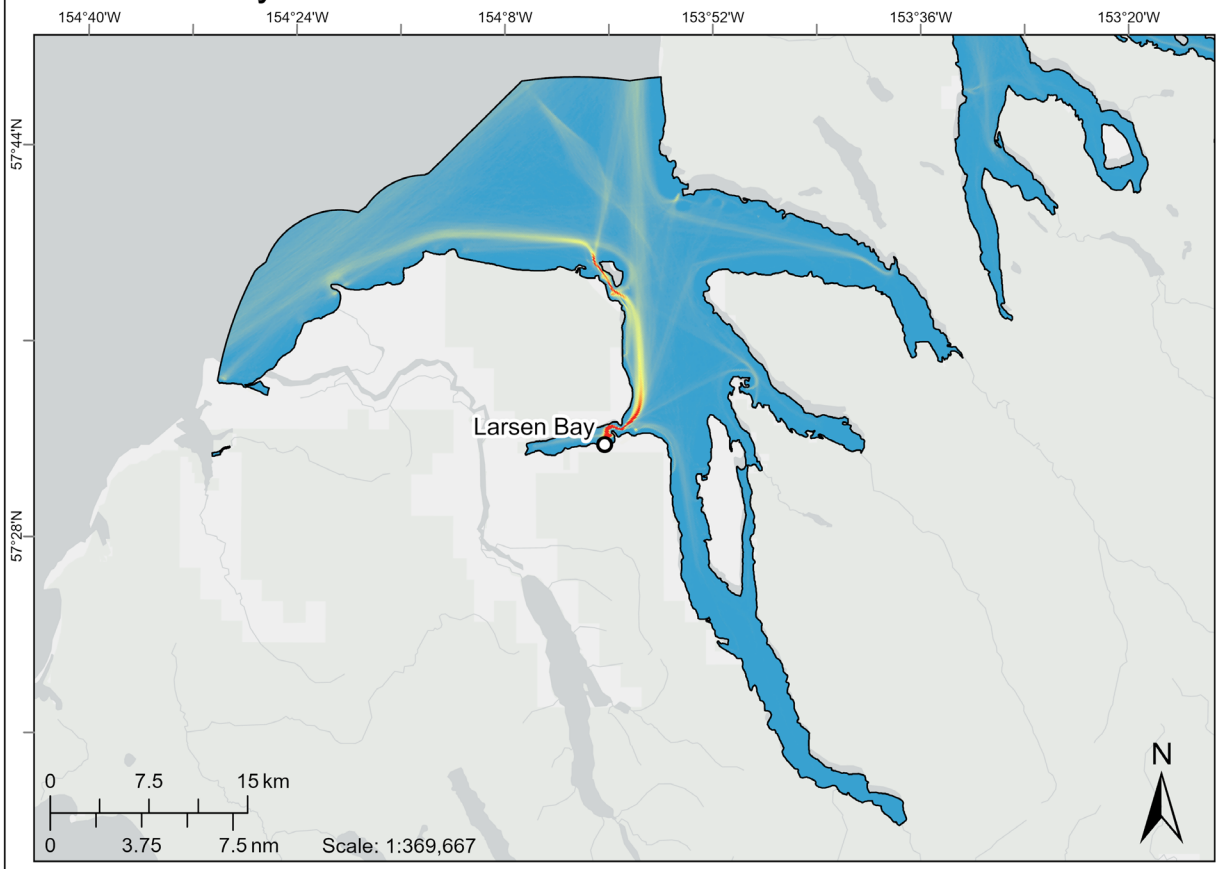
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Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Northwest



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

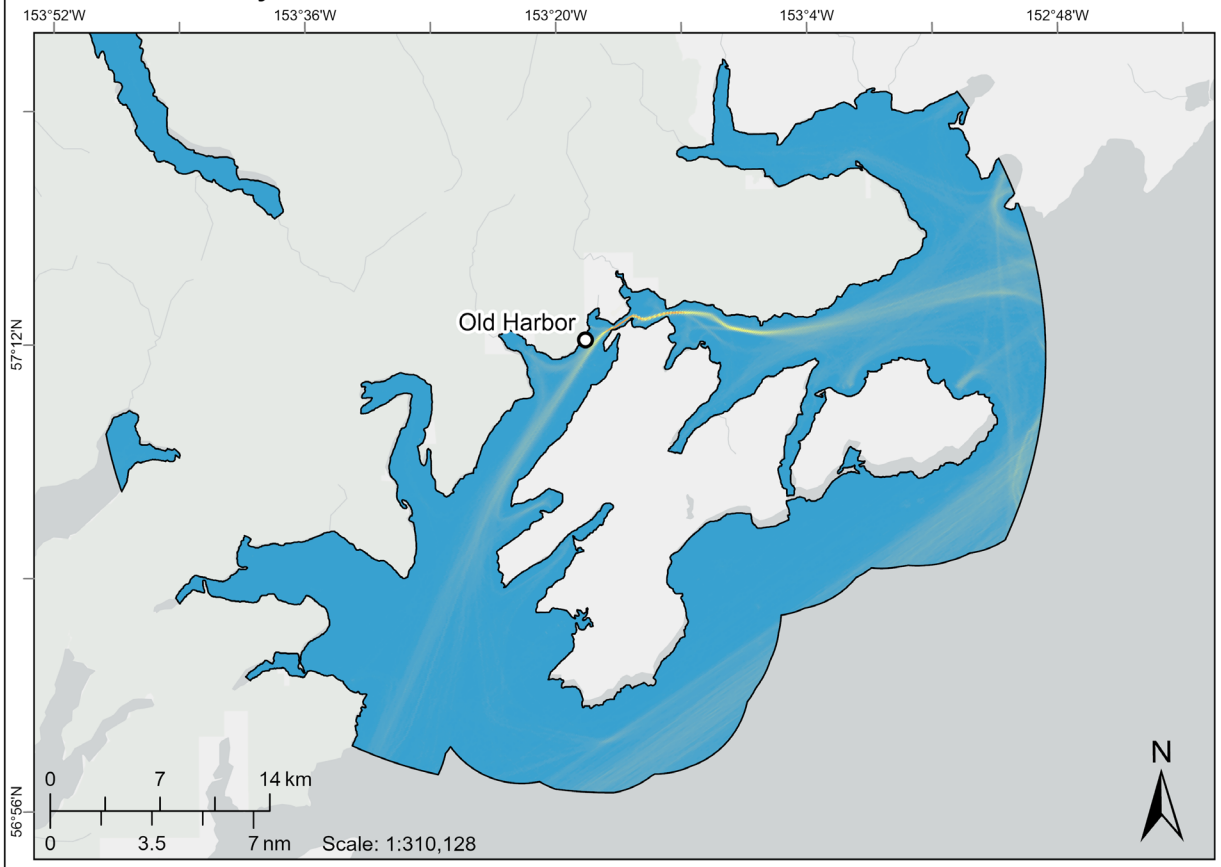
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Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

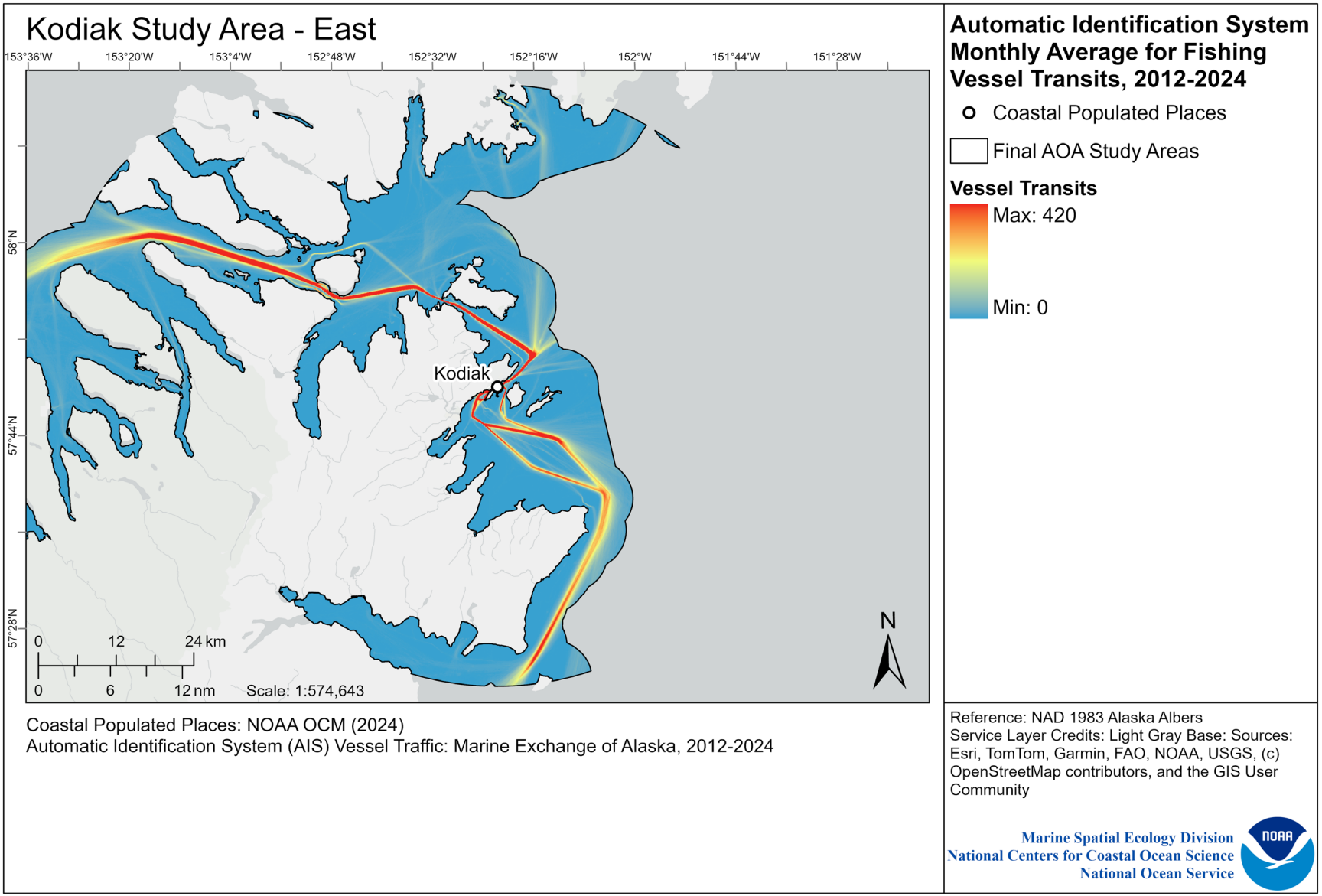
Vessel Transits

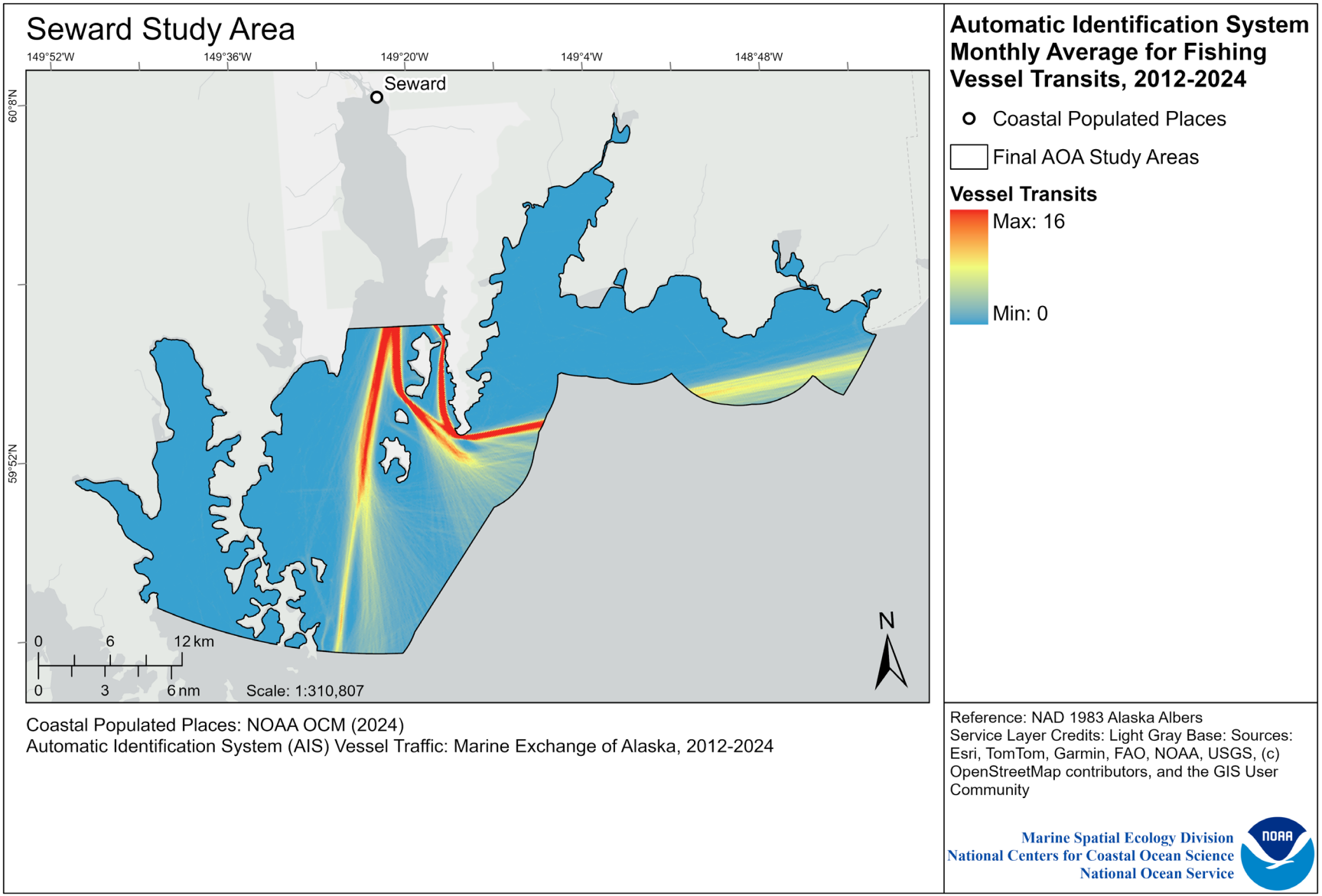
Max: 420

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

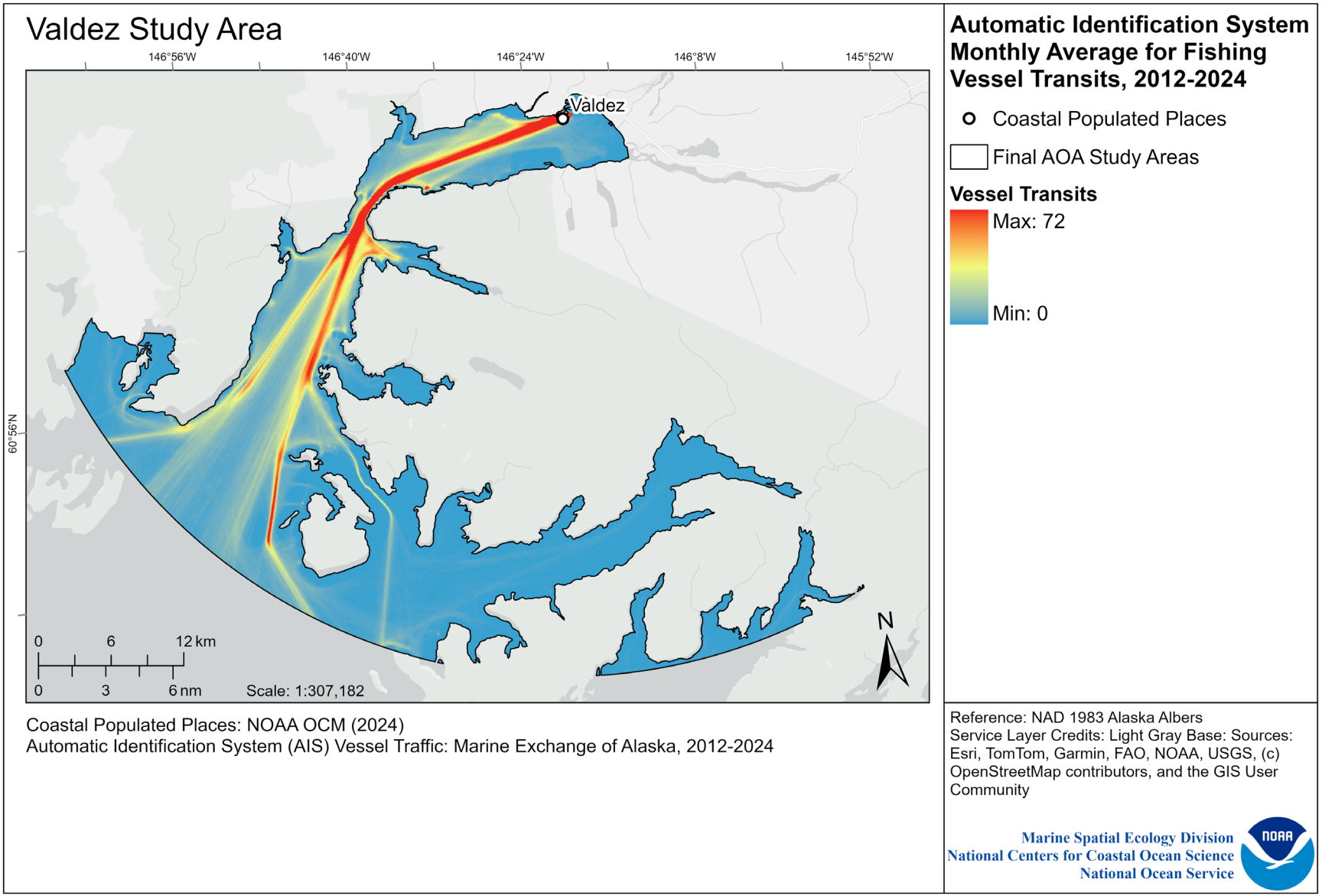

Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 420
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA



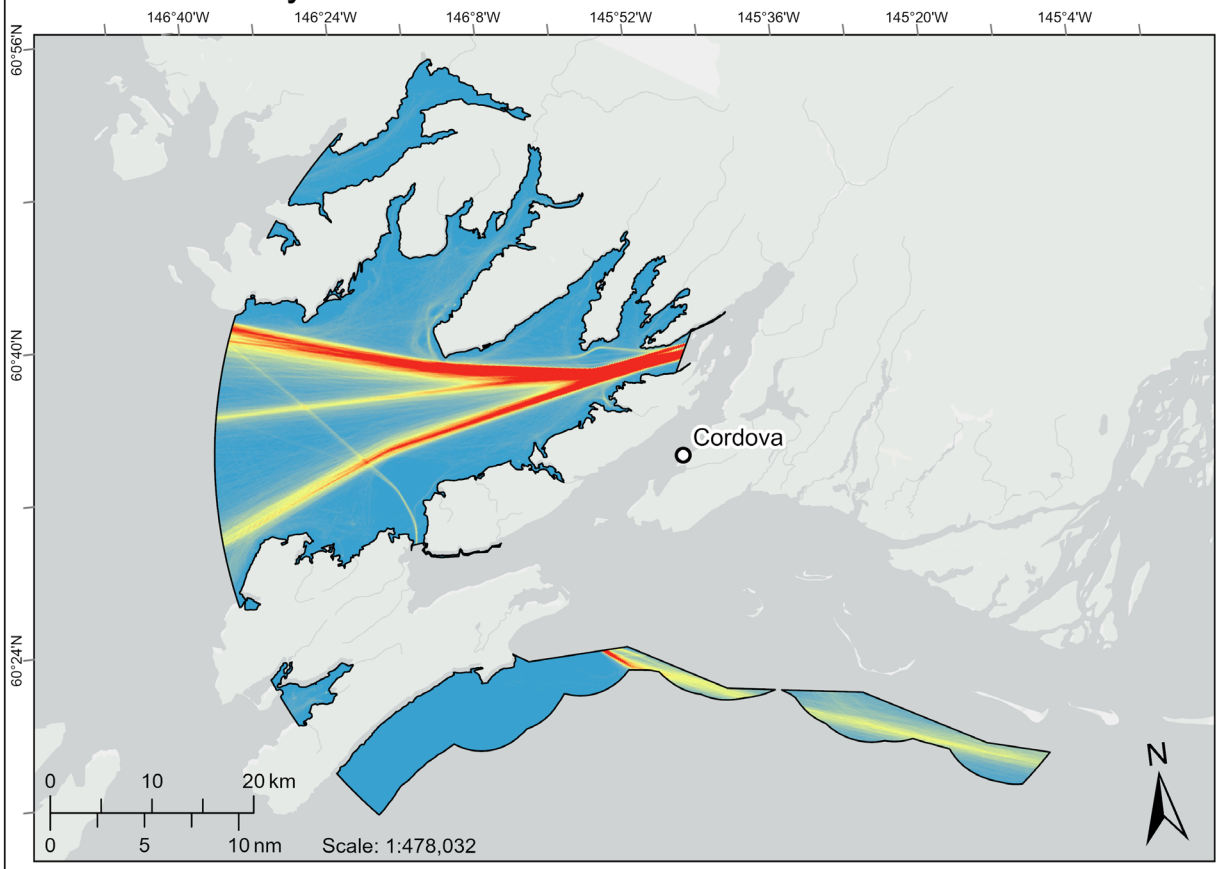
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Valdez Study Area
146°56'W
146°40'W
146°24'W
146°8'W
145°52'W
60°56'N
Valdez
0
6
12 km
0
3
6 nm
Scale: 1:307,182
N
Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 72
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

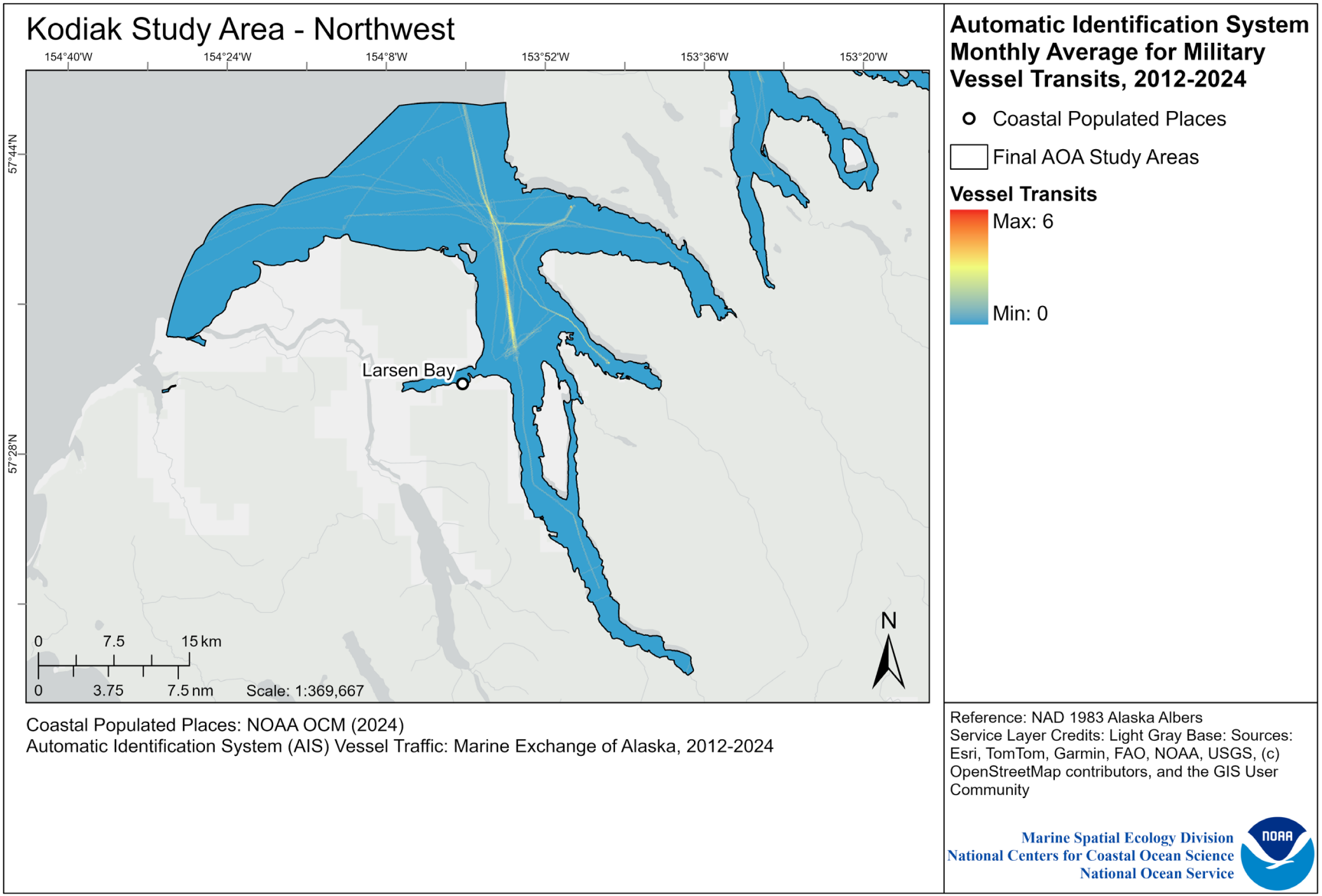
Vessel Transits

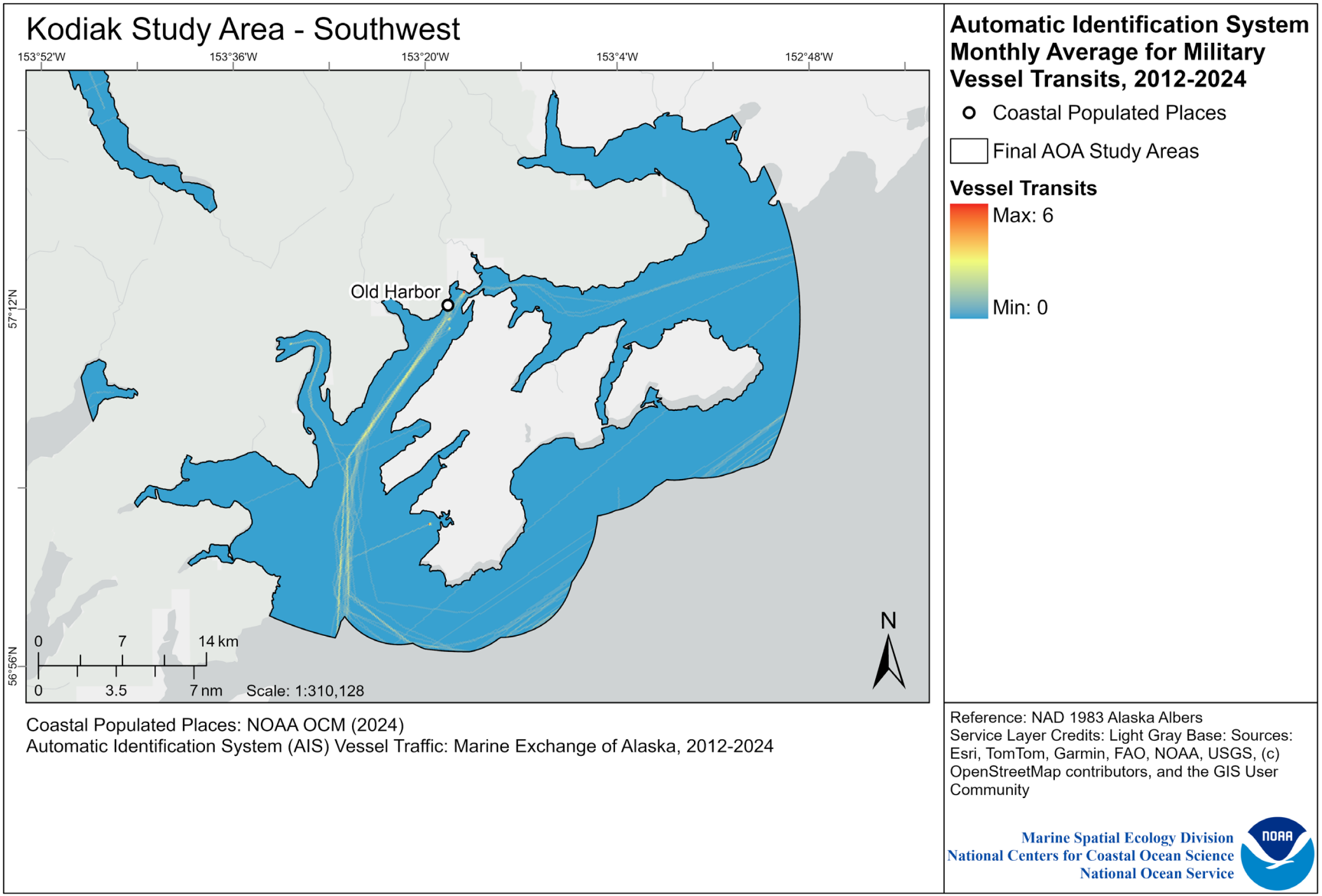
Max: 21

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

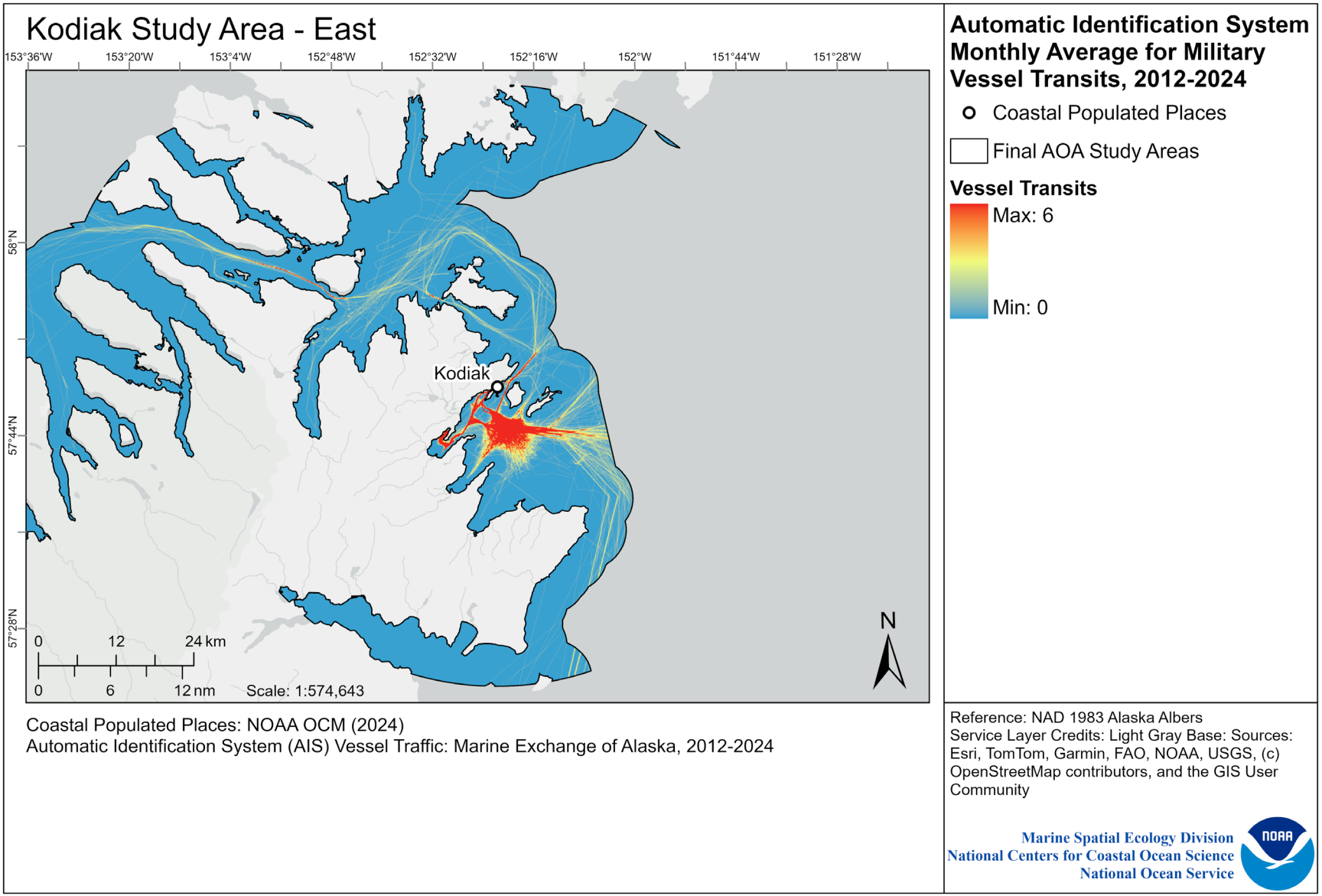

Kodiak Study Area - Northwest
154°40'W
154°24'W
154°8'W
153°52'W
153°36'W
153°20'W
57°44'N
57°28'N
Larsen Bay
0
7.5
15 km
0
3.75
7.5 nm
Scale: 1:369,667
N
Automatic Identification System Monthly Average for Military Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 6
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

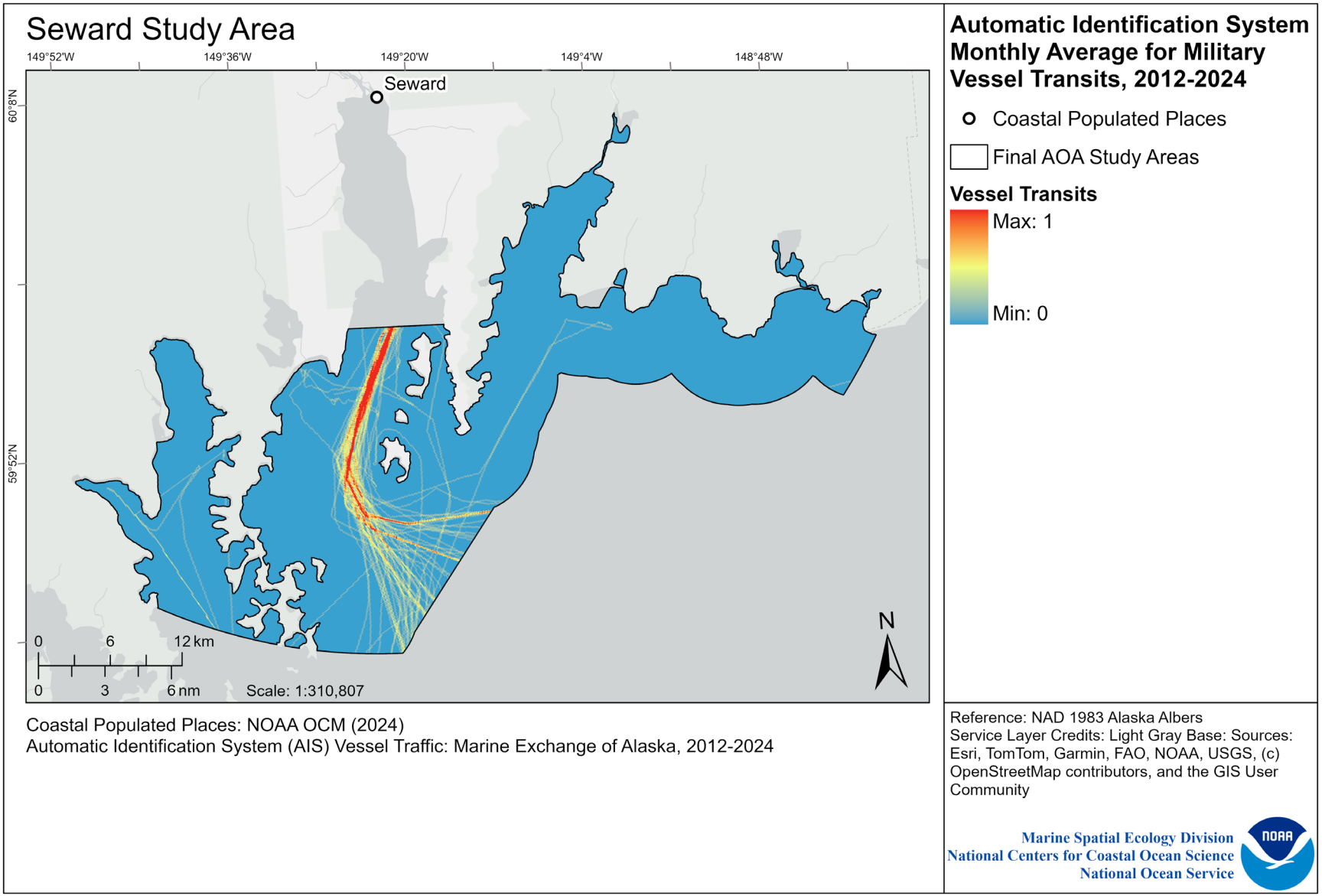


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
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National Ocean Service

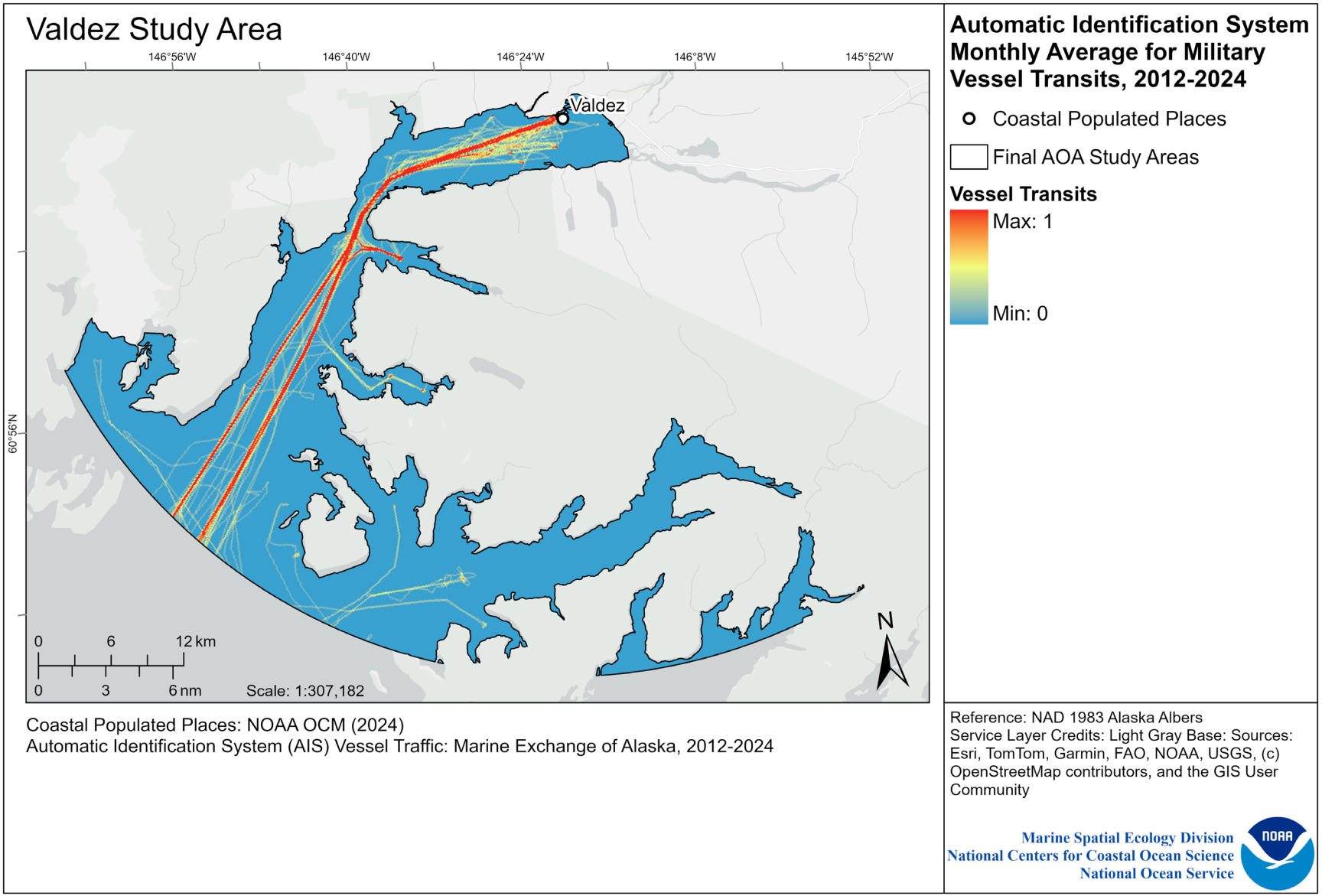

Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
Automatic Identification System Monthly Average for Military Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 6
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA



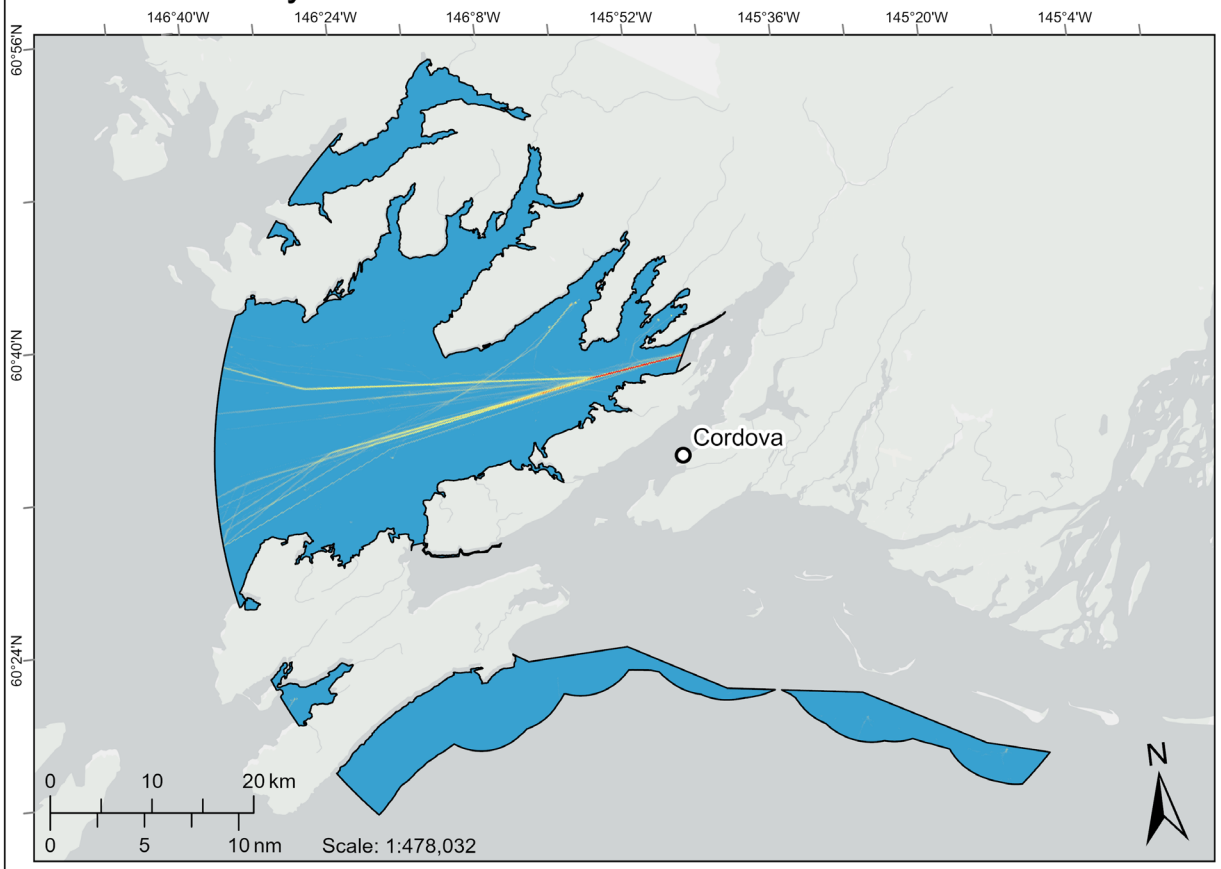
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Valdez Study Area
146°56'W
146°40'W
146°24'W
146°8'W
145°52'W
60°56'N
Valdez
0
6
12 km
0
3
6 nm
Scale: 1:307,182
N
Automatic Identification System Monthly Average for Military Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 1
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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NOAA

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Military Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

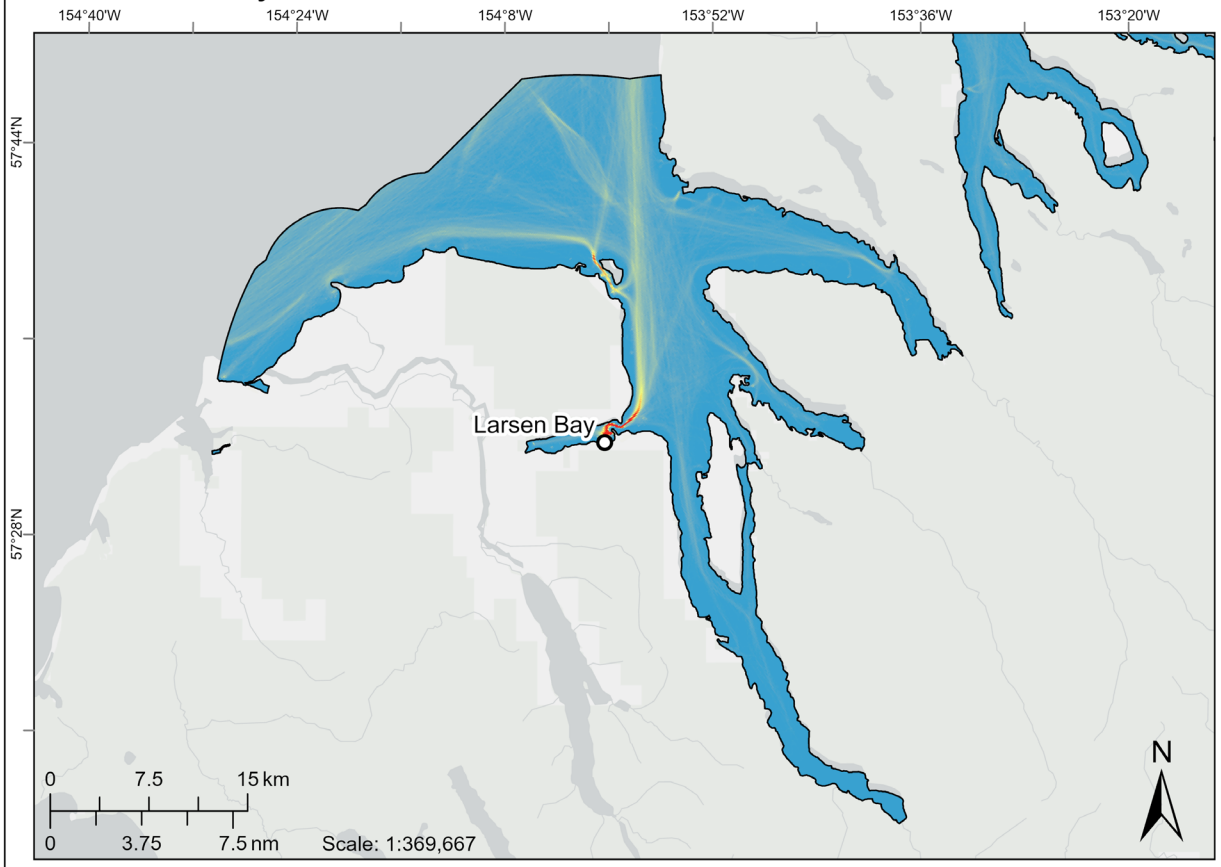
Max: 1

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Northwest



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Other Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

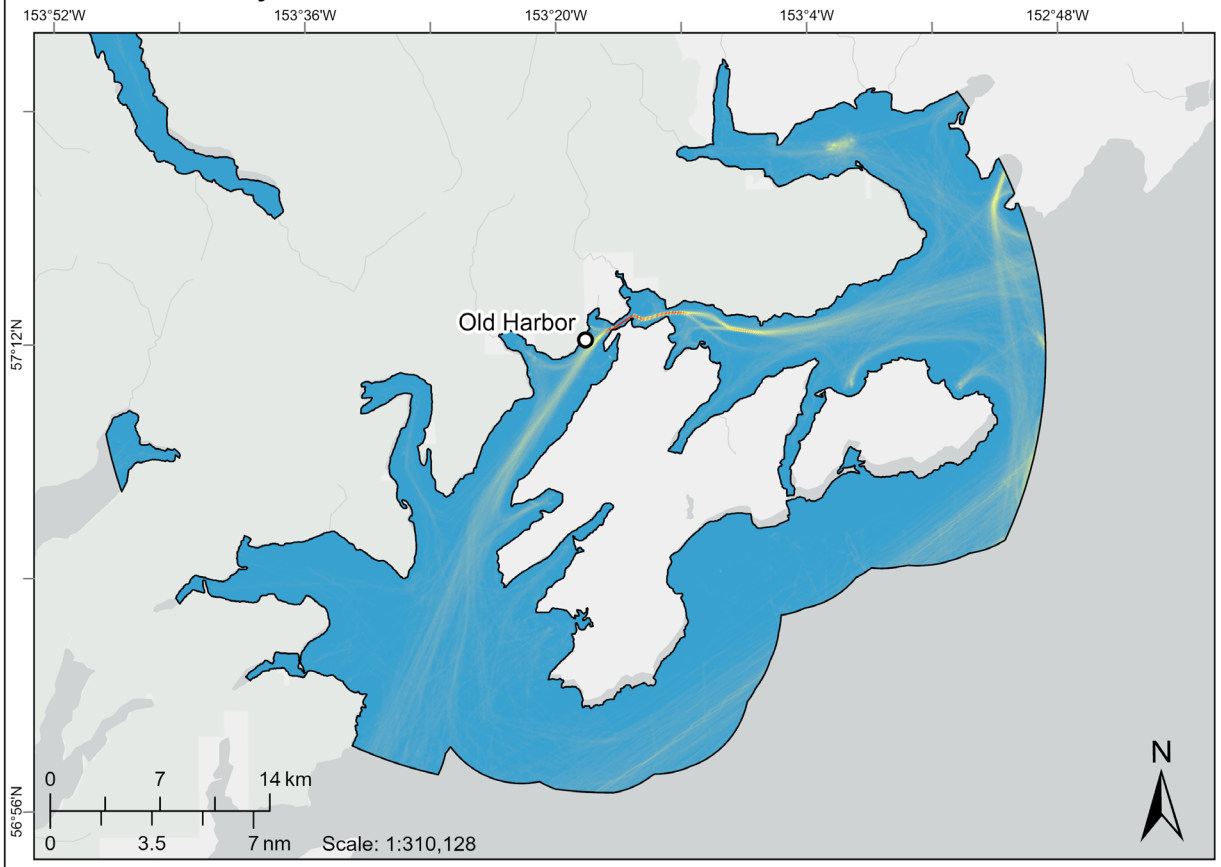
Max: 213

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Other Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

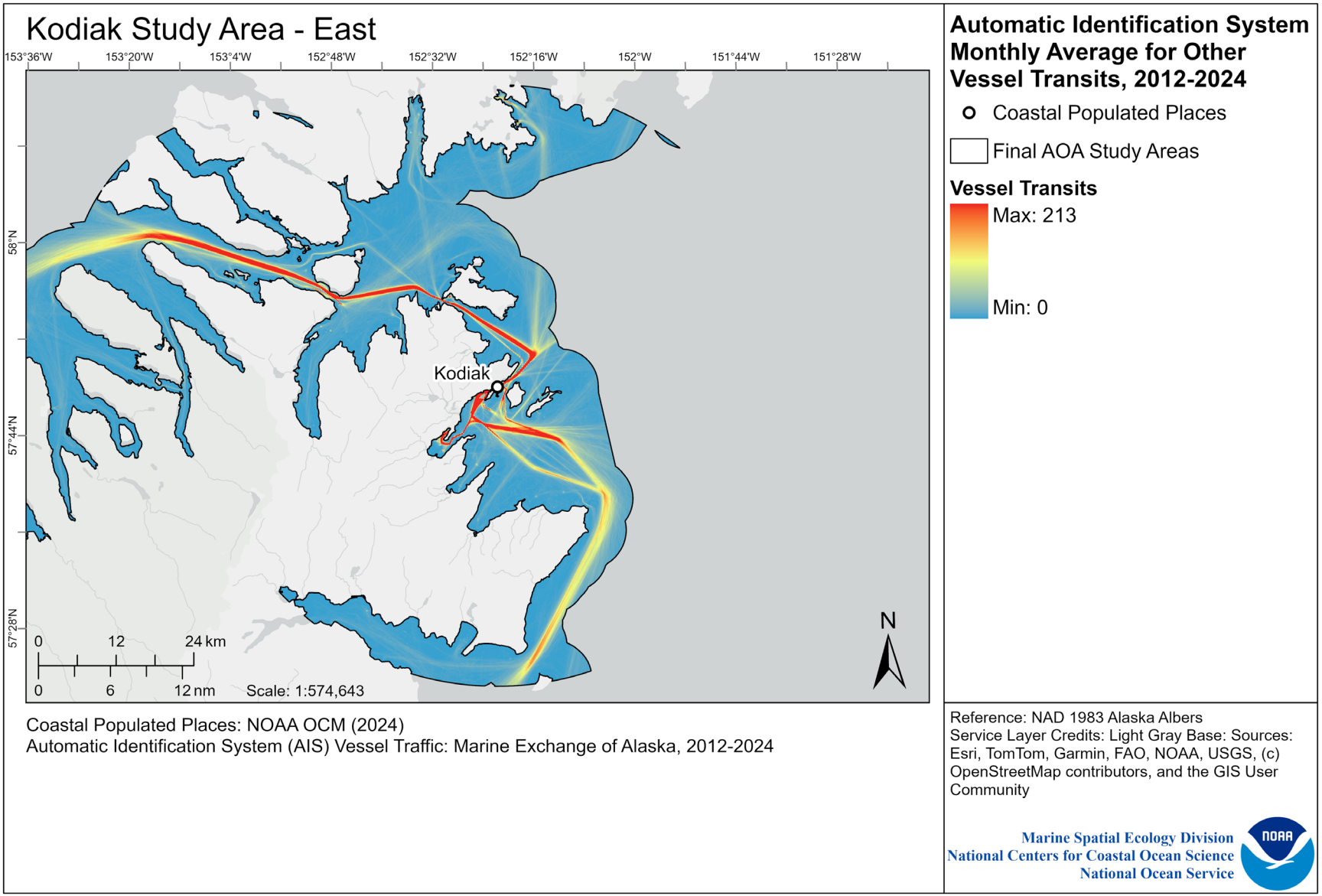
Vessel Transits

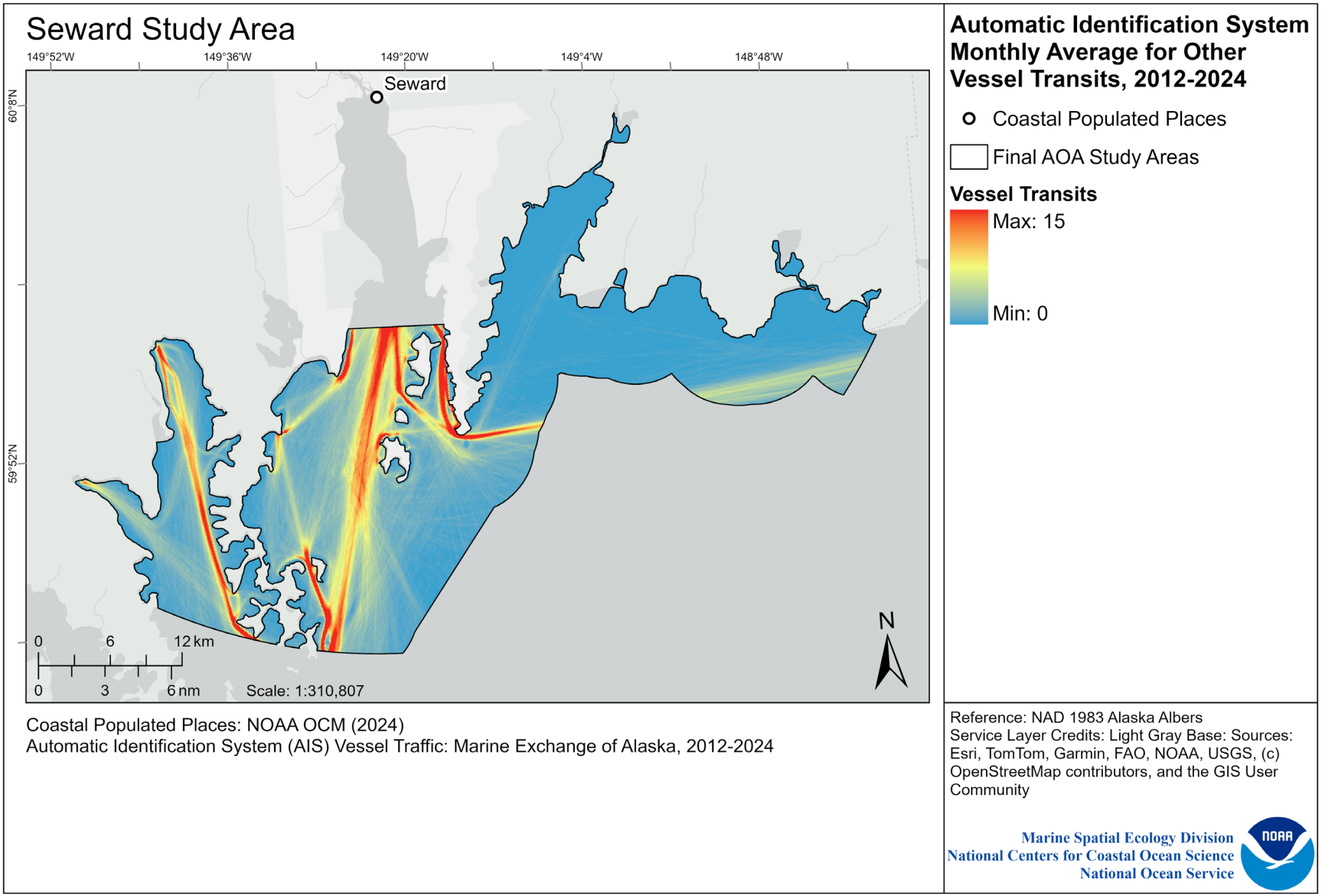
Max: 213

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
Automatic Identification System Monthly Average for Other Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 213
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

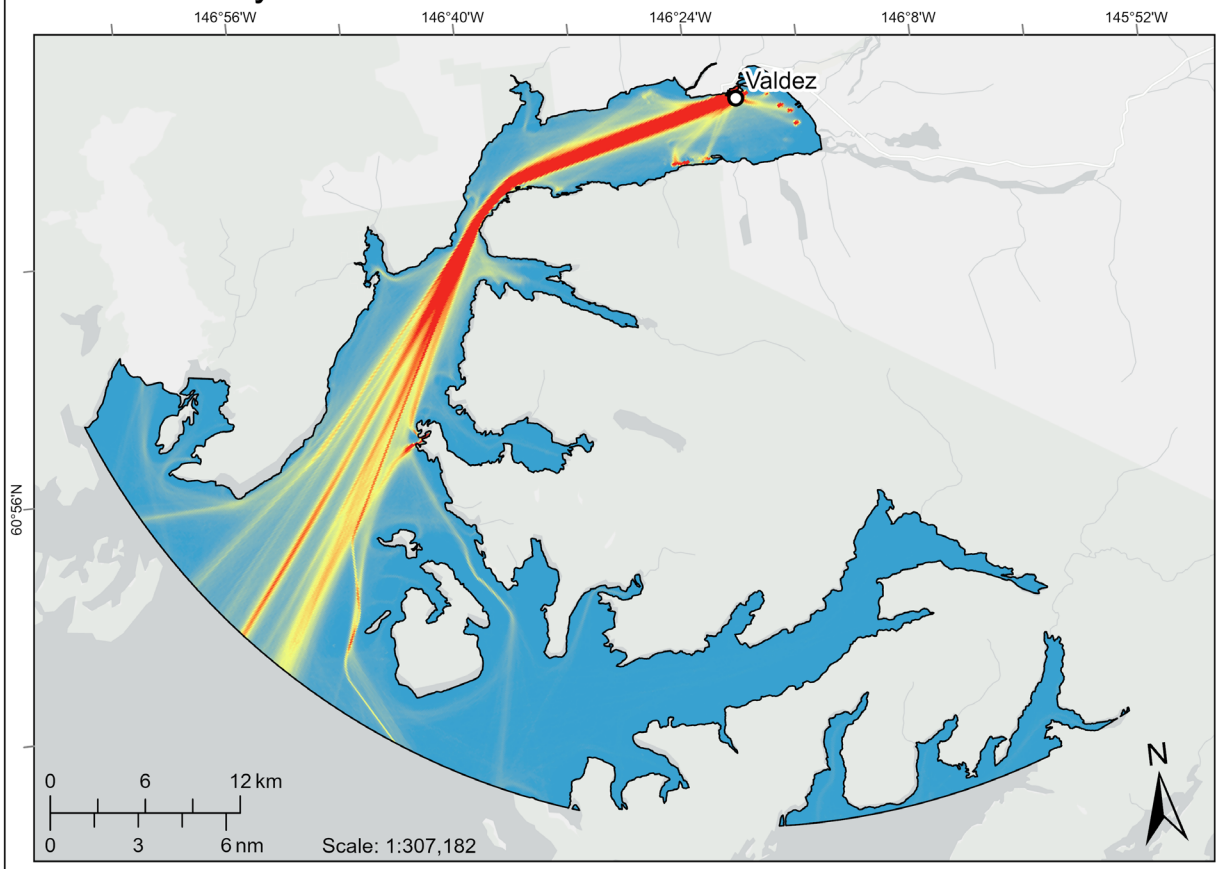


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Valdez Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Other Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

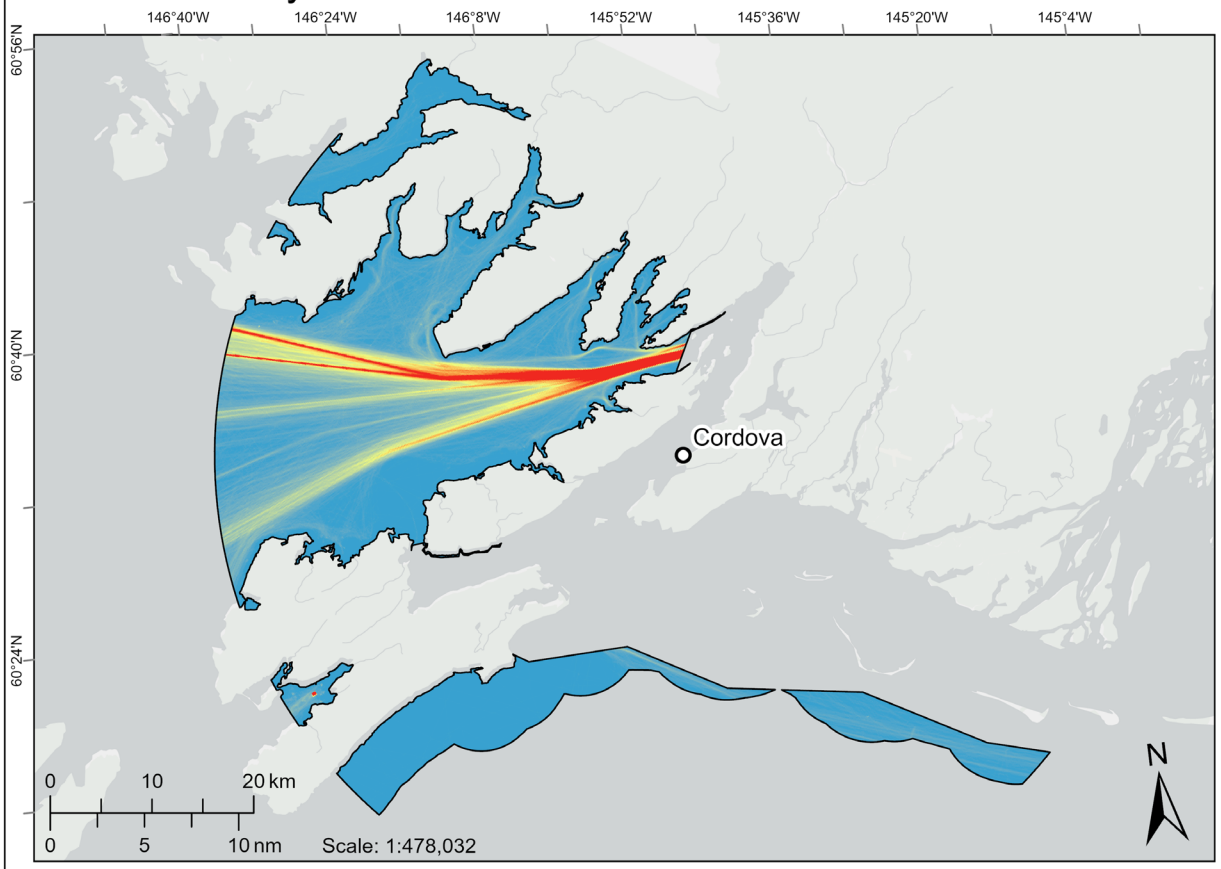
Max: 136

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Other Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

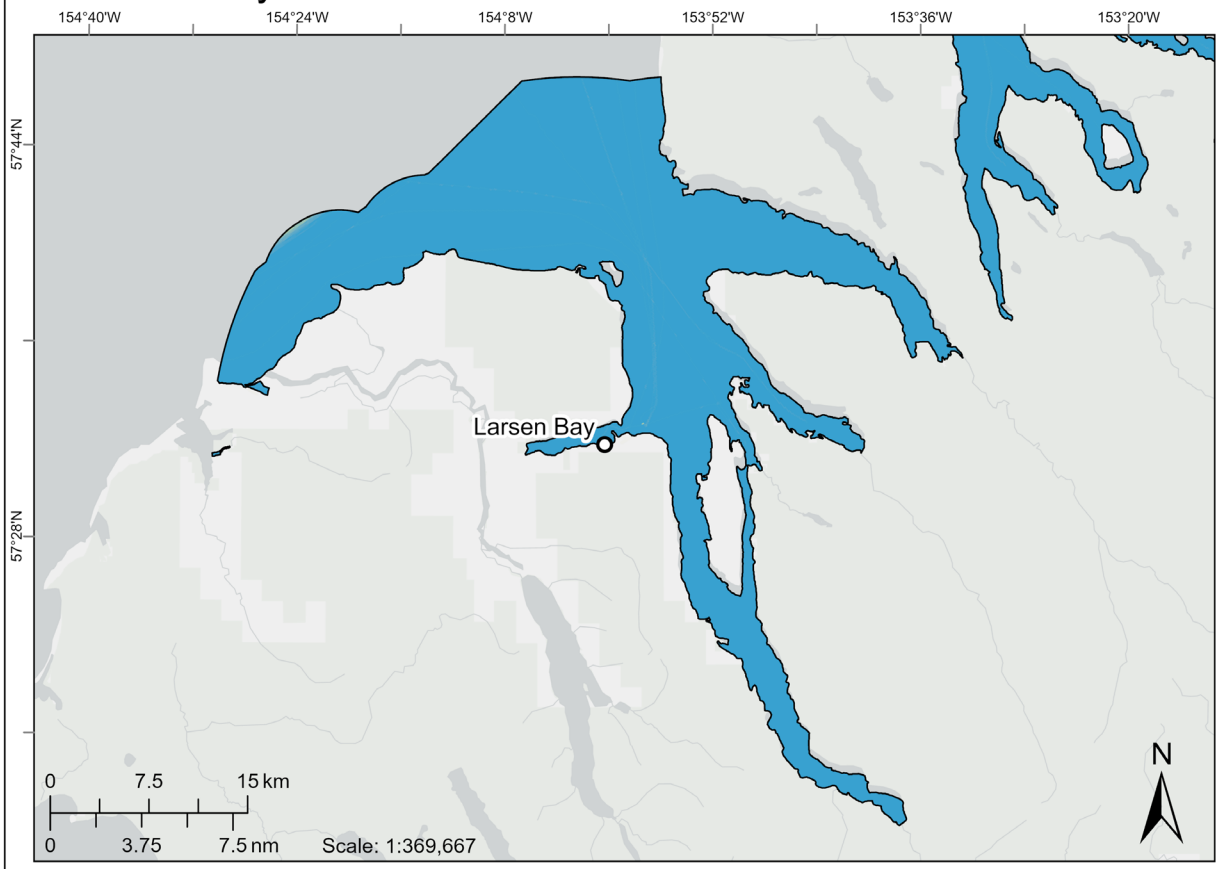
Max: 19

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
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Kodiak Study Area - Northwest



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Passenger Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

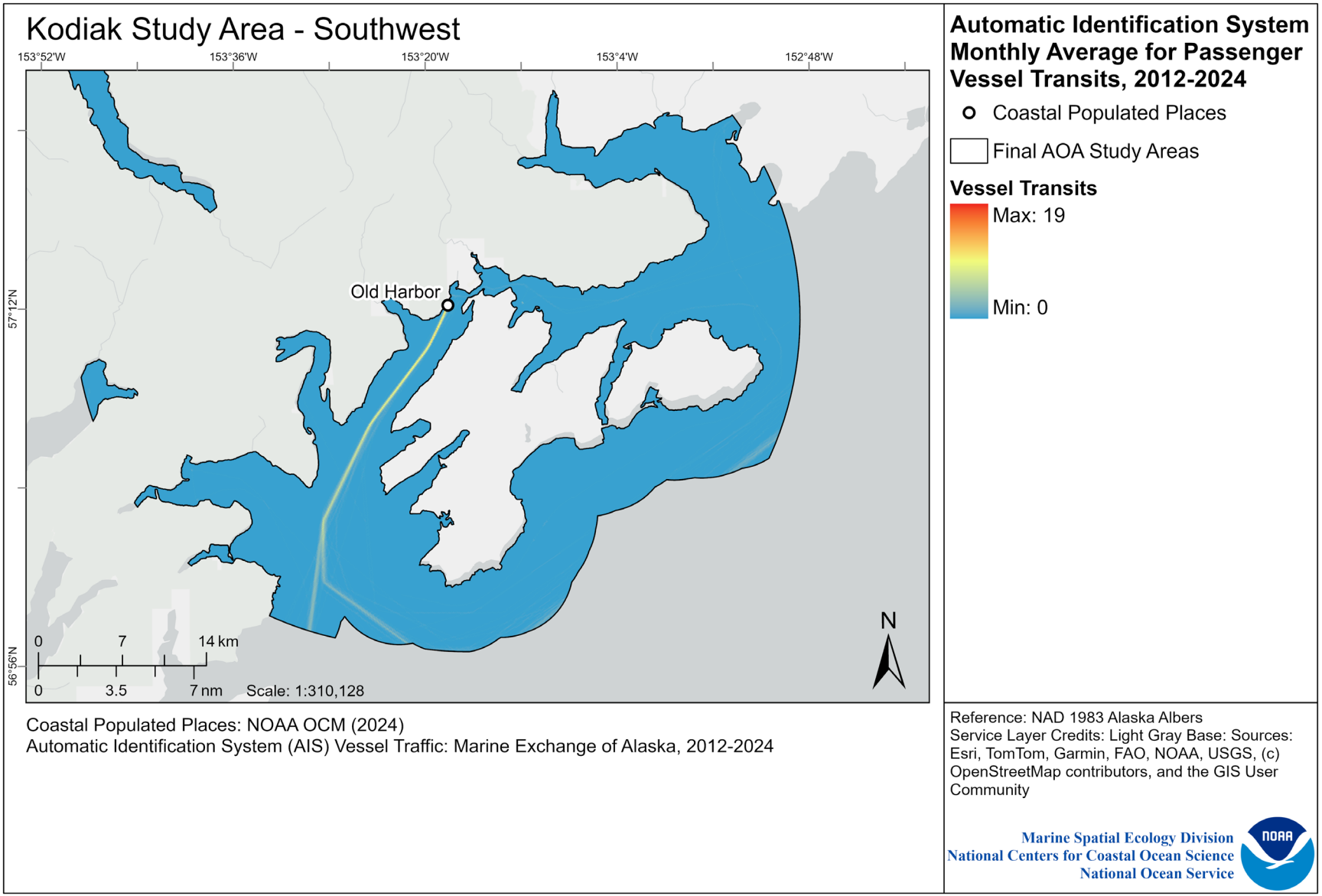
Vessel Transits

Max: 19

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

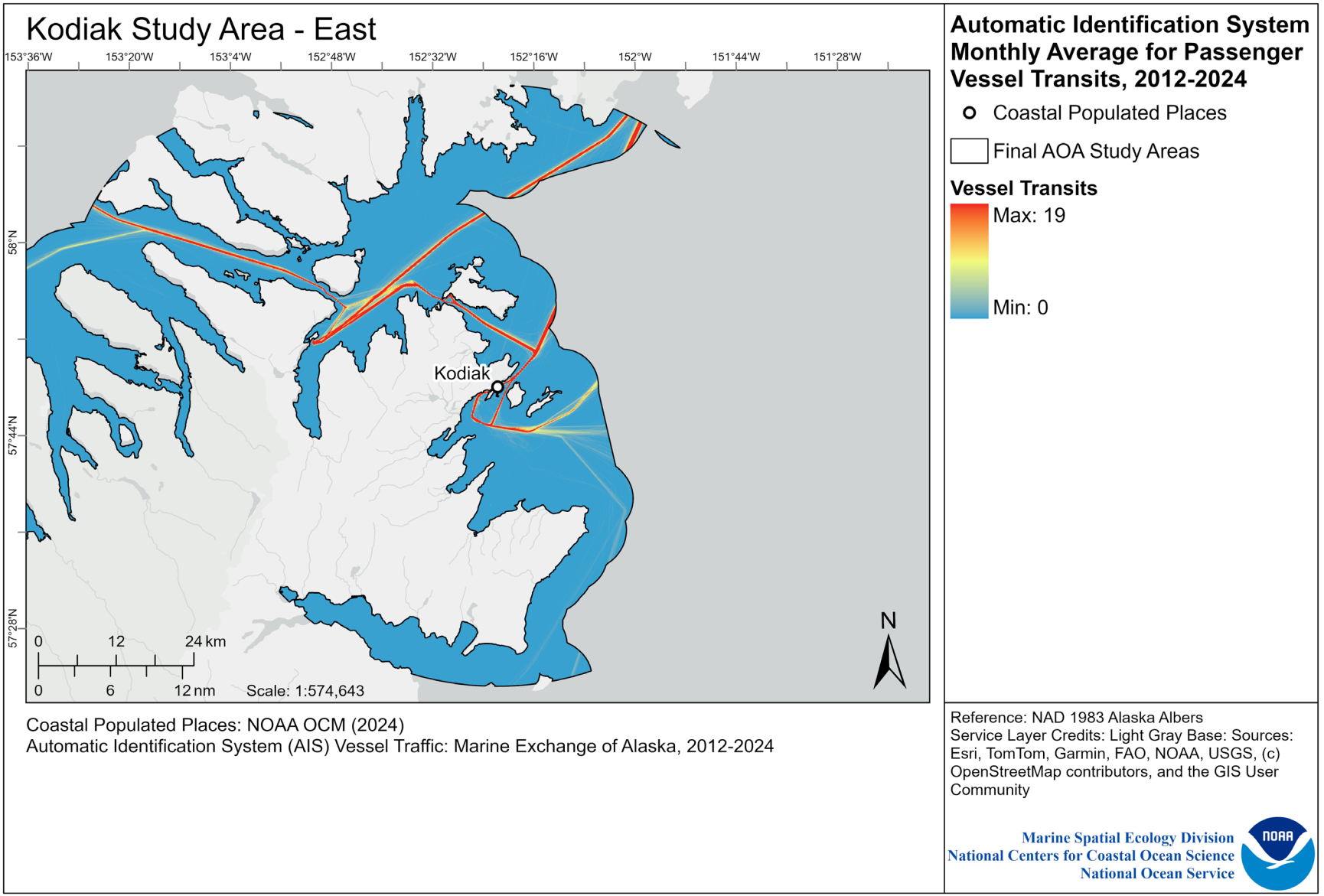
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

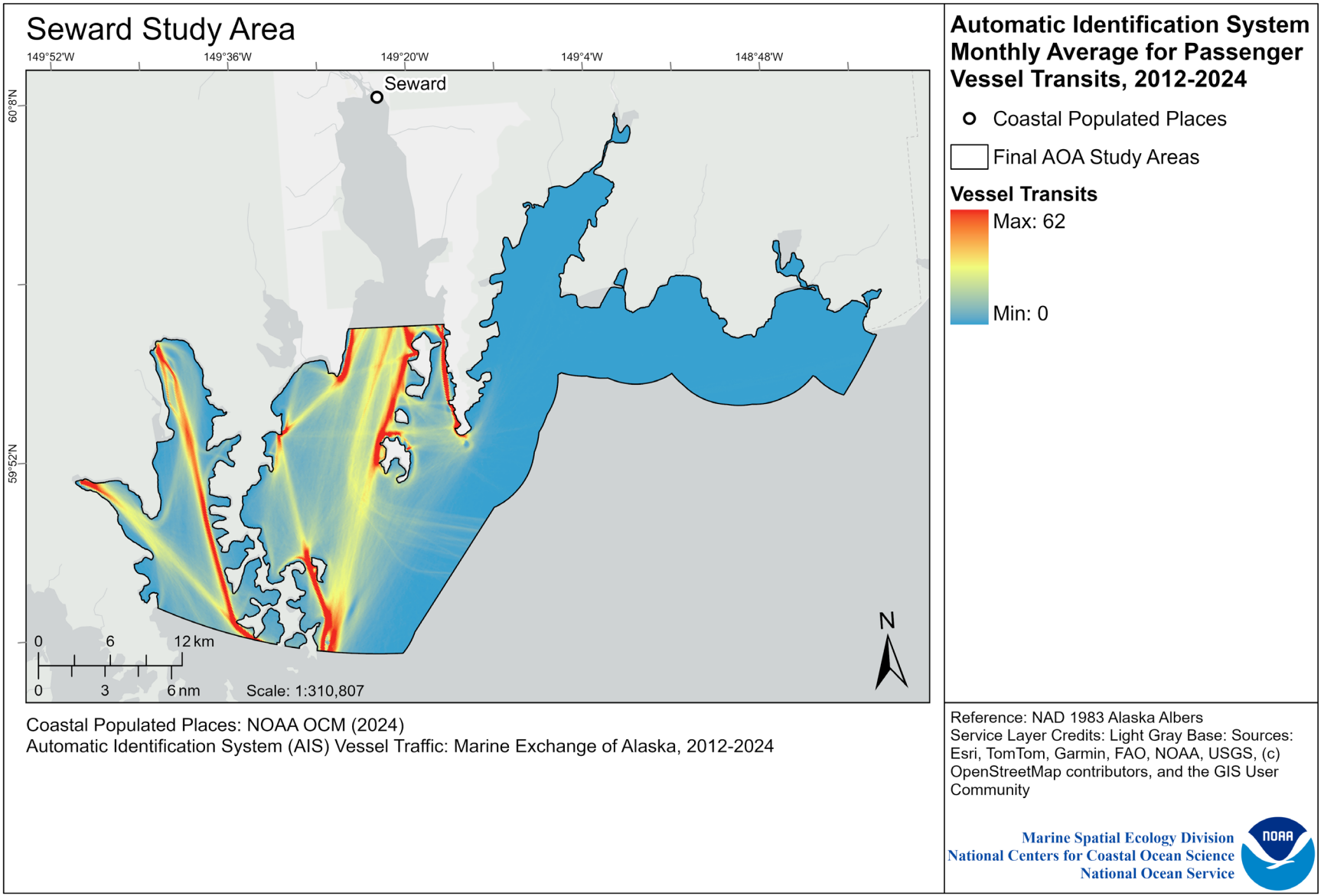


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

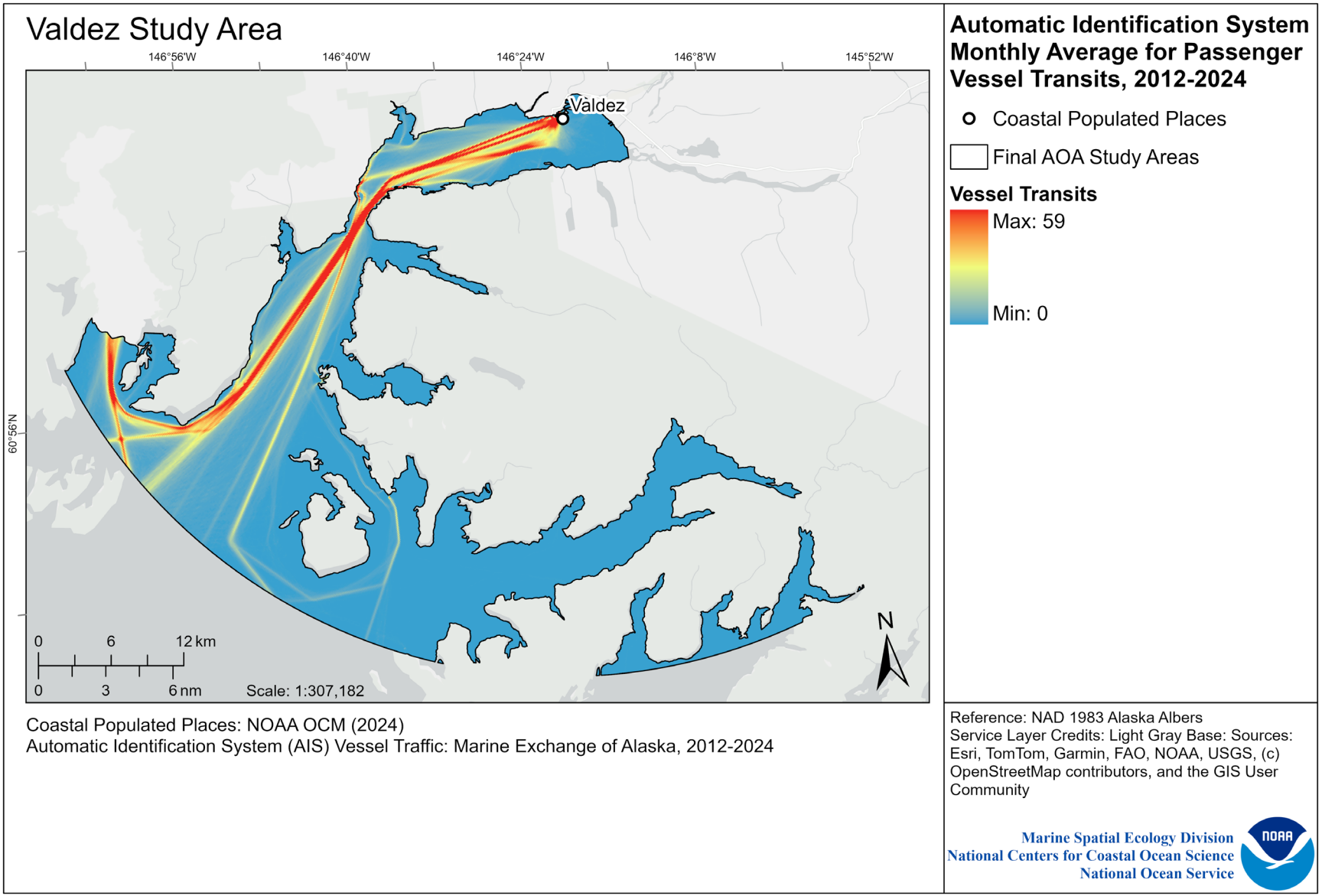

Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
Automatic Identification System Monthly Average for Passenger Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 19
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

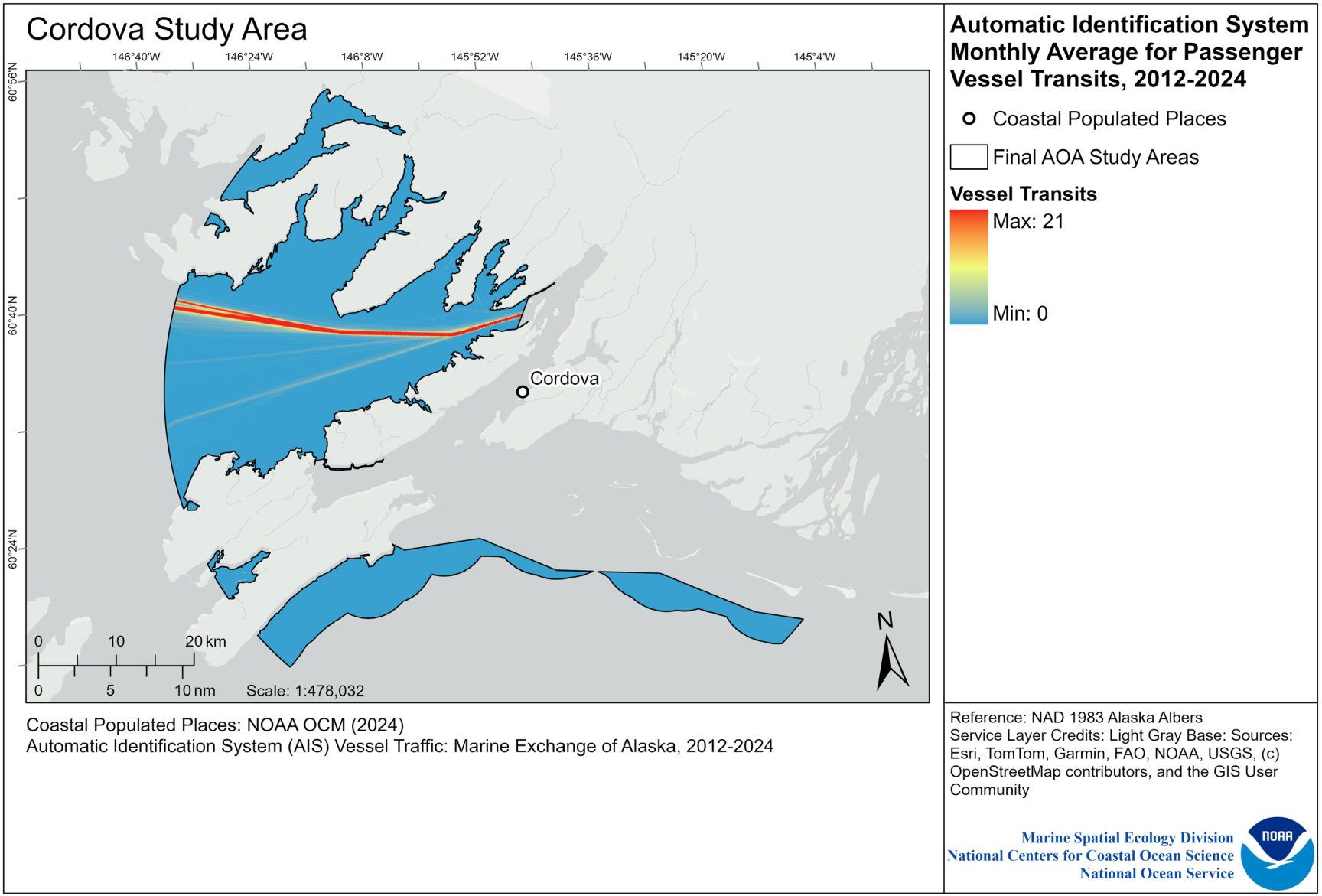


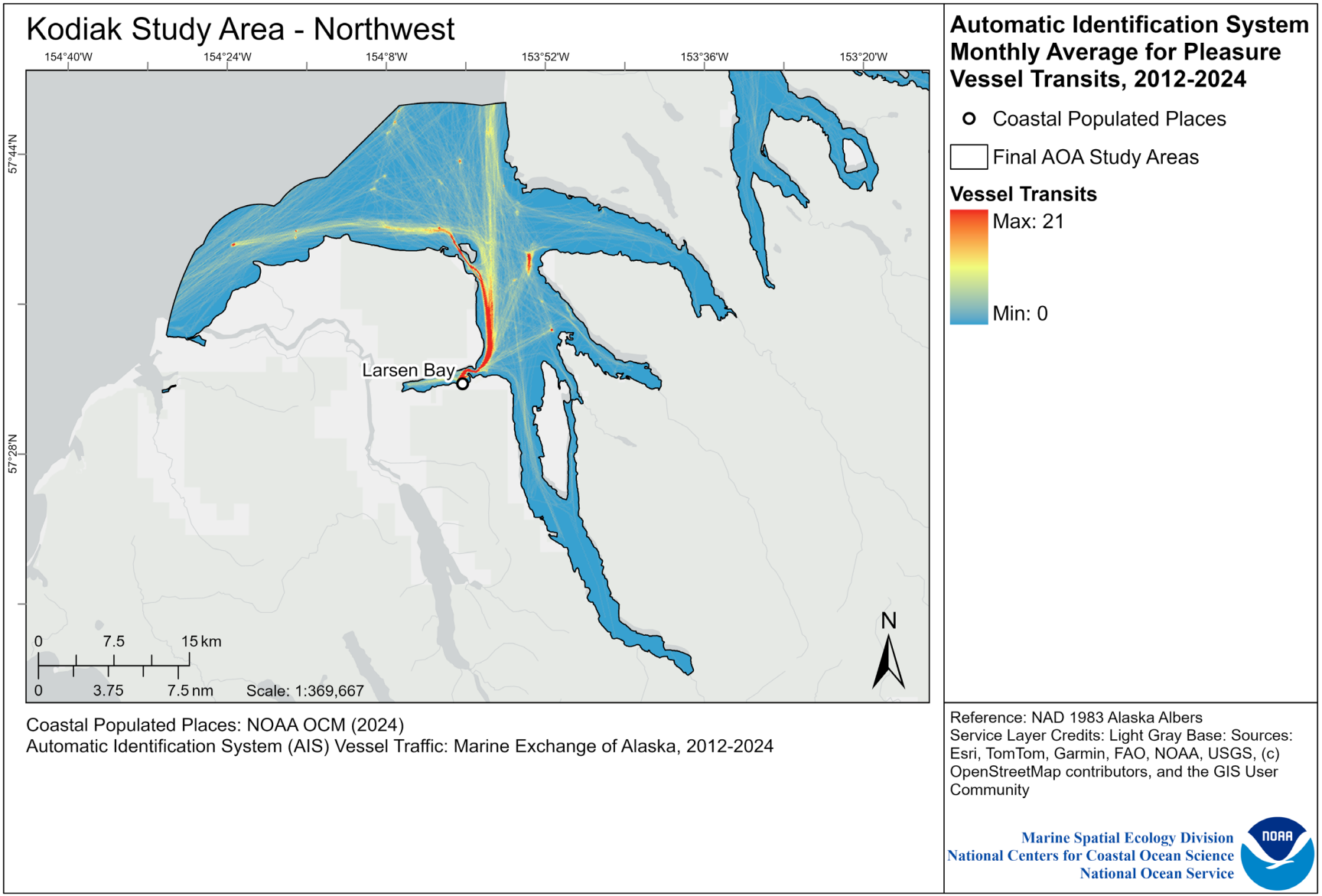
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

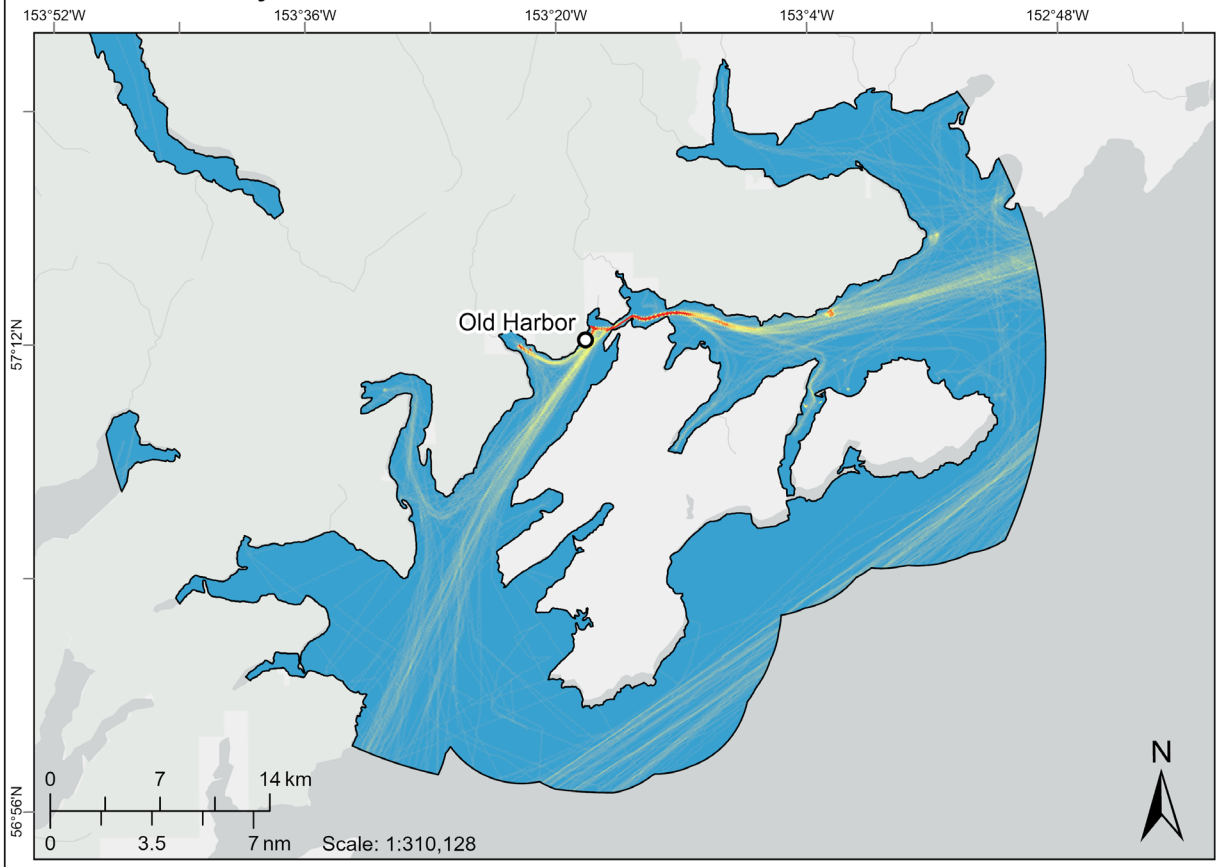
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Valdez Study Area
146°56'W
146°40'W
146°24'W
146°8'W
145°52'W
60°56'N
Valdez
0
6
12 km
0
3
6 nm
Scale: 1:307,182
N
Automatic Identification System Monthly Average for Passenger Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 59
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Cordova Study Area
146°40'W
146°24'W
146°8'W
145°52'W
145°36'W
145°20'W
145°4'W
60°56'N
60°40'N
60°24'N
Cordova
0
10
20 km
0
5
10 nm
Scale: 1:478,032
N
Automatic Identification System Monthly Average for Passenger Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 21
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Kodiak Study Area - Northwest
154°40'W
154°24'W
154°8'W
153°52'W
153°36'W
153°20'W
57°44'N
57°28'N
Larsen Bay
0
7.5
15 km
0
3.75
7.5 nm
Scale: 1:369,667
N
Automatic Identification System Monthly Average for Pleasure Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 21
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Pleasure Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

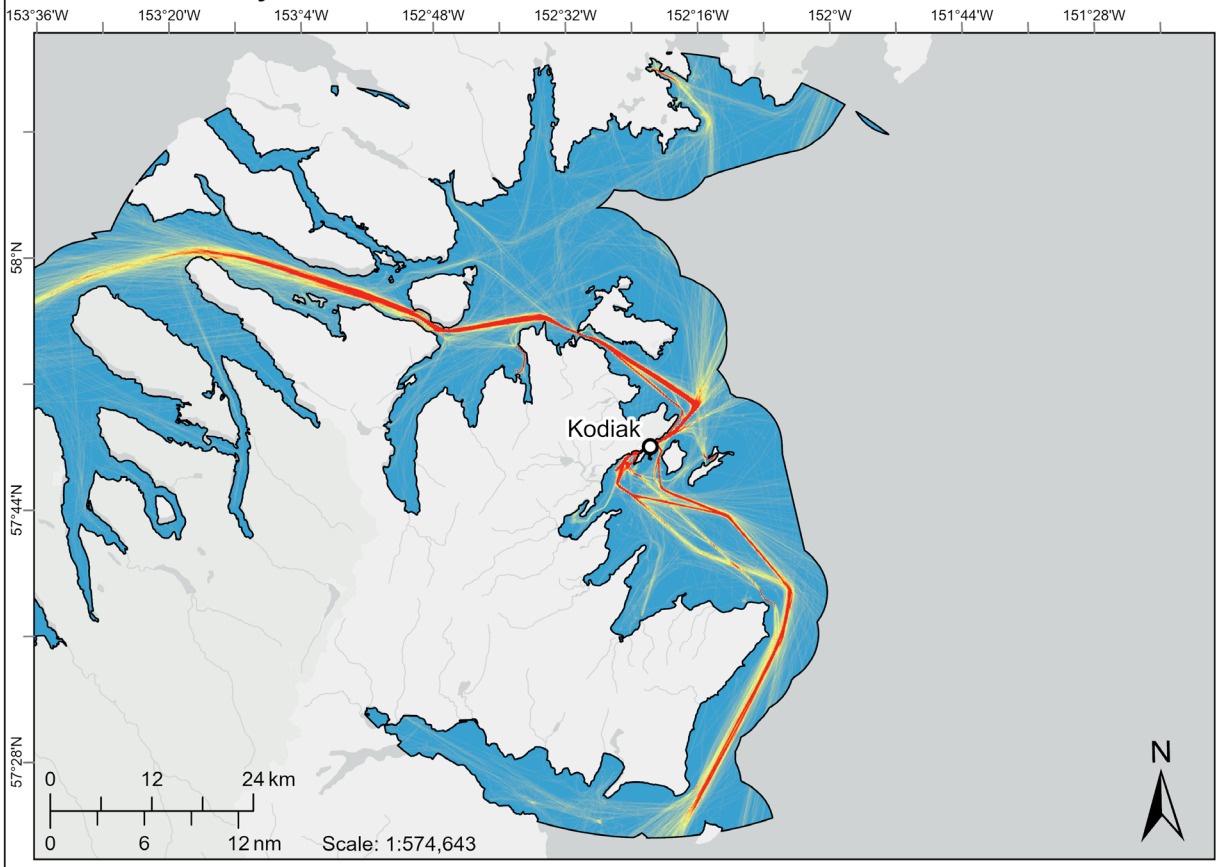
Max: 21

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Kodiak Study Area - East



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Pleasure Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

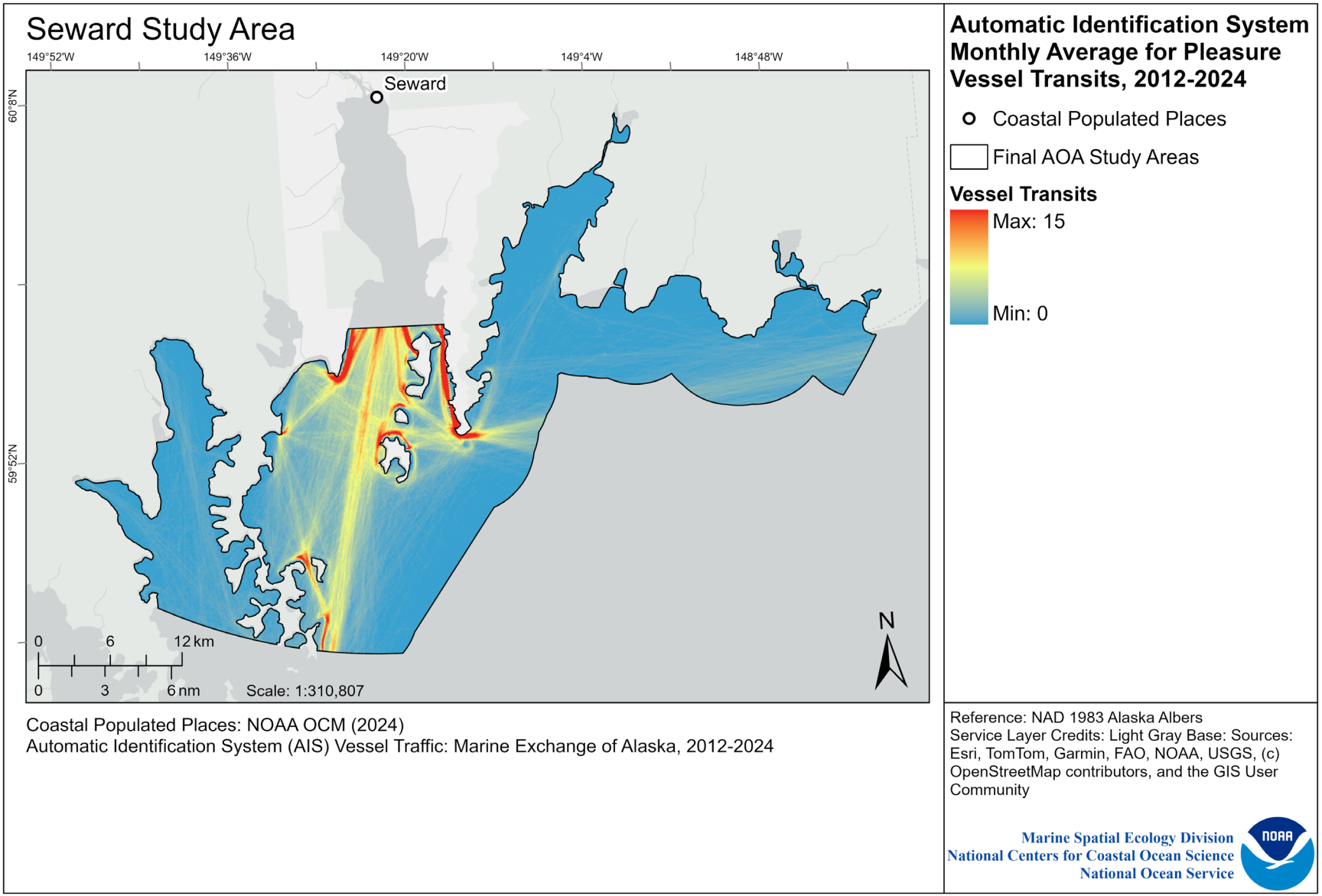
Vessel Transits

Max: 21

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

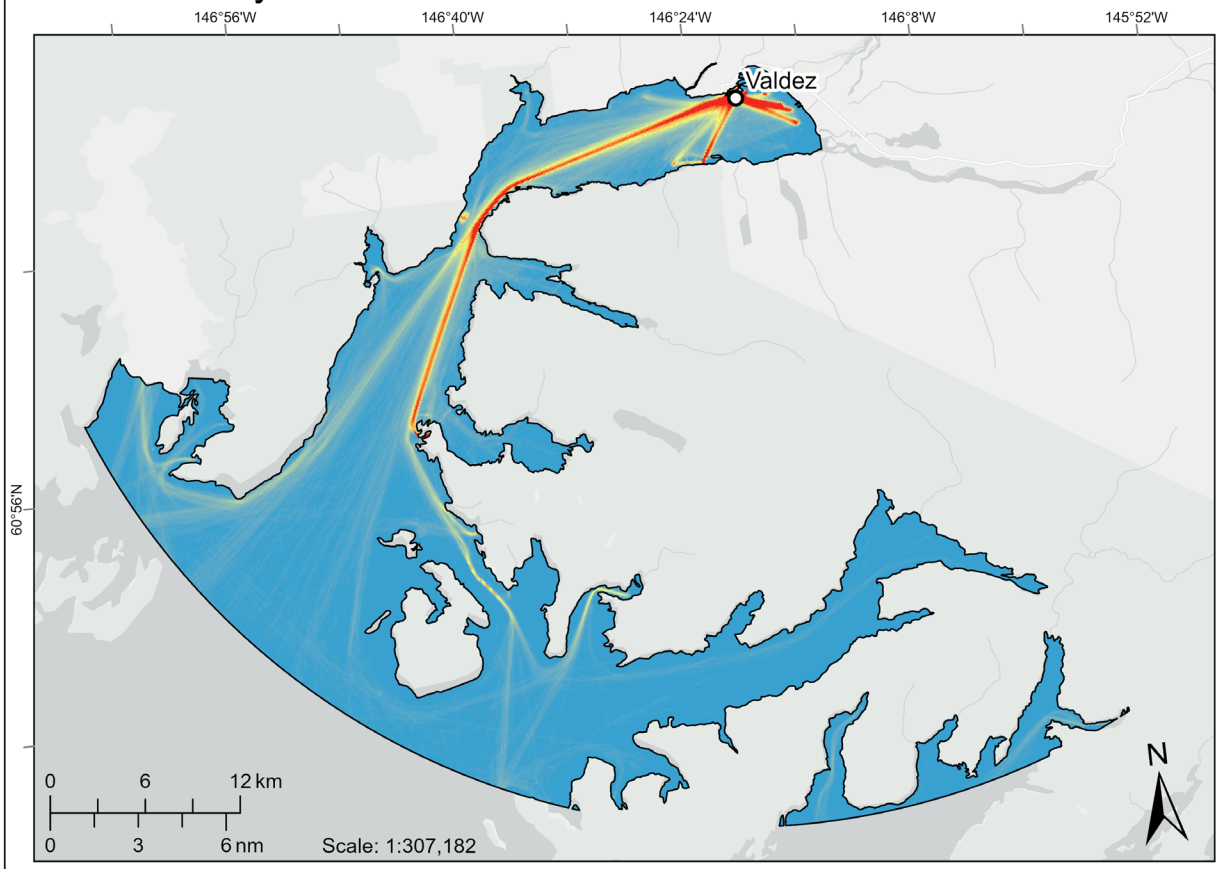


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Valdez Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Pleasure Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

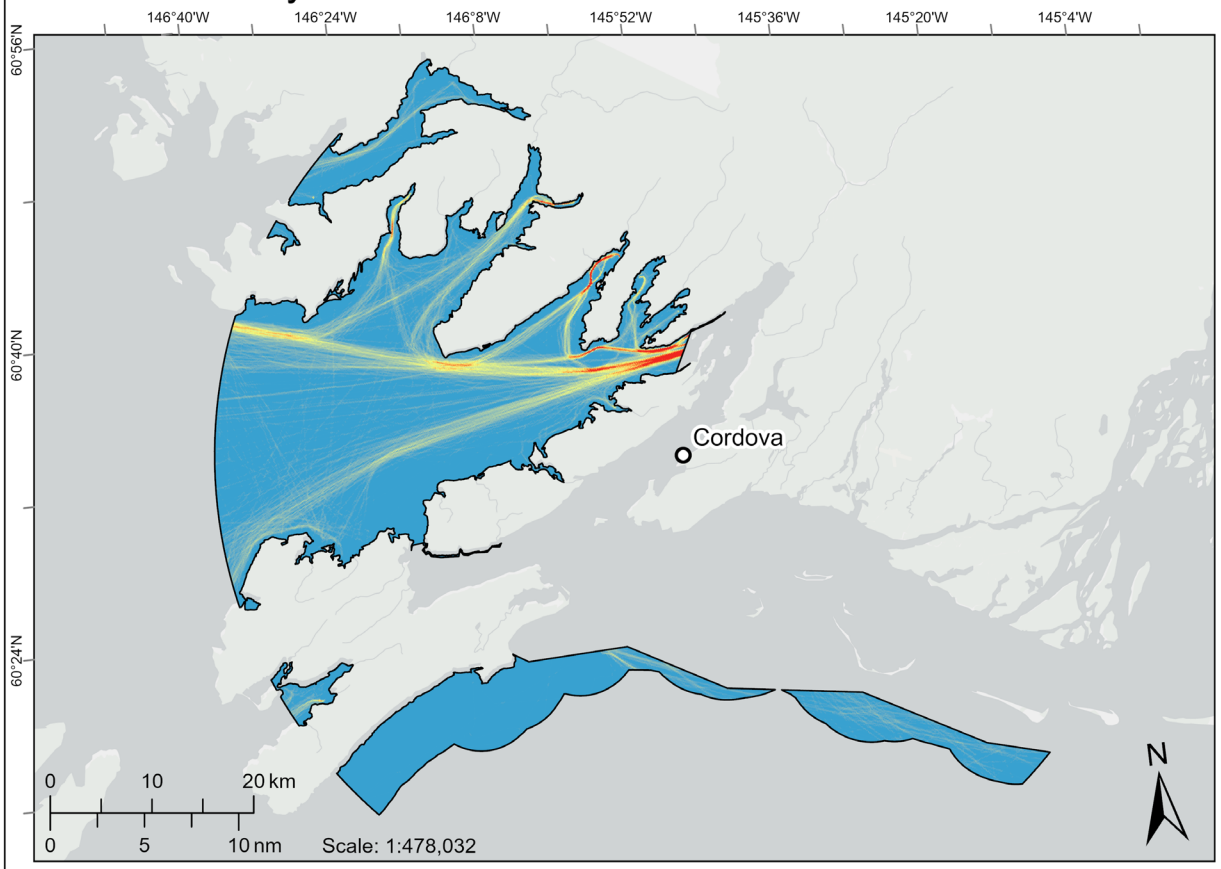
Max: 21

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Pleasure Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

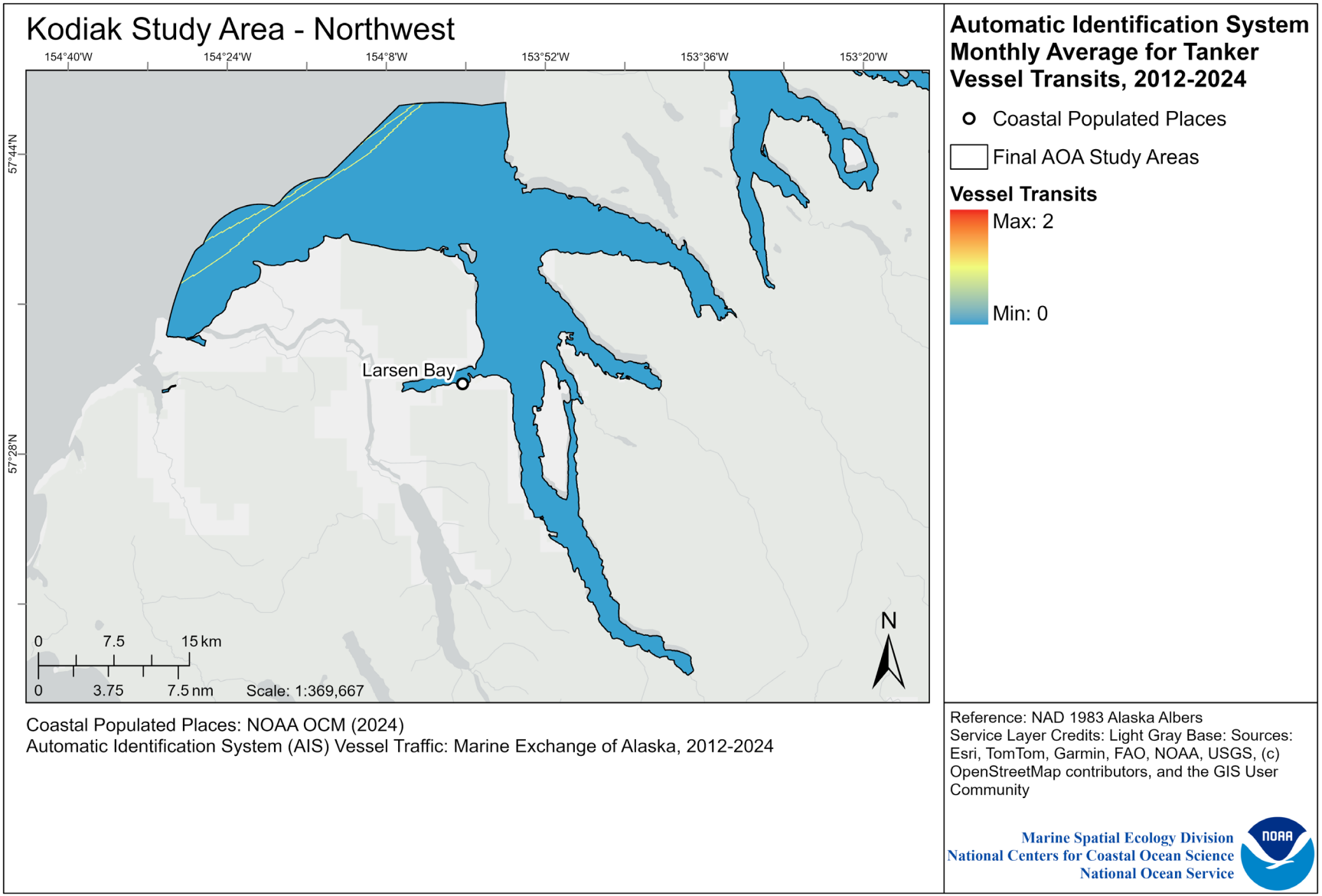
Vessel Transits

Max: 1

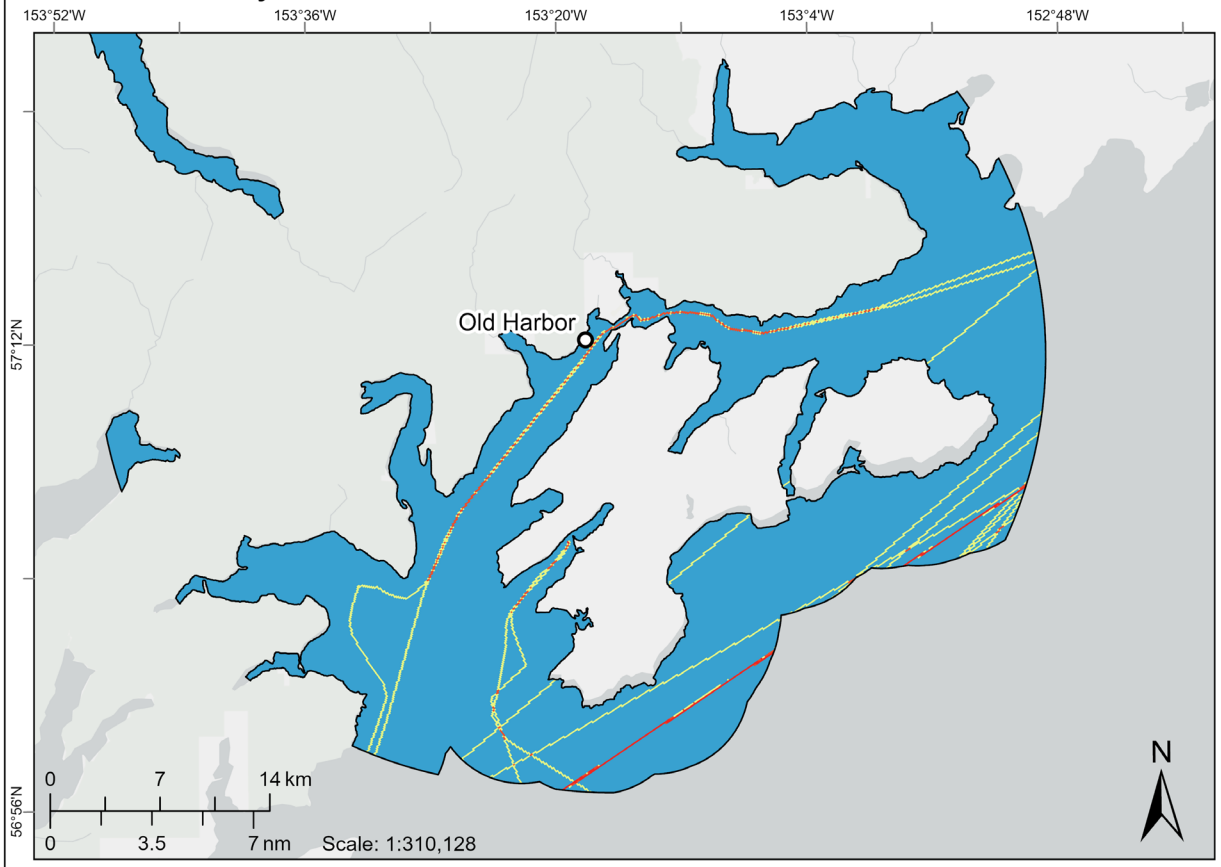
Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Kodiak Study Area - Northwest
154°40'W
154°24'W
154°8'W
153°52'W
153°36'W
153°20'W
57°44'N
57°28'N
Larsen Bay
0
7.5
15 km
0
3.75
7.5 nm
Scale: 1:369,667
N
Automatic Identification System Monthly Average for Tanker Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 2
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Tanker Vessel Transits, 2012-2024

Coastal Populated Places

Final AOA Study Areas

Vessel Transits

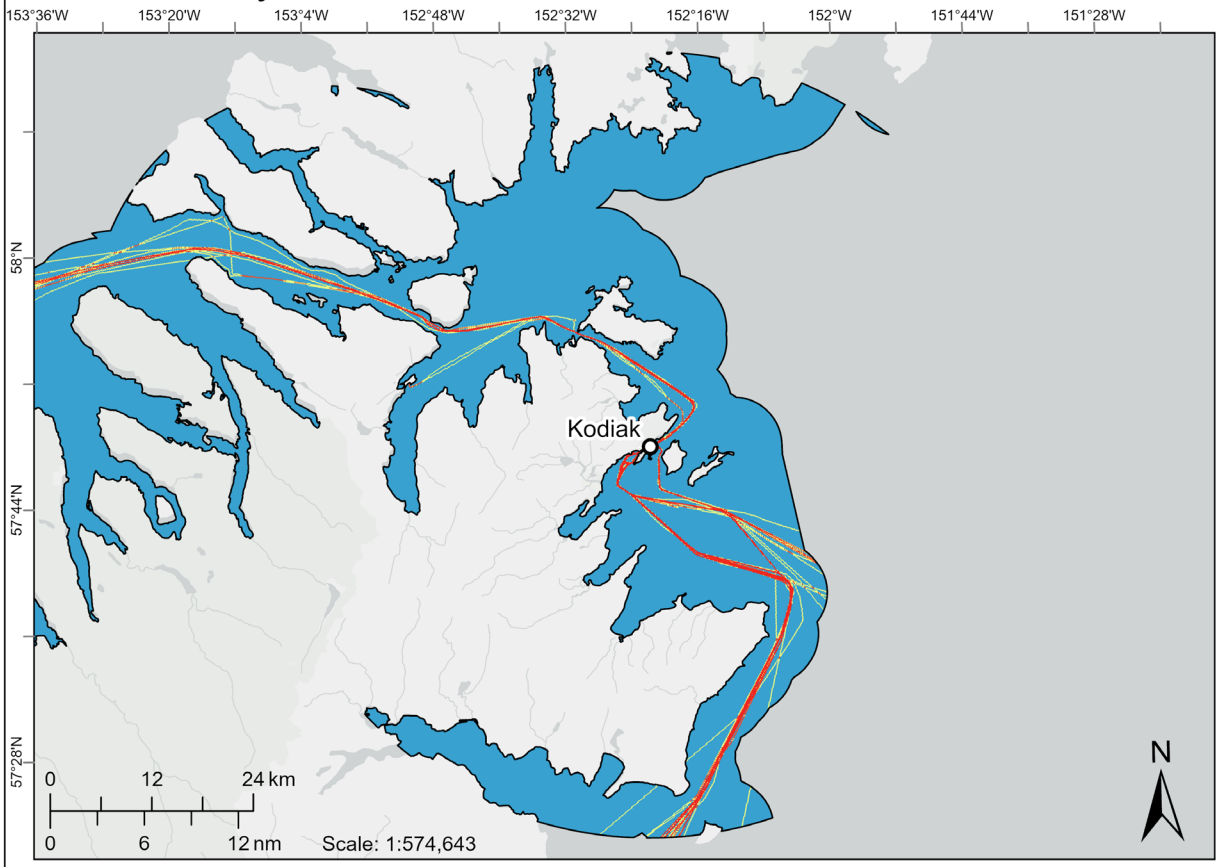
Max: 2

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Kodiak Study Area - East



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Tanker Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

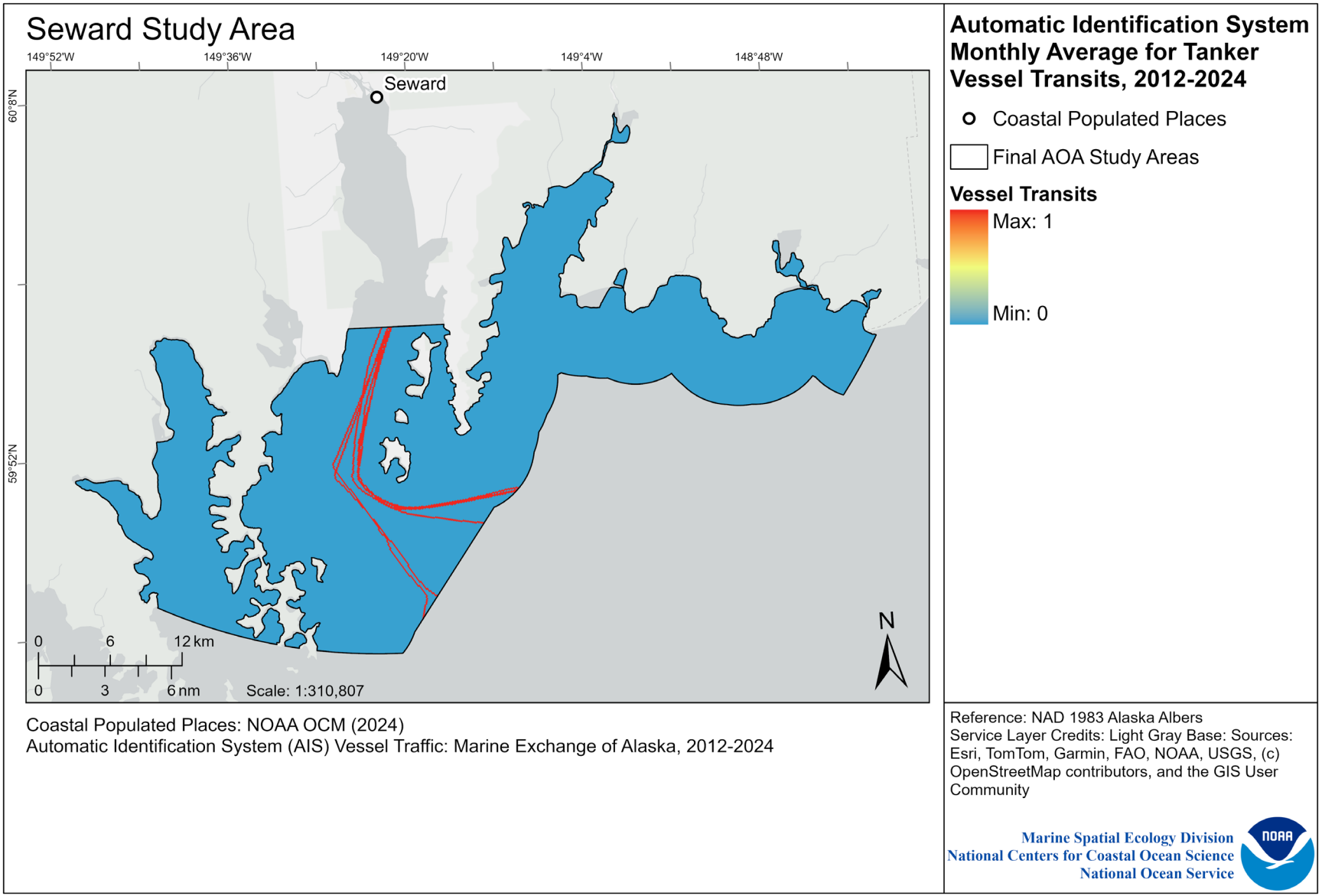
Vessel Transits

Max: 2

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

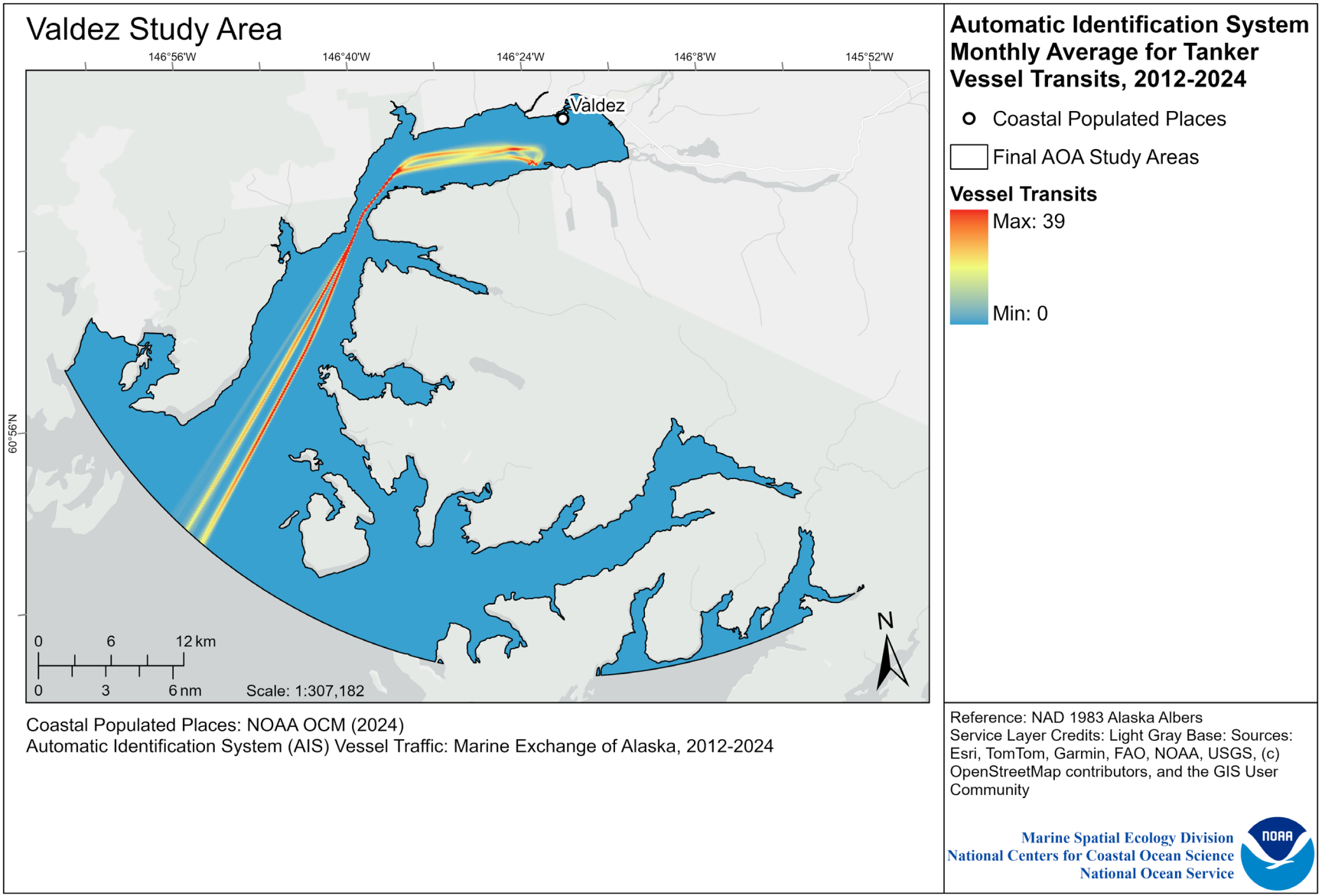
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



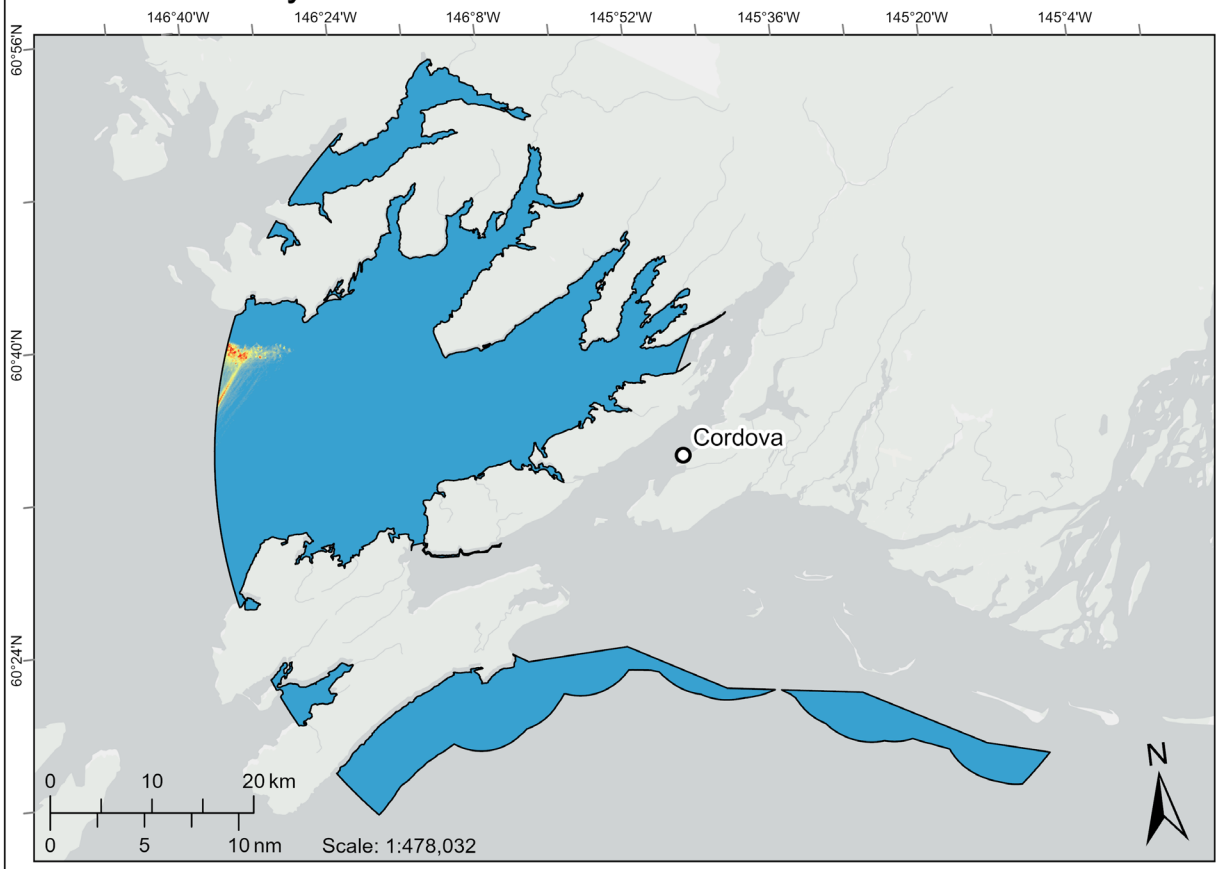
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service


Valdez Study Area
146°56'W
146°40'W
146°24'W
146°8'W
145°52'W
60°56'N
Valdez
0
6
12 km
0
3
6 nm
Scale: 1:307,182
N
Automatic Identification System Monthly Average for Tanker Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 39
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Tanker Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

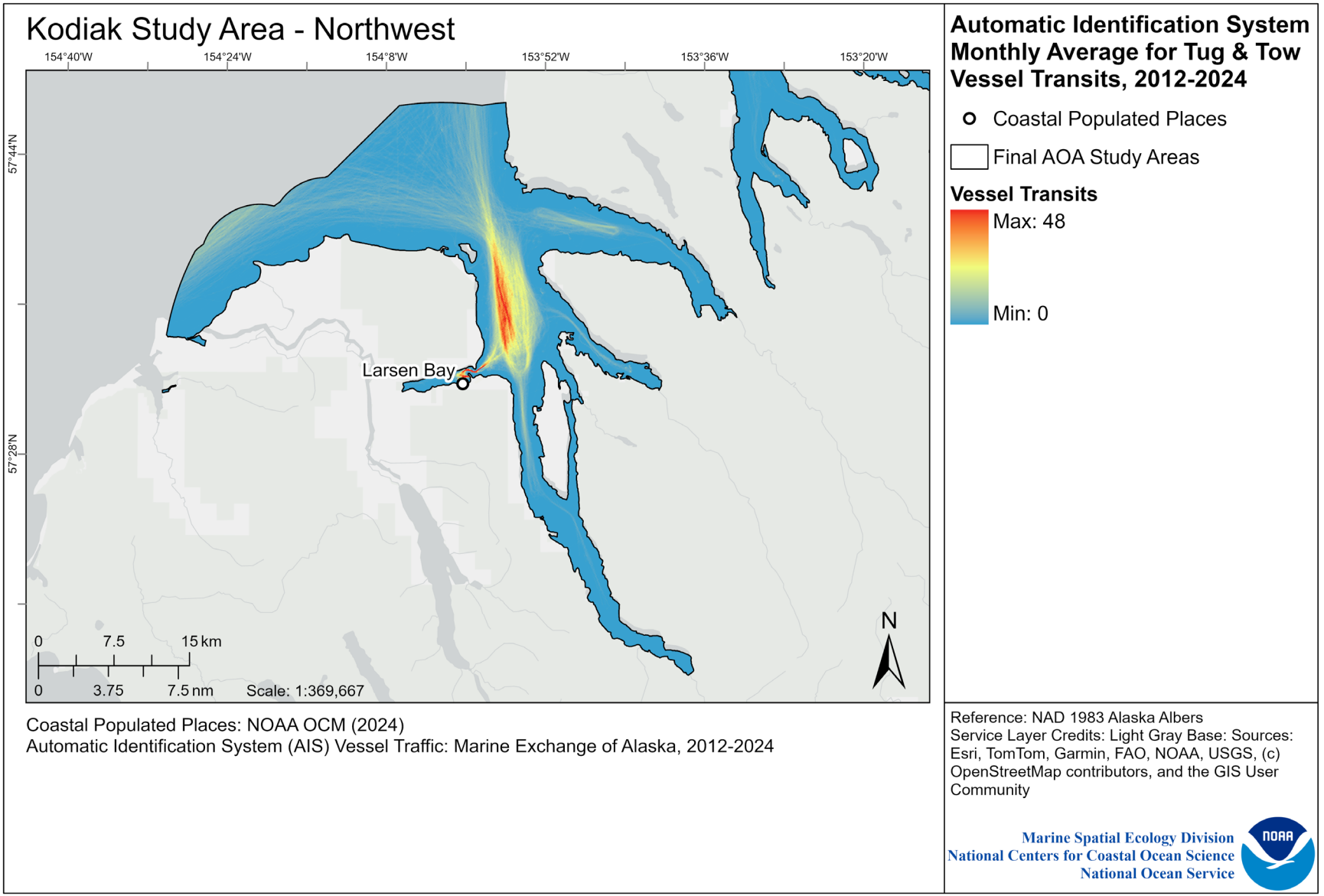
Vessel Transits

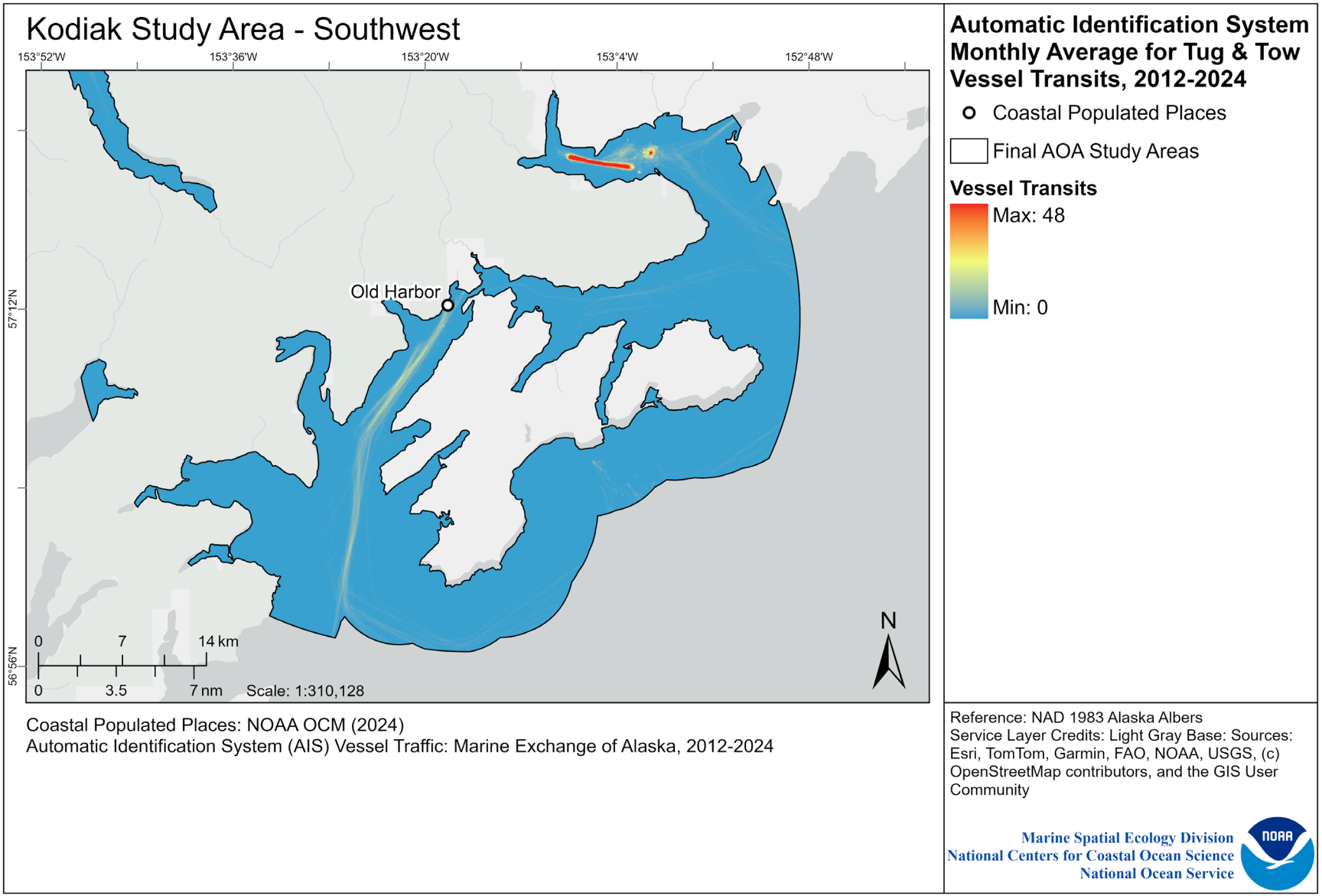
Max: 2

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

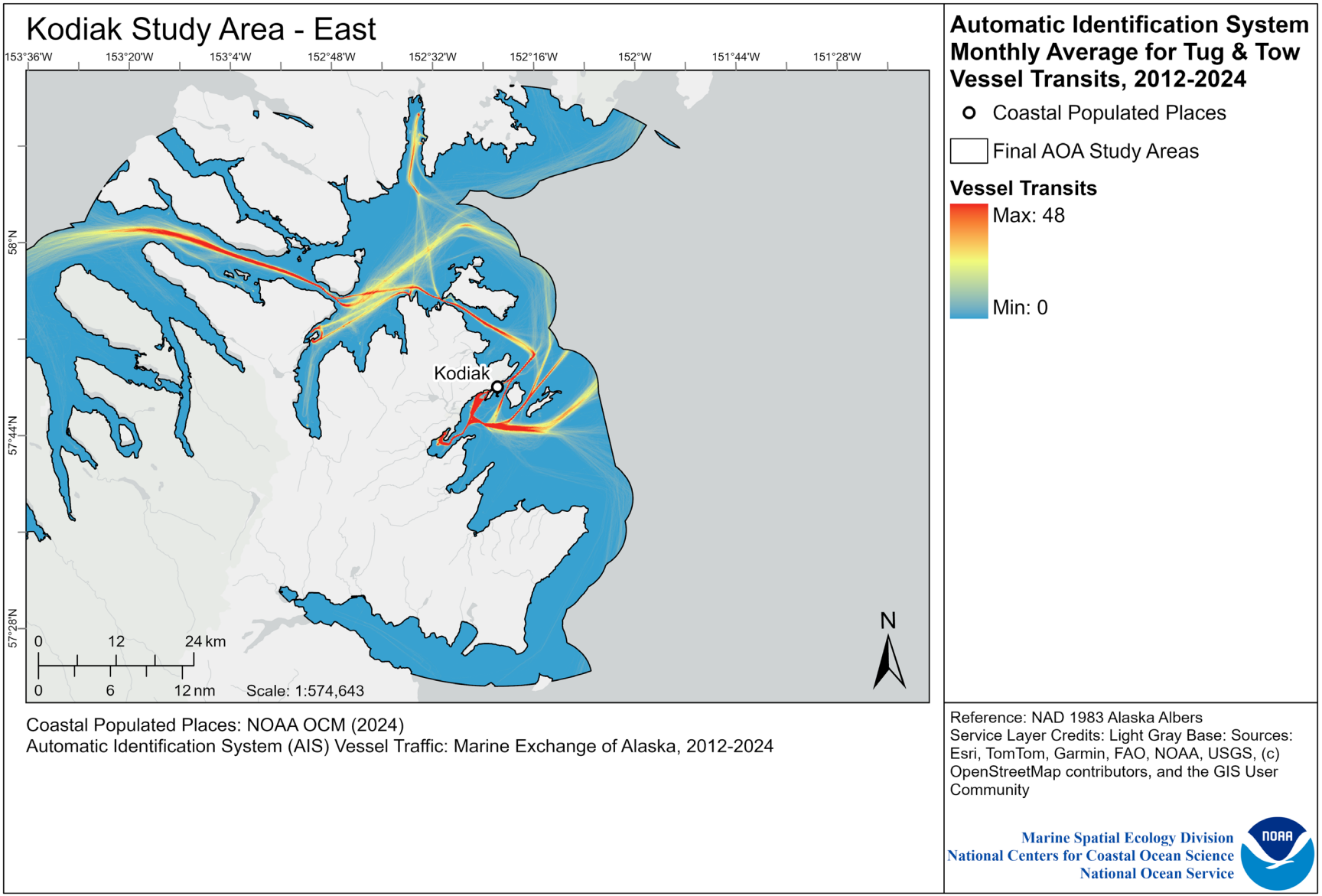

Kodiak Study Area - Northwest
154°40'W
154°24'W
154°8'W
153°52'W
153°36'W
153°20'W
57°44'N
57°28'N
Larsen Bay
0
7.5
15 km
0
3.75
7.5 nm
Scale: 1:369,667
N
Automatic Identification System Monthly Average for Tug & Tow Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 48
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

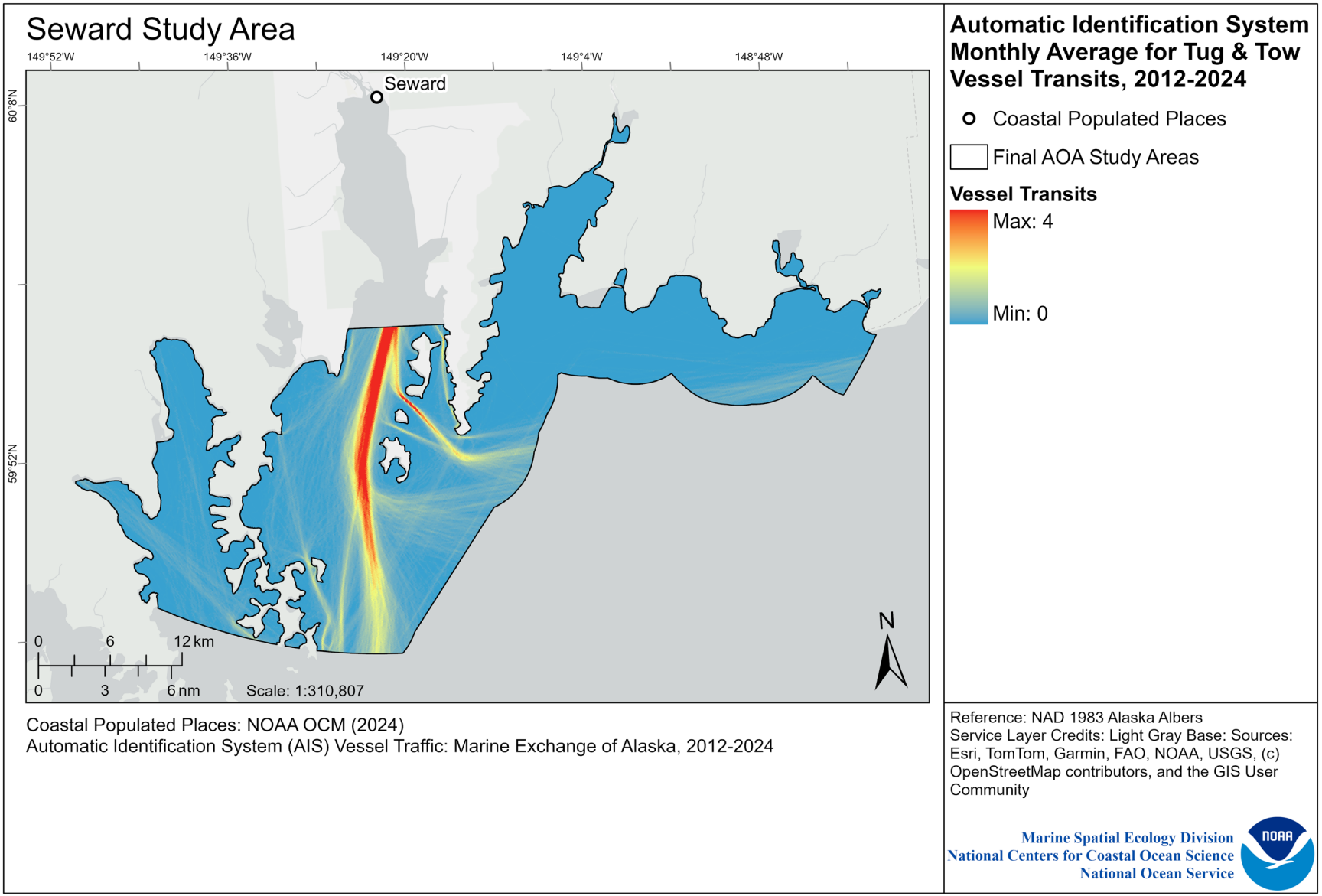


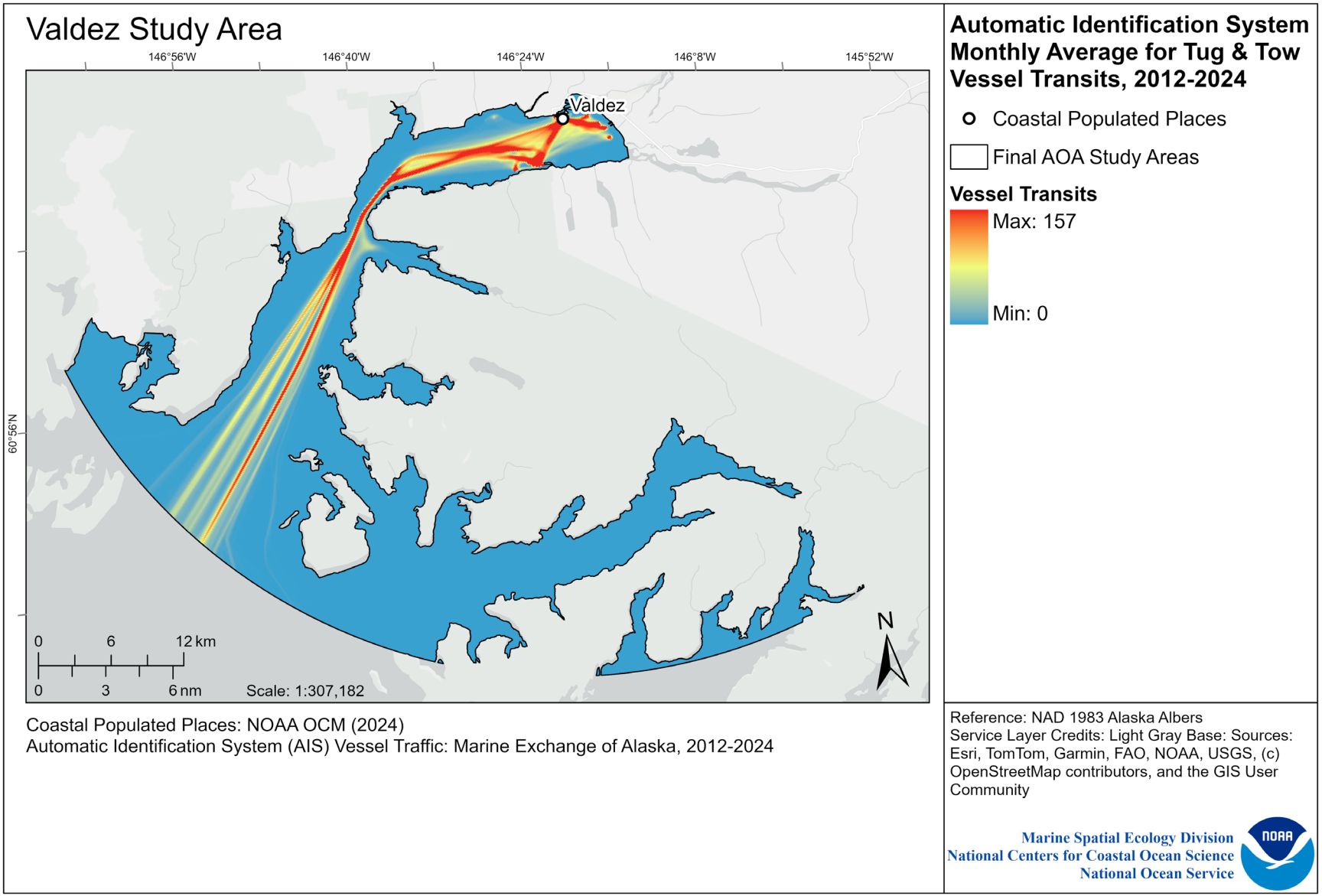
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

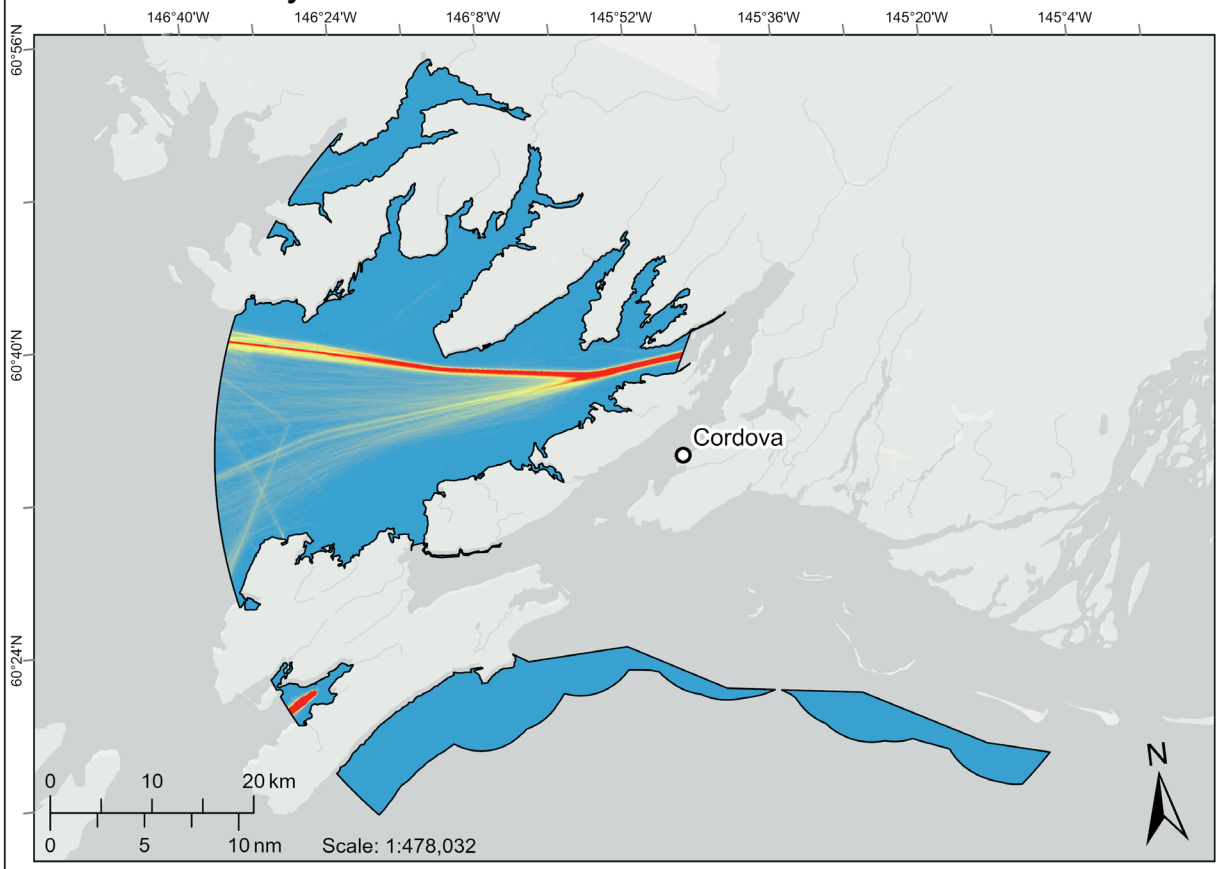
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National Ocean Service


Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
Automatic Identification System Monthly Average for Tug & Tow Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 48
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA


Seward Study Area
149°52'W
149°36'W
149°20'W
149°4'W
148°48'W
60°8'N
59°52'N
Seward
0
6
12 km
0
3
6 nm
Scale: 1:310,807
N
Automatic Identification System Monthly Average for Tug & Tow Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 4
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Valdez Study Area
146°56'W
146°40'W
146°24'W
146°8'W
145°52'W
60°56'N
Valdez
0
6
12 km
0
3
6 nm
Scale: 1:307,182
N
Automatic Identification System Monthly Average for Tug & Tow Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 157
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Tug & Tow Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

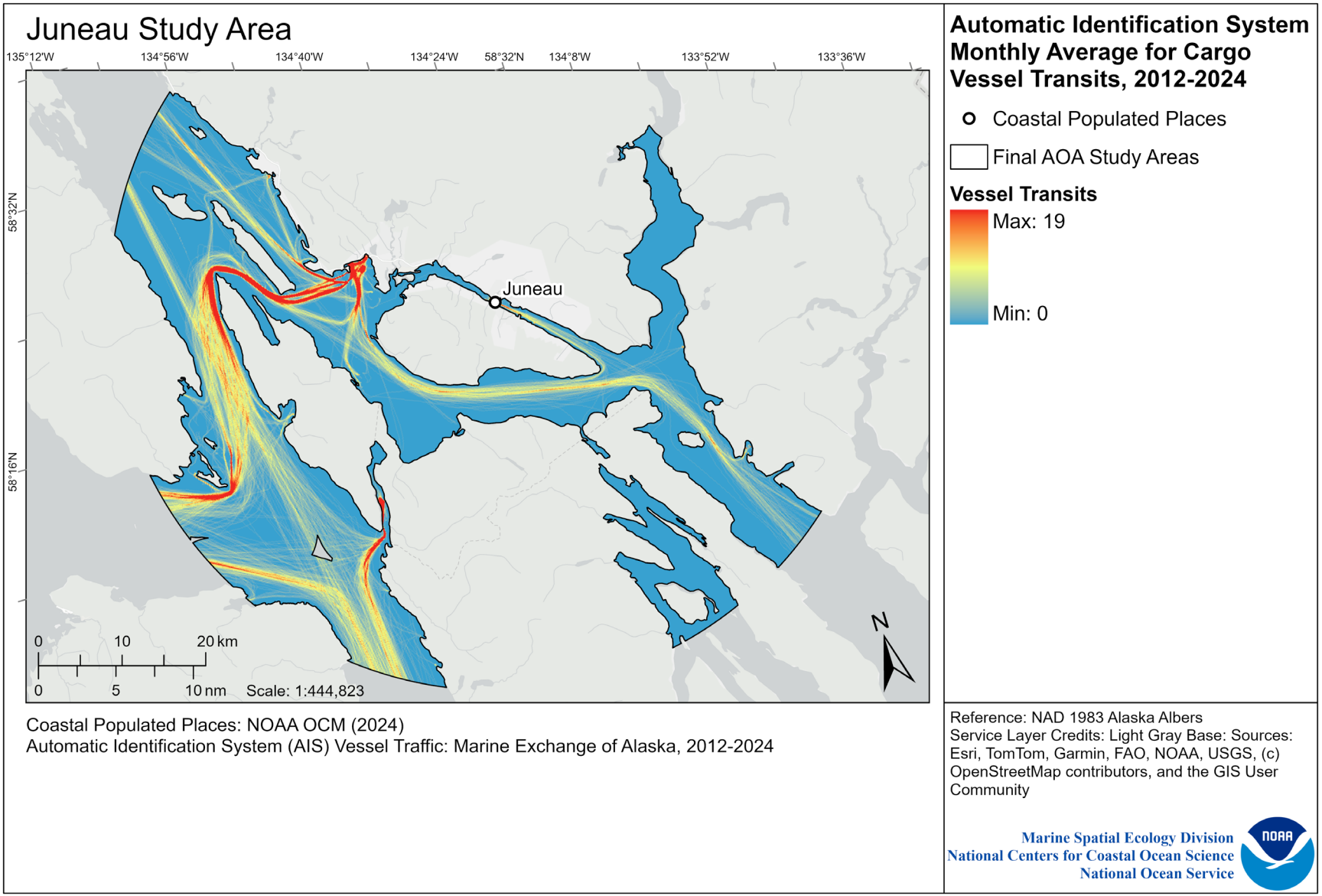
Vessel Transits

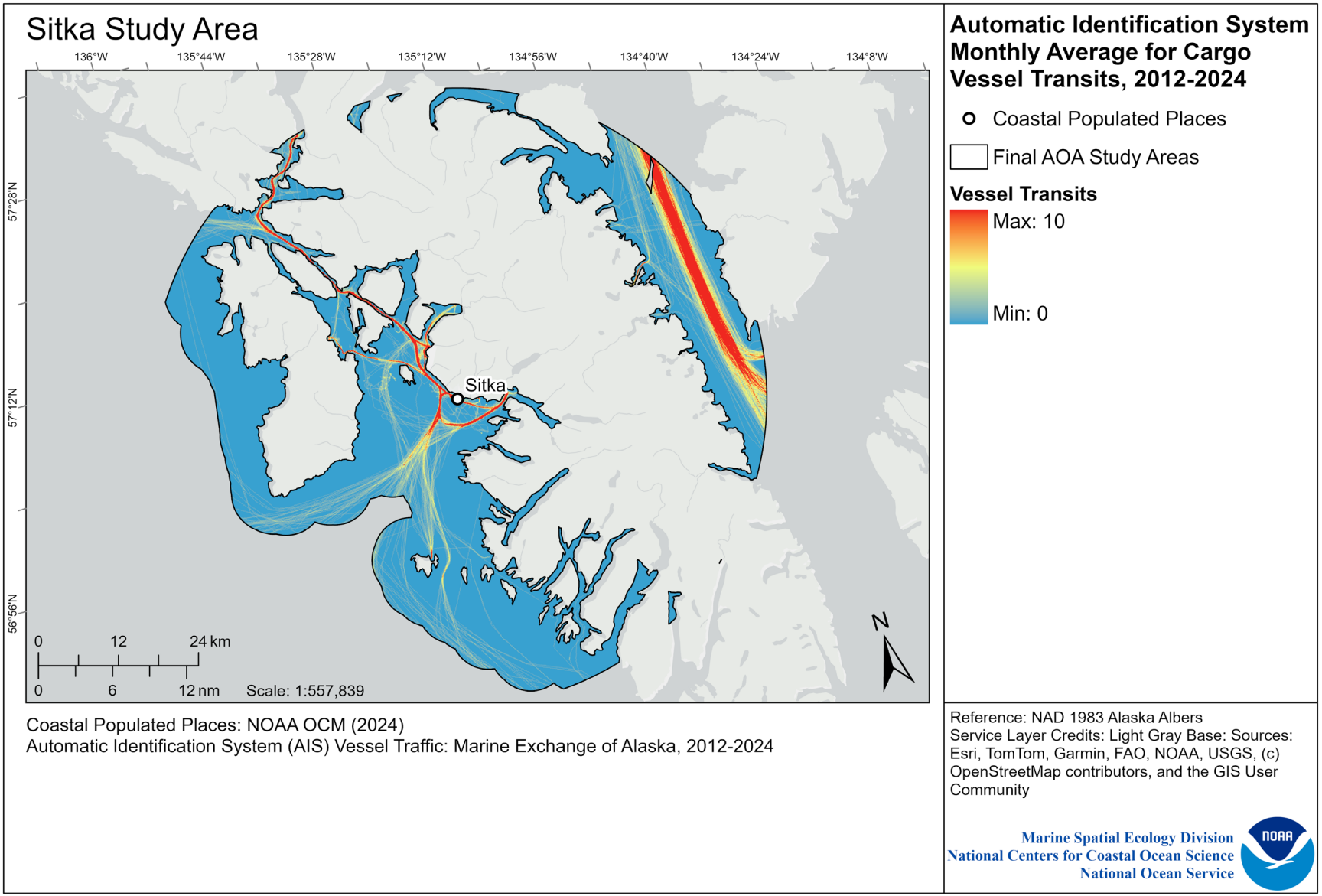
Max: 101

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Juneau Study Area
135°12'W
134°56'W
134°40'W
134°24'W
58°32'N
134°8'W
133°52'W
133°36'W
58°32'N
58°16'N
Juneau
0
10
20 km
0
5
10 nm
Scale: 1:444,823
N
Automatic Identification System Monthly Average for Cargo Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 19
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

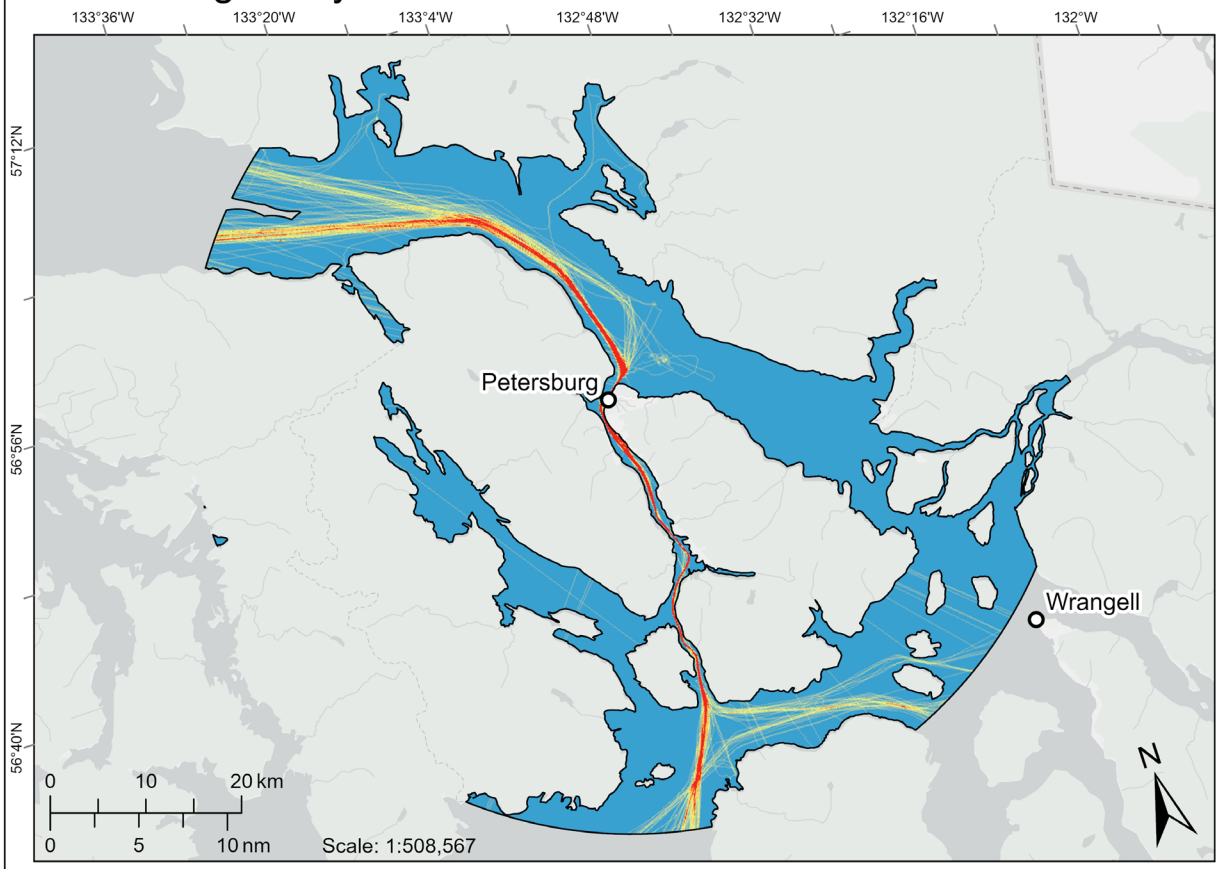


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Cargo Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

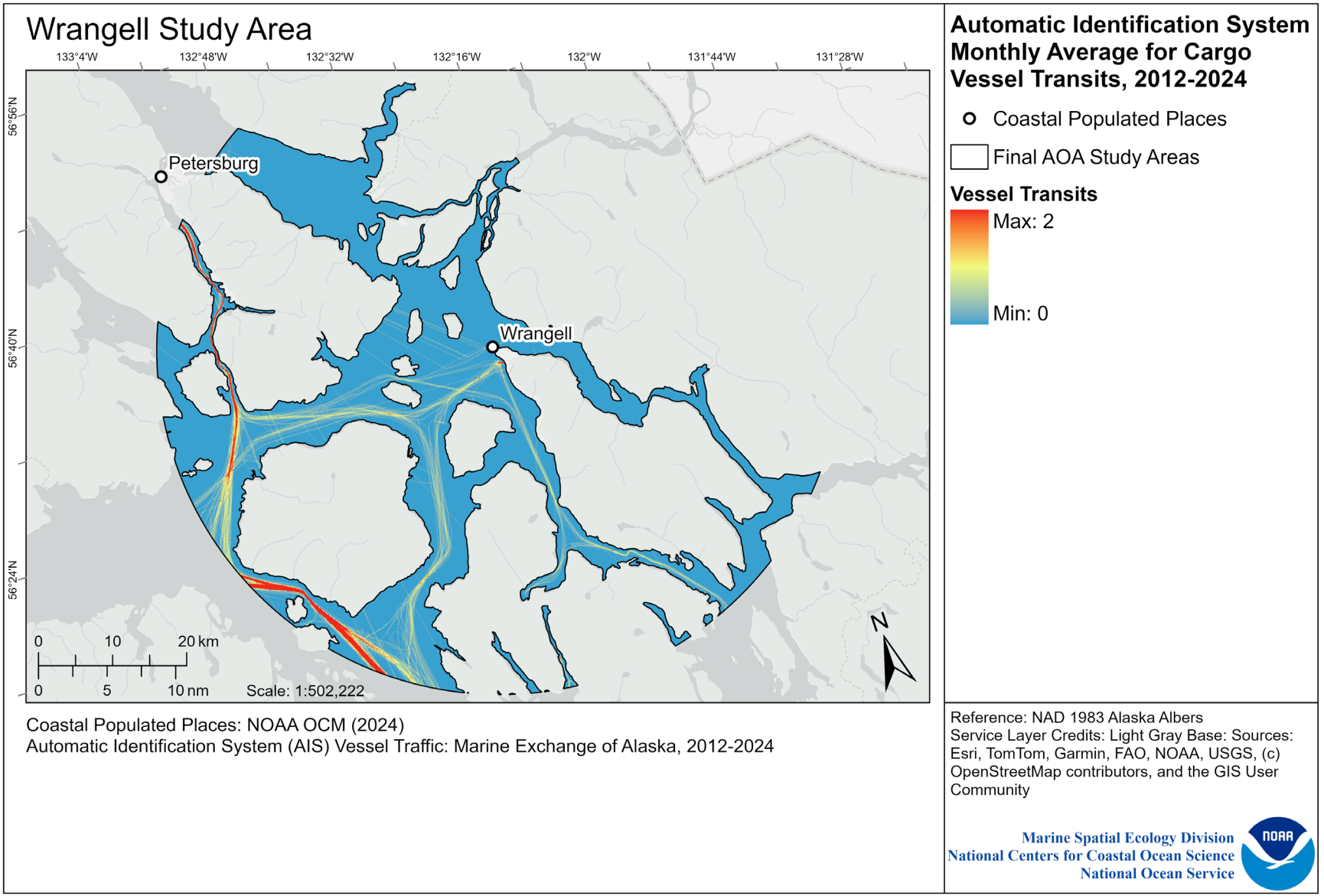
Vessel Transits

Max: 2

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

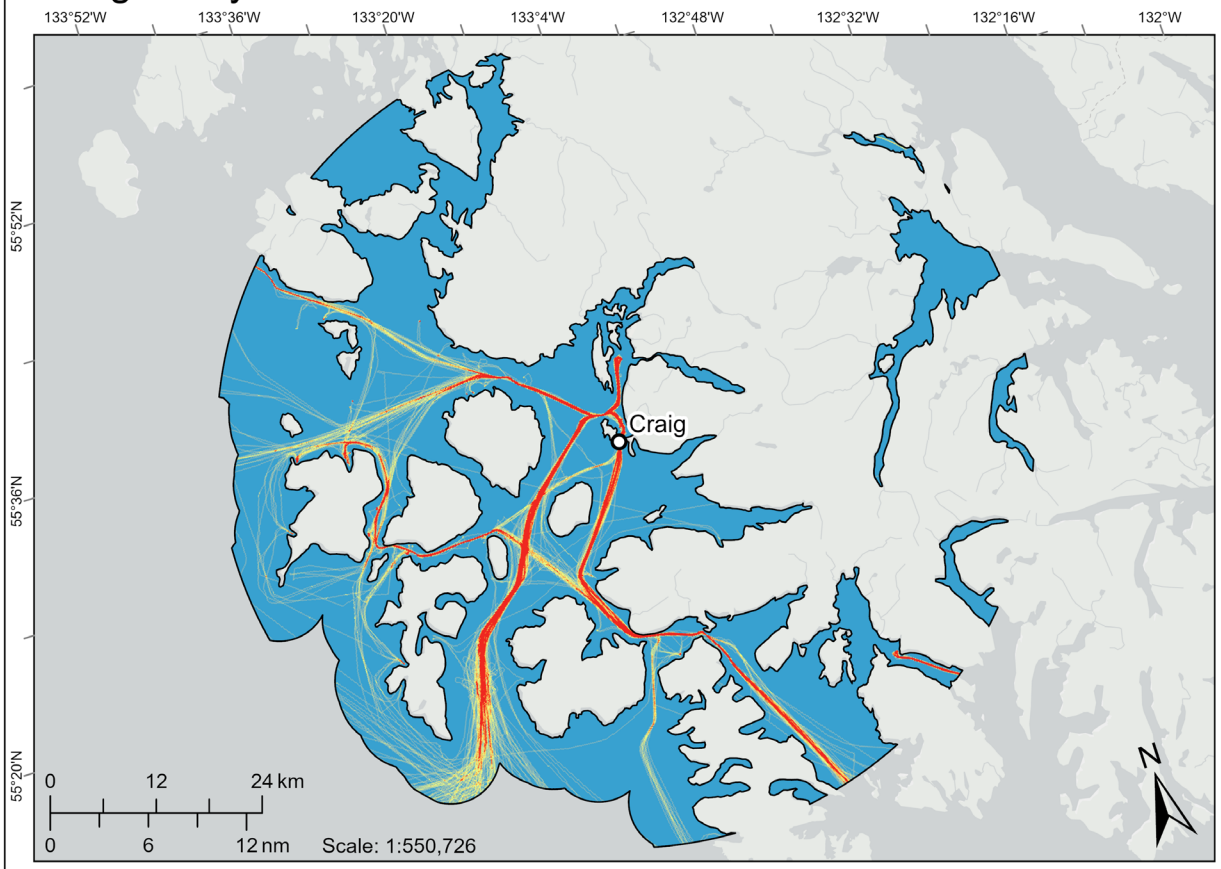


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Cargo Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

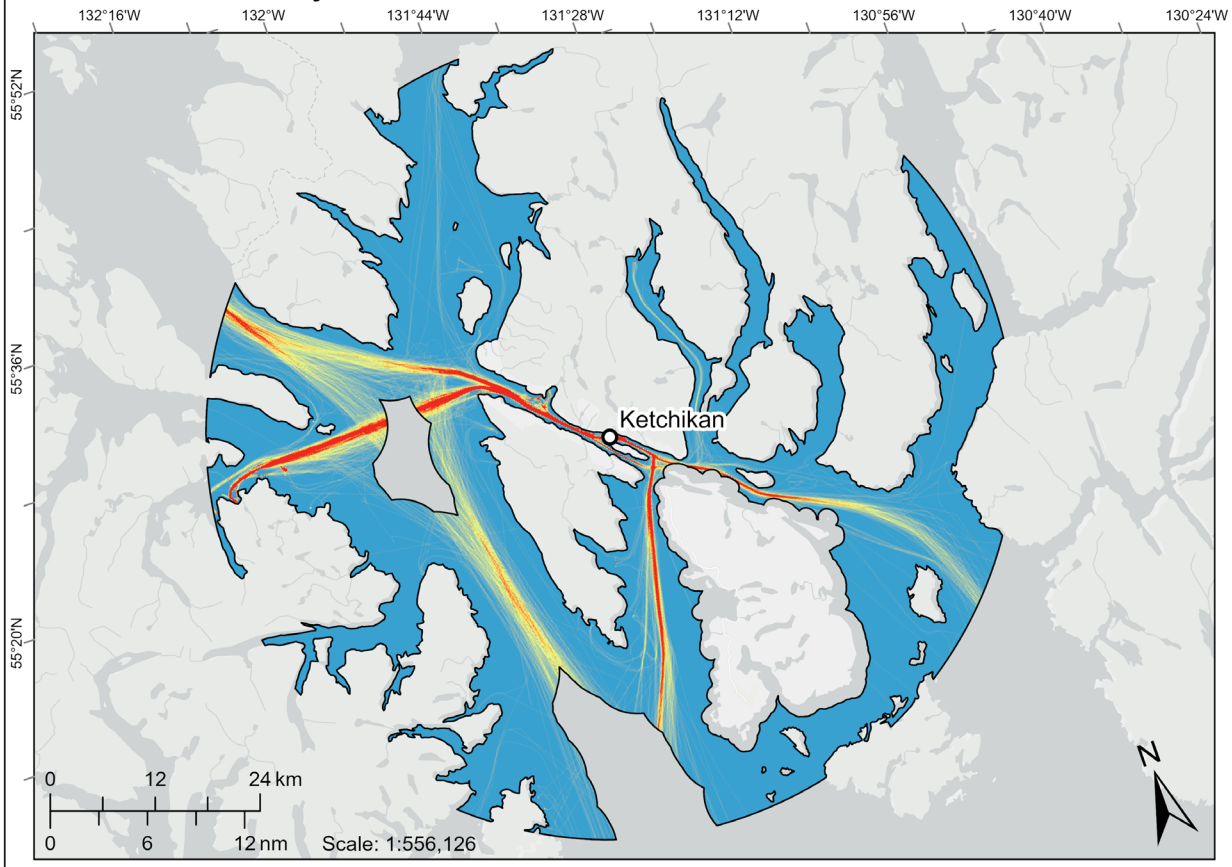
Max: 4

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Cargo Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

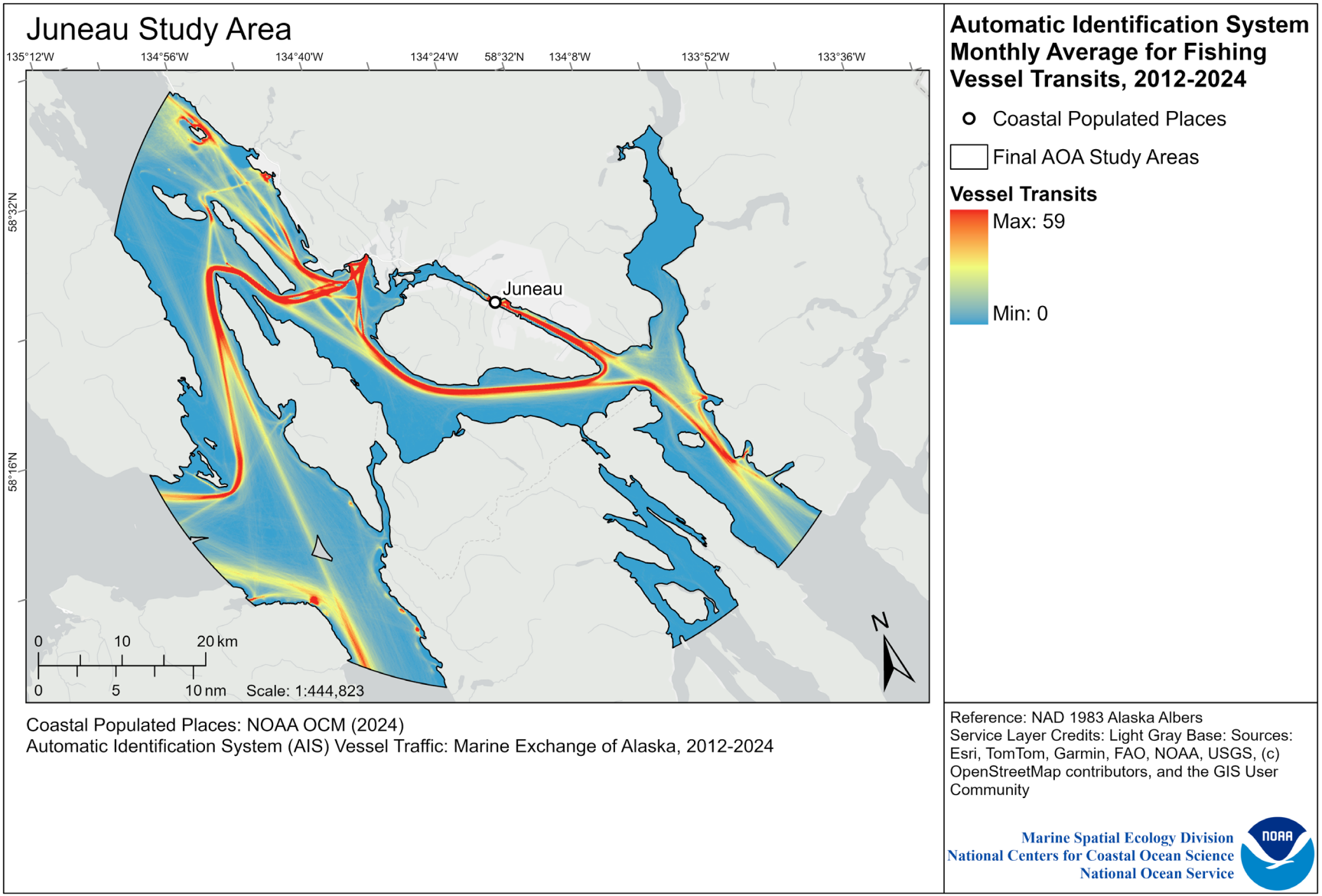
Vessel Transits

Max: 13

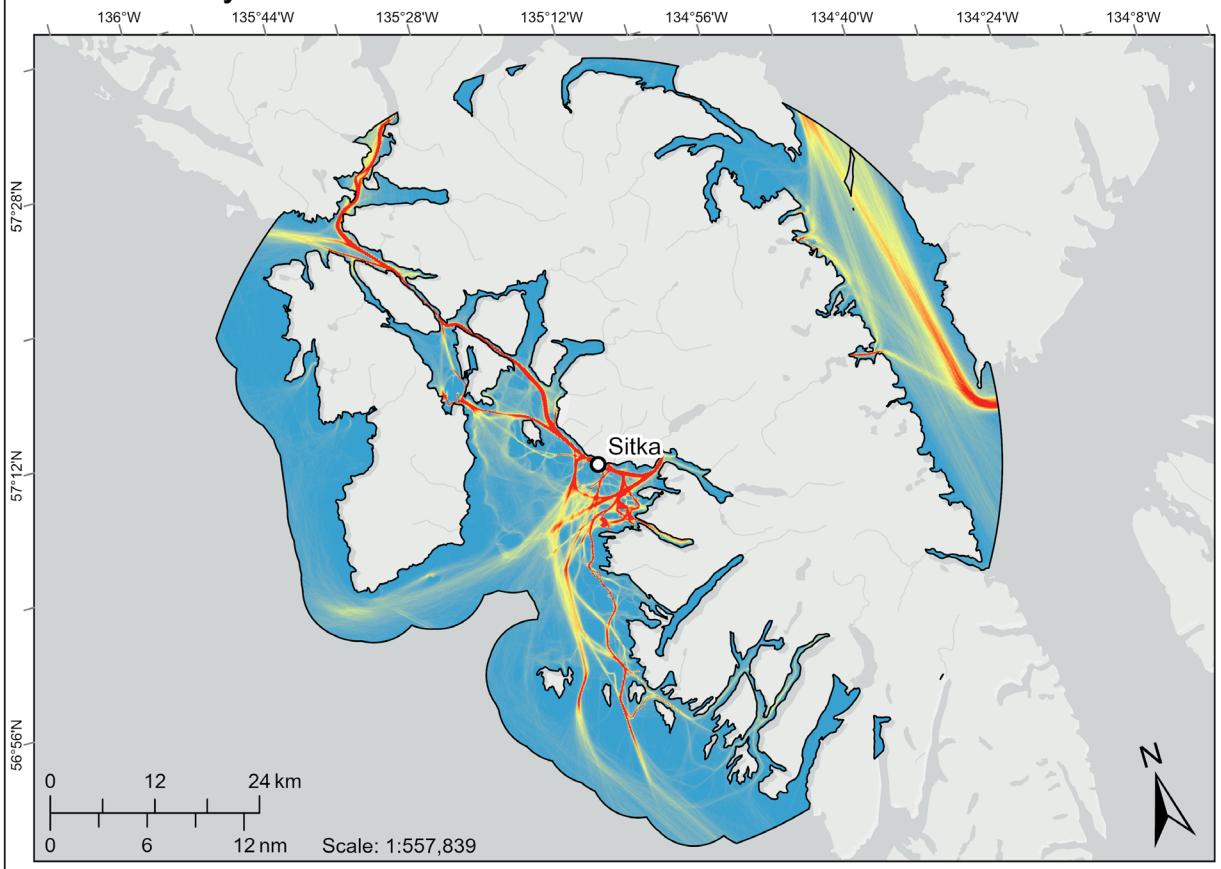
Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Juneau Study Area
135°12'W
134°56'W
134°40'W
134°24'W
58°32'N
134°8'W
133°52'W
133°36'W
58°32'N
58°16'N
Juneau
0
10
20 km
0
5
10 nm
Scale: 1:444,823
N
Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 59
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Sitka Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

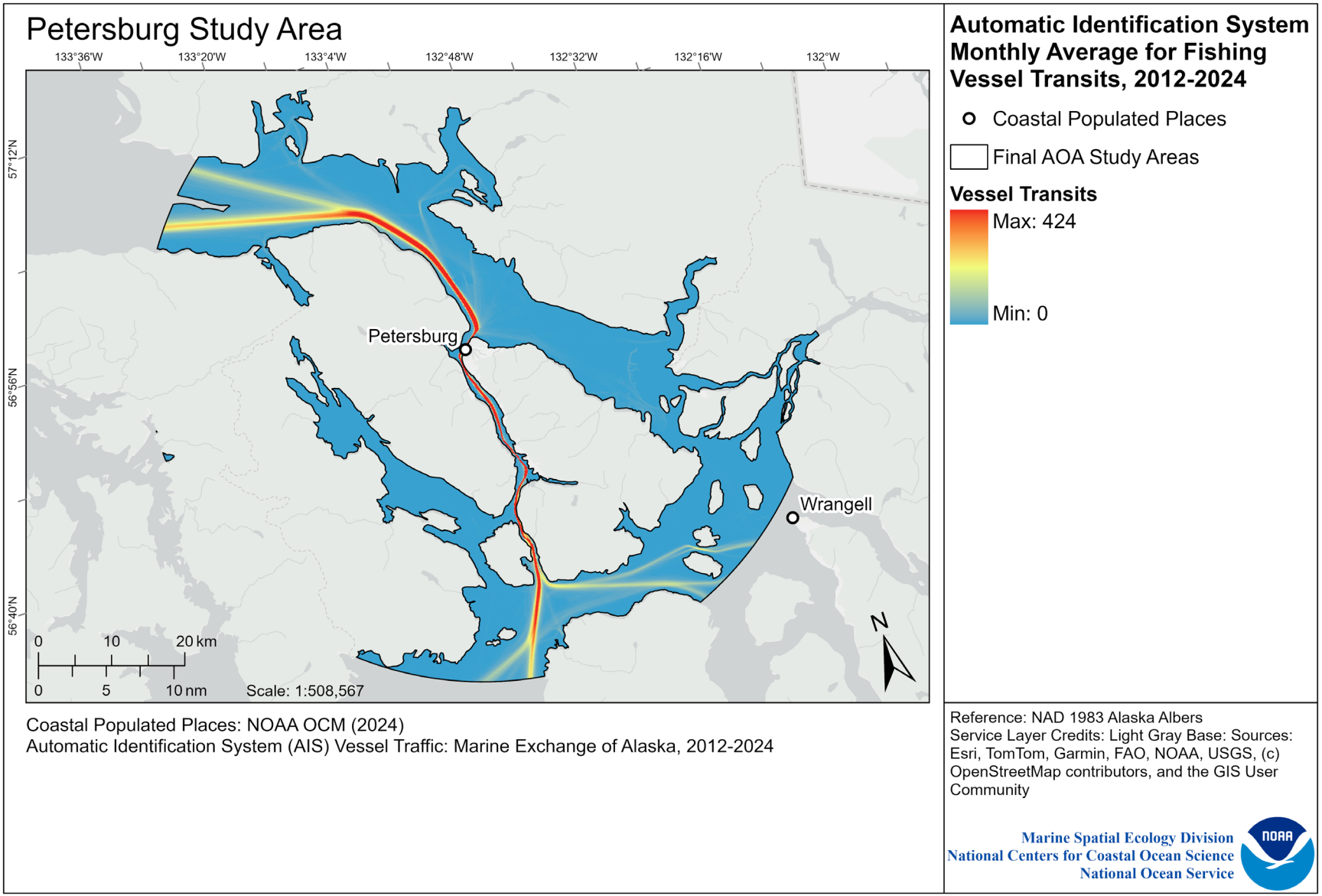
Vessel Transits

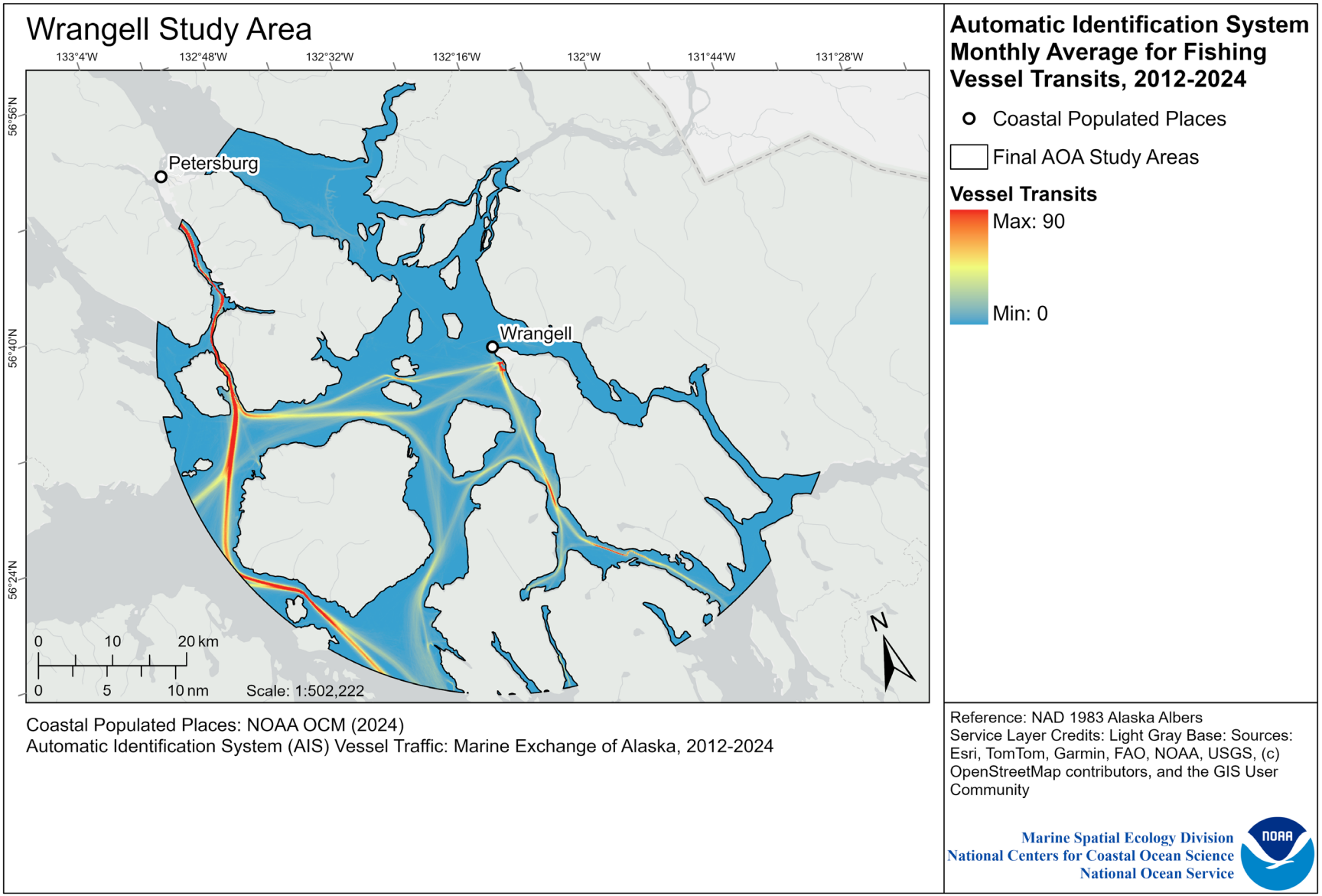
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Min: 0

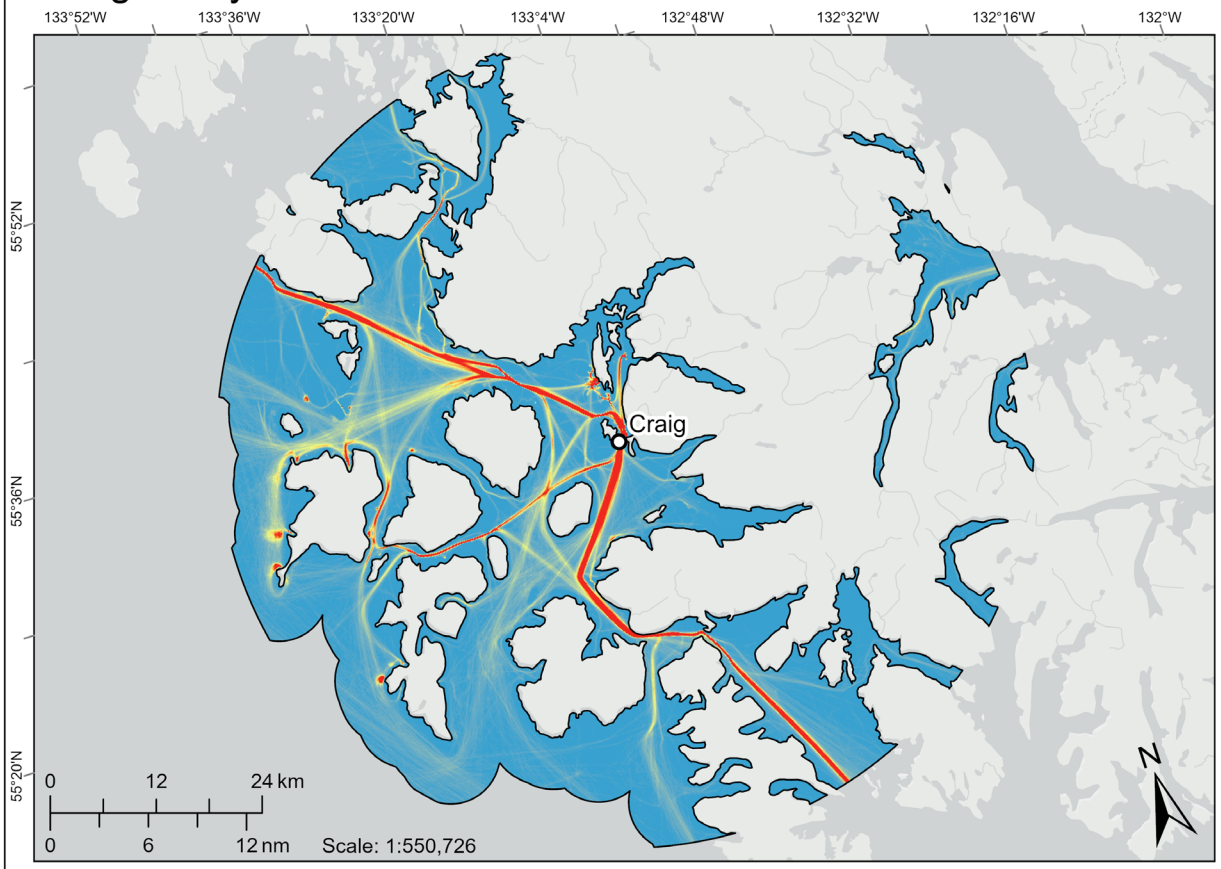
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Petersburg Study Area
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
57°12'N
56°56'N
56°40'N
Petersburg
Wrangell
0
10
20 km
0
5
10 nm
Scale: 1:508,567
N
Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 424
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Wrangell Study Area
133°4'W
132°48'W
132°32'W
132°16'W
132°W
131°44'W
131°28'W
56°56'N
56°40'N
56°24'N
Petersburg
Wrangell
0
10
20 km
0
5
10 nm
Scale: 1:502,222
N
Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 90
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

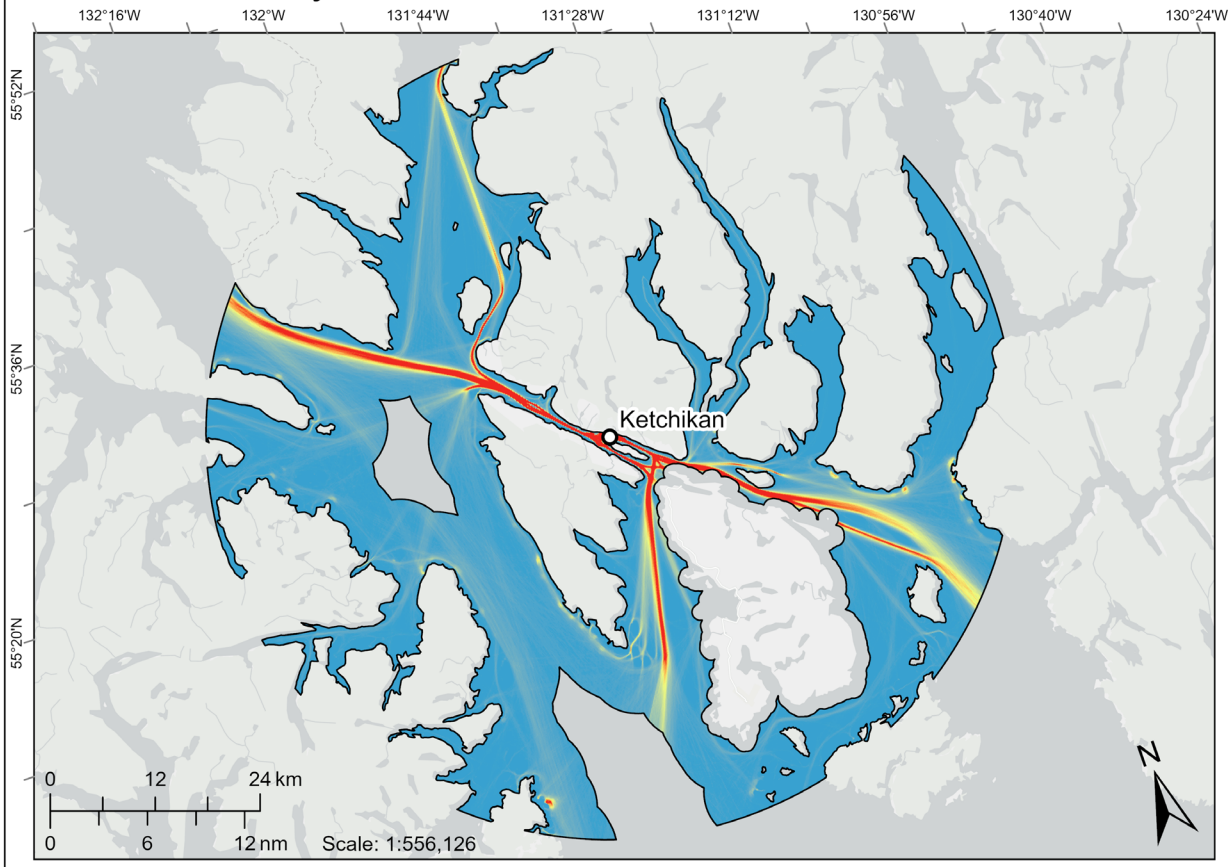
Max: 31

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Fishing Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

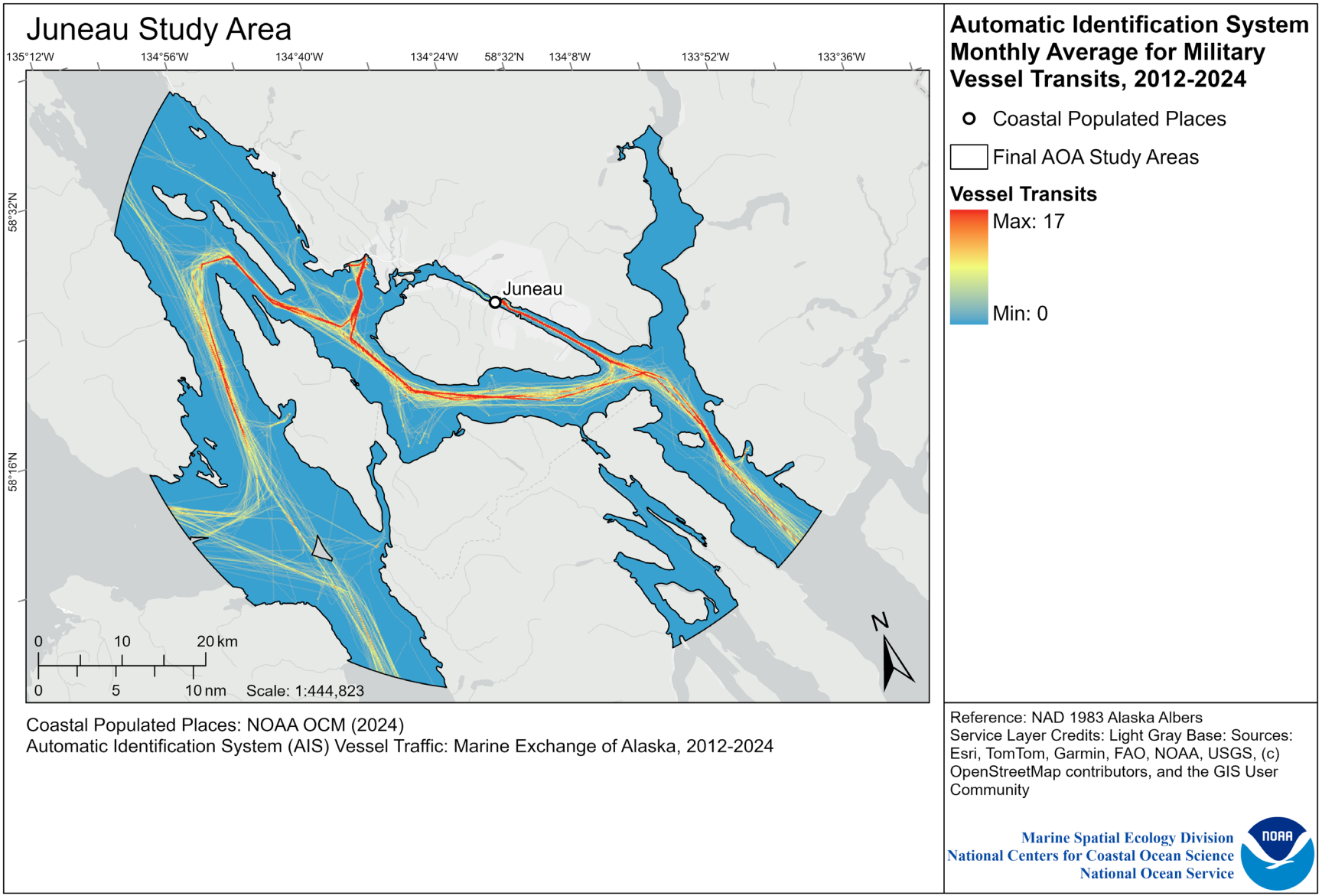
Vessel Transits

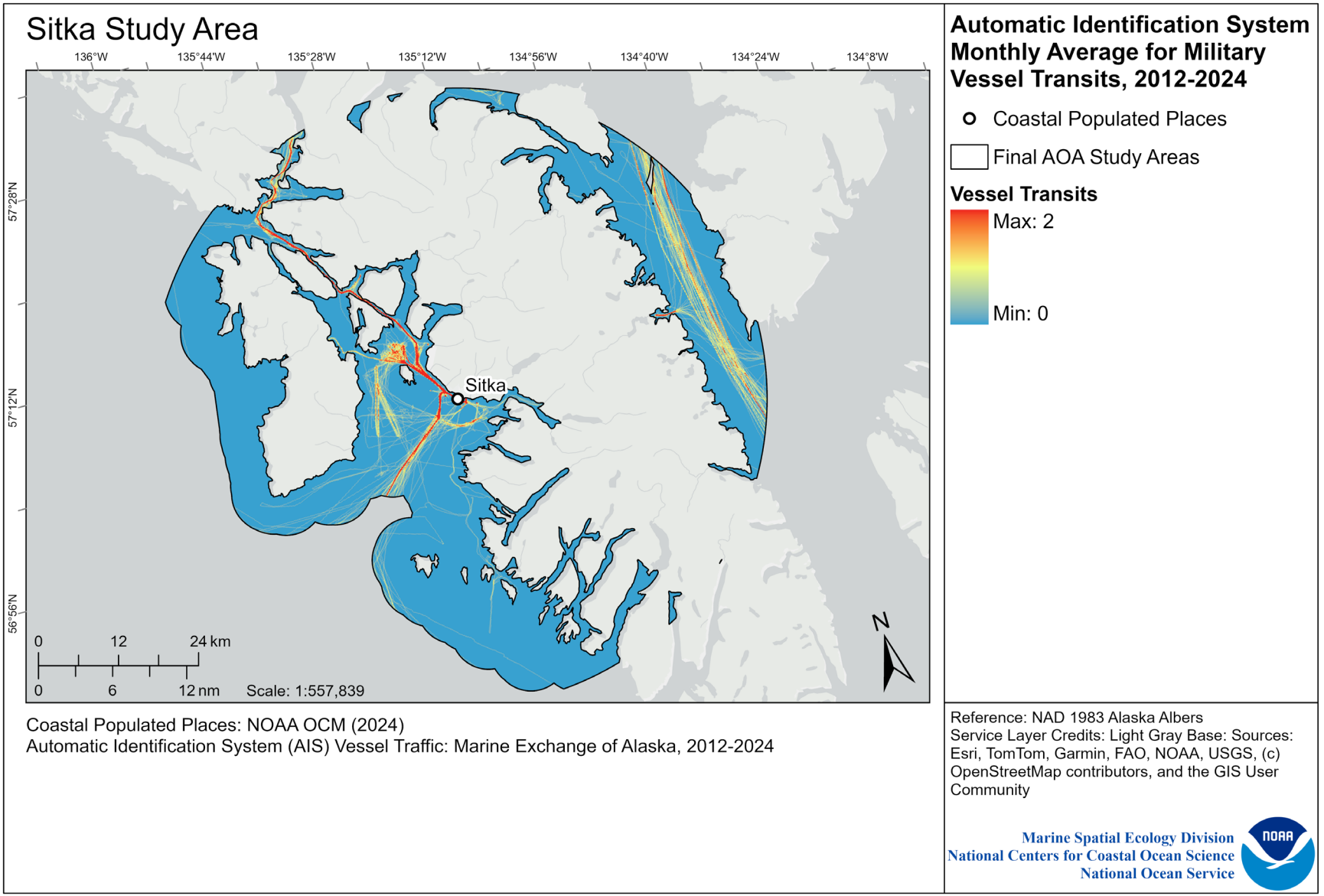
Max: 91

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Juneau Study Area
135°12'W
134°56'W
134°40'W
134°24'W
58°32'N
134°8'W
133°52'W
133°36'W
58°32'N
58°16'N
Juneau
0
10
20 km
0
5
10 nm
Scale: 1:444,823
N
Automatic Identification System Monthly Average for Military Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 17
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

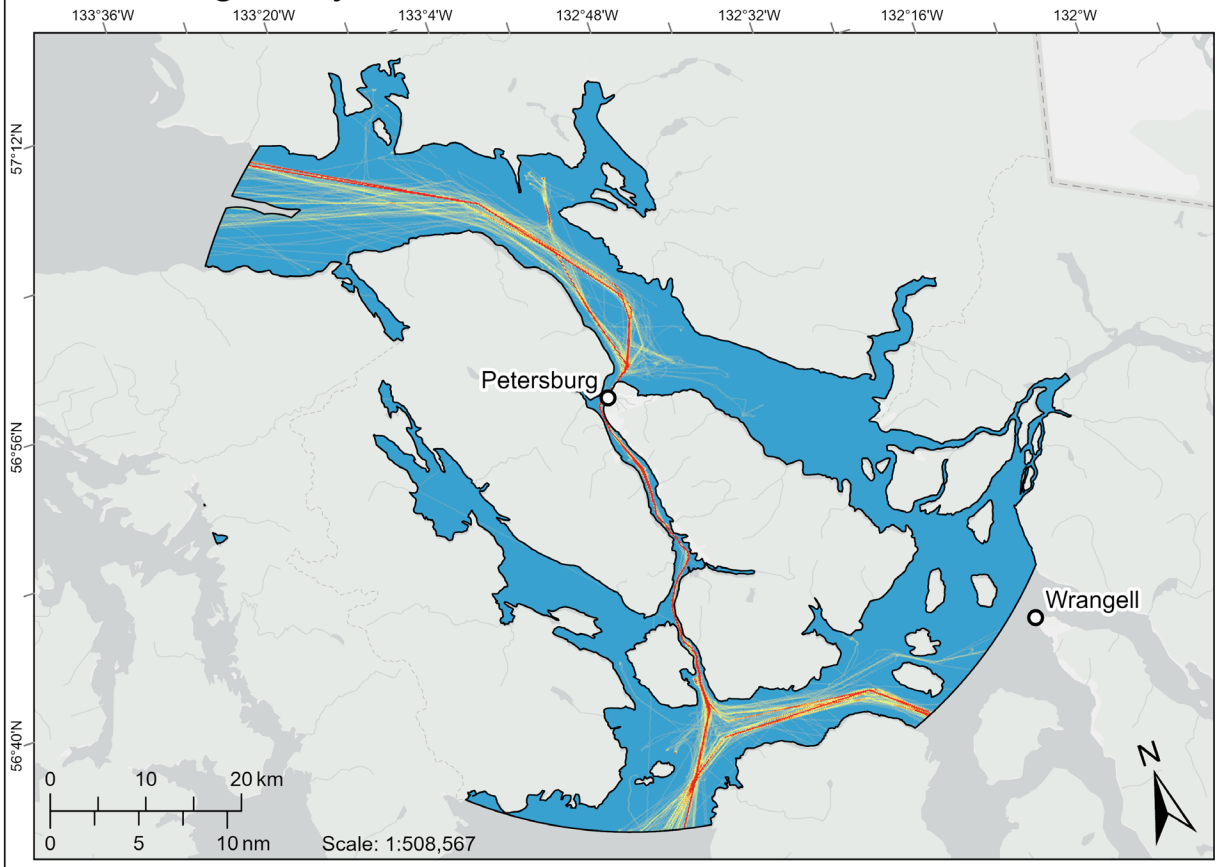


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Military Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

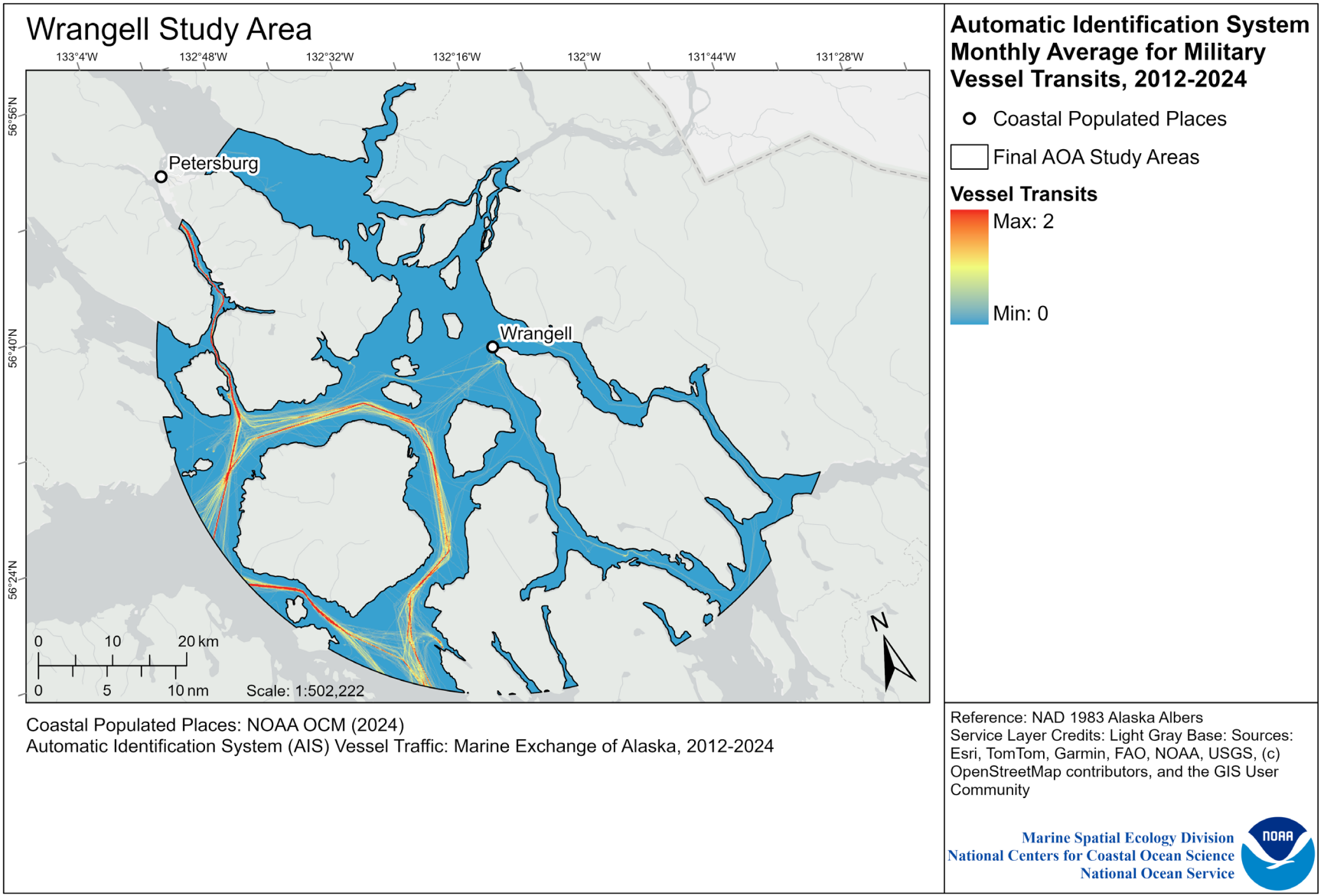
Vessel Transits

Max: 2

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

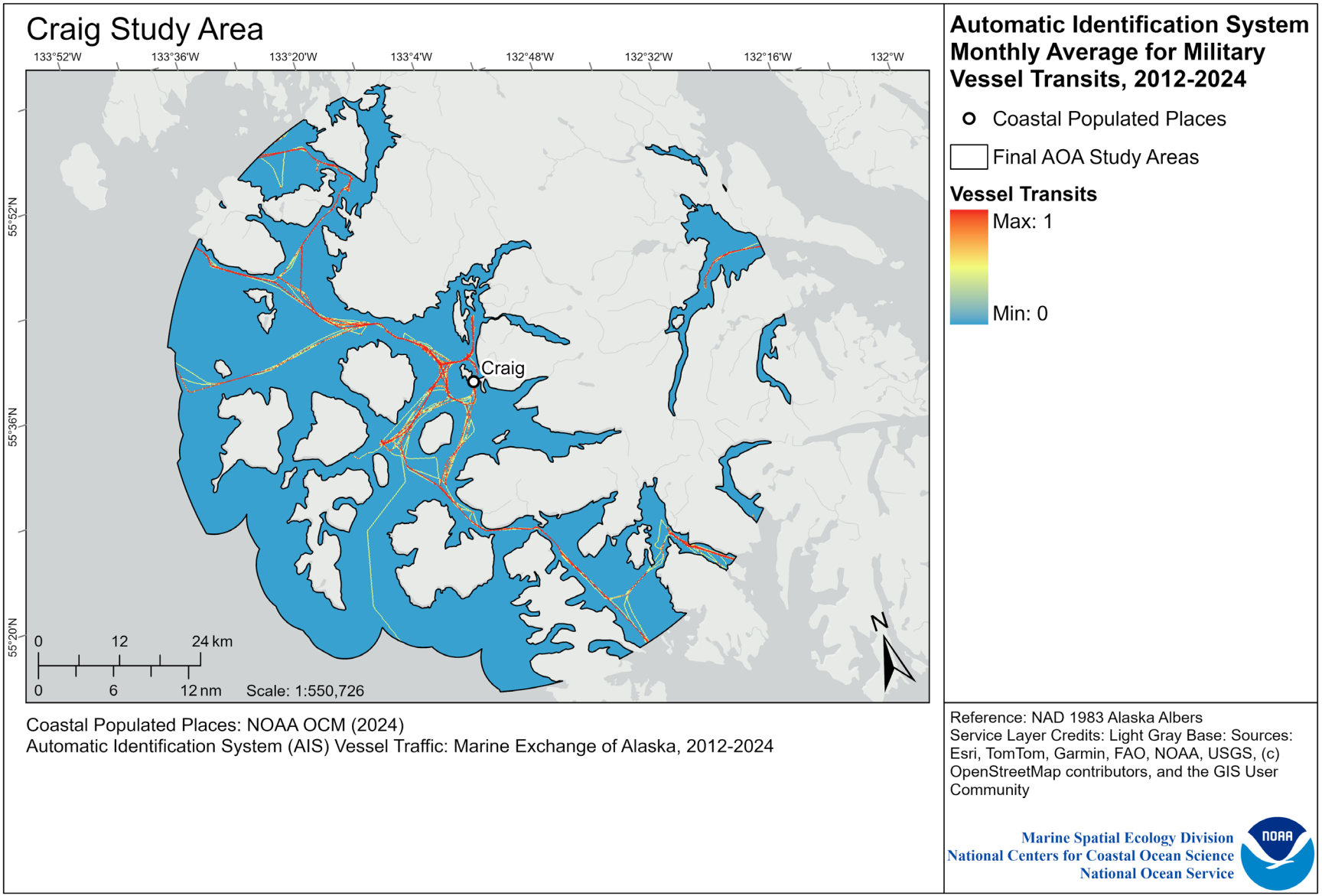
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

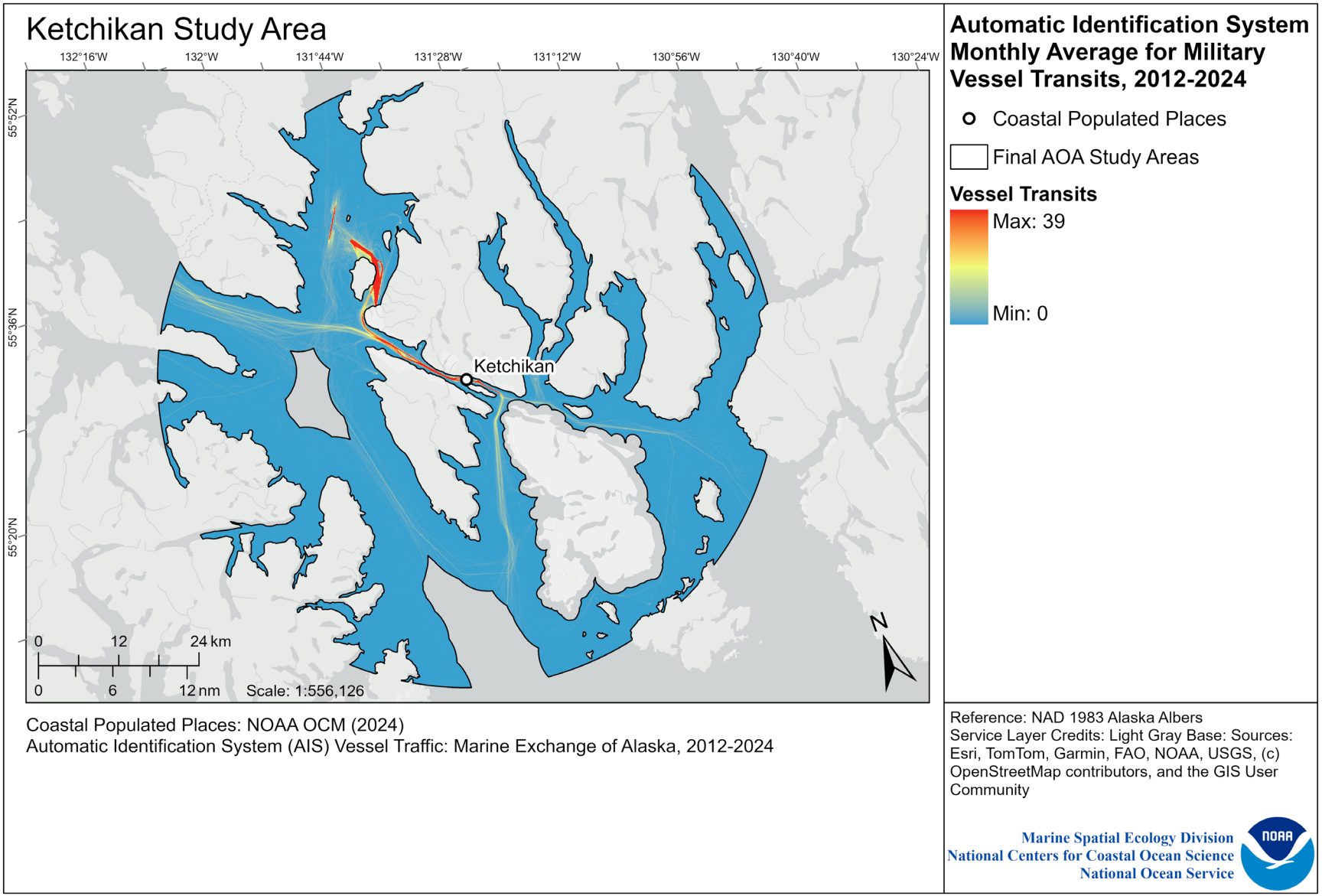


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Craig Study Area
133°52'W
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
55°52'N
55°36'N
55°20'N
Craig
0
12
24 km
0
6
12 nm
Scale: 1:550,726
N
Automatic Identification System Monthly Average for Military Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 1
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

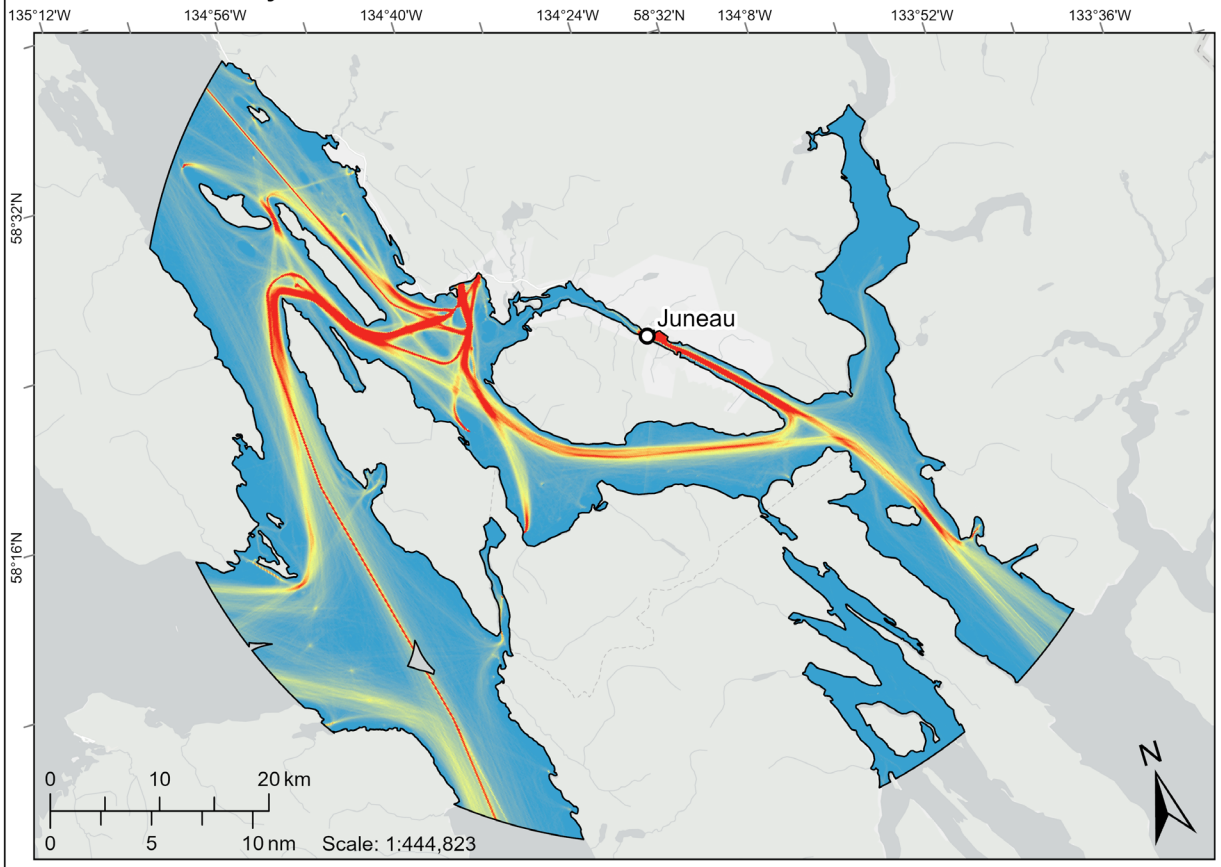


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Juneau Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Other Vessel Transits, 2012-2024

Coastal Populated Places

Final AOA Study Areas

Vessel Transits

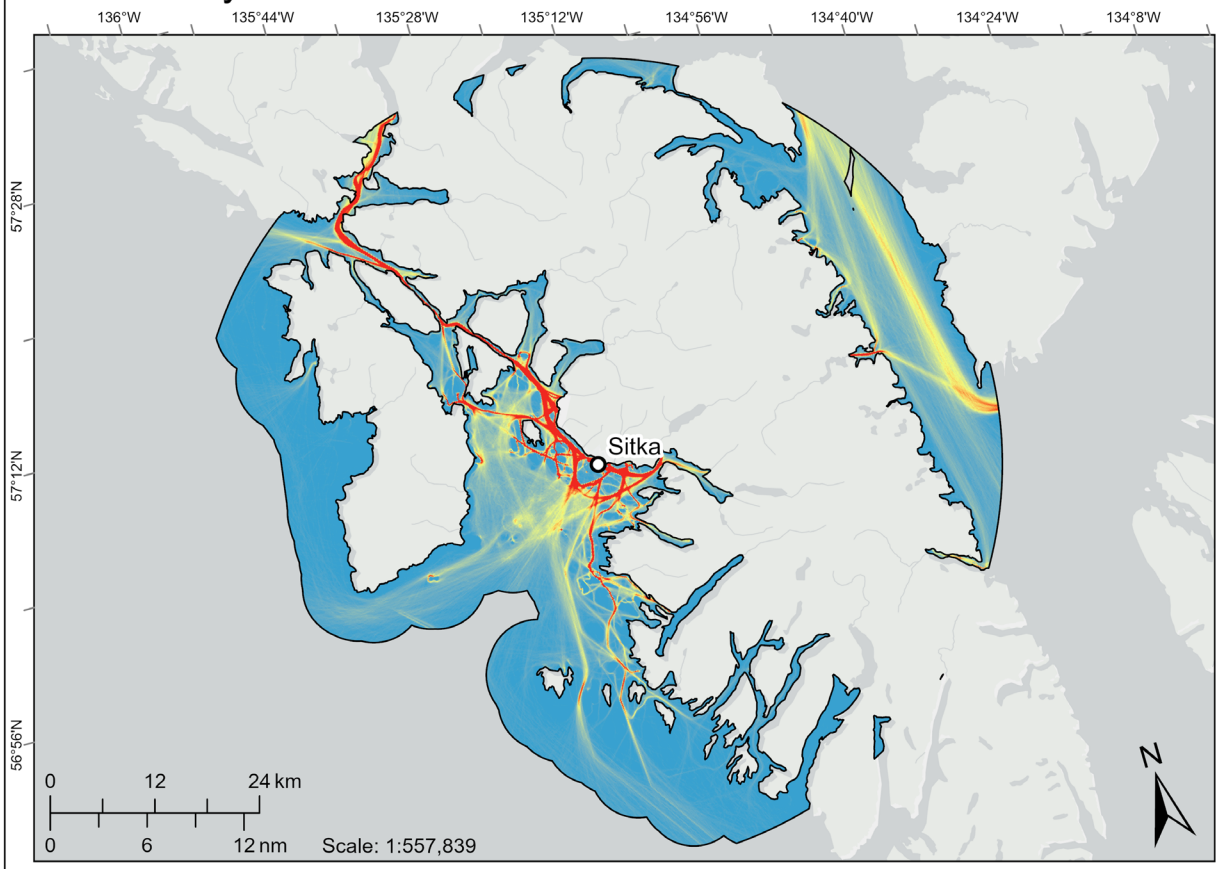
Max: 48

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Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Sitka Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Other Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

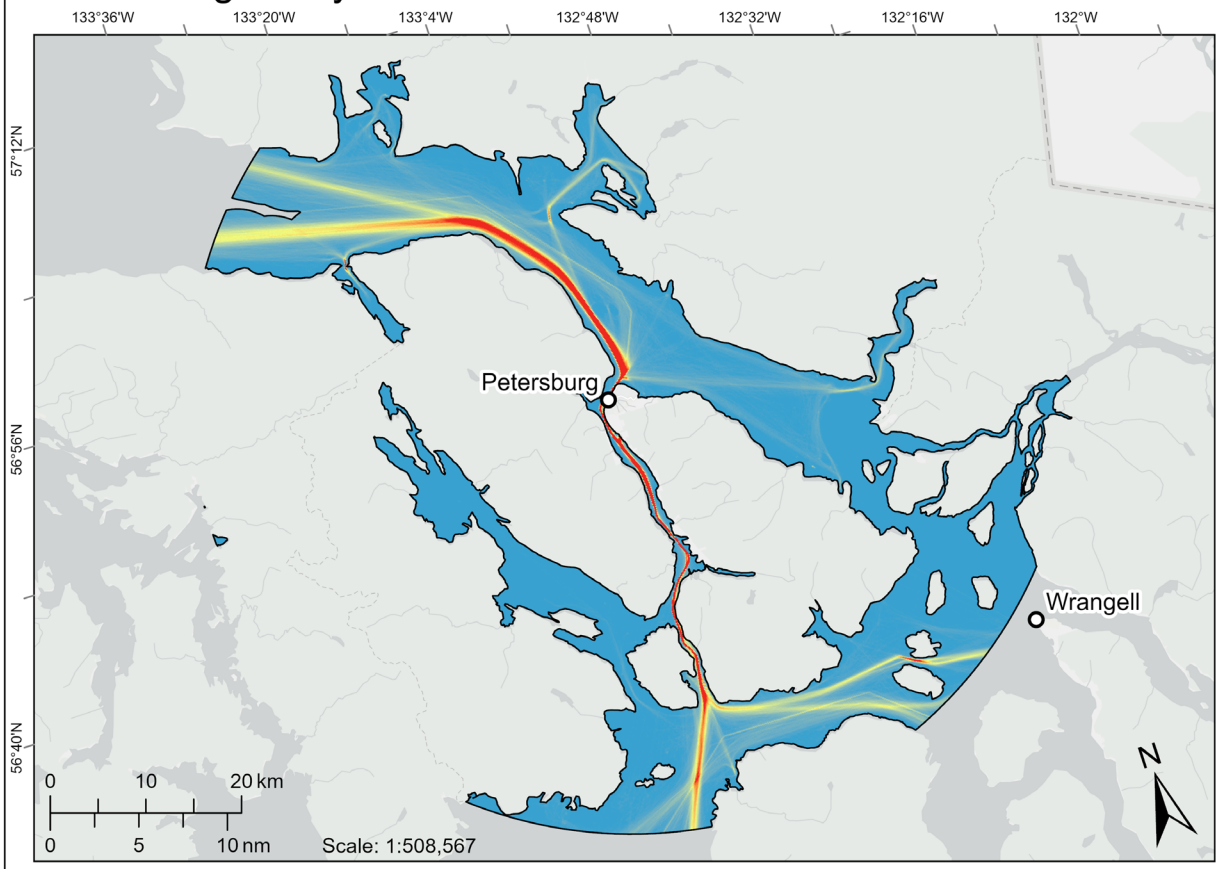
Max: 129

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Other Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

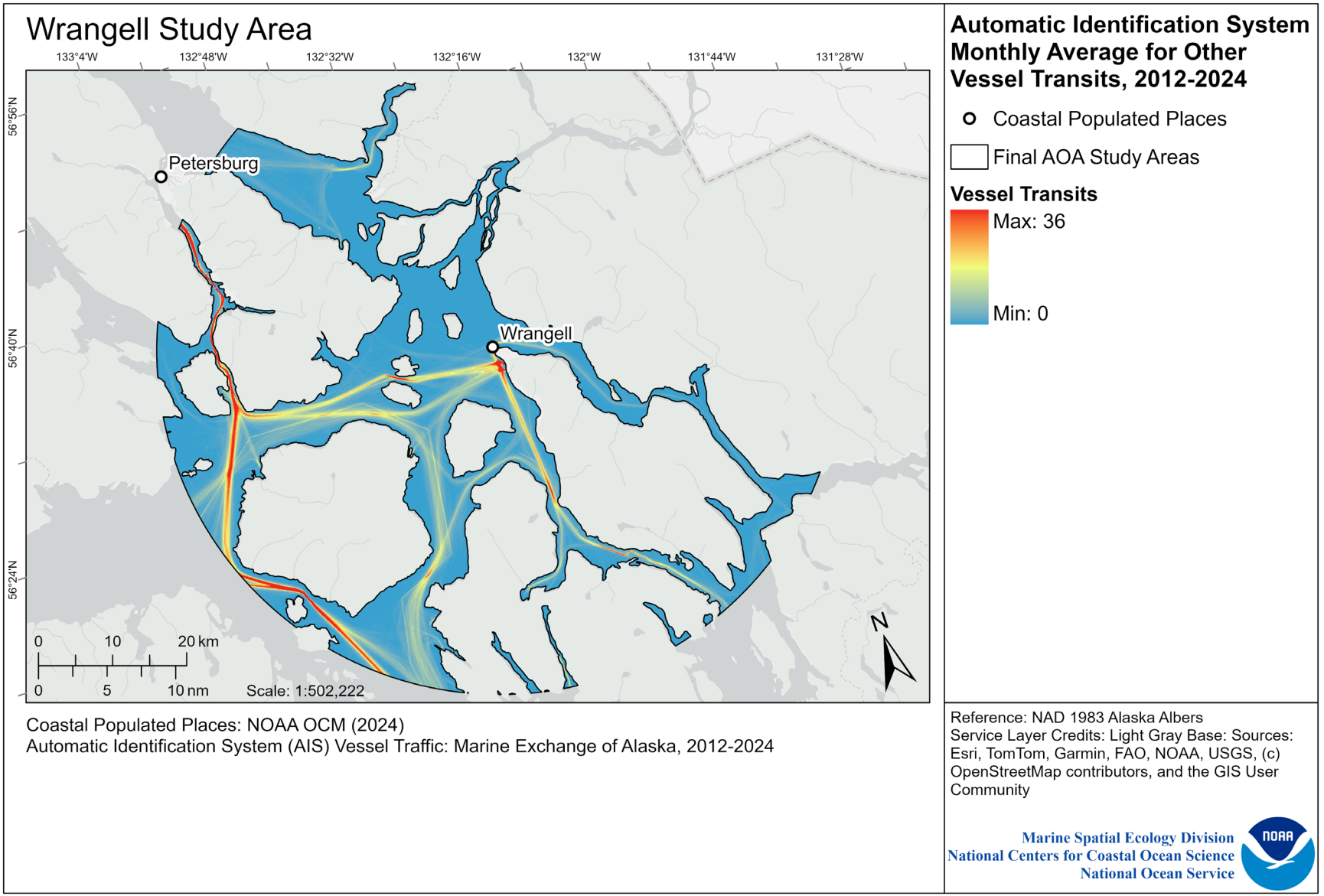
Vessel Transits

Max: 54

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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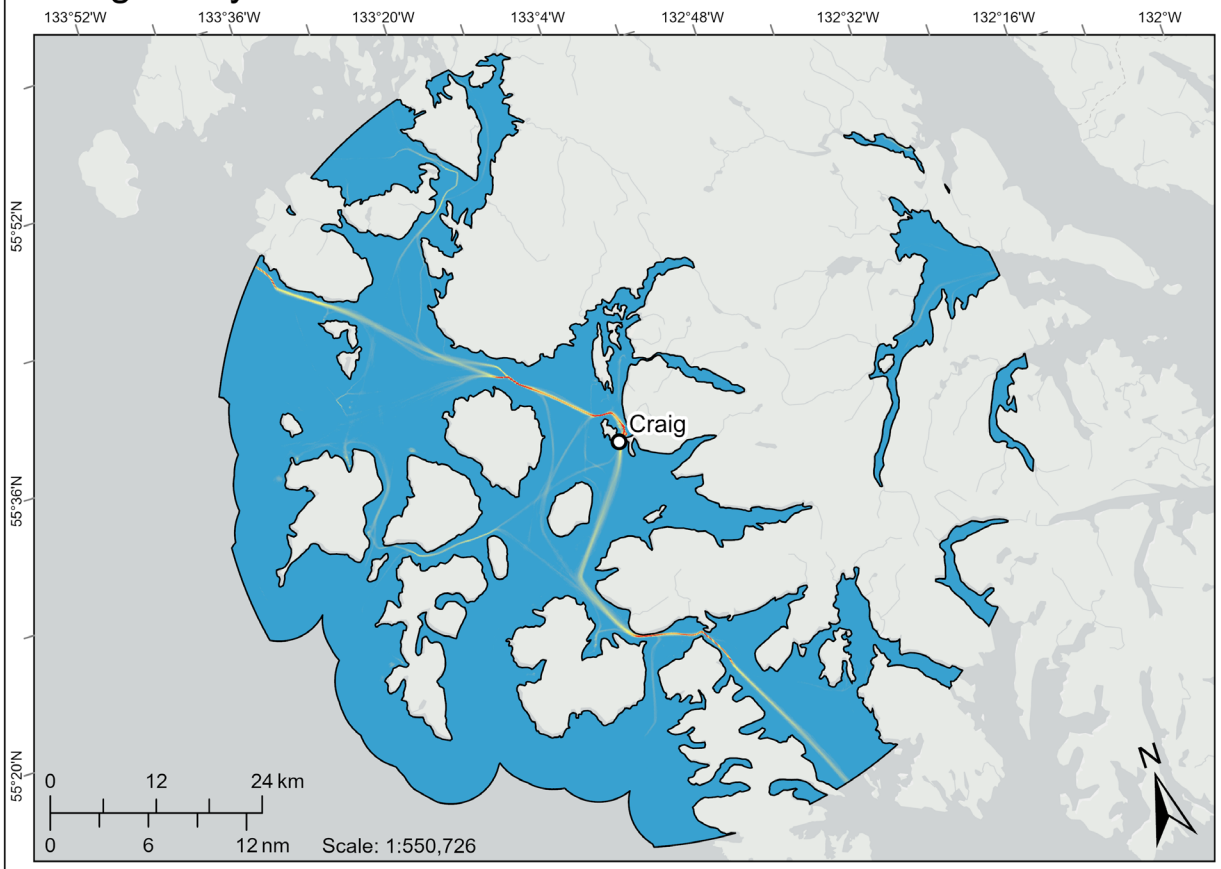


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Other Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

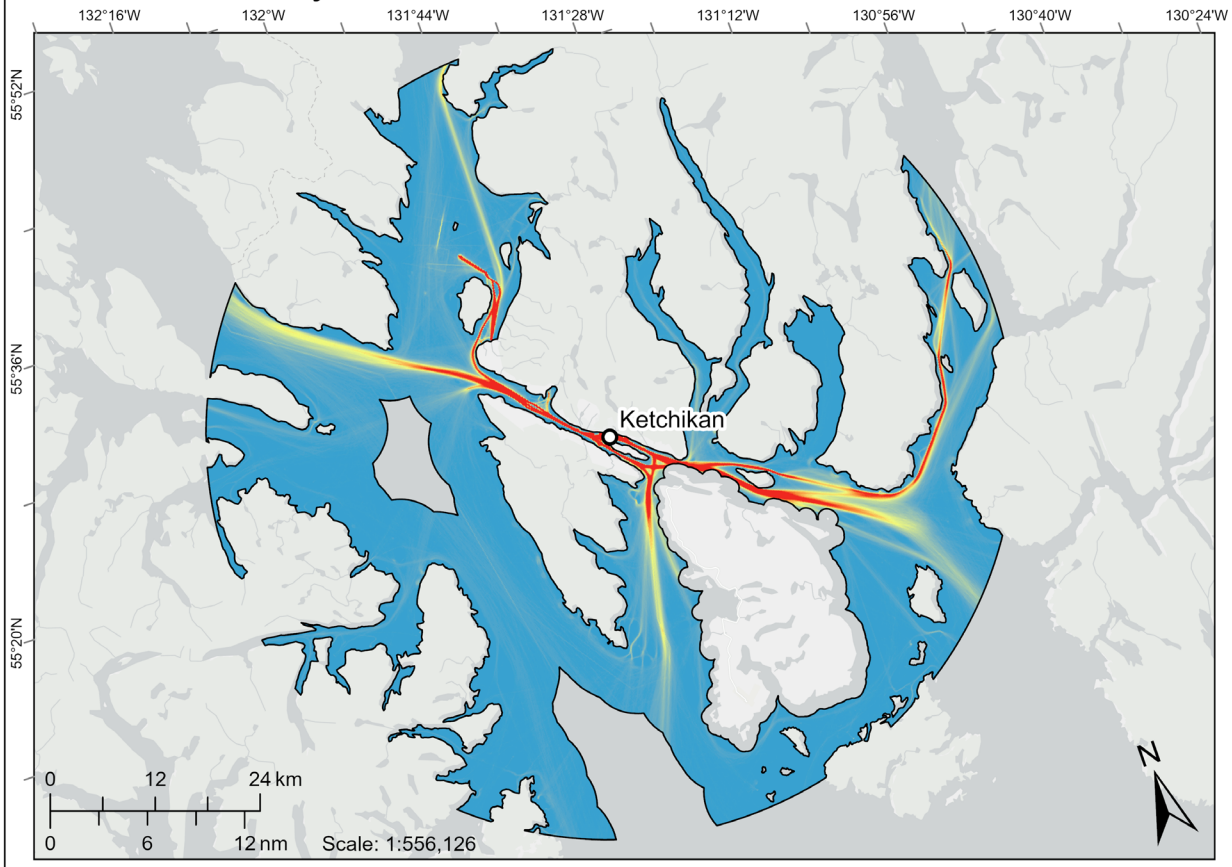
Max: 10

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Other Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

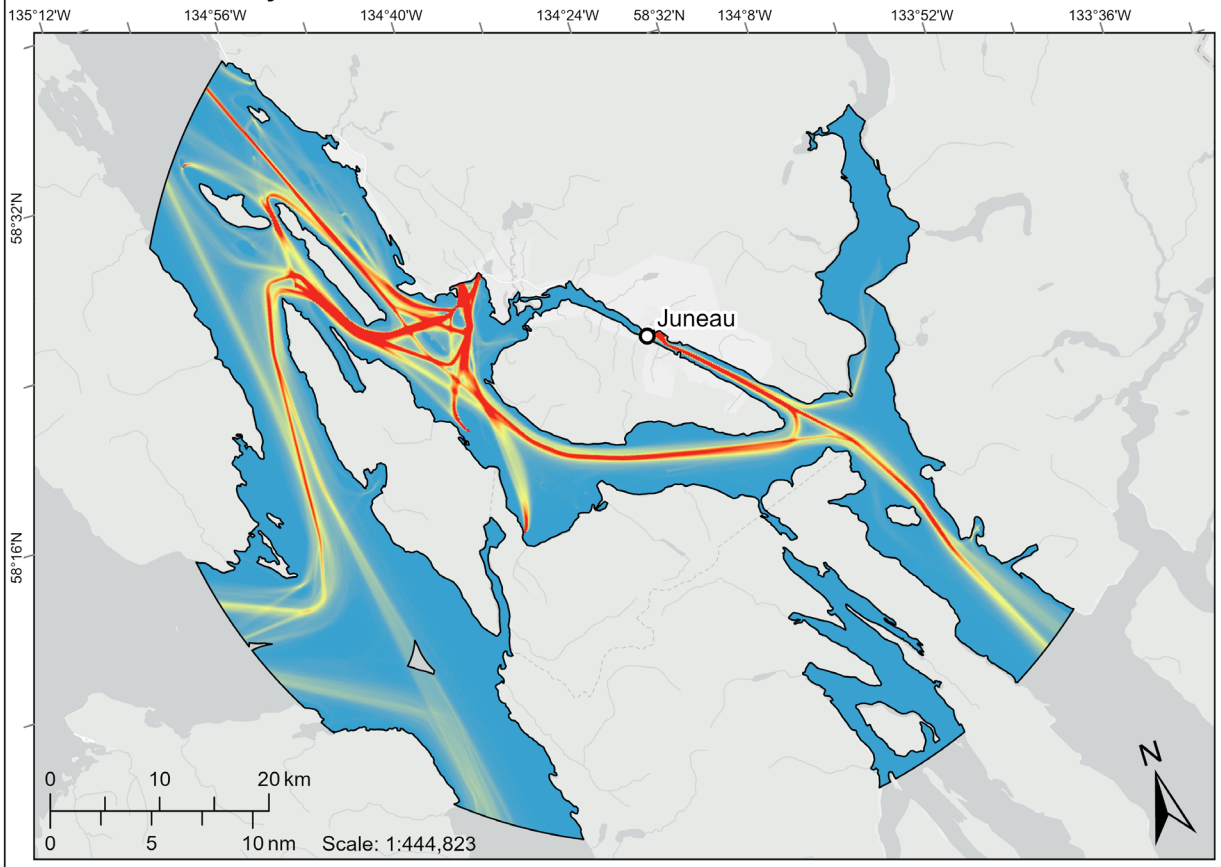
Max: 320

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Juneau Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Passenger Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

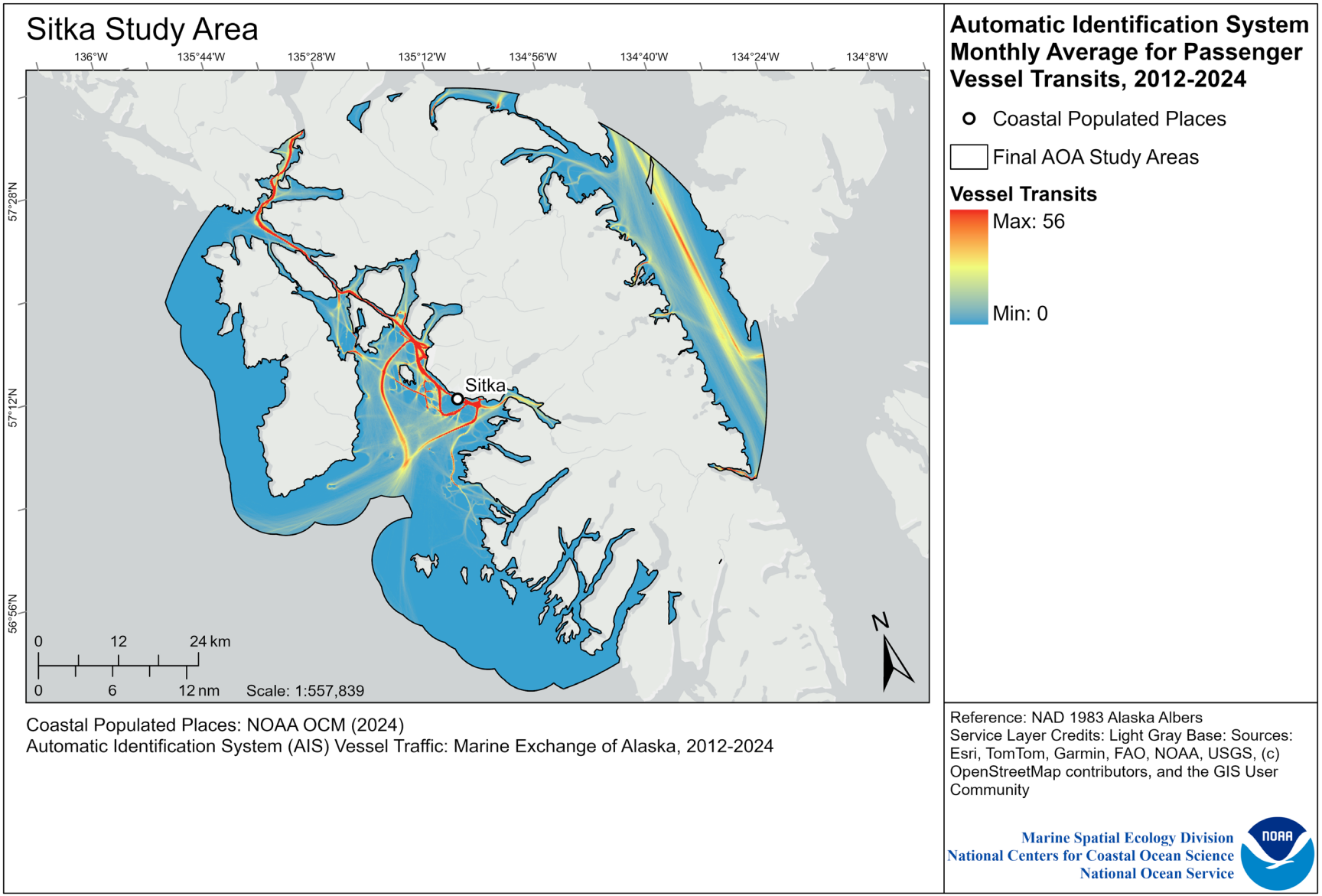
Vessel Transits

Max: 245

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

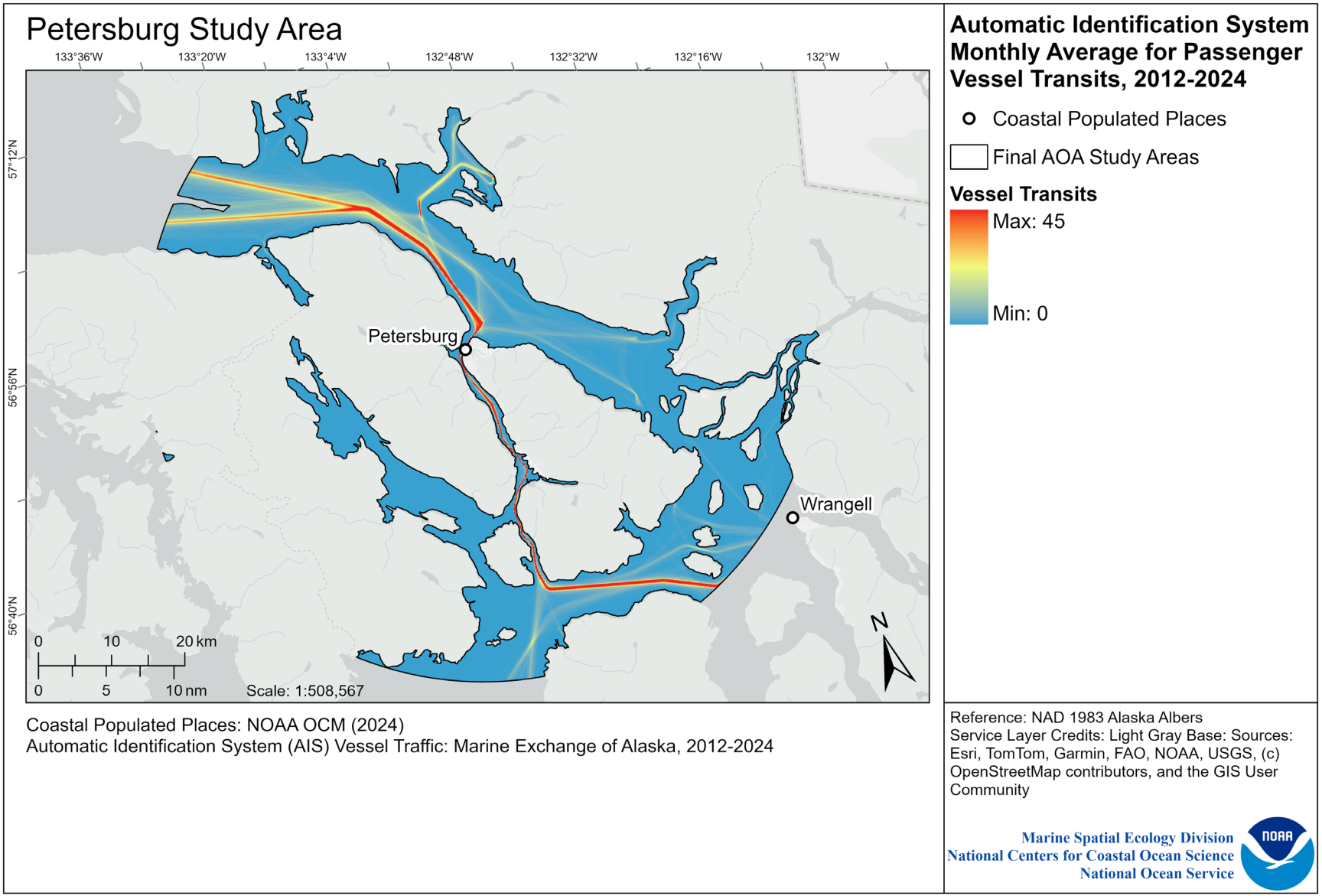
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

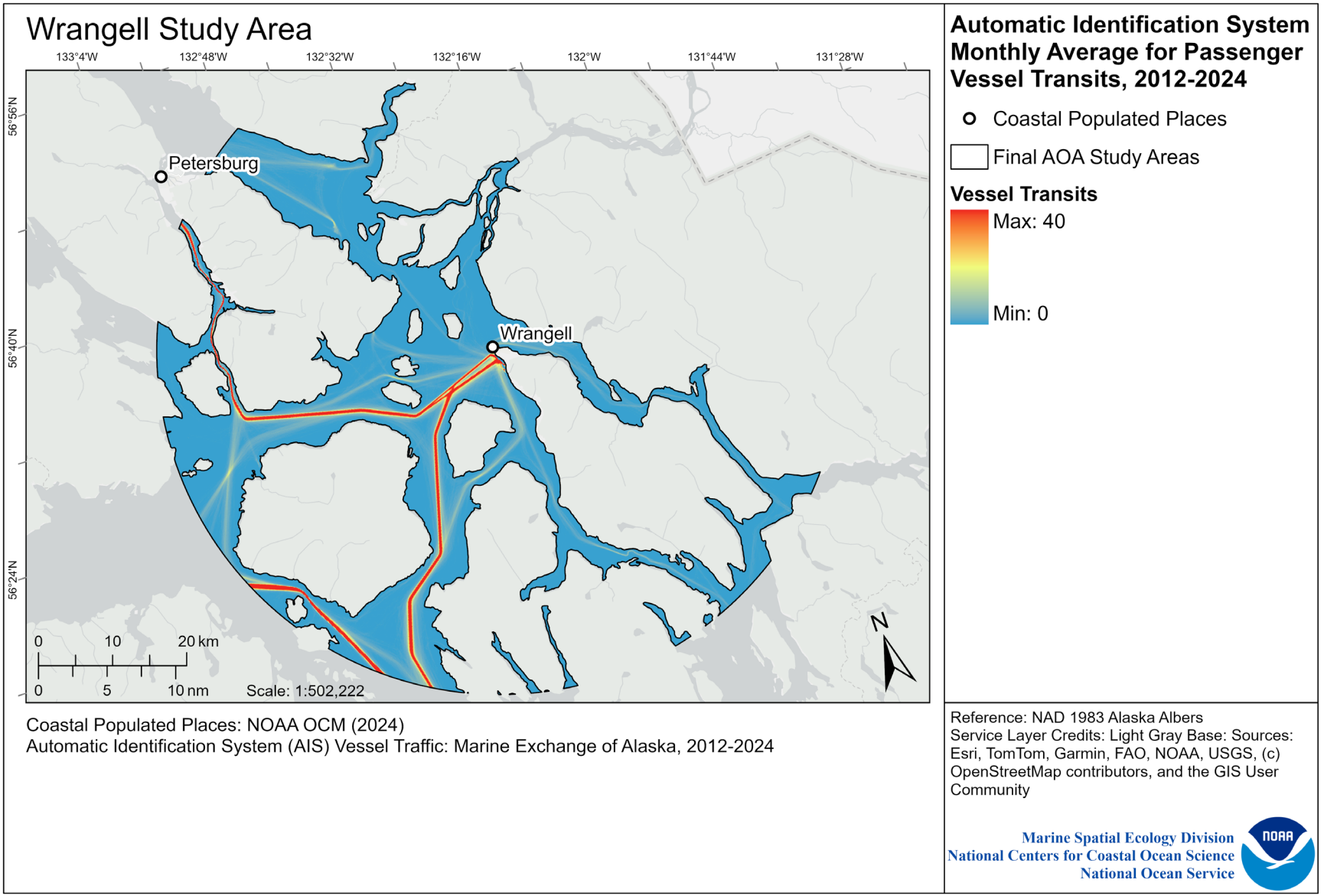
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
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National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Passenger Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

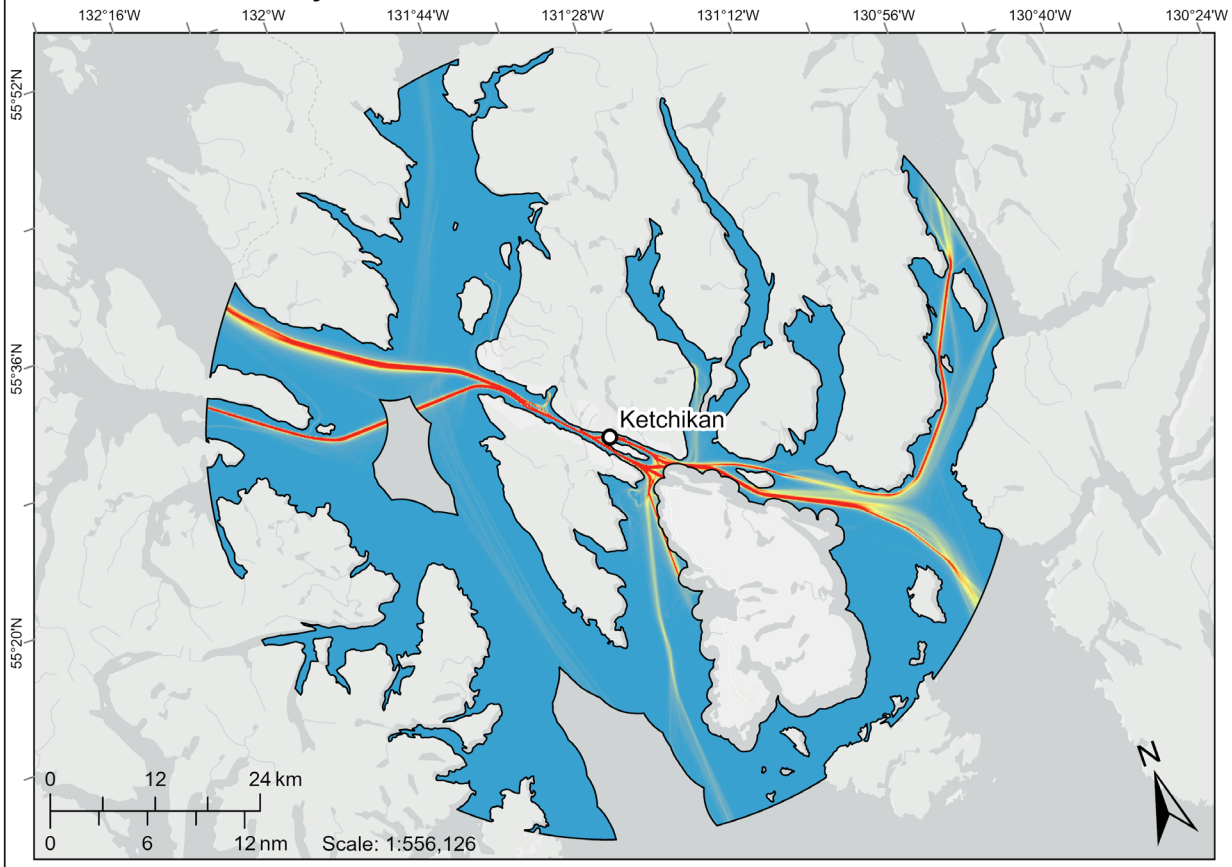
Max: 62

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Passenger Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

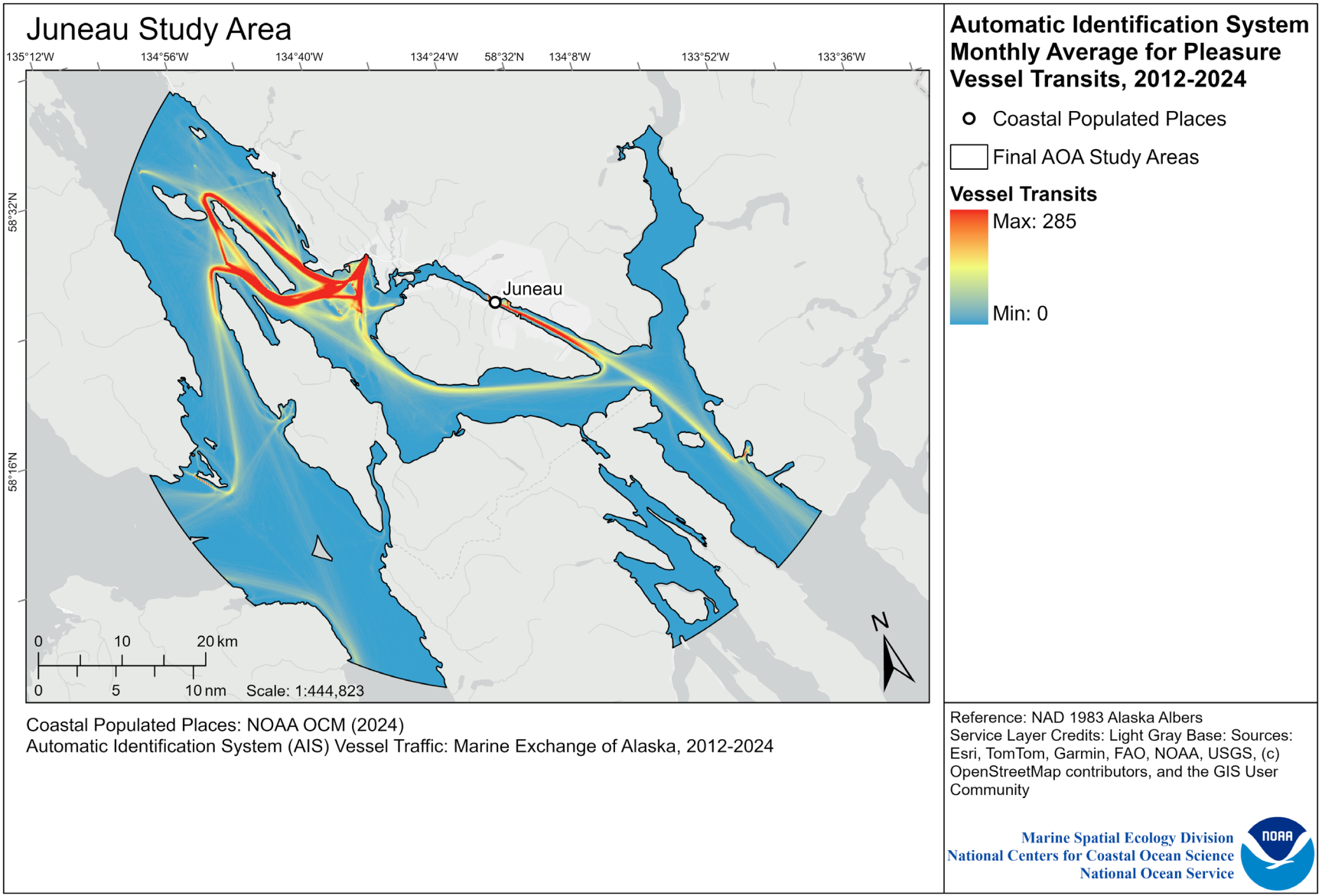
Vessel Transits

Max: 184

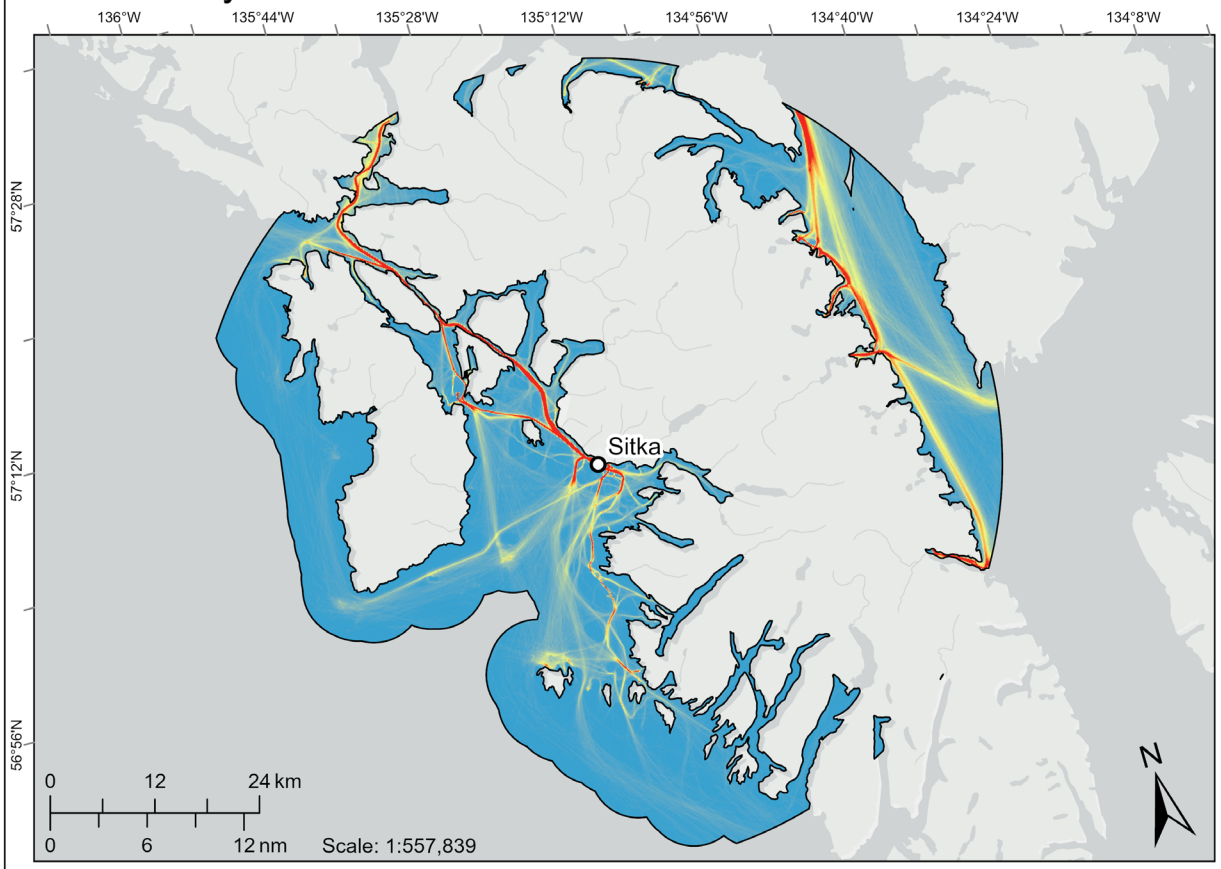
Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Juneau Study Area
135°12'W
134°56'W
134°40'W
134°24'W
58°32'N
134°8'W
133°52'W
133°36'W
58°32'N
58°16'N
Juneau
0
10
20 km
0
5
10 nm
Scale: 1:444,823
N
Automatic Identification System Monthly Average for Pleasure Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 285
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Sitka Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Pleasure Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

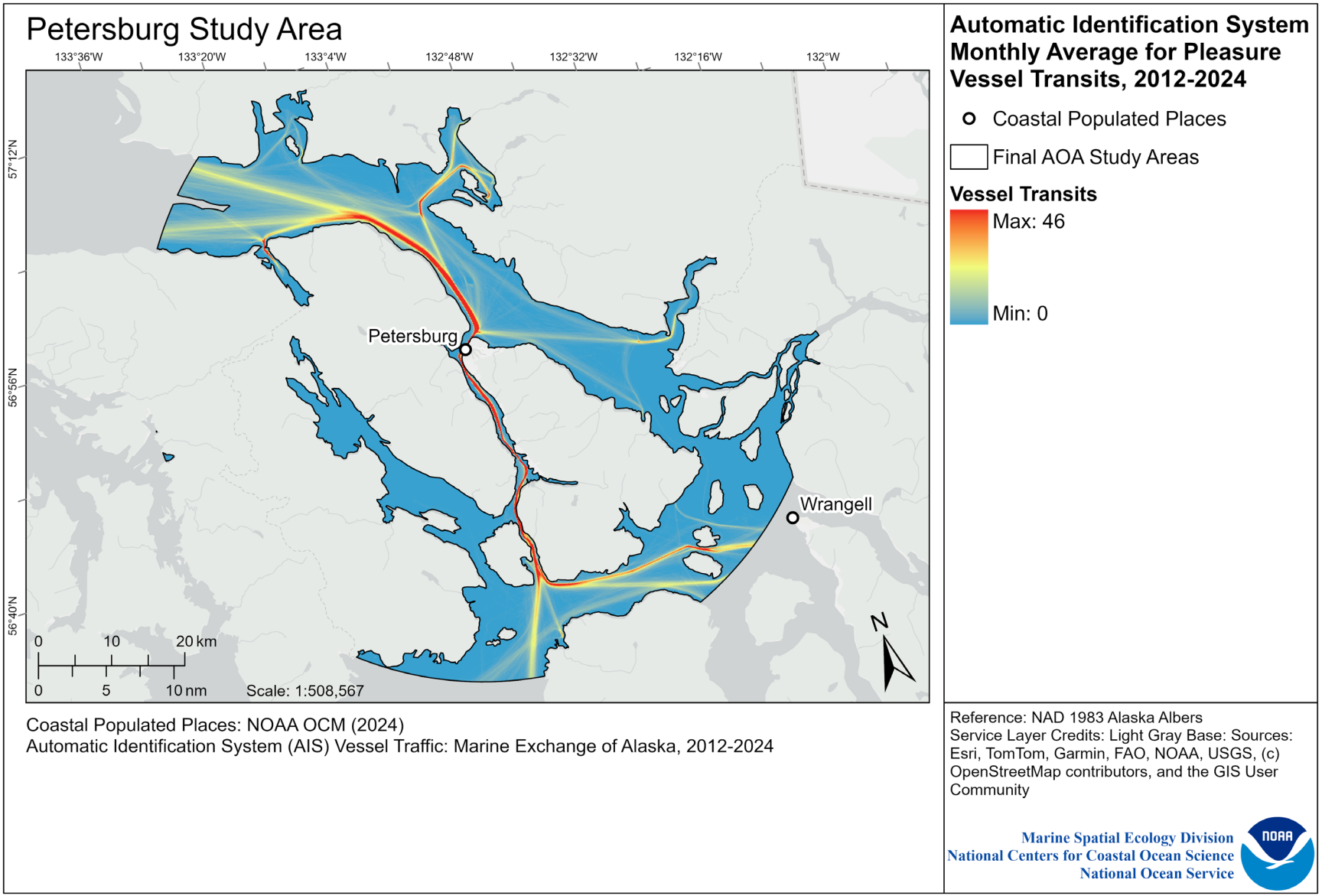
Vessel Transits

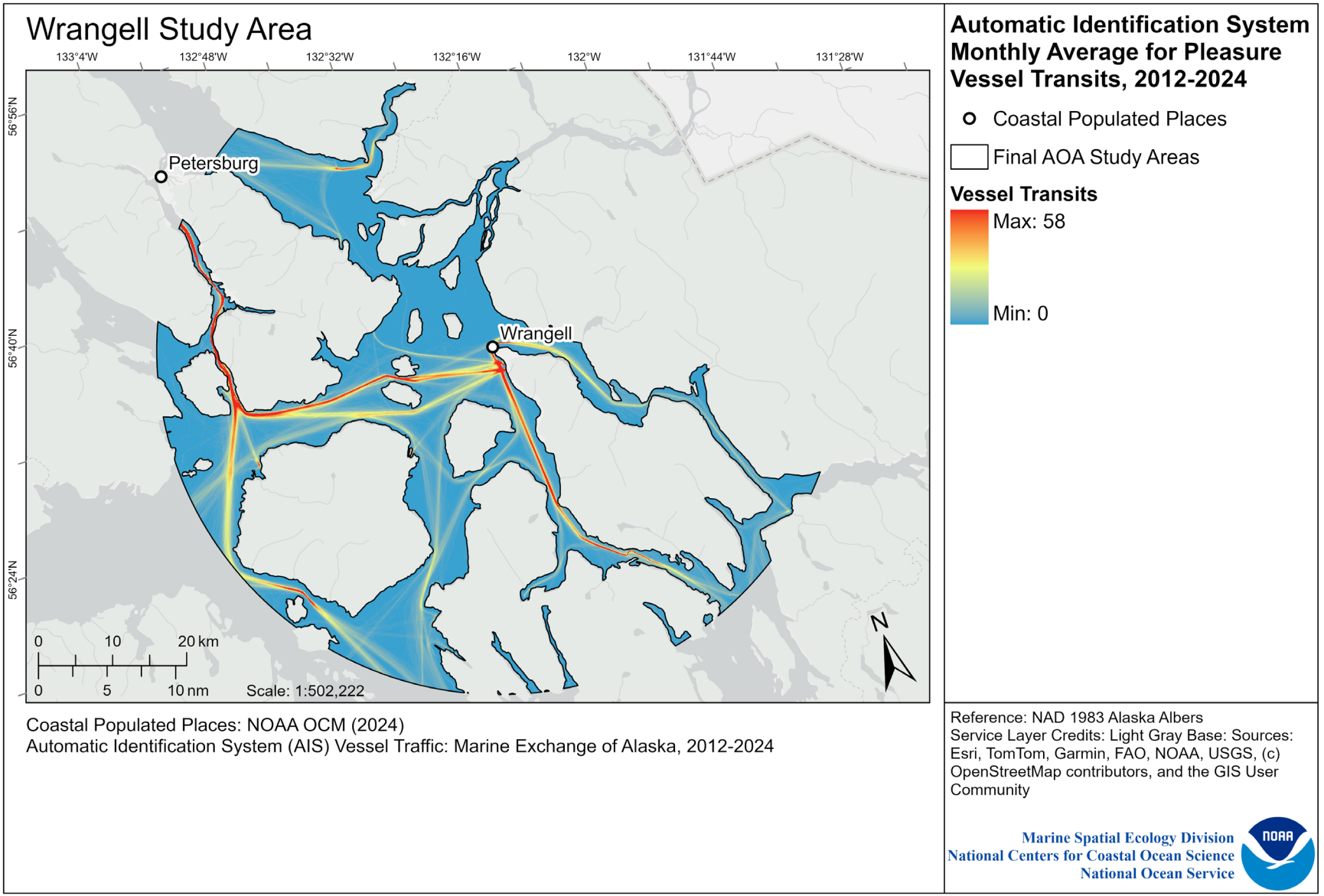
Max: 46

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

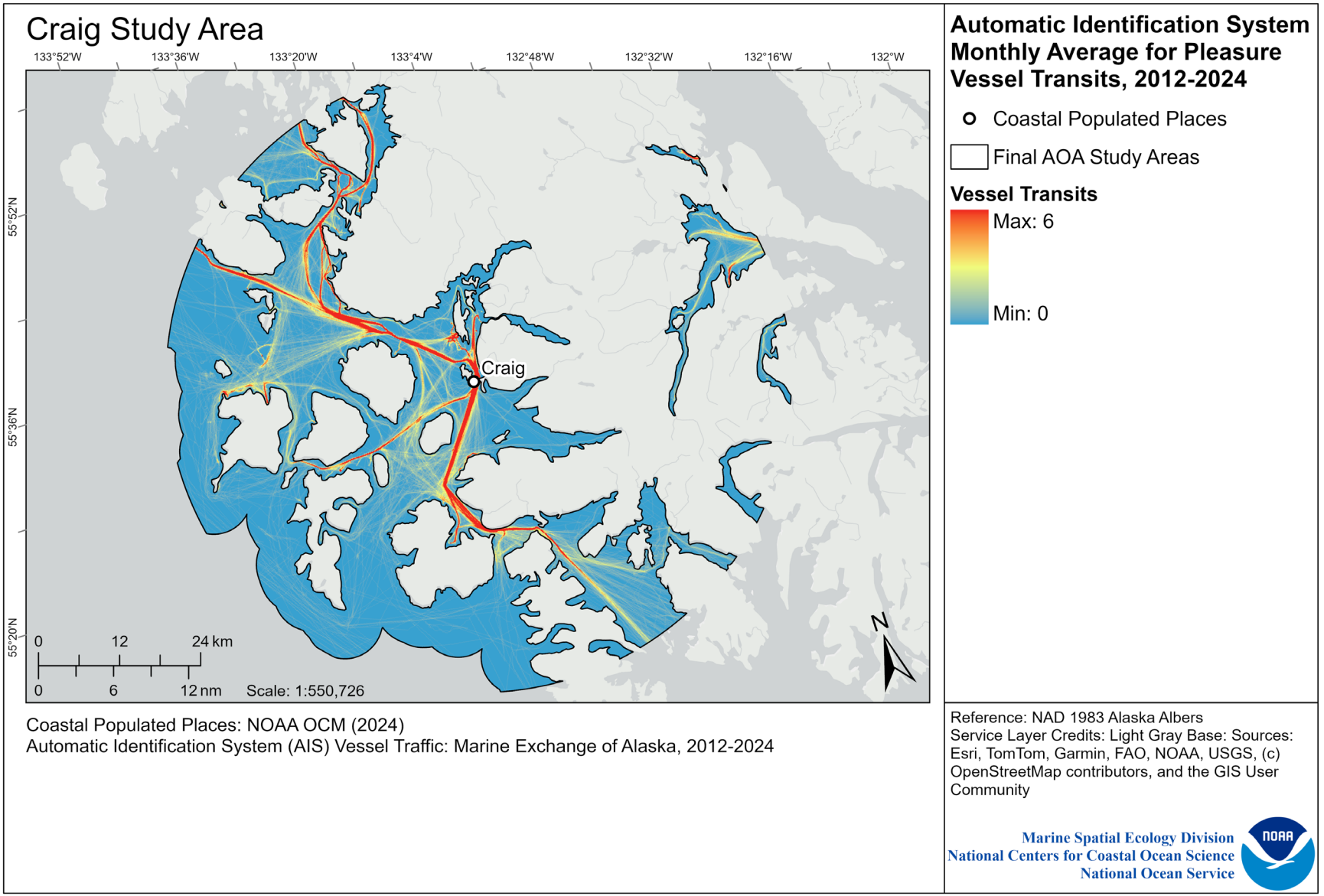

Petersburg Study Area
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
57°12'N
56°56'N
56°40'N
Petersburg
Wrangell
0
10
20 km
0
5
10 nm
Scale: 1:508,567
N
Automatic Identification System Monthly Average for Pleasure Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 46
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

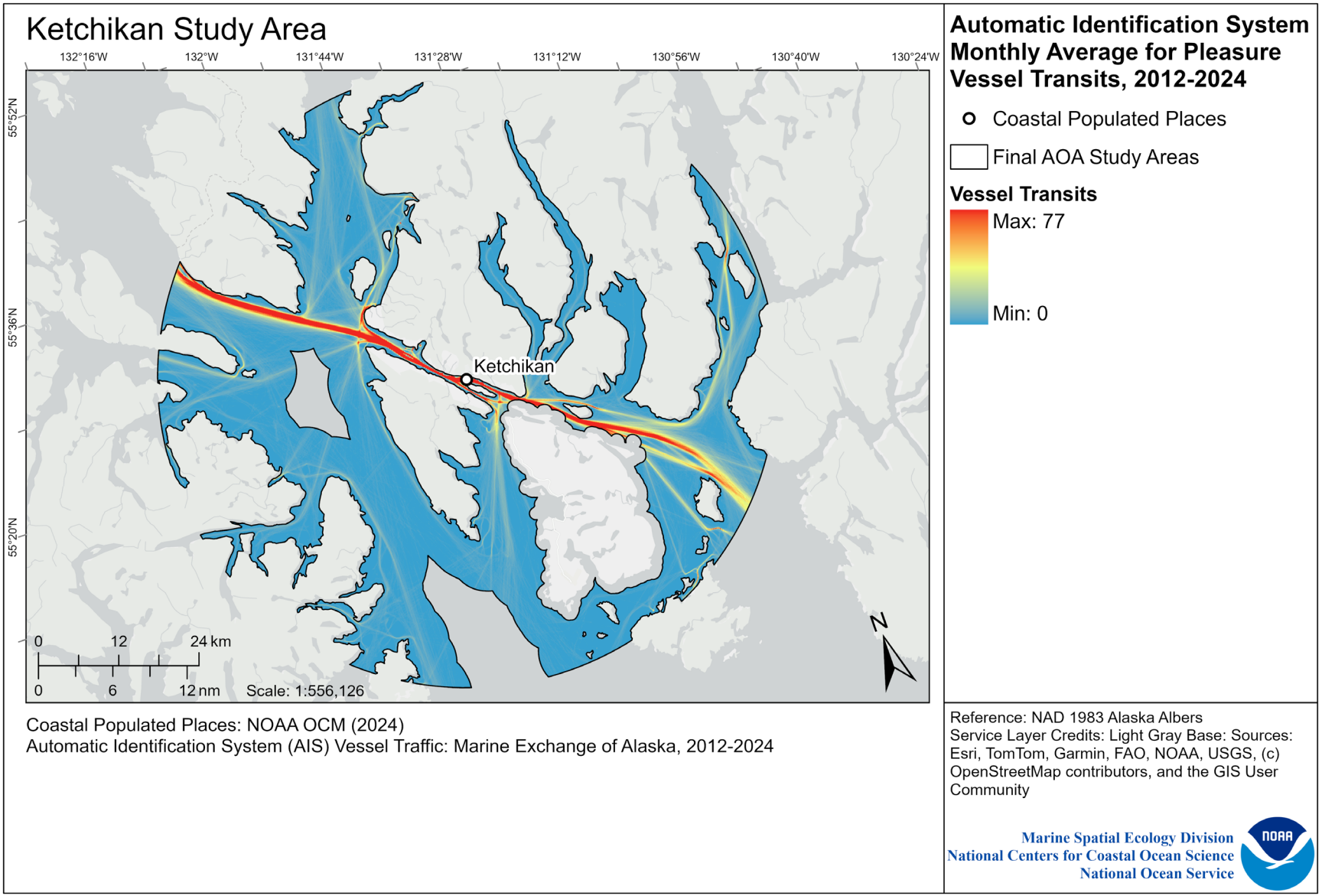
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

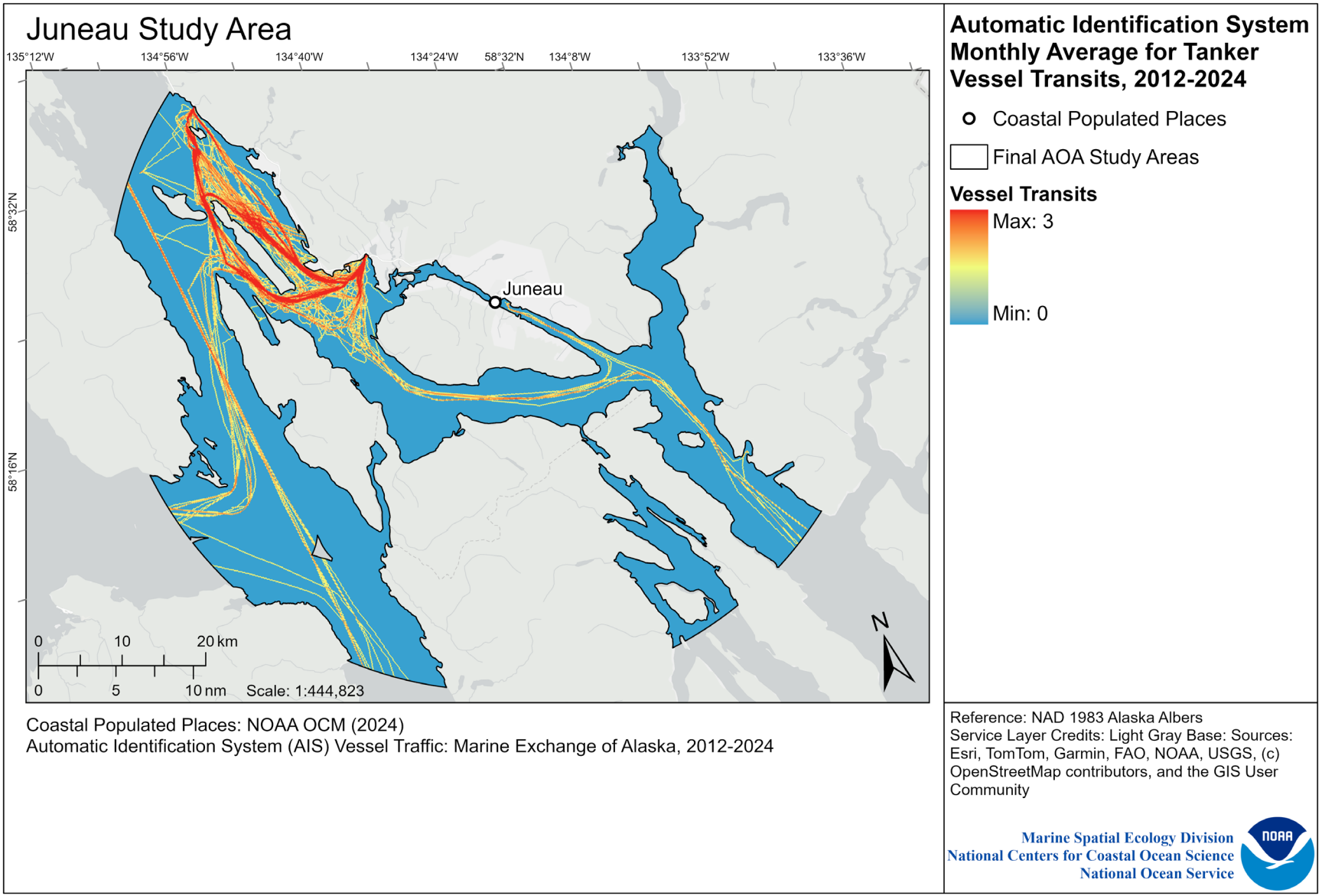
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

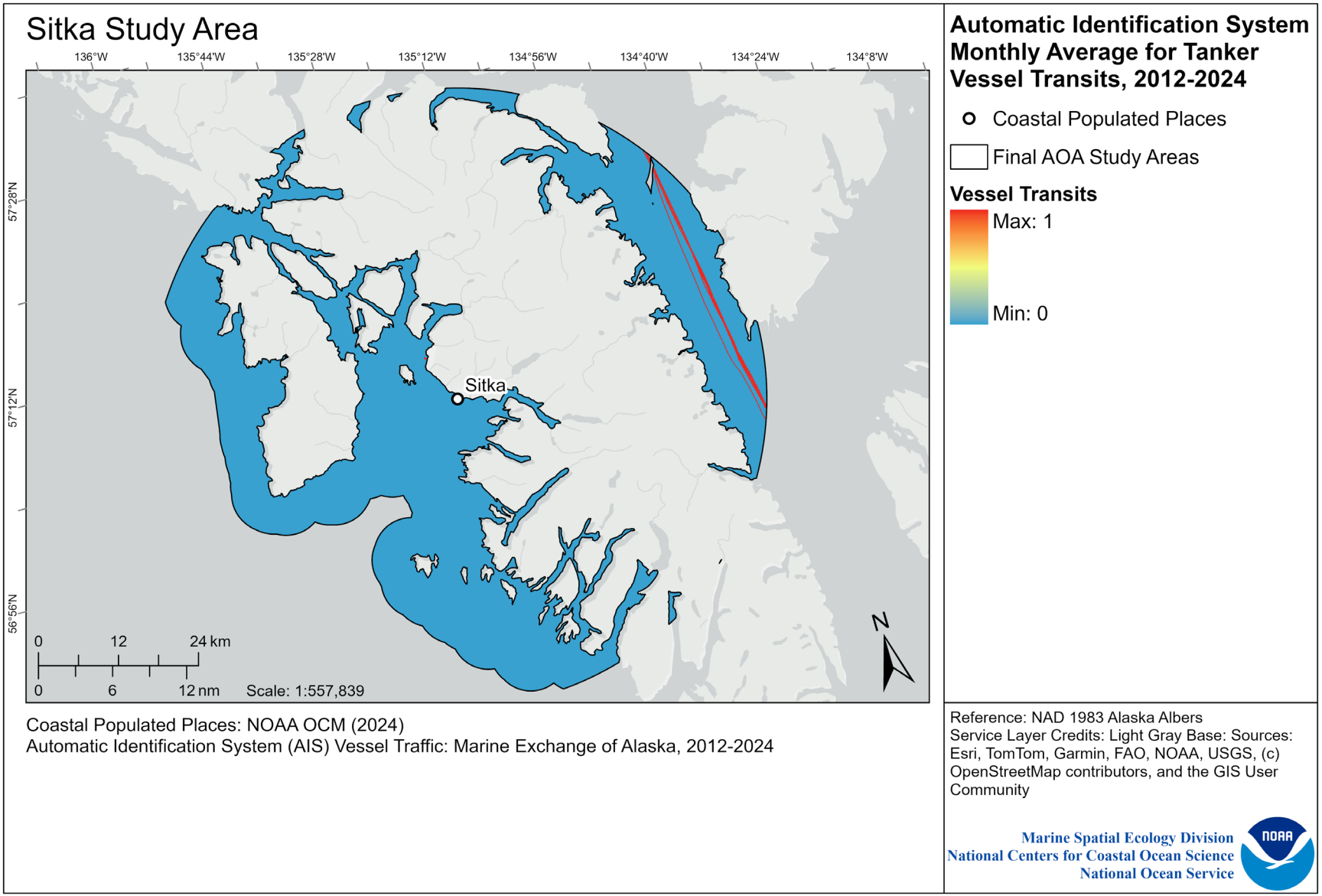


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Juneau Study Area
135°12'W
134°56'W
134°40'W
134°24'W
58°32'N
134°8'W
133°52'W
133°36'W
58°32'N
58°16'N
Juneau
0
10
20 km
0
5
10 nm
Scale: 1:444,823
N
Automatic Identification System Monthly Average for Tanker Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 3
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

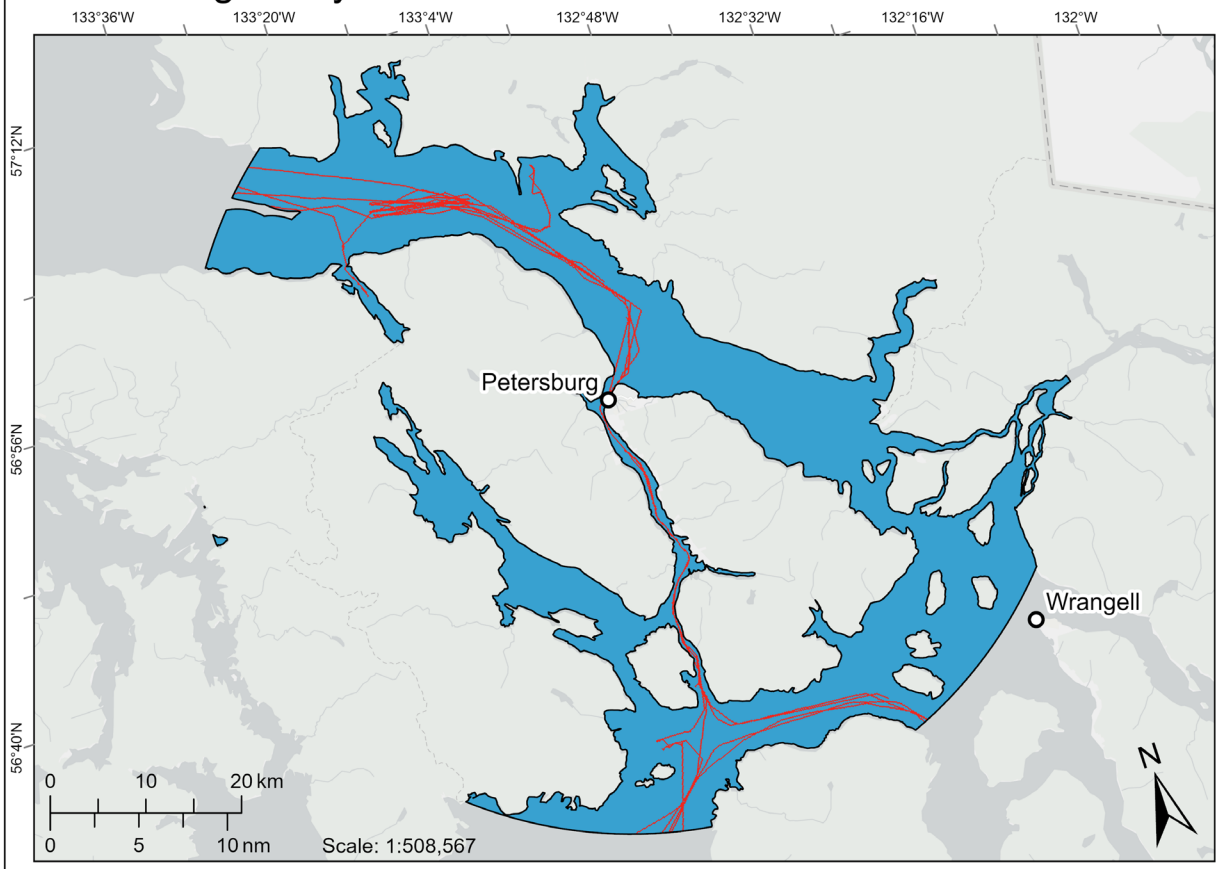


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Tanker Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

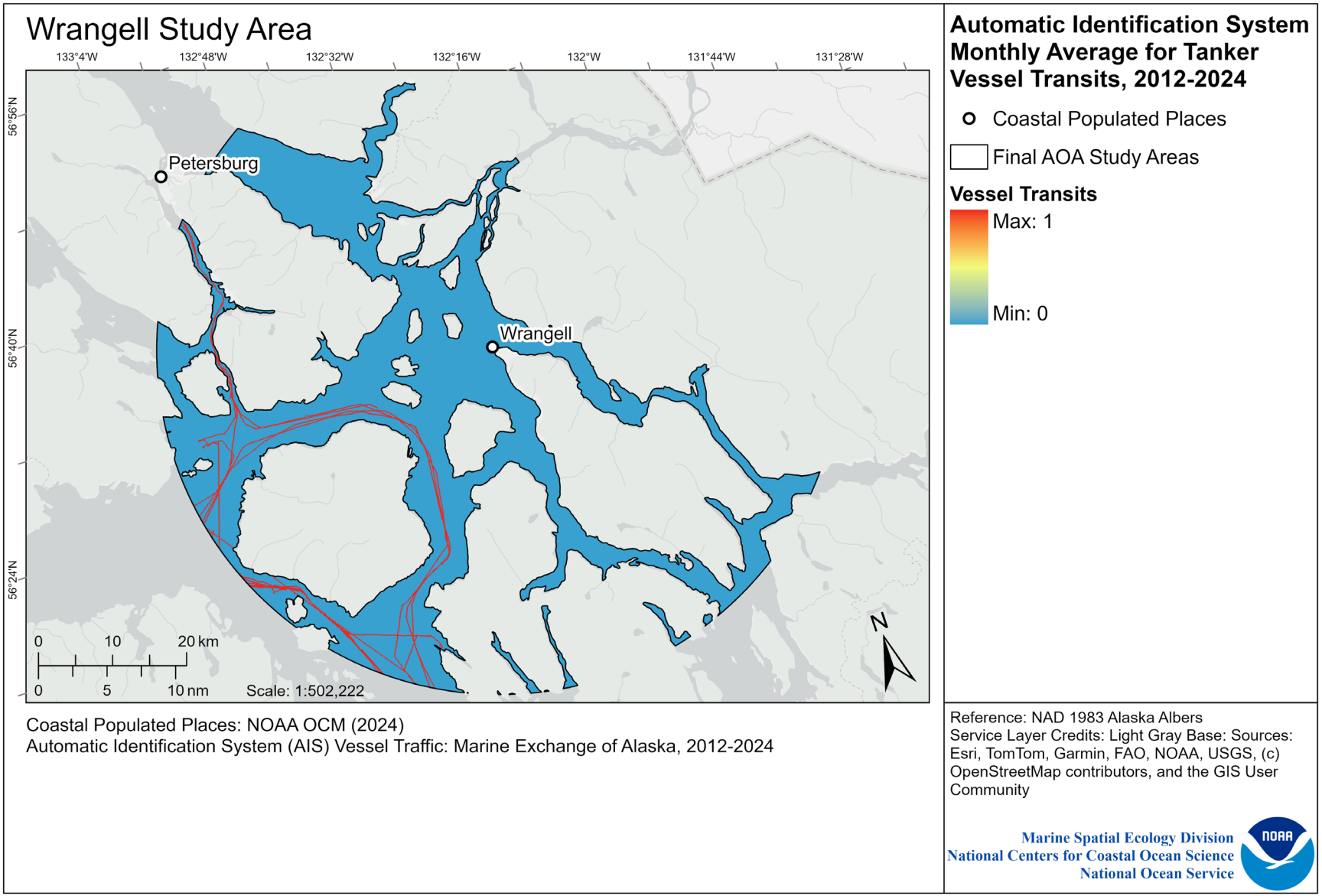
Vessel Transits

Max: 1

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

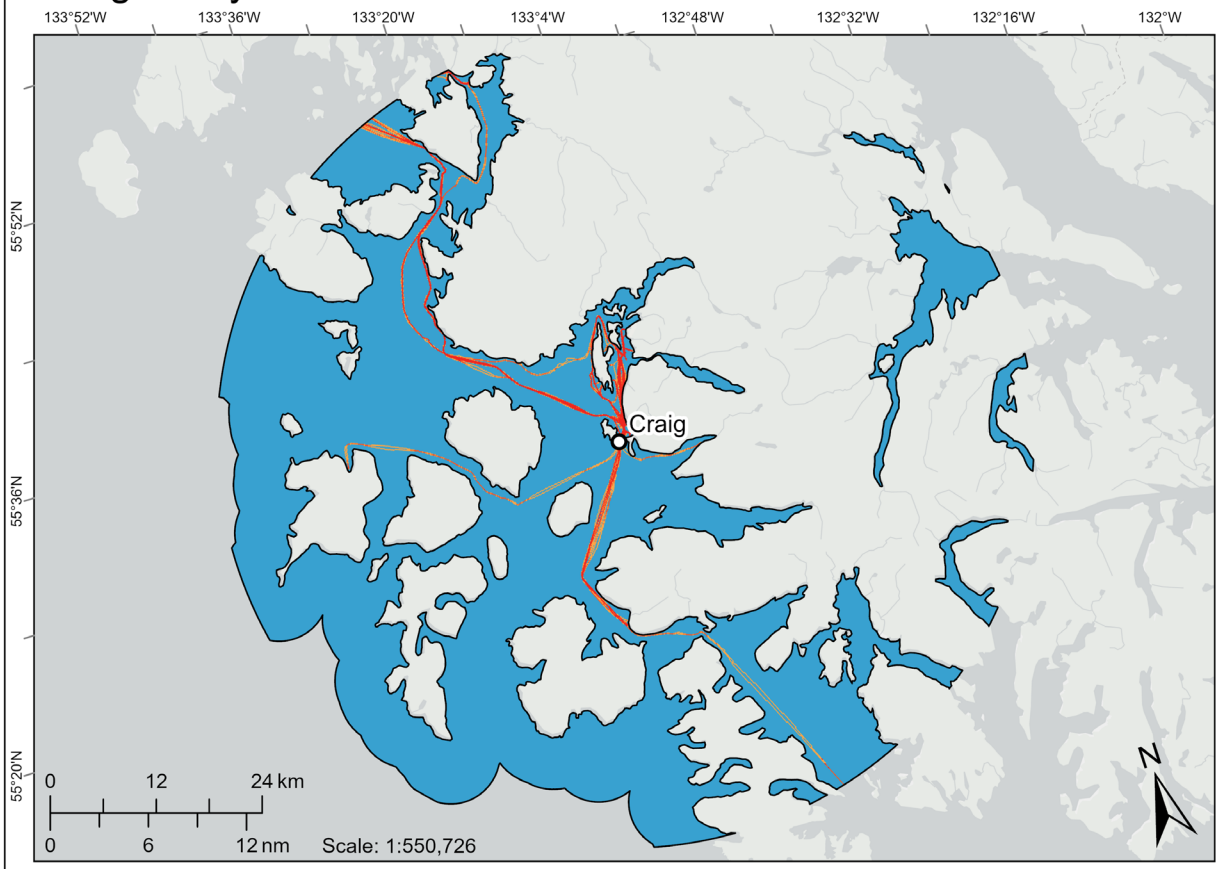


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Tanker Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

Vessel Transits

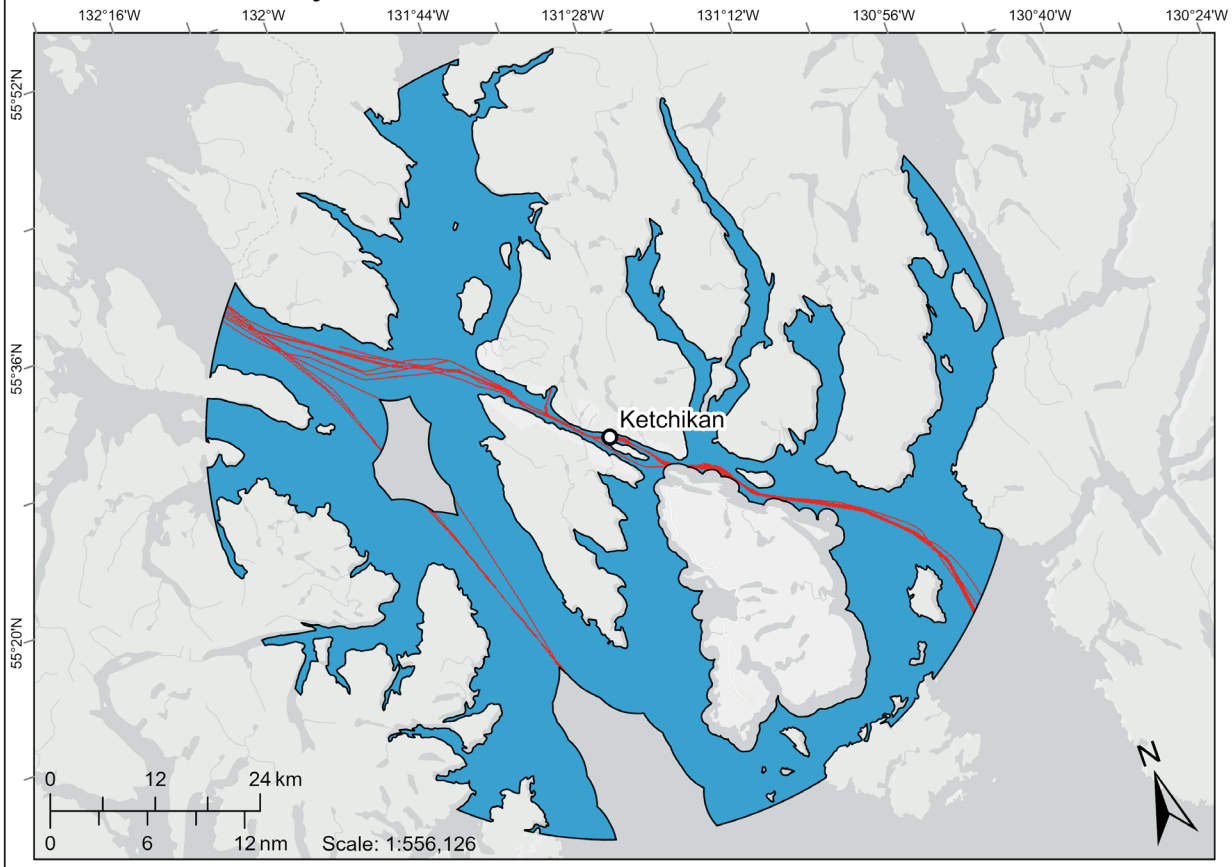
Max: 1

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Tanker Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

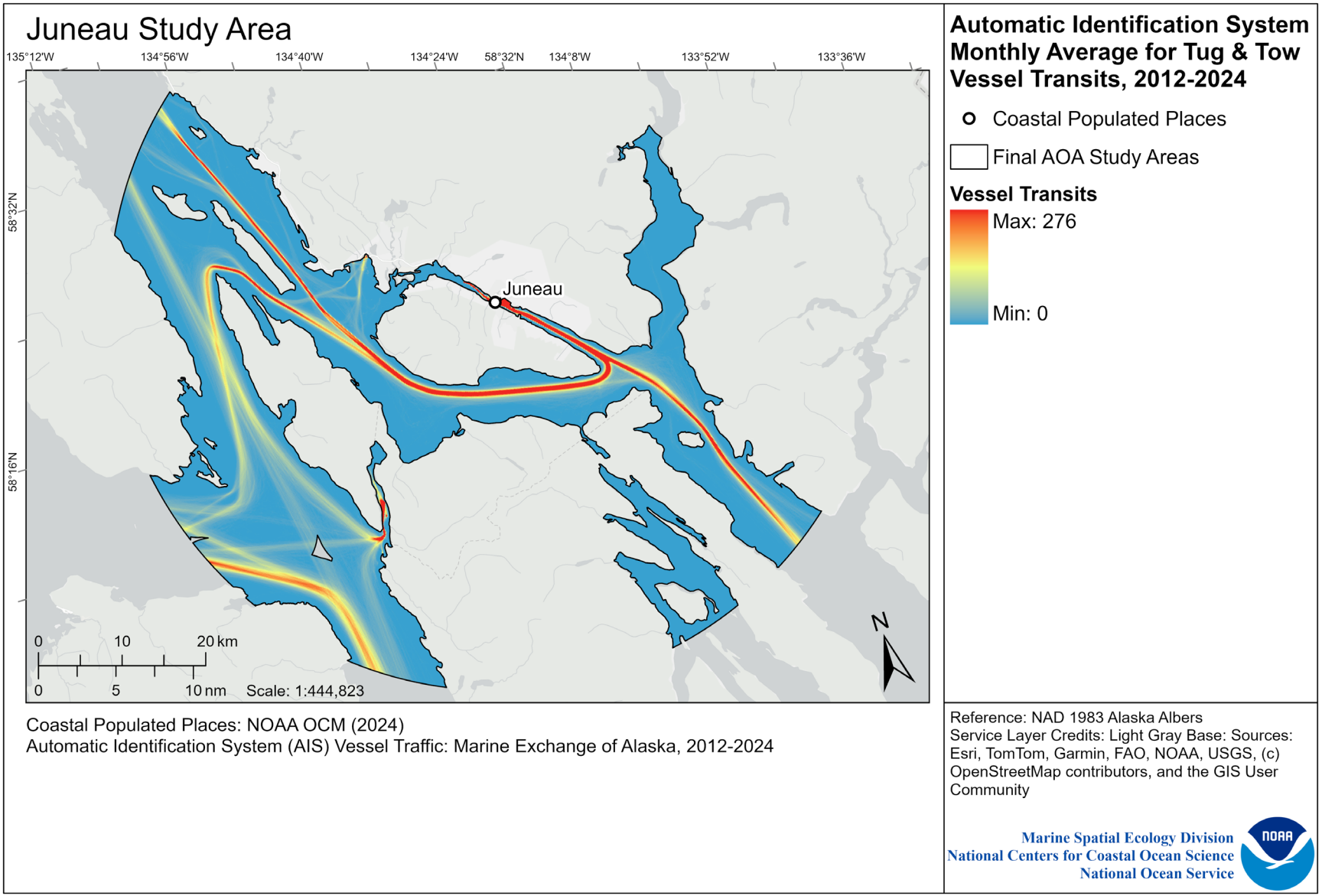
Vessel Transits

Max: 1

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

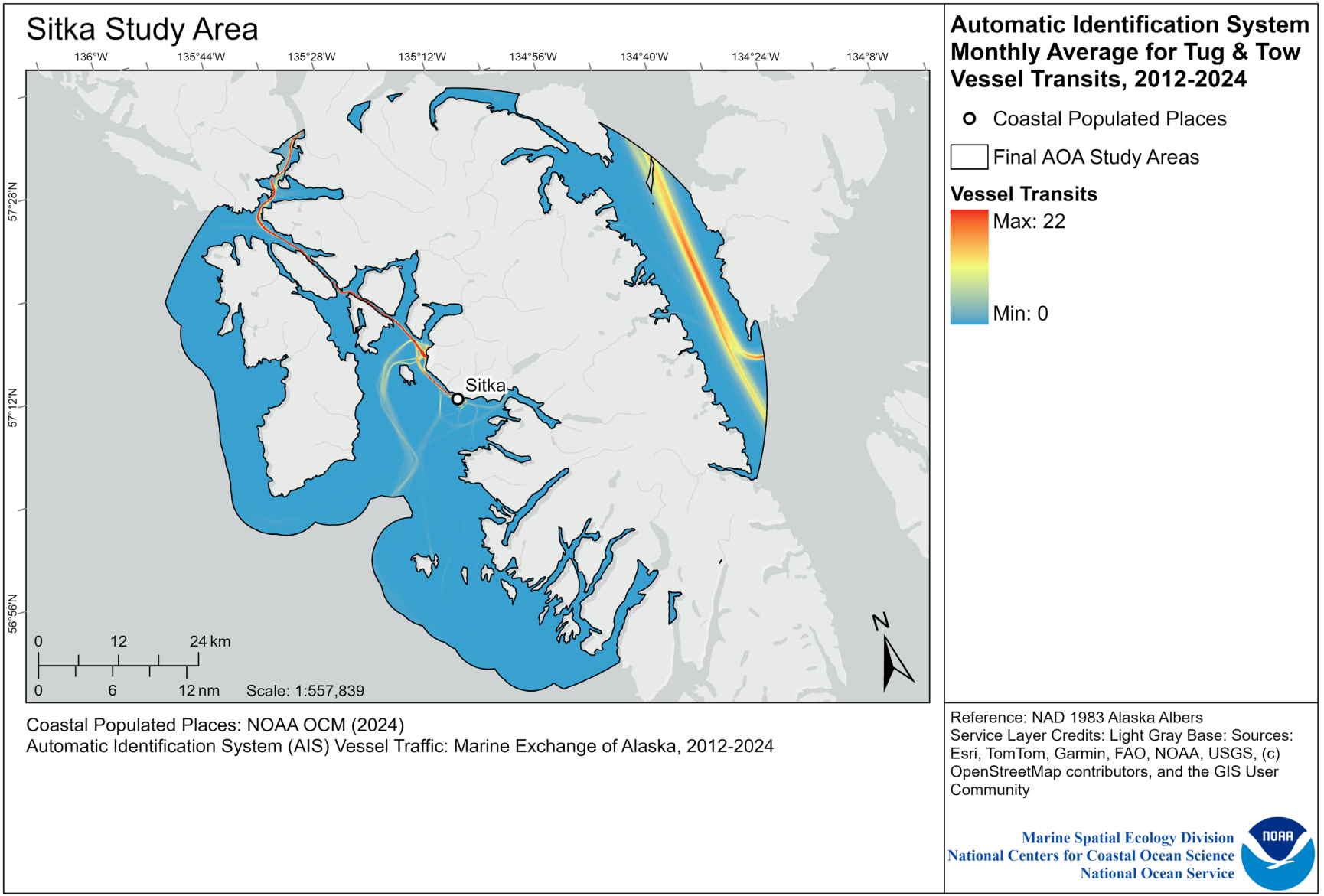
Marine Spatial Ecology Division
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Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

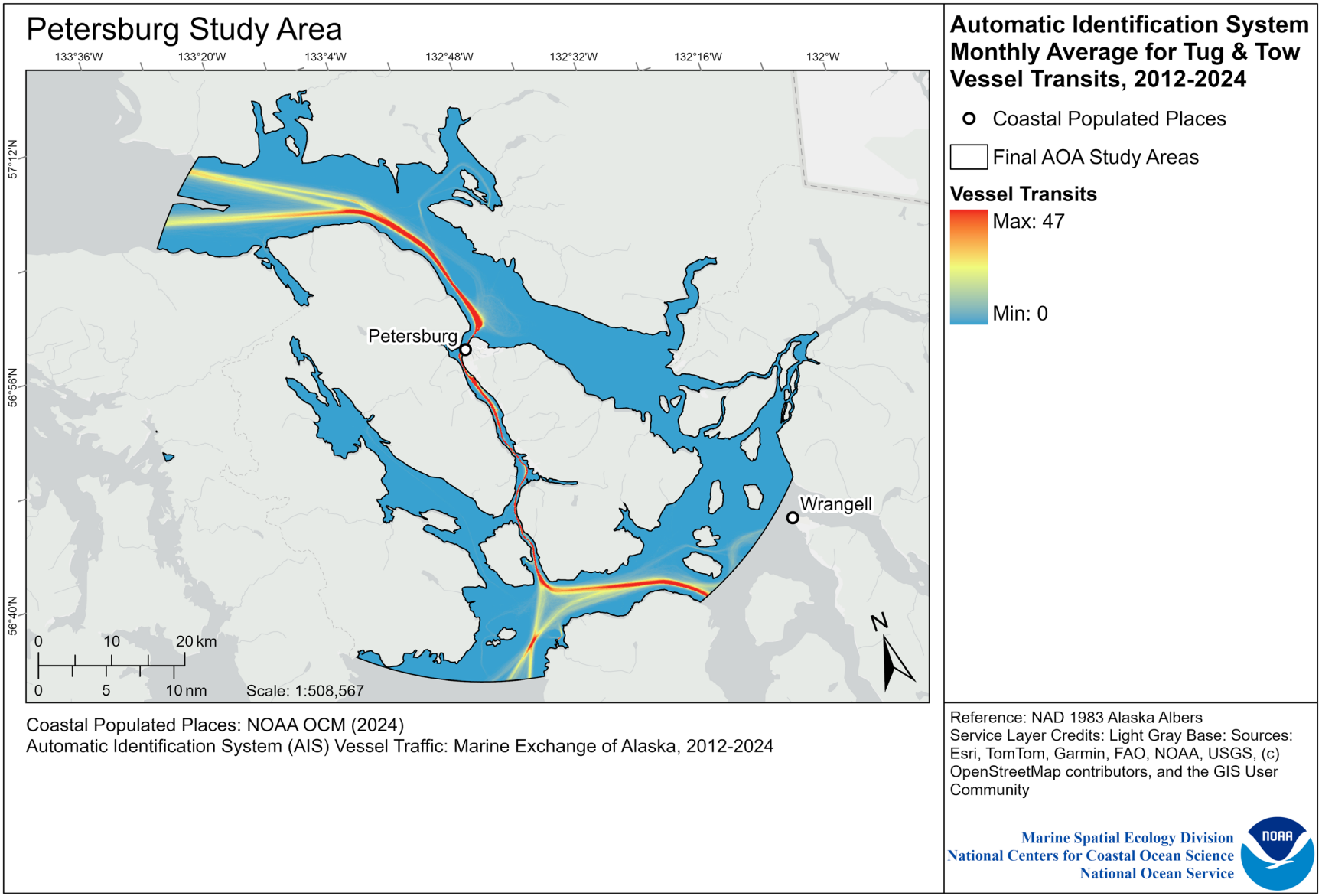
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

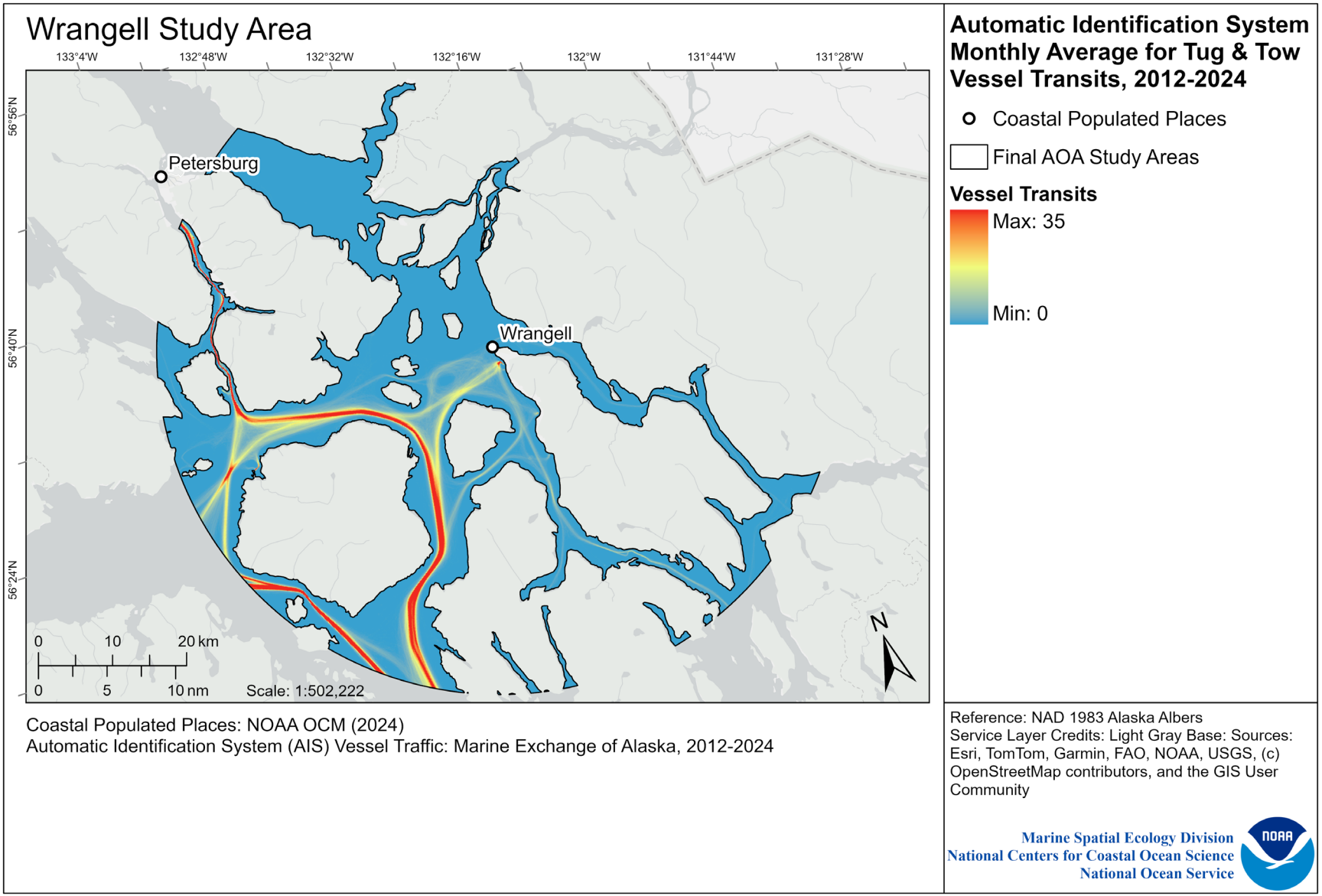


Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

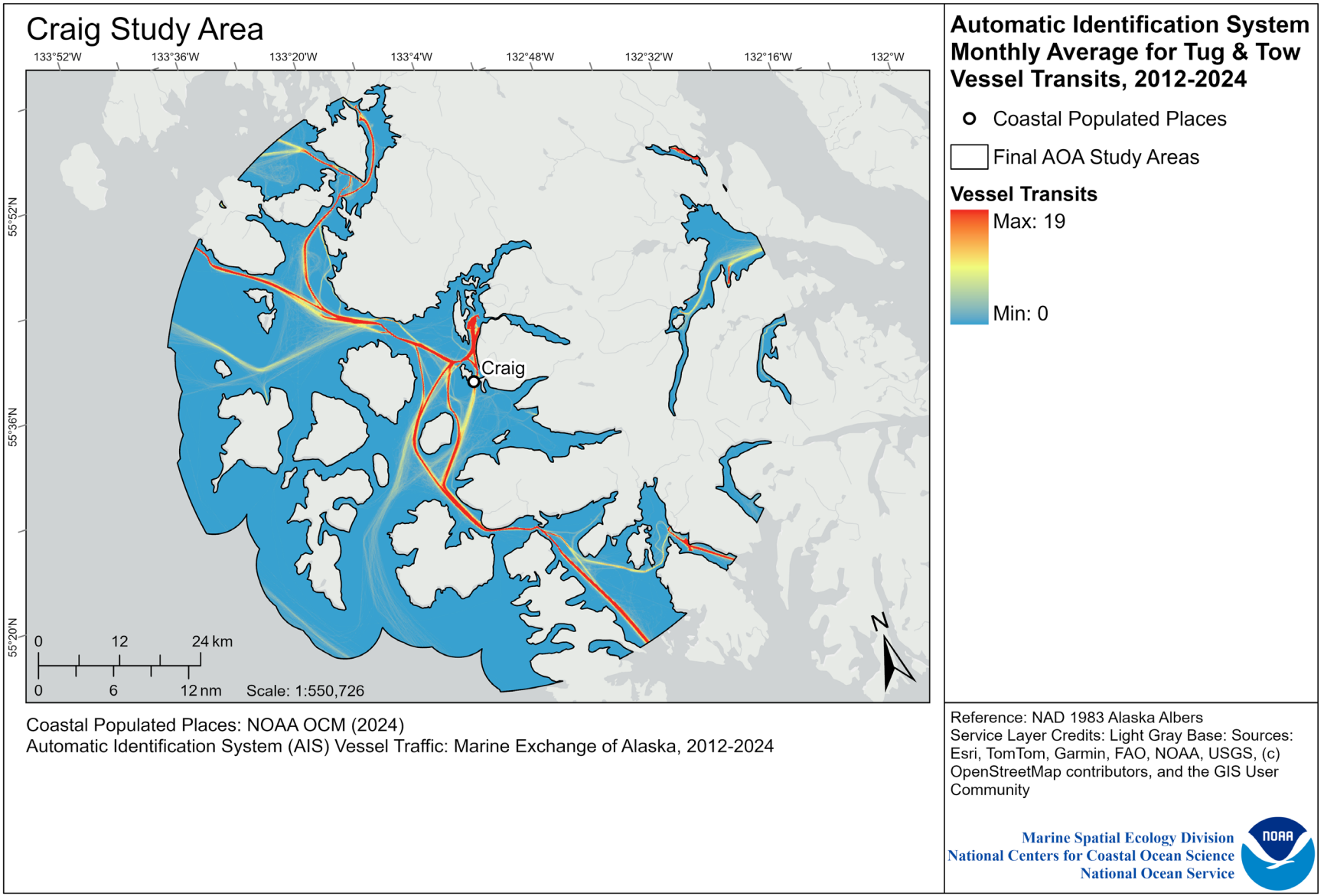

Petersburg Study Area
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
57°12'N
56°56'N
56°40'N
Petersburg
Wrangell
0
10
20 km
0
5
10 nm
Scale: 1:508,567
N
Automatic Identification System Monthly Average for Tug & Tow Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 47
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA



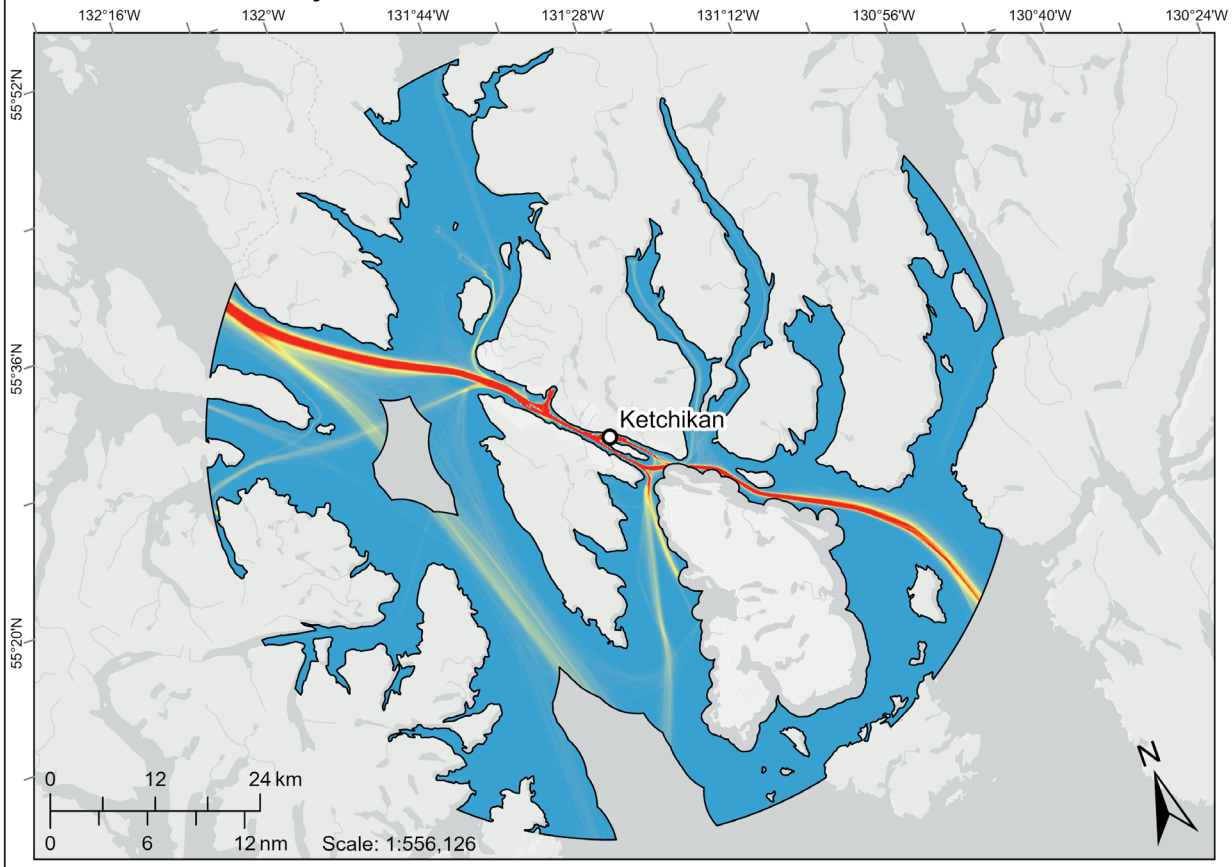
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Craig Study Area
133°52'W
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
55°52'N
55°36'N
55°20'N
Craig
0
12
24 km
0
6
12 nm
Scale: 1:550,726
N
Automatic Identification System Monthly Average for Tug & Tow Vessel Transits, 2012-2024
Coastal Populated Places
Final AOA Study Areas
Vessel Transits
Max: 19
Min: 0
Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)
Automatic Identification System (AIS) Vessel Traffic: Marine Exchange of Alaska, 2012-2024

Automatic Identification System Monthly Average for Tug & Tow Vessel Transits, 2012-2024

- Coastal Populated Places
- Final AOA Study Areas

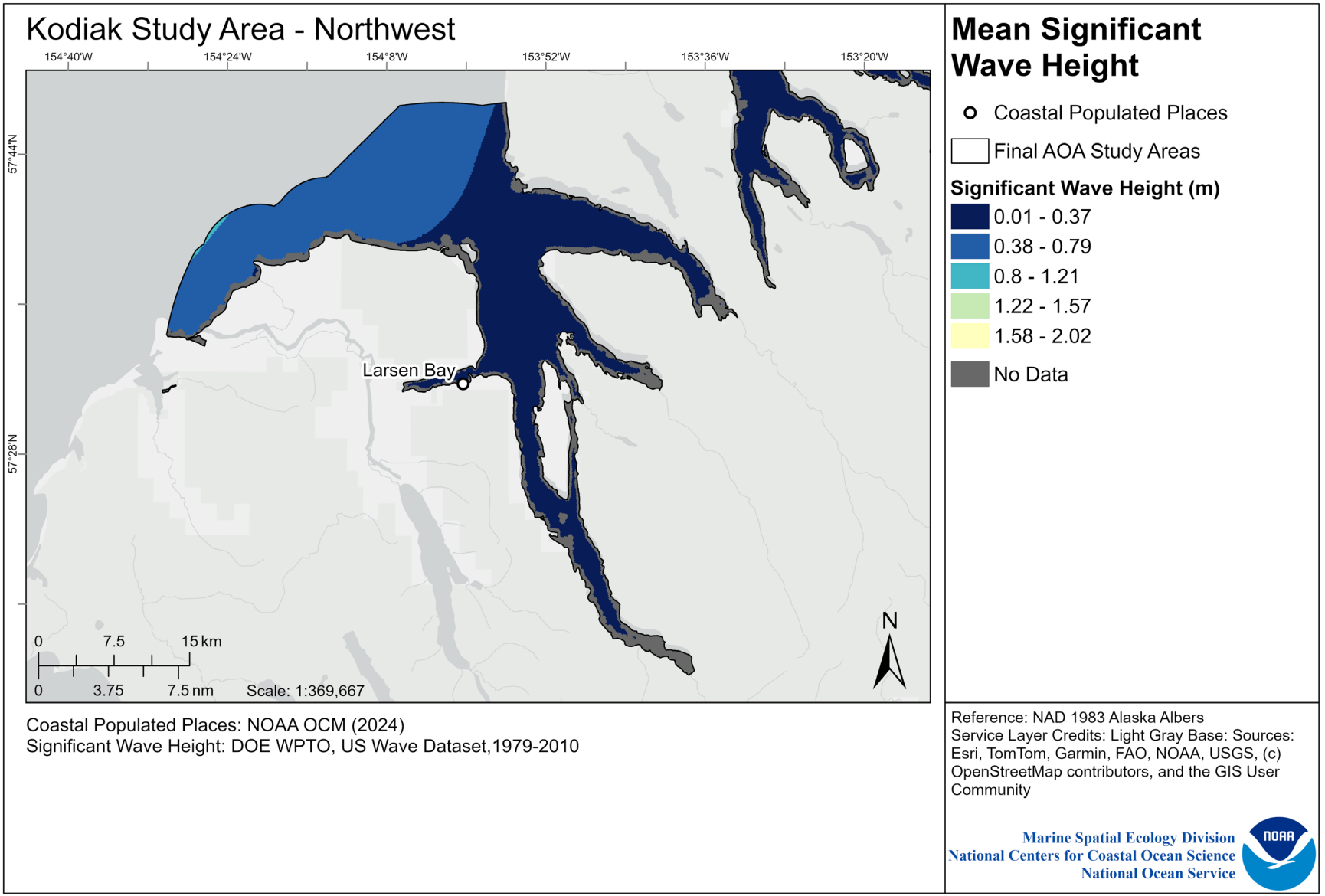
Vessel Transits

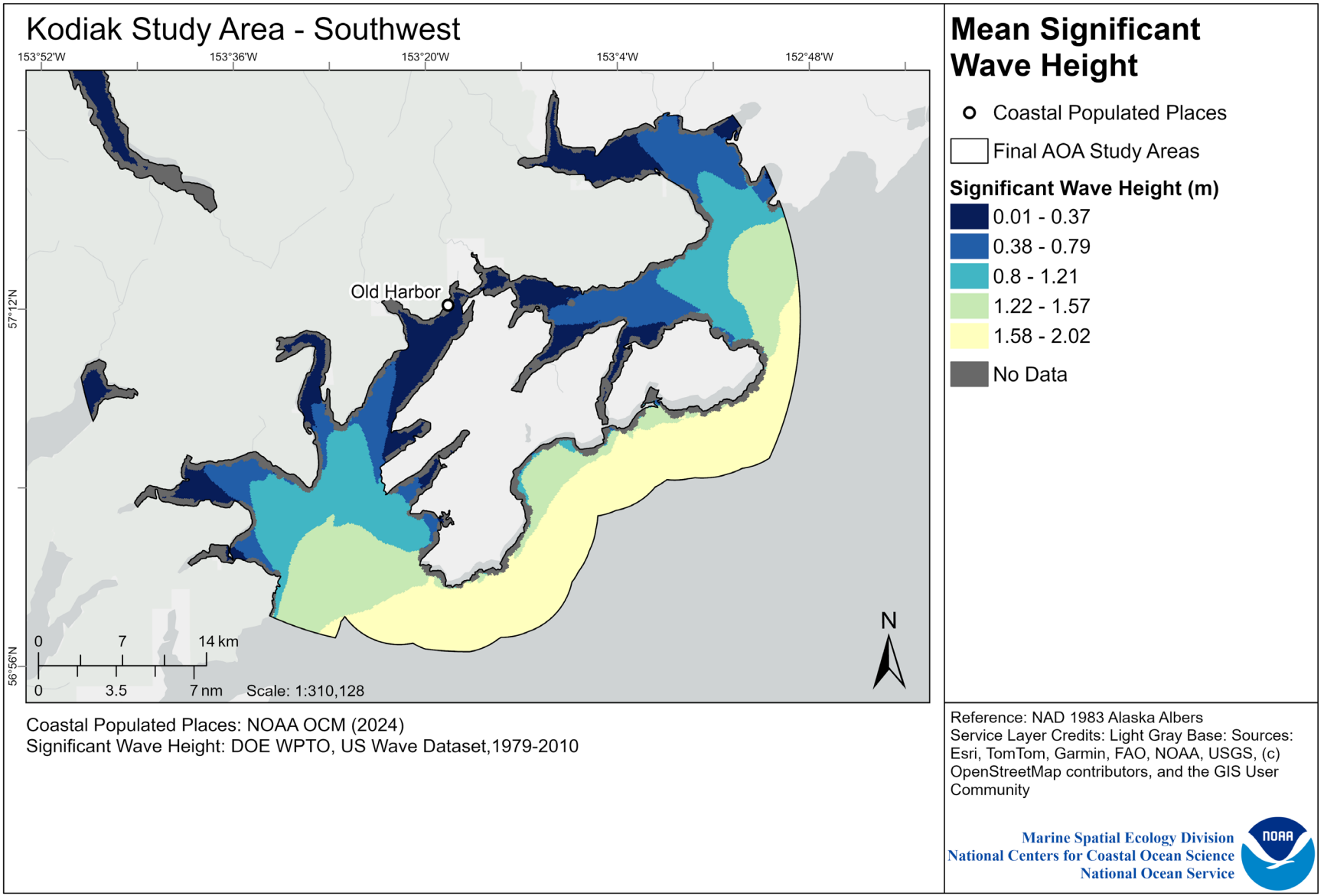
Max: 119

Min: 0

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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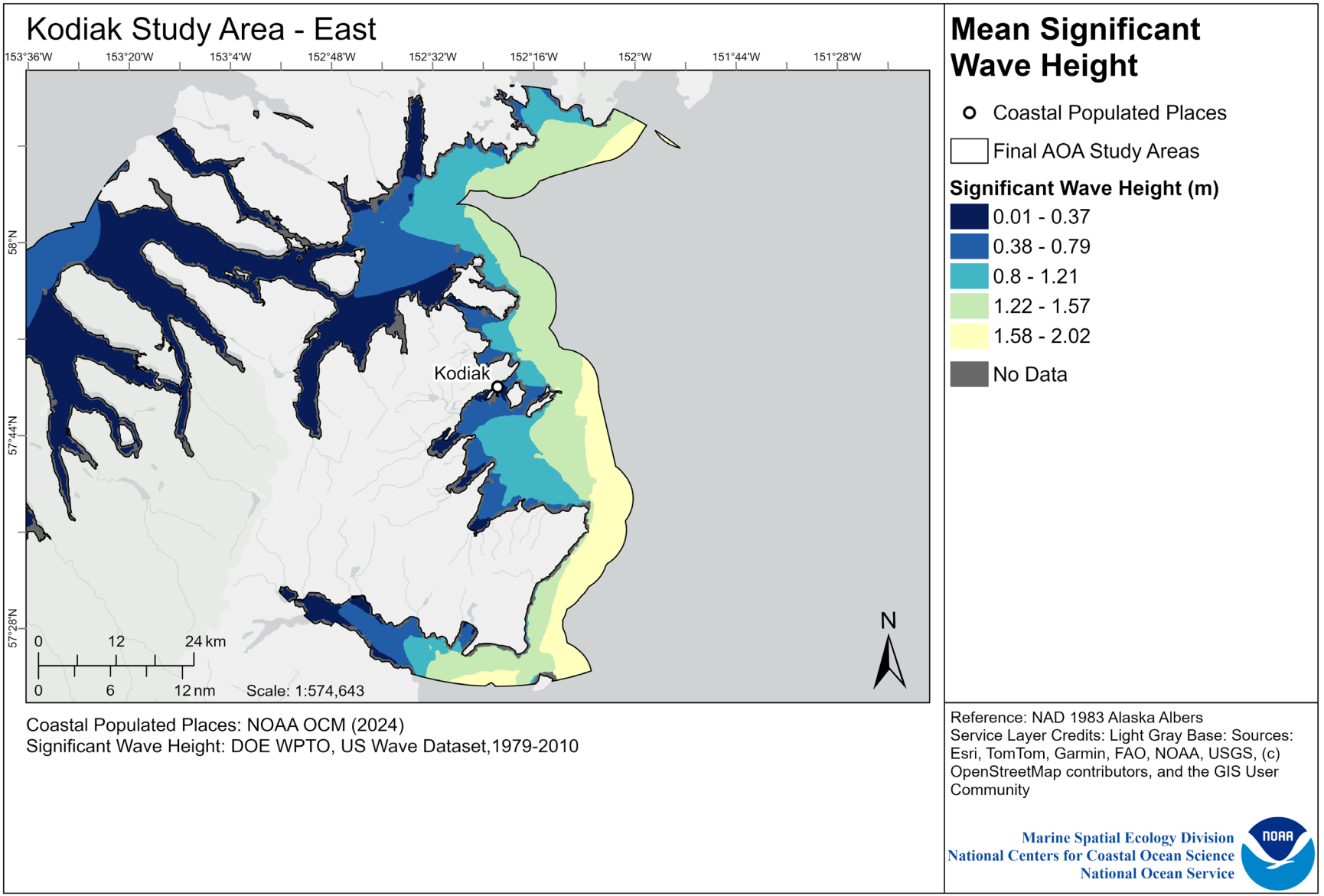

Kodiak Study Area - Northwest
154°40'W
154°24'W
154°8'W
153°52'W
153°36'W
153°20'W
57°44'N
57°28'N
Larsen Bay
0
7.5
15 km
0
3.75
7.5 nm
Scale: 1:369,667
N
Mean Significant Wave Height
Coastal Populated Places
Final AOA Study Areas
Significant Wave Height (m)
0.01 - 0.37
0.38 - 0.79
0.8 - 1.21
1.22 - 1.57
1.58 - 2.02
No Data
Coastal Populated Places: NOAA OCM (2024)
Significant Wave Height: DOE WPTO, US Wave Dataset,1979-2010
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA



Coastal Populated Places: NOAA OCM (2024)
Significant Wave Height: DOE WPTO, US Wave Dataset,1979-2010

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

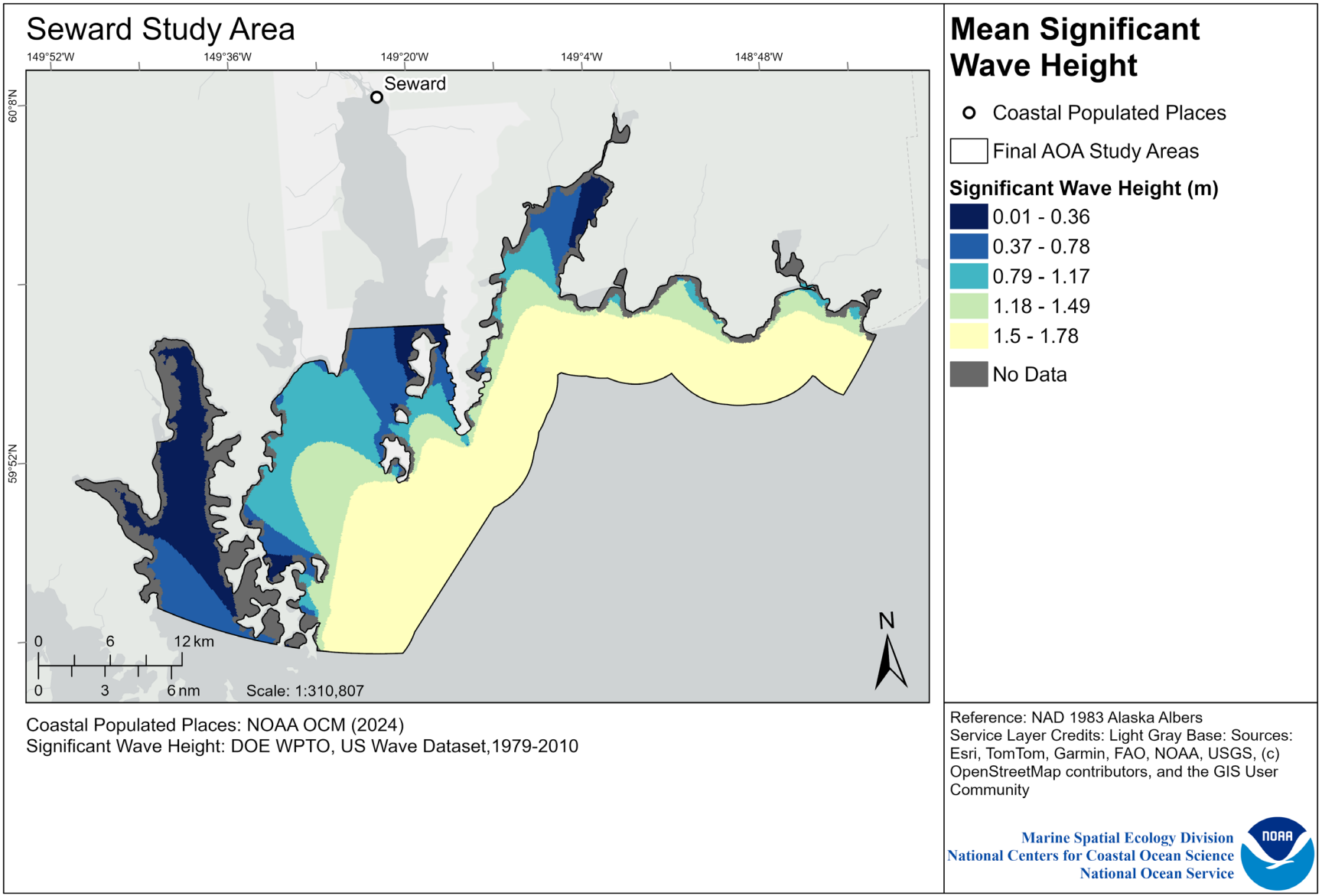
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National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Significant Wave Height: DOE WPTO, US Wave Dataset,1979-2010

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

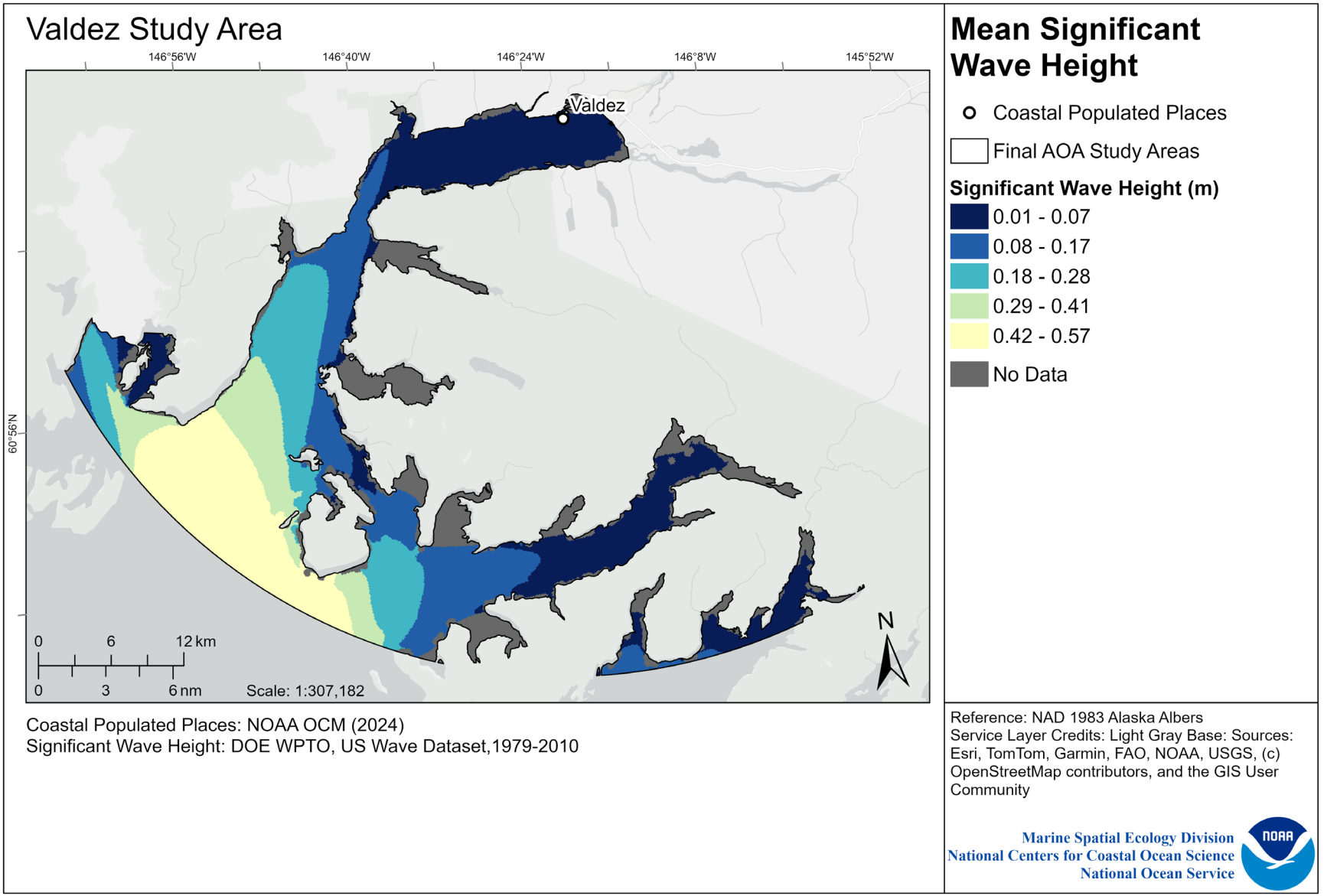
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Significant Wave Height: DOE WPTO, US Wave Dataset,1979-2010

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

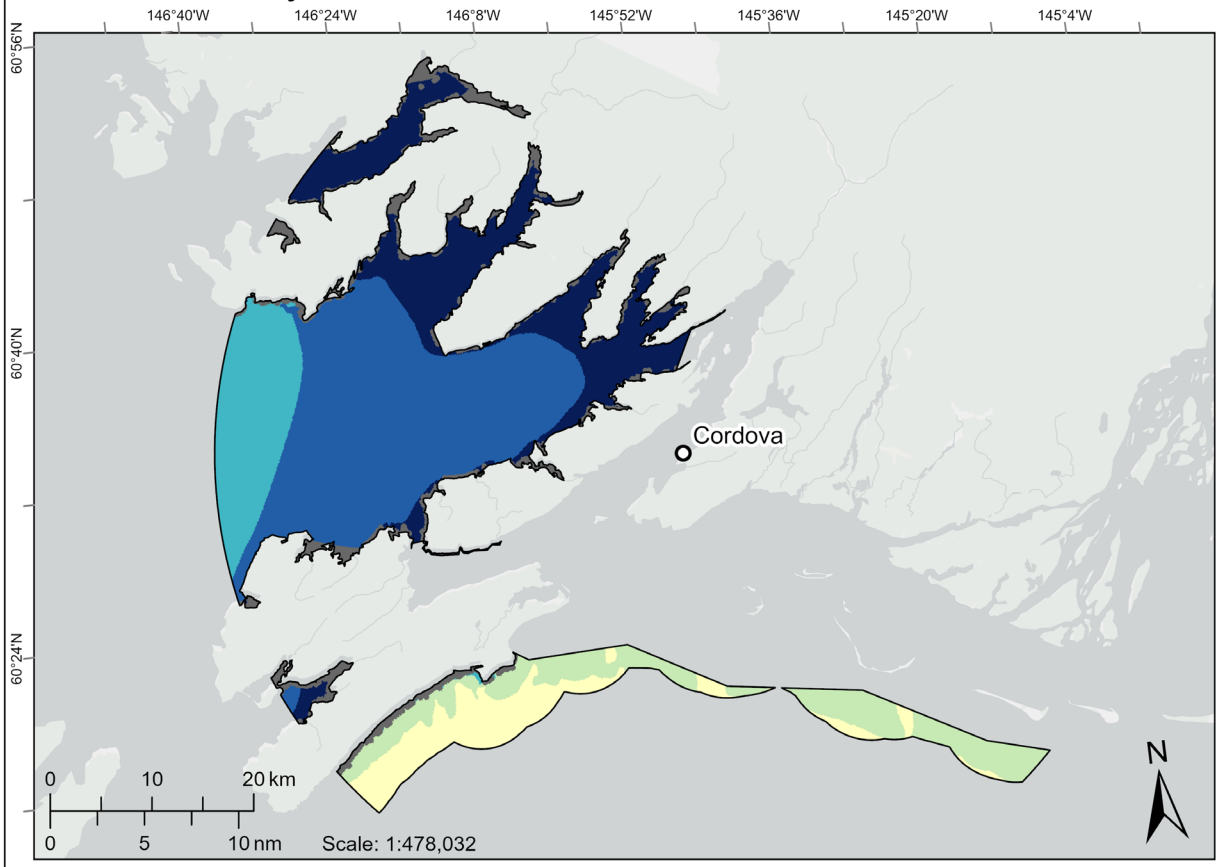


Coastal Populated Places: NOAA OCM (2024)
Significant Wave Height: DOE WPTO, US Wave Dataset,1979-2010

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)
Significant Wave Height: DOE WPTO, US Wave Dataset,1979-2010

Mean Significant Wave Height

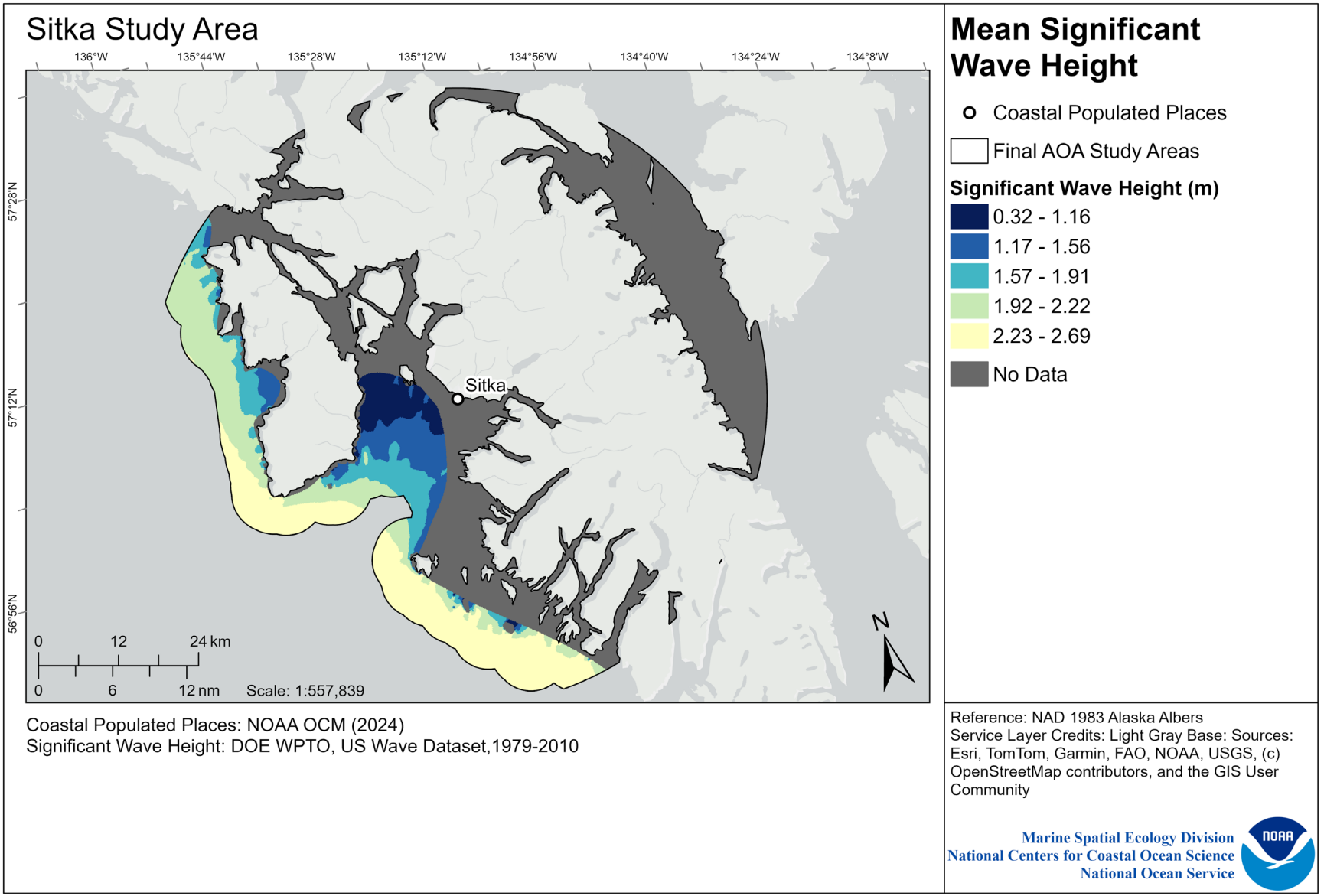
- Coastal Populated Places
- Final AOA Study Areas

Signigicant Wave Height (m)

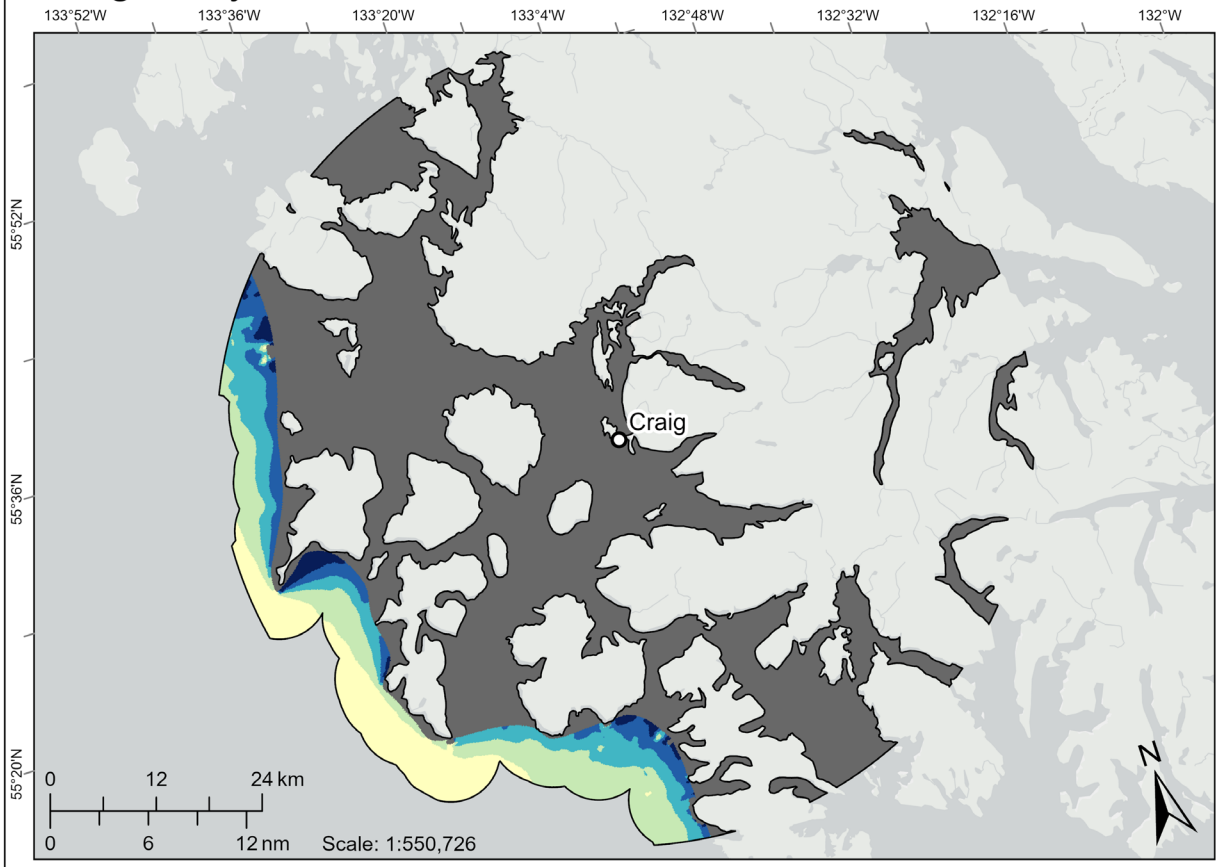
- 0.01 - 0.15
- 0.16 - 0.37
- 0.38 - 1.05
- 1.06 - 1.65
- 1.66 - 1.86
- No Data

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Sitka Study Area
136°W
135°44'W
135°28'W
135°12'W
134°56'W
134°40'W
134°24'W
134°8'W
57°28'N
57°12'N
56°56'N
Sitka
0
12
24 km
0
6
12 nm
Scale: 1:557,839
N
Mean Significant Wave Height
Coastal Populated Places
Final AOA Study Areas
Significant Wave Height (m)
0.32 - 1.16
1.17 - 1.56
1.57 - 1.91
1.92 - 2.22
2.23 - 2.69
No Data
Coastal Populated Places: NOAA OCM (2024)
Significant Wave Height: DOE WPTO, US Wave Dataset,1979-2010
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)
Significant Wave Height: DOE WPTO, US Wave Dataset,1979-2010

Mean Significant Wave Height

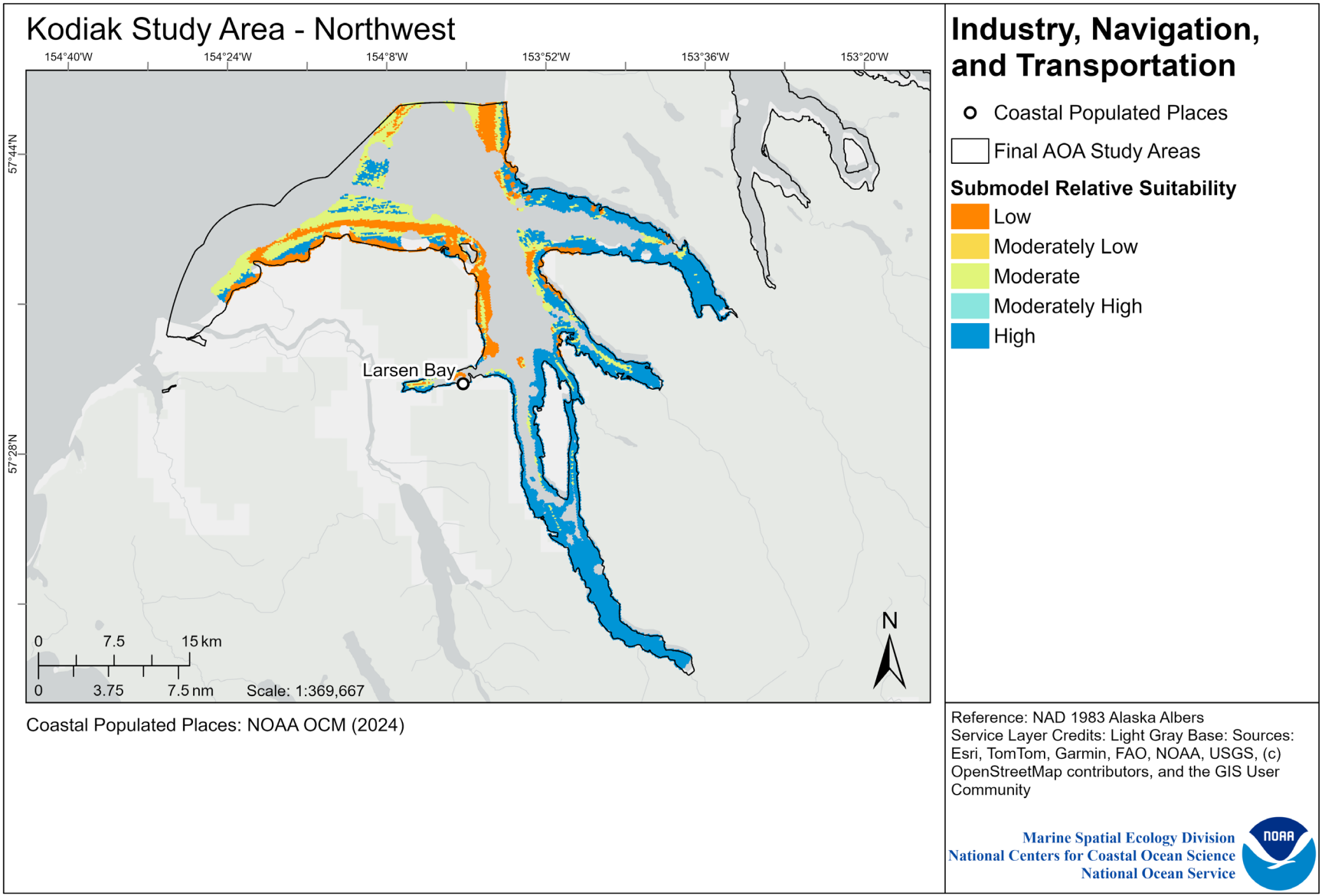
- Coastal Populated Places
- Final AOA Study Areas

Significant Wave Height (m)

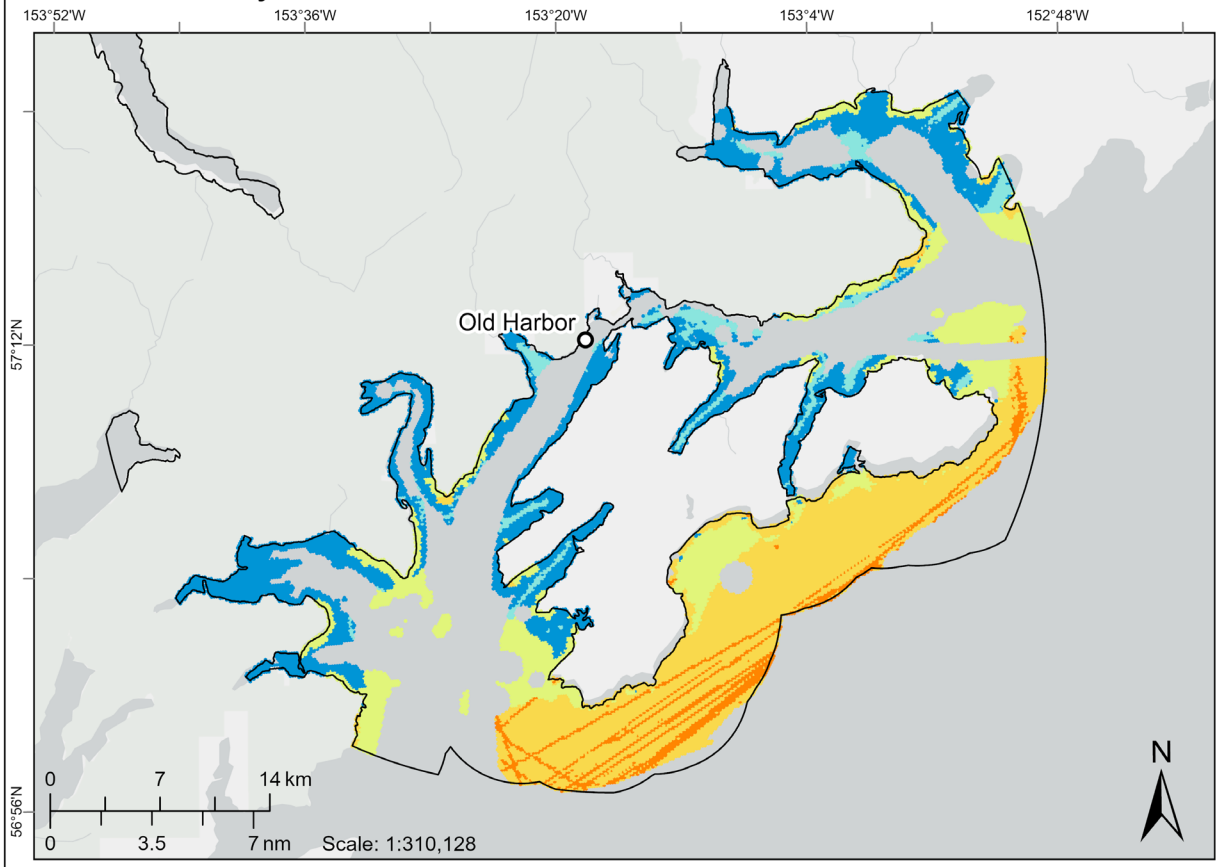
- 1.06 - 1.83
- 1.84 - 2.04
- 2.05 - 2.2
- 2.21 - 2.36
- 2.37 - 2.59
- No Data

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Kodiak Study Area - Northwest
154°40'W
154°24'W
154°8'W
153°52'W
153°36'W
153°20'W
57°44'N
57°28'N
Larsen Bay
0
7.5
15 km
0
3.75
7.5 nm
Scale: 1:369,667
N
Industry, Navigation, and Transportation
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)

Industry, Navigation, and Transportation

- Coastal Populated Places
- Final AOA Study Areas

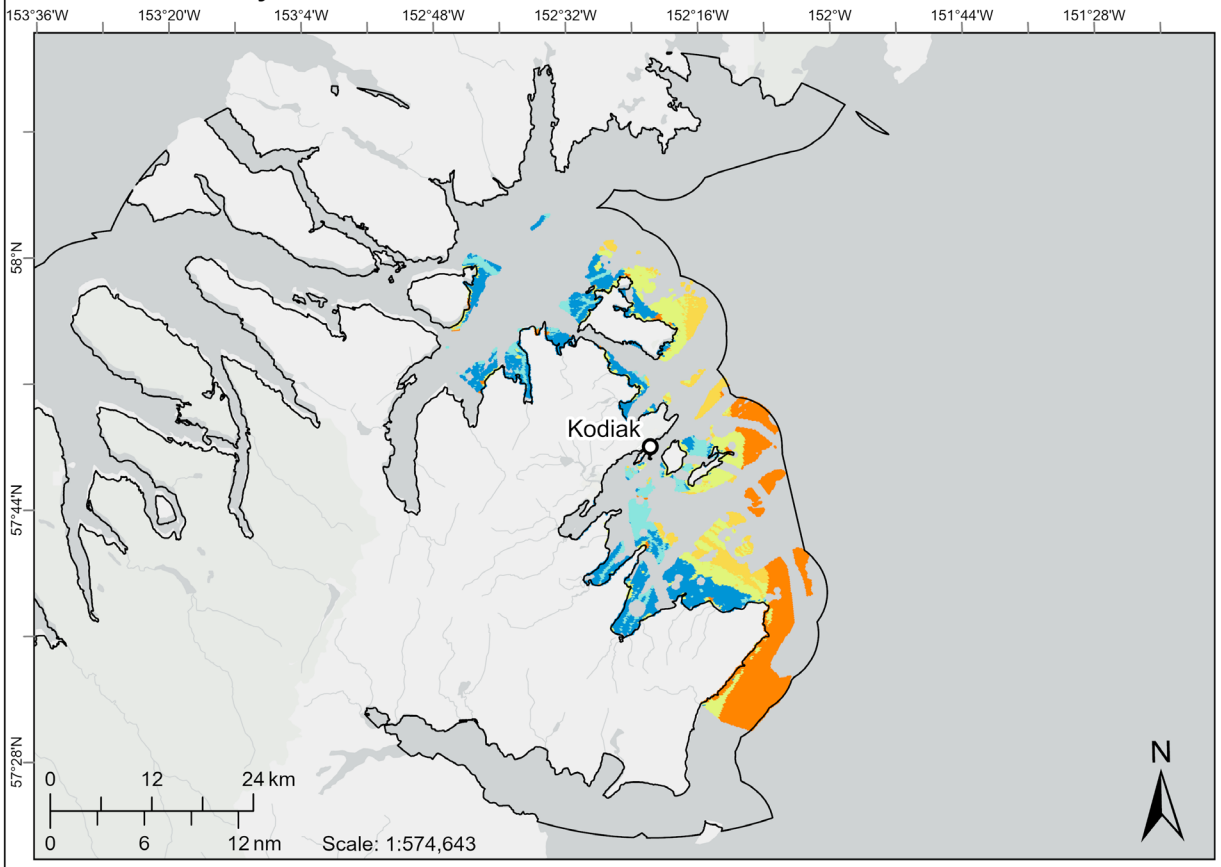
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
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Kodiak Study Area - East



Coastal Populated Places: NOAA OCM (2024)

Industry, Navigation, and Transportation

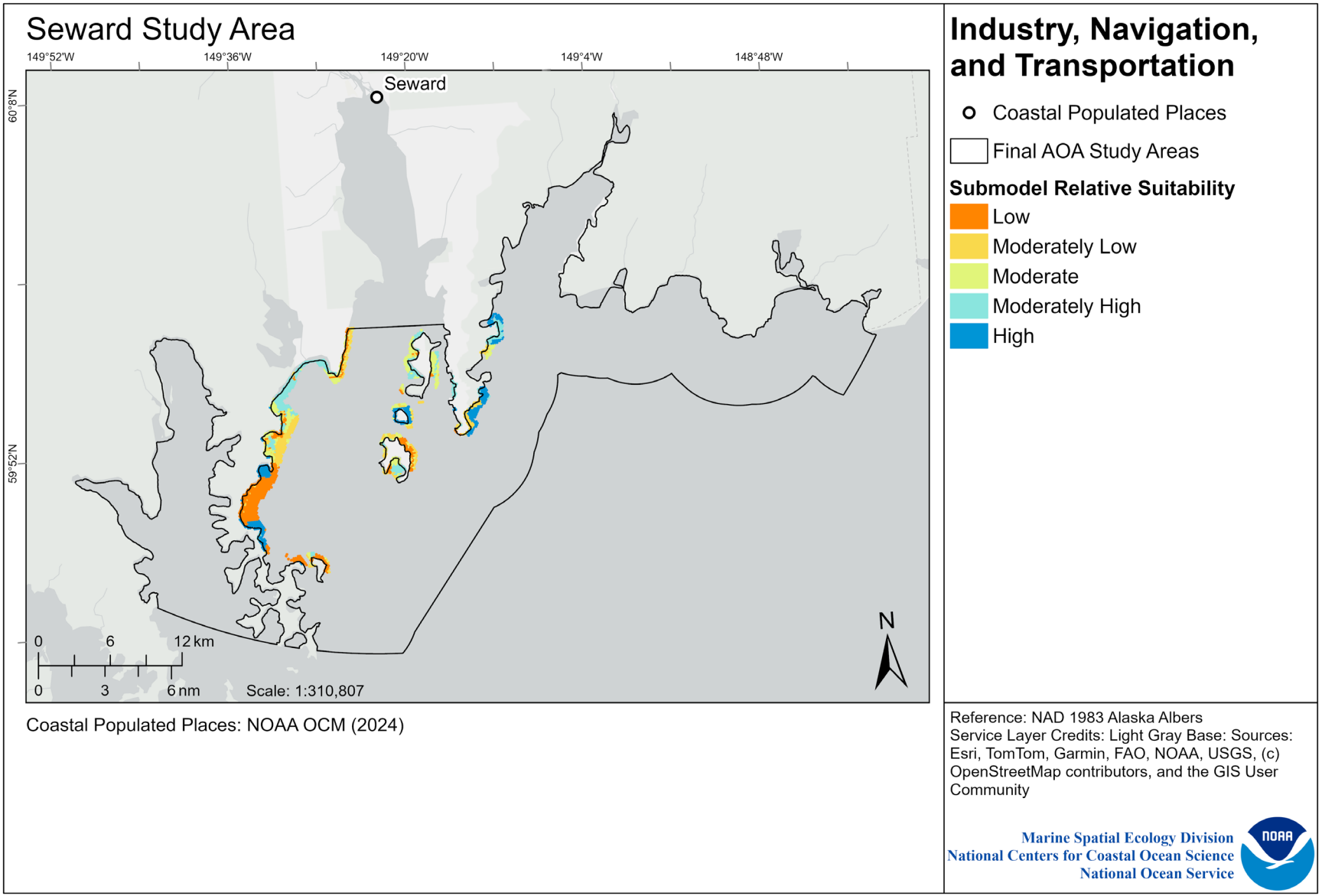
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

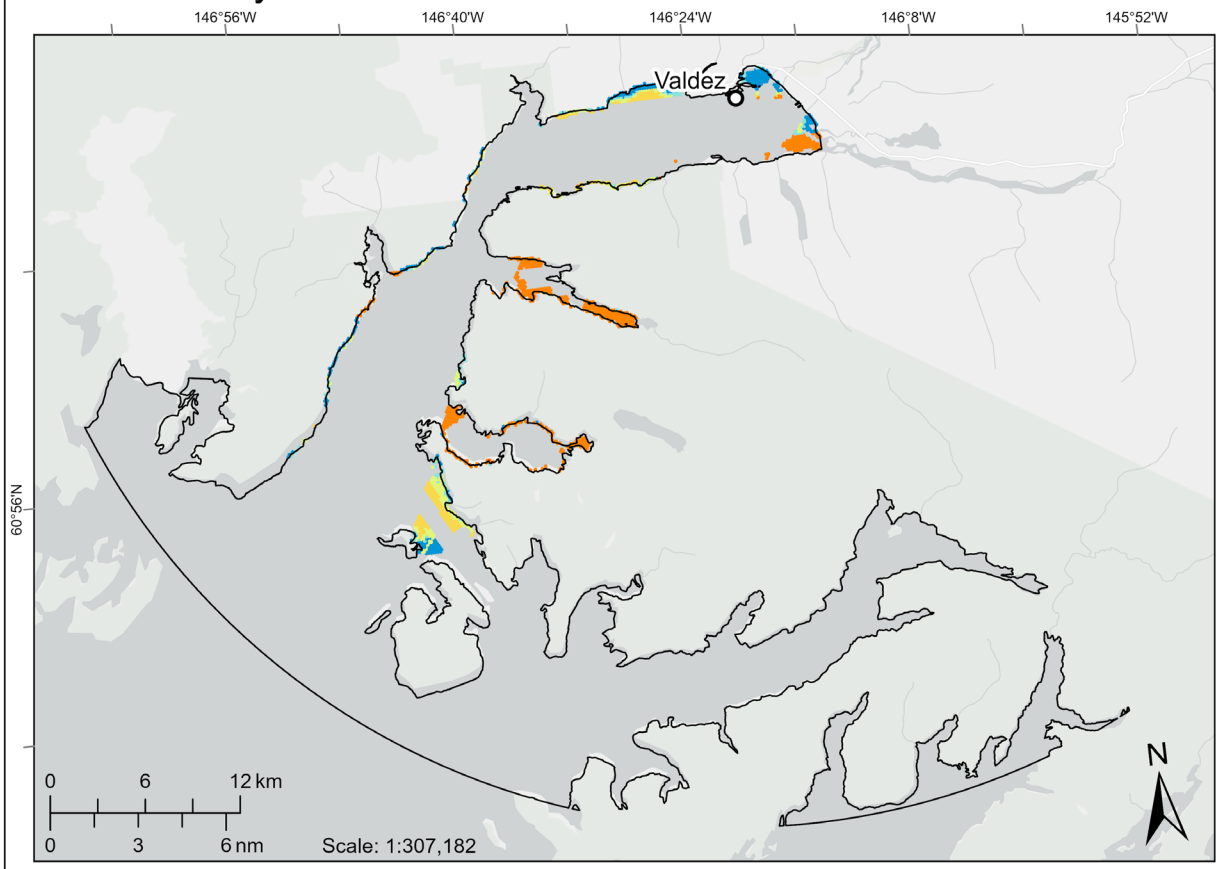
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Seward Study Area
149°52'W
149°36'W
149°20'W
149°4'W
148°48'W
60°8'N
59°52'N
Seward
0
6
12 km
0
3
6 nm
Scale: 1:310,807
N
Industry, Navigation, and Transportation
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

Valdez Study Area



Coastal Populated Places: NOAA OCM (2024)

Industry, Navigation, and Transportation

- Coastal Populated Places
- Final AOA Study Areas

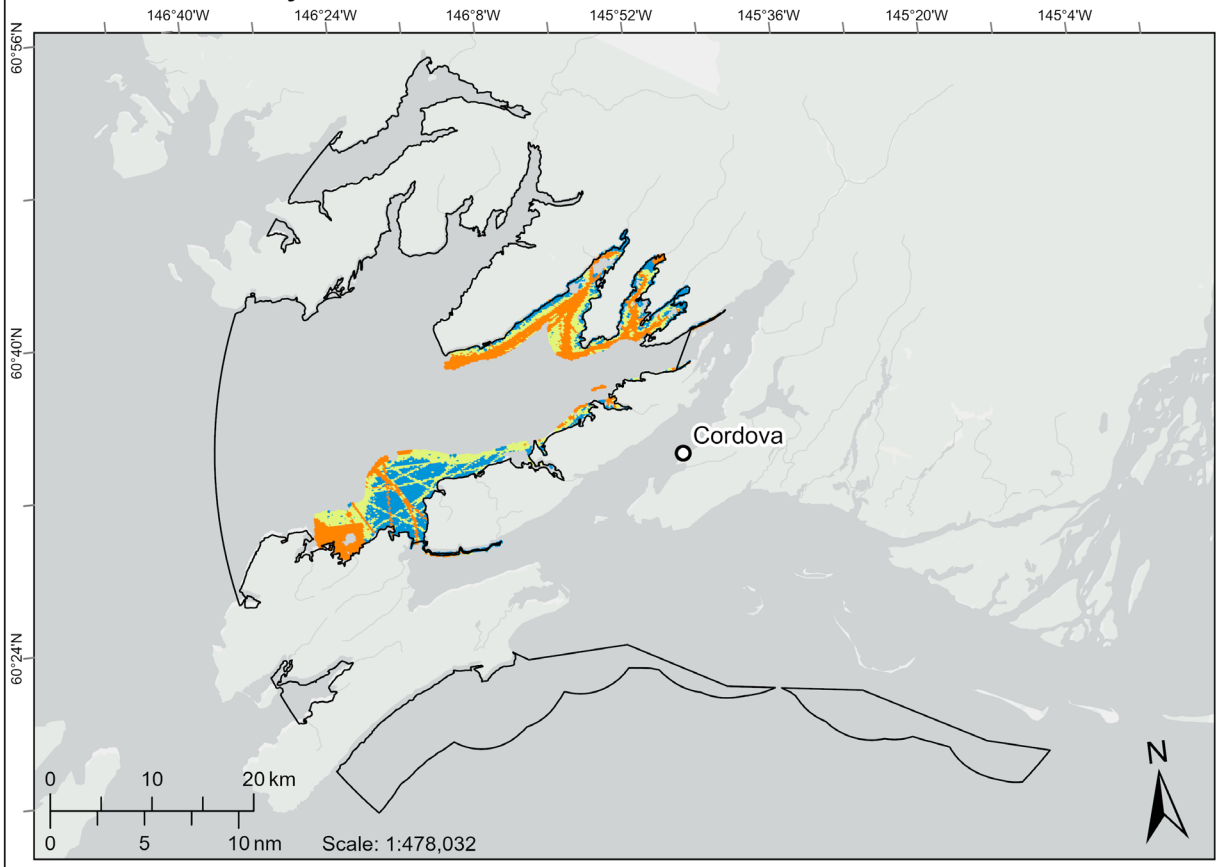
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)

Industry, Navigation, and Transportation

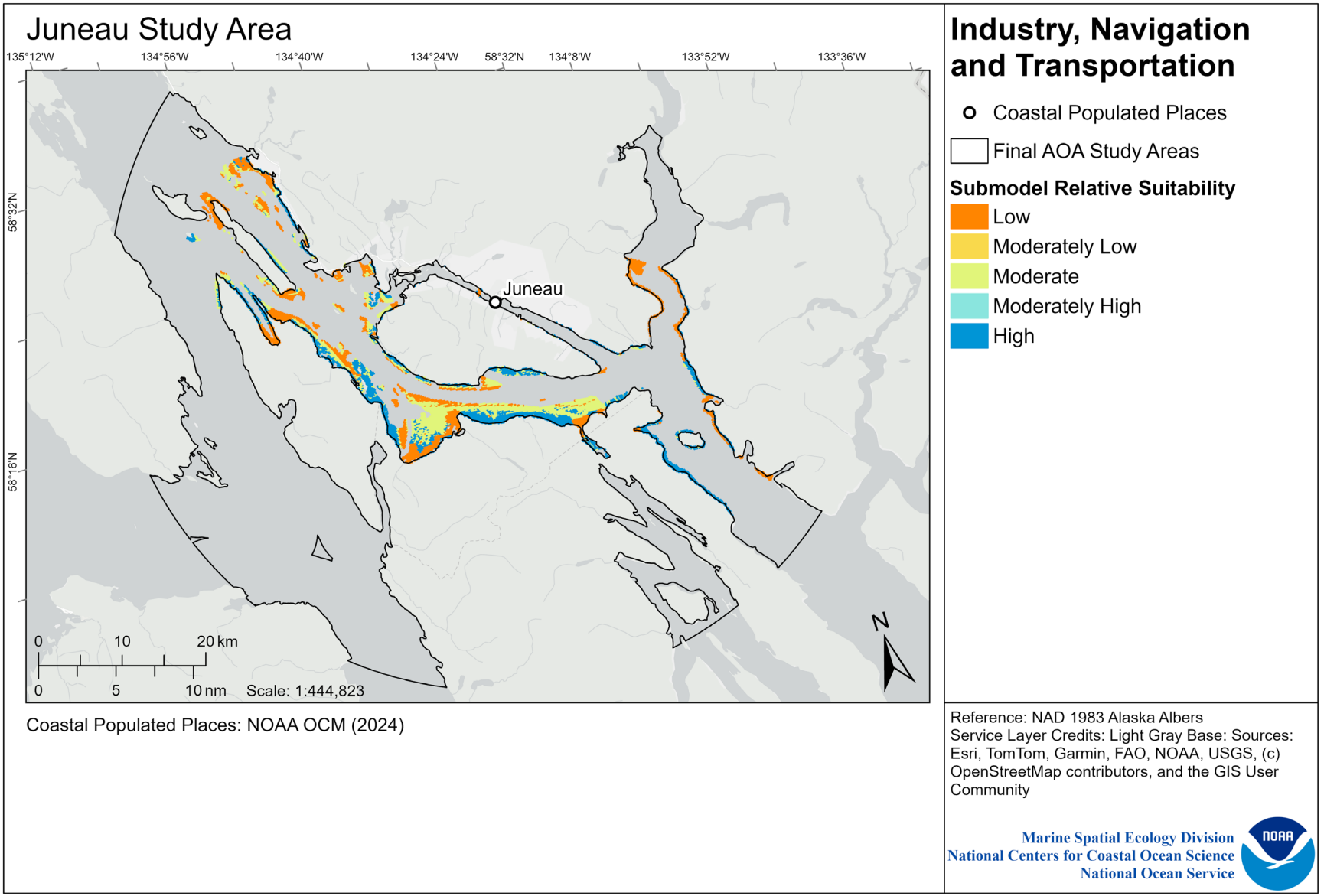
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

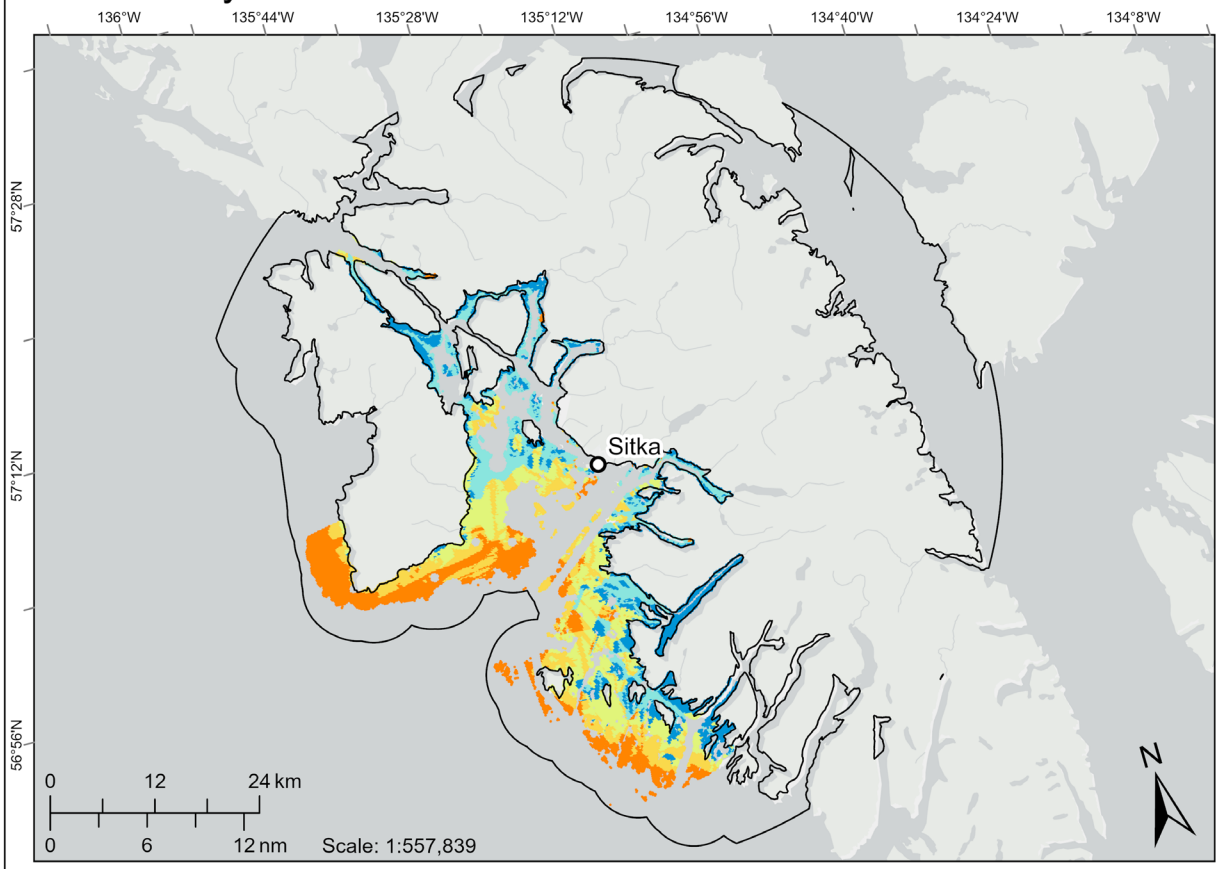
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Juneau Study Area
135°12'W
134°56'W
134°40'W
134°24'W
58°32'N
134°8'W
133°52'W
133°36'W
58°32'N
58°16'N
Juneau
0
10
20 km
0
5
10 nm
Scale: 1:444,823
N
Industry, Navigation and Transportation
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Sitka Study Area



Coastal Populated Places: NOAA OCM (2024)

Industry, Navigation, and Transportation

- Coastal Populated Places
- Final AOA Study Areas

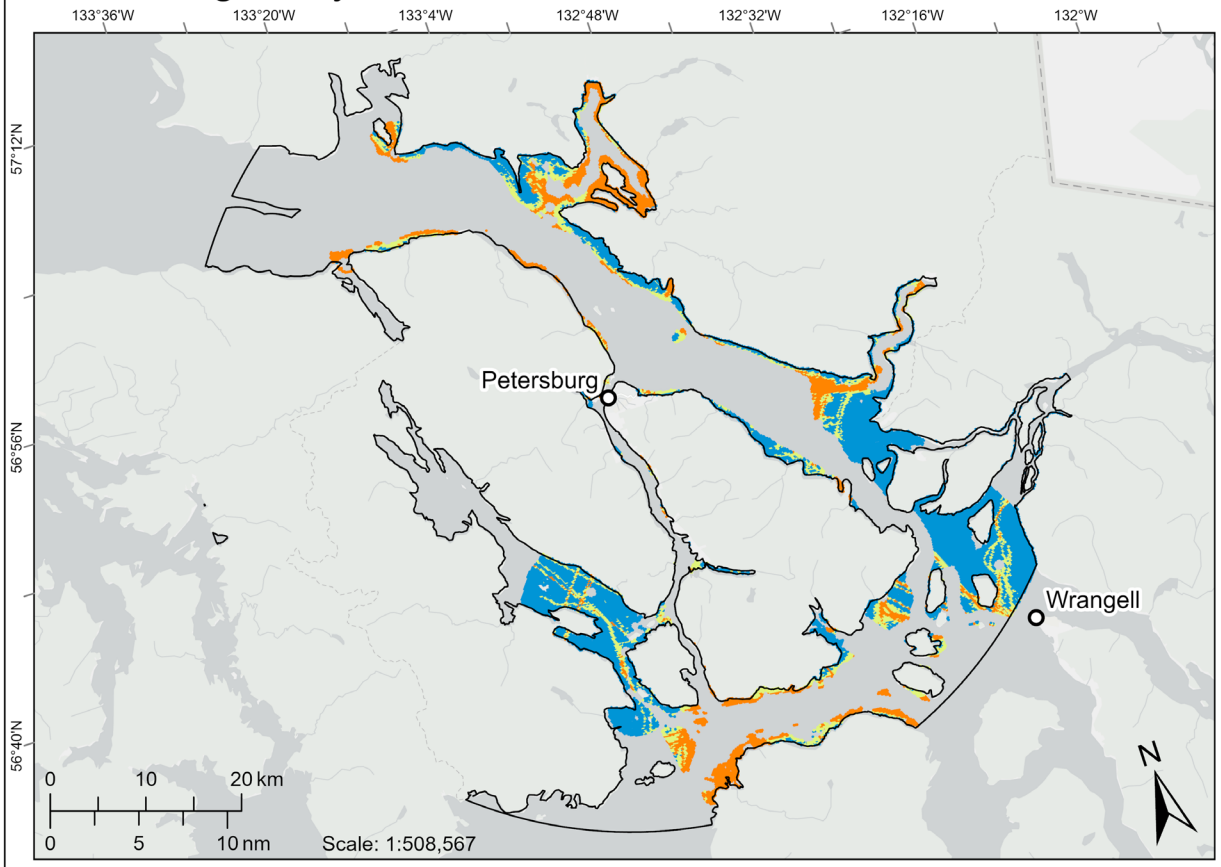
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)

Industry, Navigation, and Transportation

- Coastal Populated Places
- Final AOA Study Areas

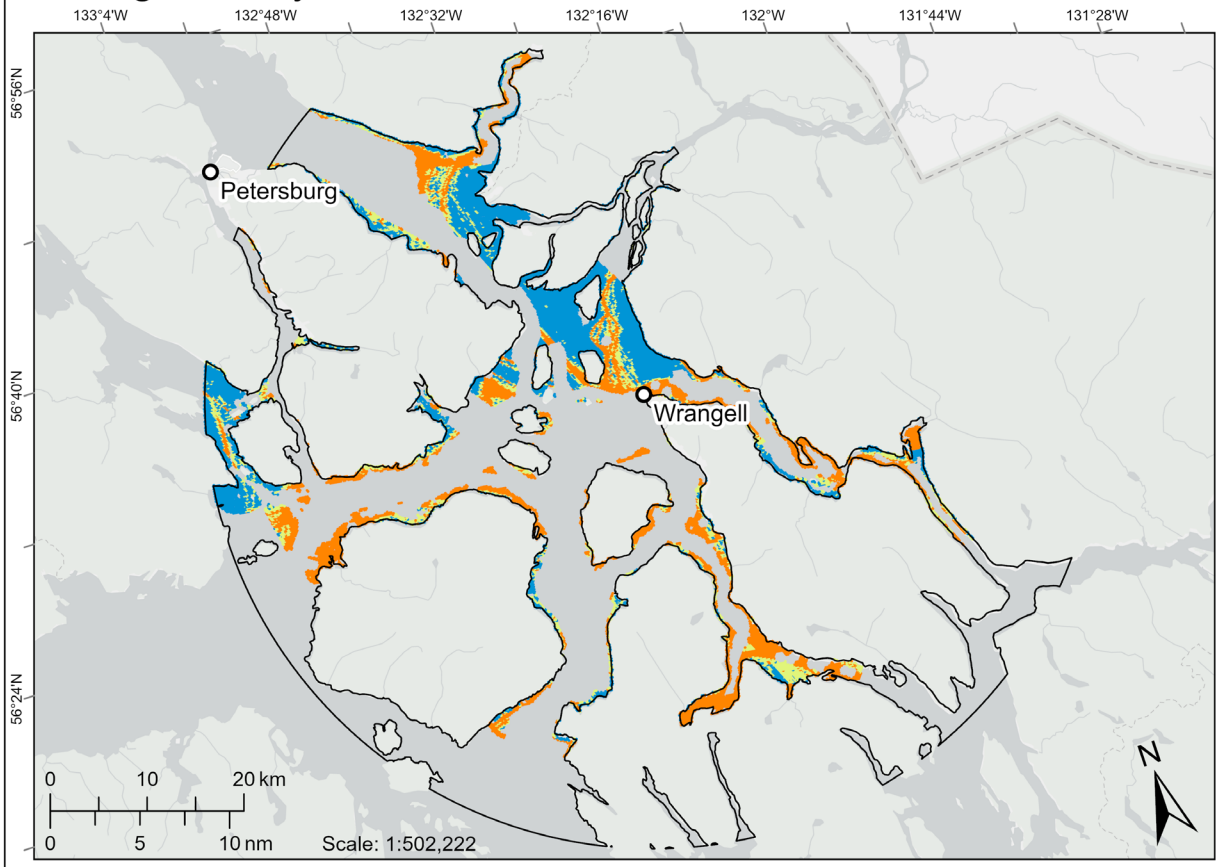
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Wrangell Study Area



Coastal Populated Places: NOAA OCM (2024)

Industry, Navigation, and Transportation

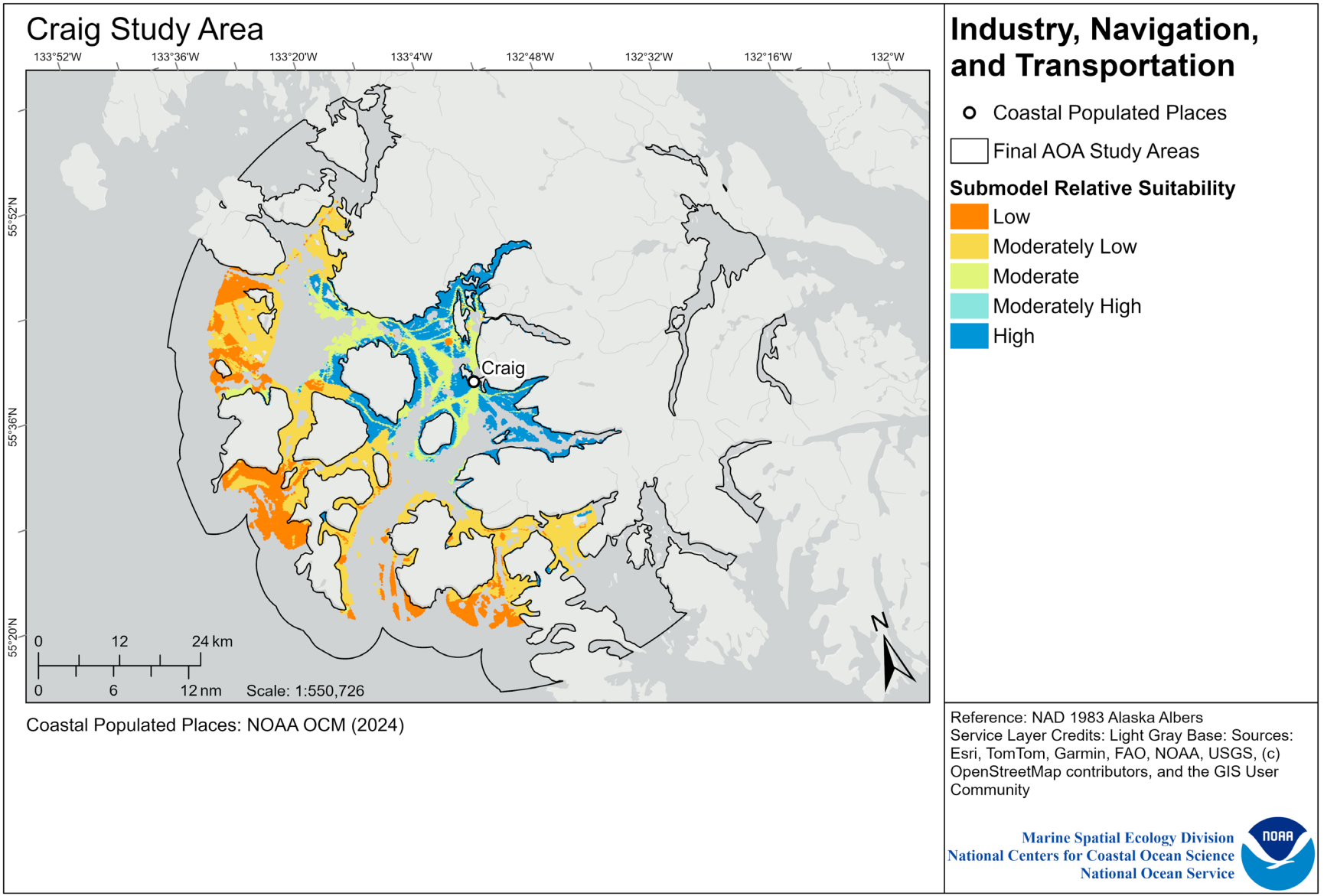
- Coastal Populated Places
- Final AOA Study Areas

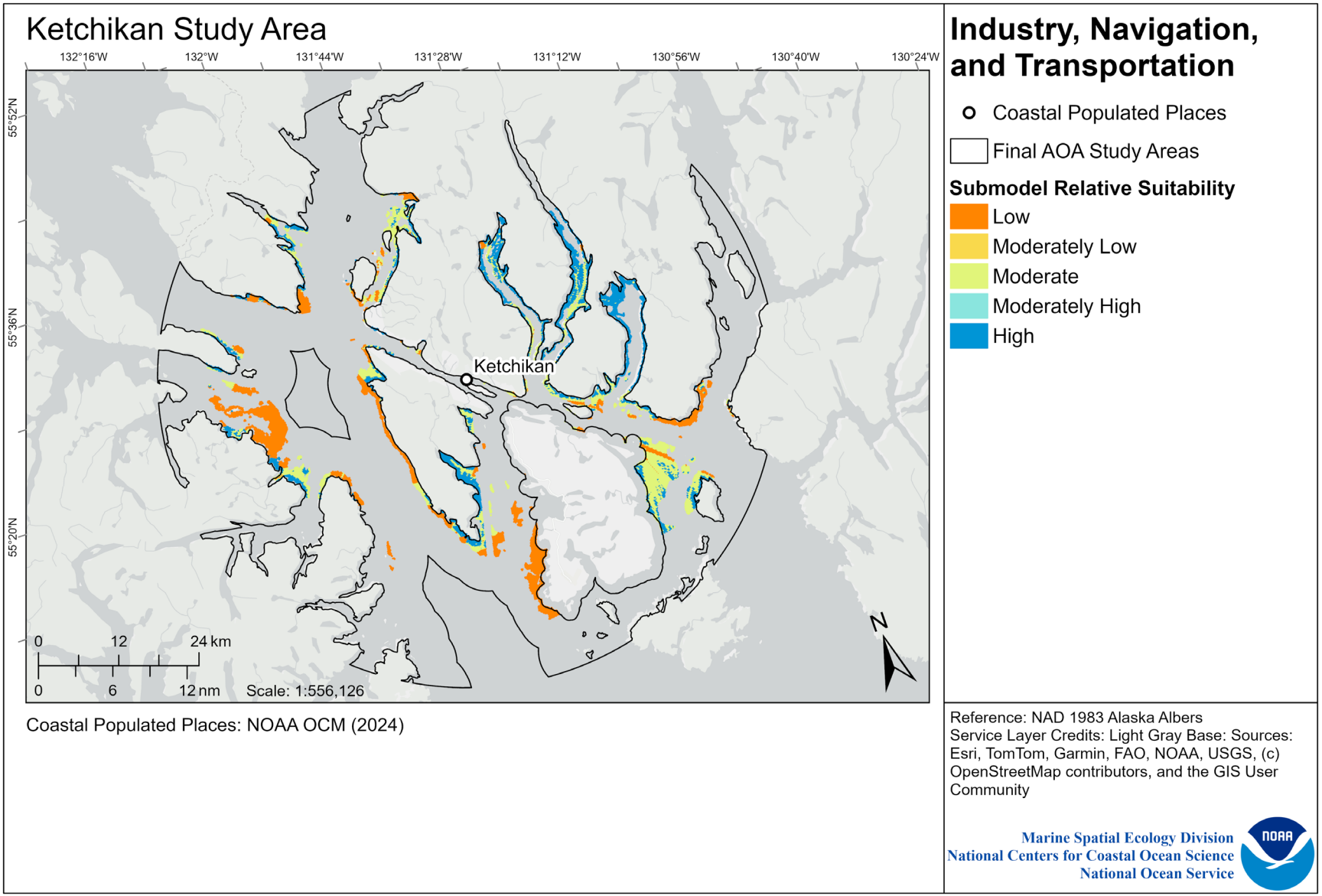
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Craig Study Area
133°52'W
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
55°52'N
55°36'N
55°20'N
Craig
0
12
24 km
0
6
12 nm
Scale: 1:550,726
N
Industry, Navigation, and Transportation
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

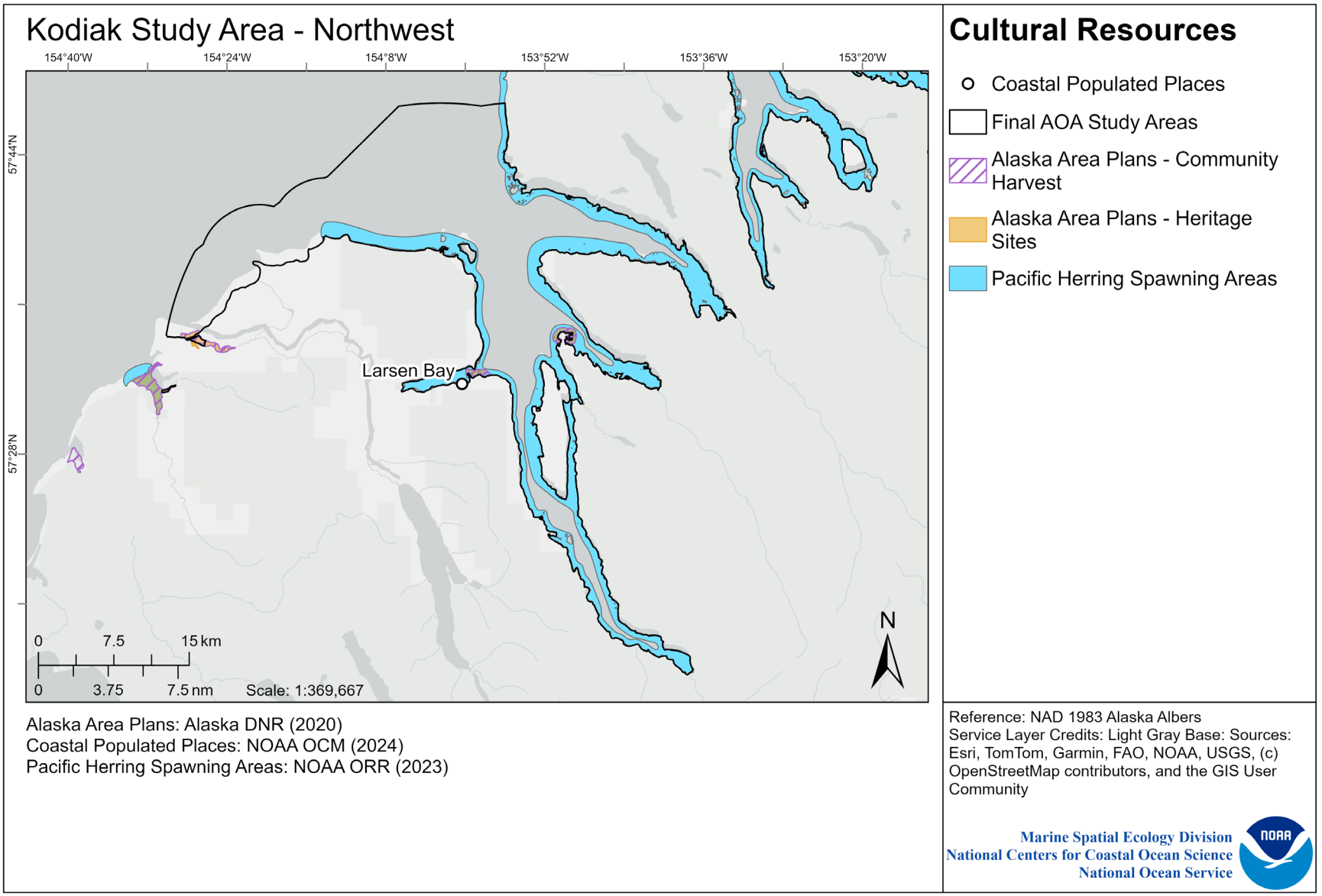


Coastal Populated Places: NOAA OCM (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Cultural Resources Submodel Maps

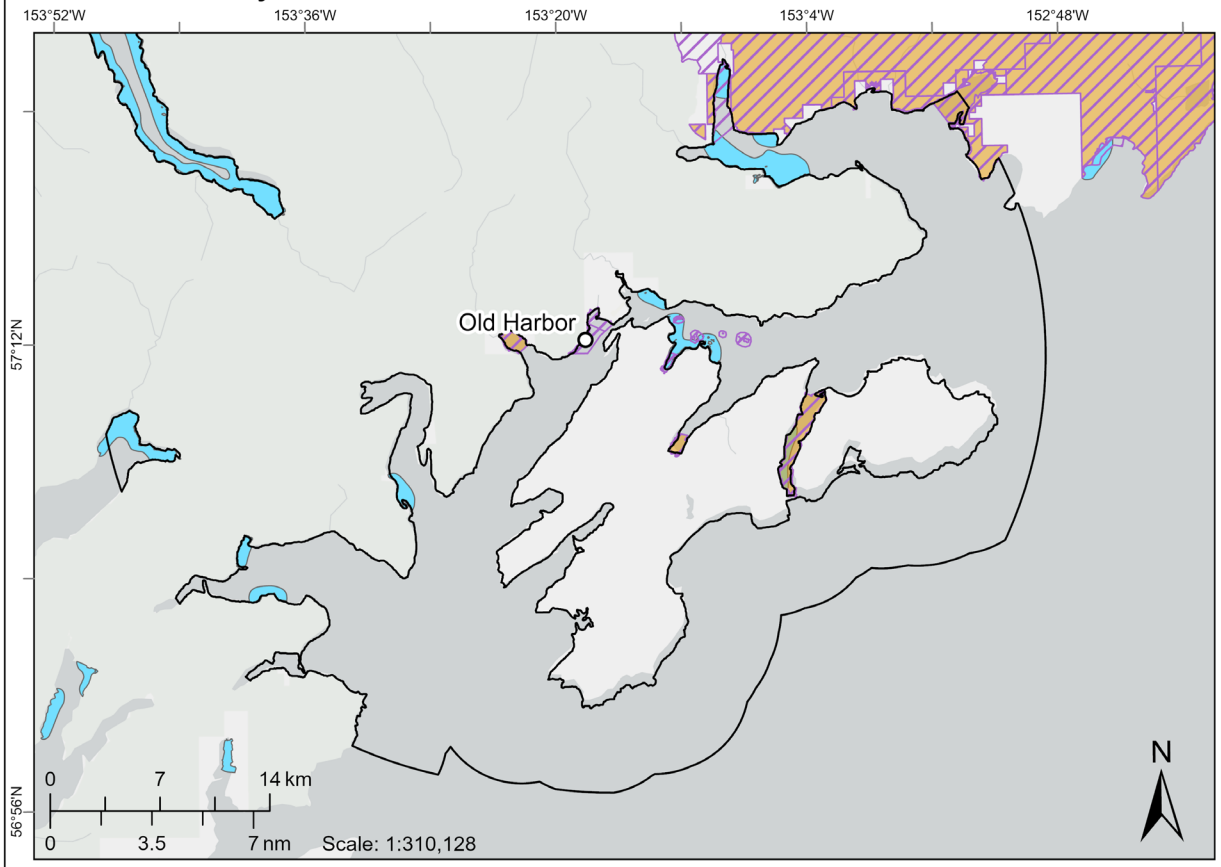


Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Spawning Areas: NOAA ORR (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Southwest



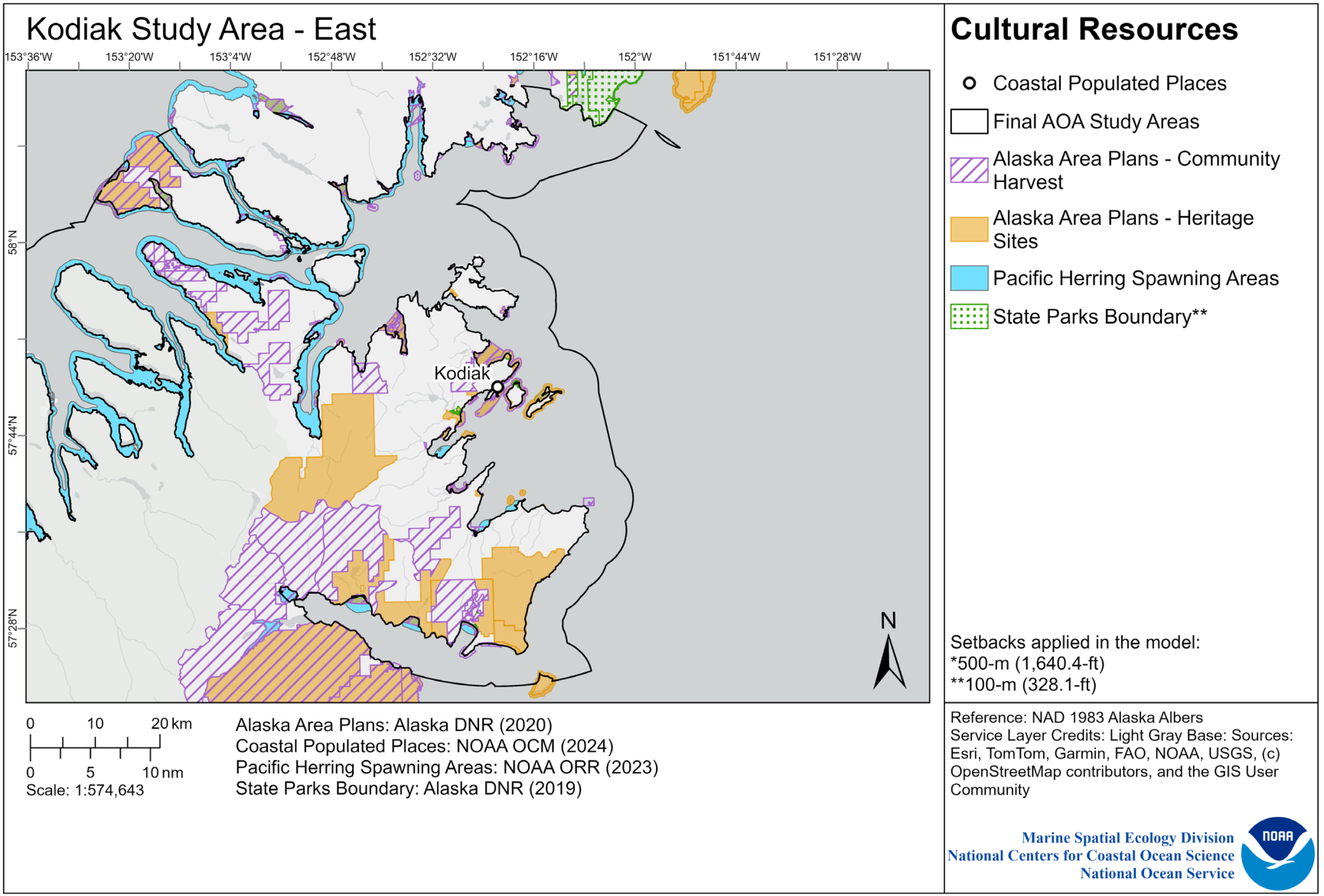
Cultural Resources

- Coastal Populated Places
- Final AOA Study Areas
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- Pacific Herring Spawning Areas

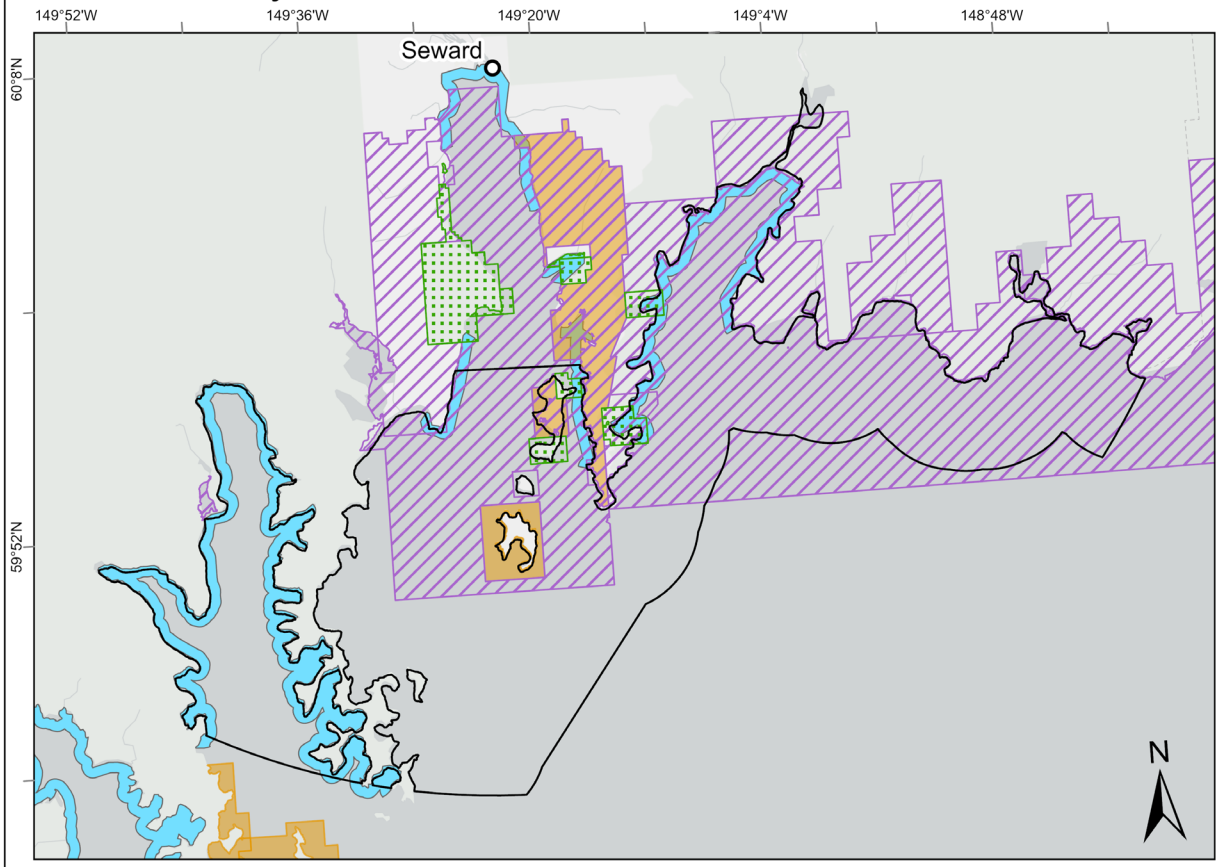
Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Spawning Areas: NOAA ORR (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
N
0 10 20 km
0 5 10 nm
Scale: 1:574,643
Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Spawning Areas: NOAA ORR (2023)
State Parks Boundary: Alaska DNR (2019)
Cultural Resources
Coastal Populated Places
Final AOA Study Areas
Alaska Area Plans - Community Harvest
Alaska Area Plans - Heritage Sites
Pacific Herring Spawning Areas
State Parks Boundary**
Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Seward Study Area



0 6 12 km
0 3 6 nm
Scale: 1:310,807

Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Spawning Areas: NOAA ORR (2023)
State Parks Boundary: Alaska DNR (2019)

Cultural Resources

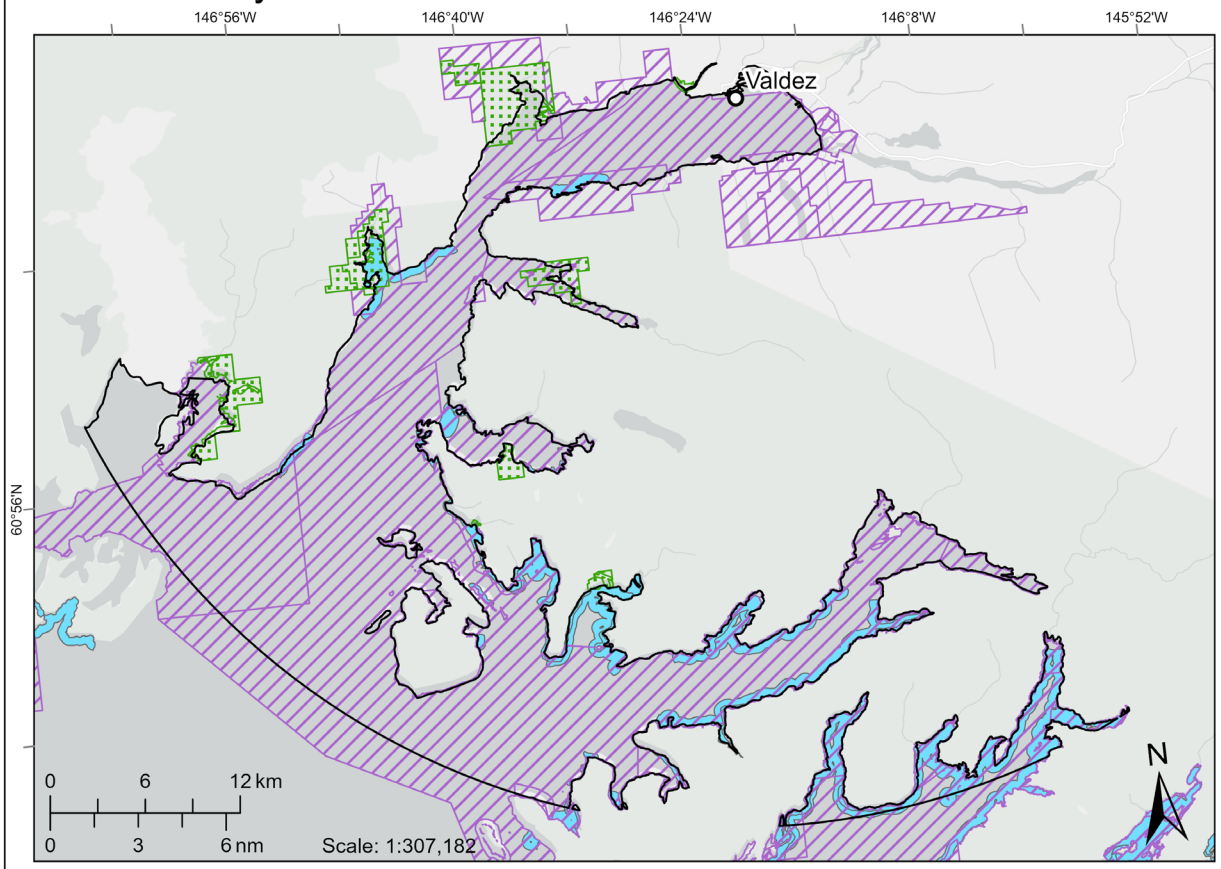
- Coastal Populated Places
- Final AOA Study Areas
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- Pacific Herring Spawning Areas
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Valdez Study Area



Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Spawning Areas: NOAA ORR (2023)
State Parks Boundary: Alaska DNR (2019)

Cultural Resources

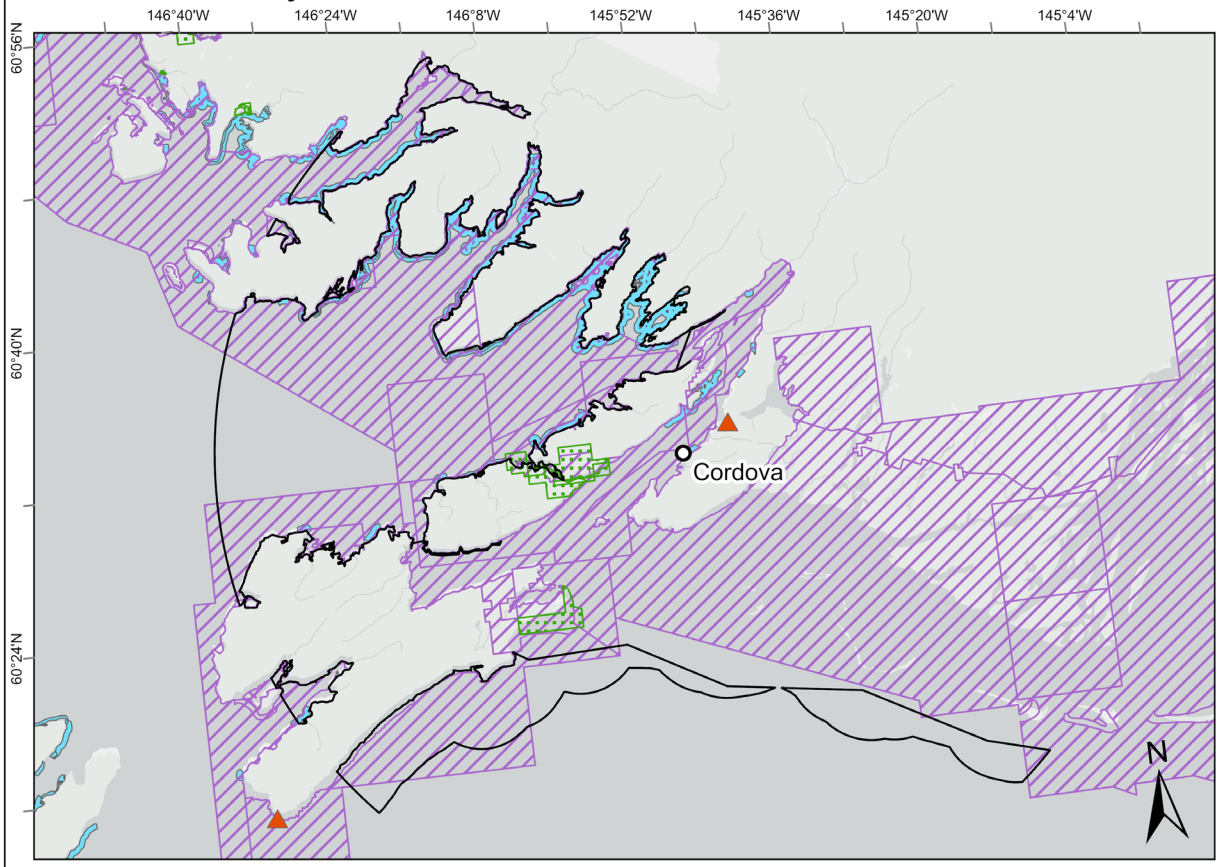
- Coastal Populated Places
- Final AOA Study Areas
- Alaska Area Plans - Community Harvest
- Pacific Herring Spawning Areas
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Cordova Study Area



0 10 20 km
0 5 10 nm
Scale: 1:478,032

Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Historic Lighthouses: NOAA OCM (2018)
Pacific Herring Spawning Areas: NOAA ORR (2023)
State Parks Boundary: Alaska DNR (2019)

Cultural Resources

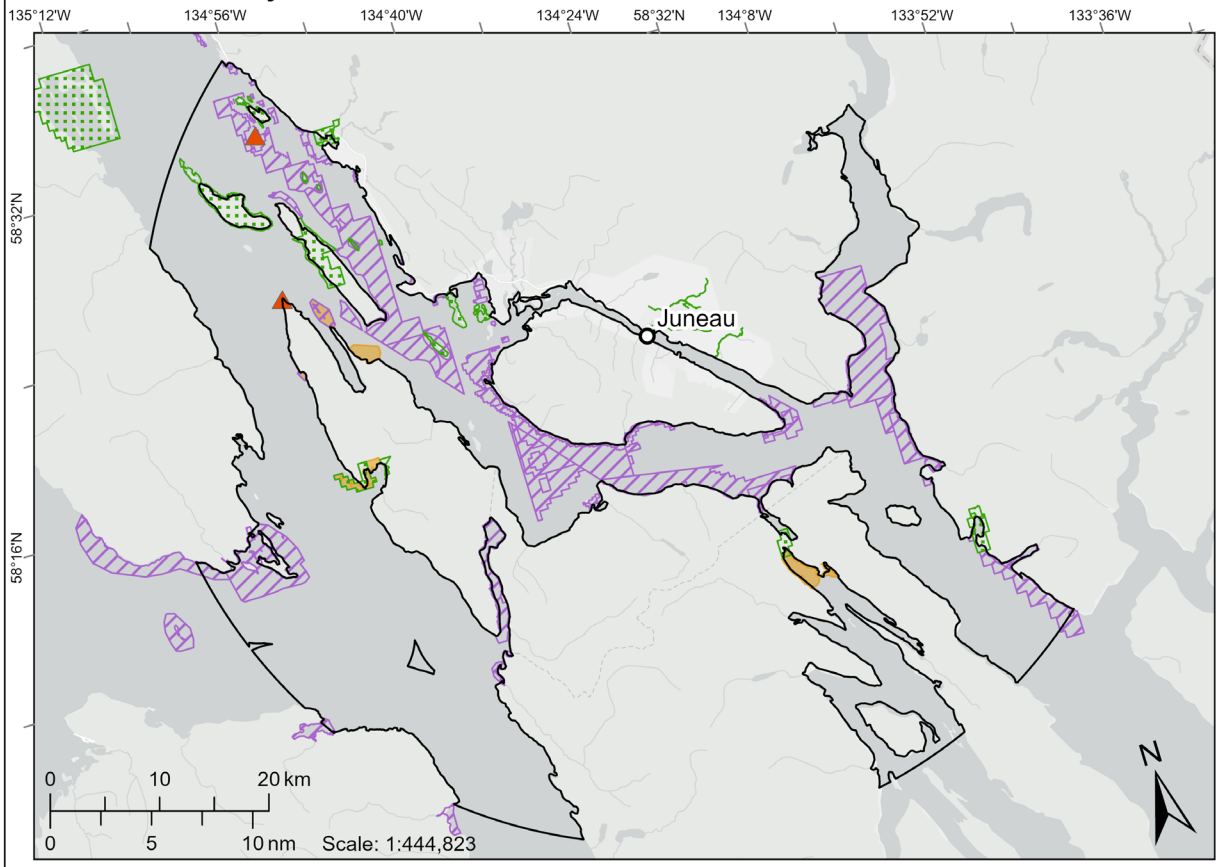
- Coastal Populated Places
- Final AOA Study Areas
- Historic Lighthouses*
- Alaska Area Plans - Community Harvest
- Pacific Herring Spawning Areas
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Juneau Study Area



Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Historic Lighthouses: NOAA OCM (2018)
State Parks Boundary: Alaska DNR (2019)

Cultural Resources

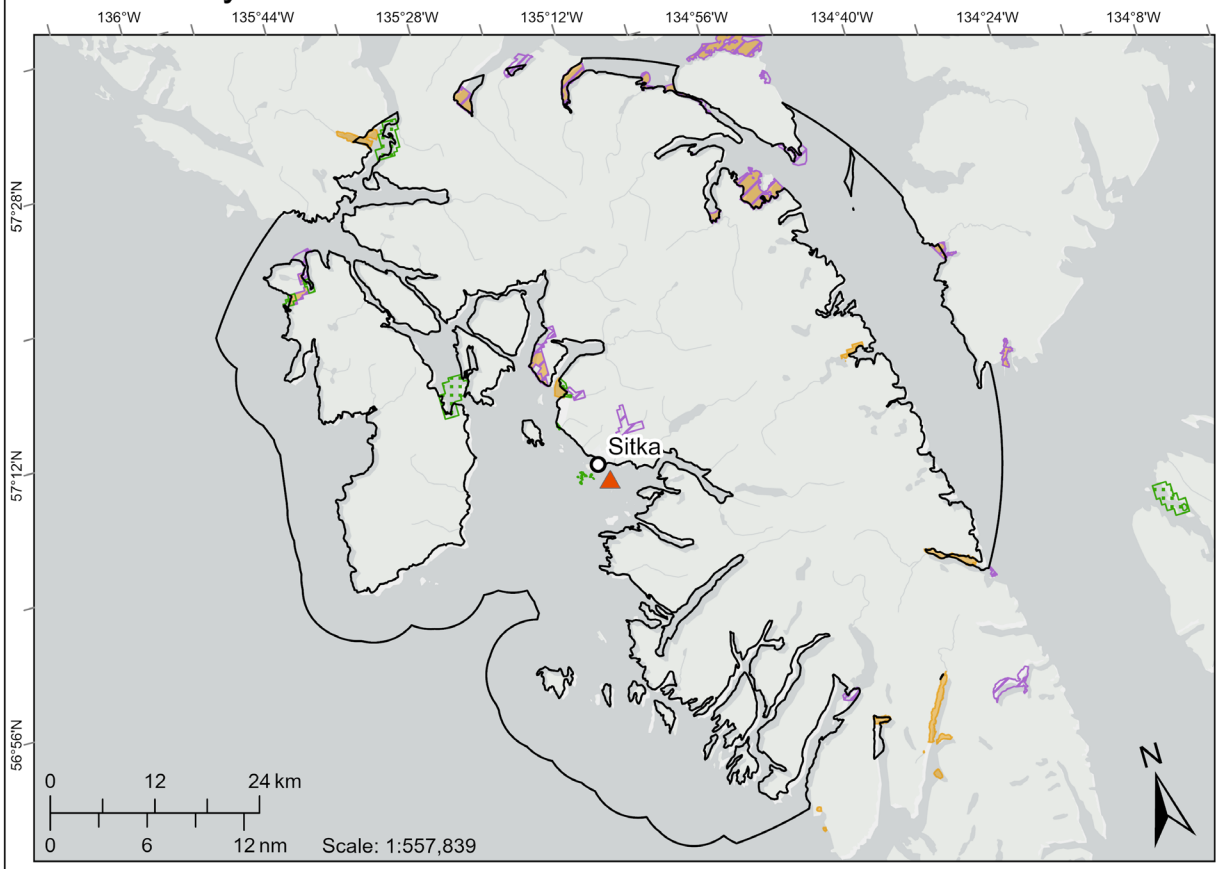
- Coastal Populated Places
- Final AOA Study Areas
- Historic Lighthouses*
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Sitka Study Area



Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Historic Lighthouses: NOAA OCM (2018)
State Parks Boundary: Alaska DNR (2019)

Cultural Resources

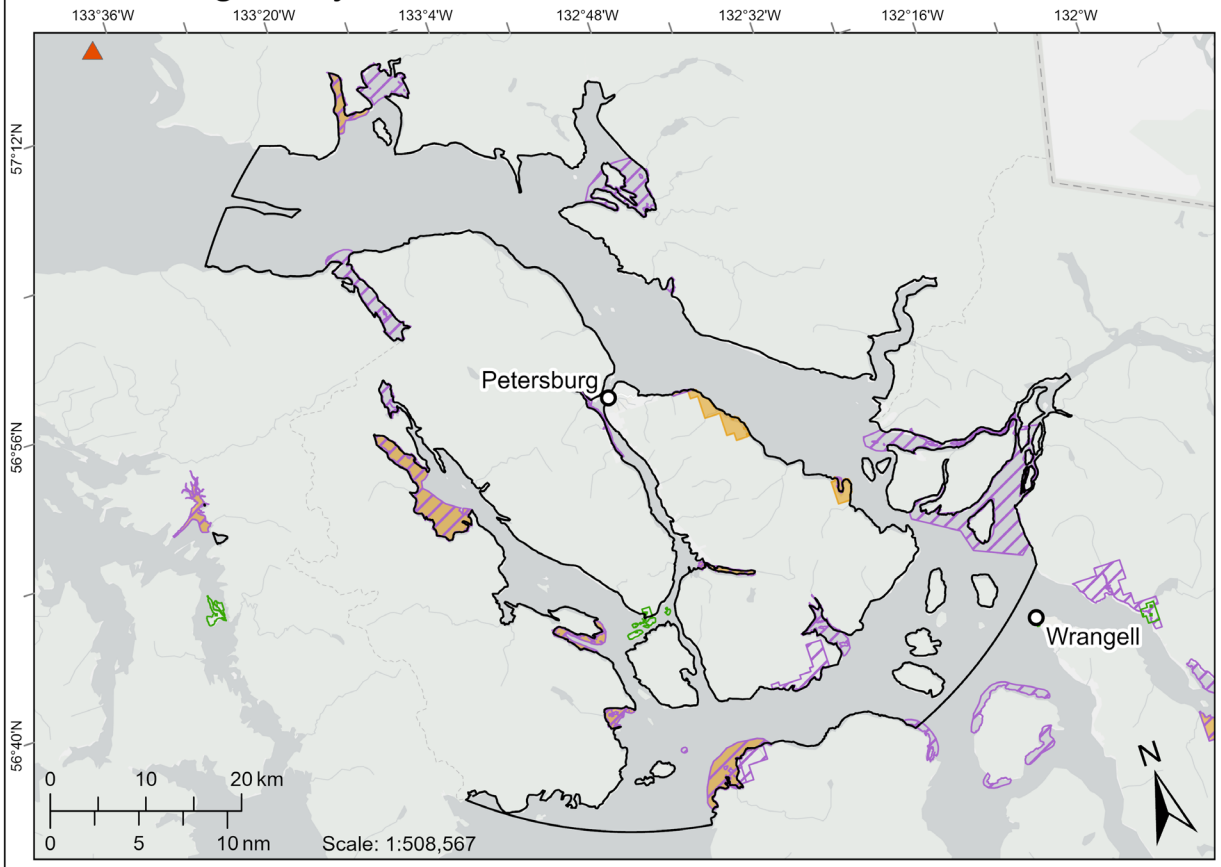
- Coastal Populated Places
- Final AOA Study Areas
- Historic Lighthouses*
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Petersburg Study Area



Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Historic Lighthouses: NOAA OCM (2018)
State Parks Boundary: Alaska DNR (2019)

Cultural Resources

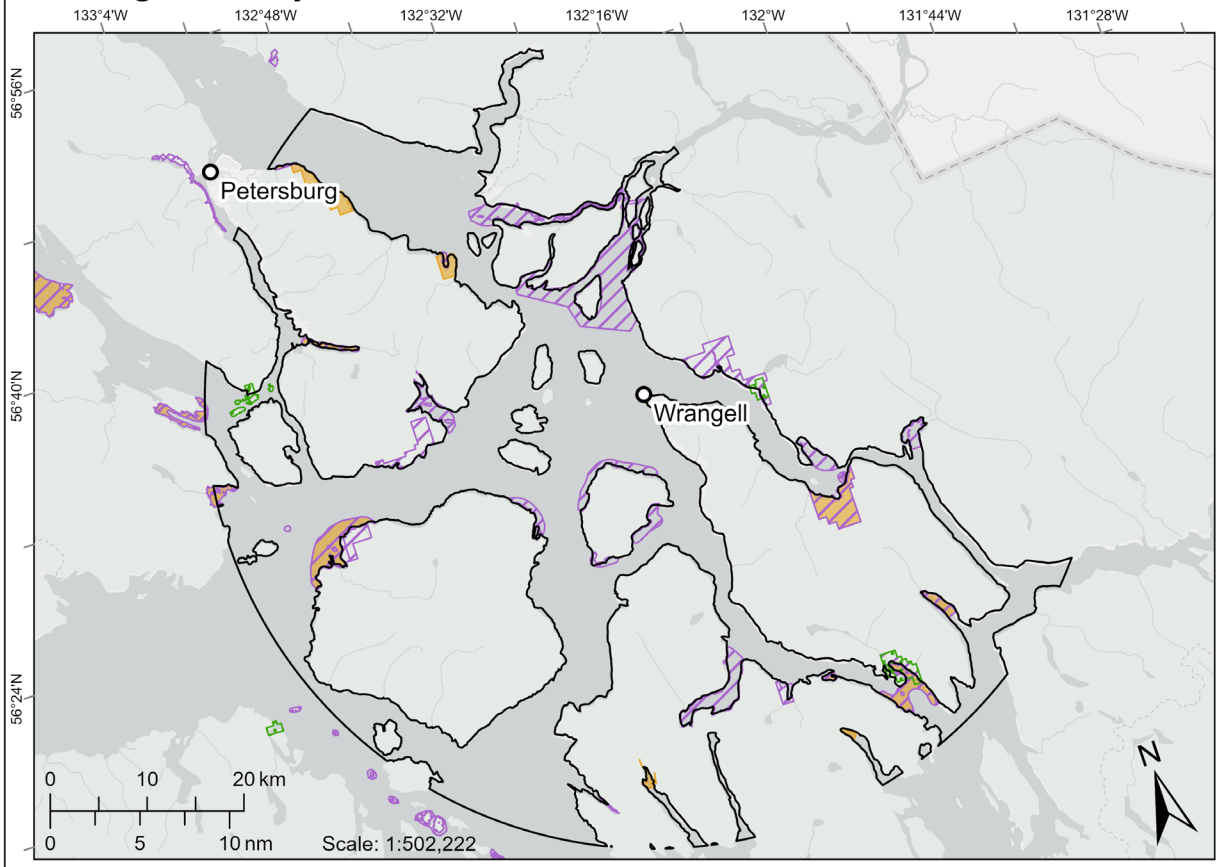
- Coastal Populated Places
- Final AOA Study Areas
- Historic Lighthouses*
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Wrangell Study Area



Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
State Parks Boundary: Alaska DNR (2019)

Cultural Resources

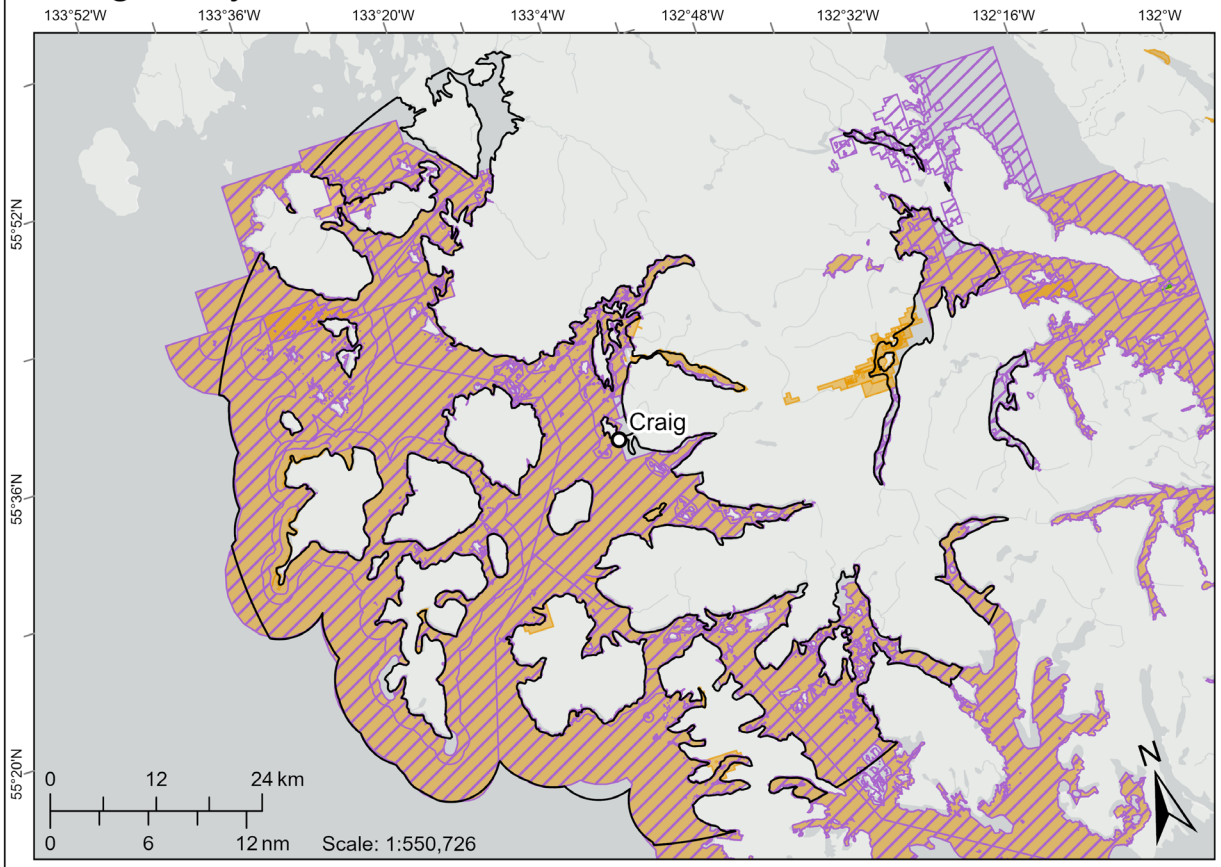
- Coastal Populated Places
- Final AOA Study Areas
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Craig Study Area



Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
State Parks Boundary: Alaska DNR (2019)

Cultural Resources

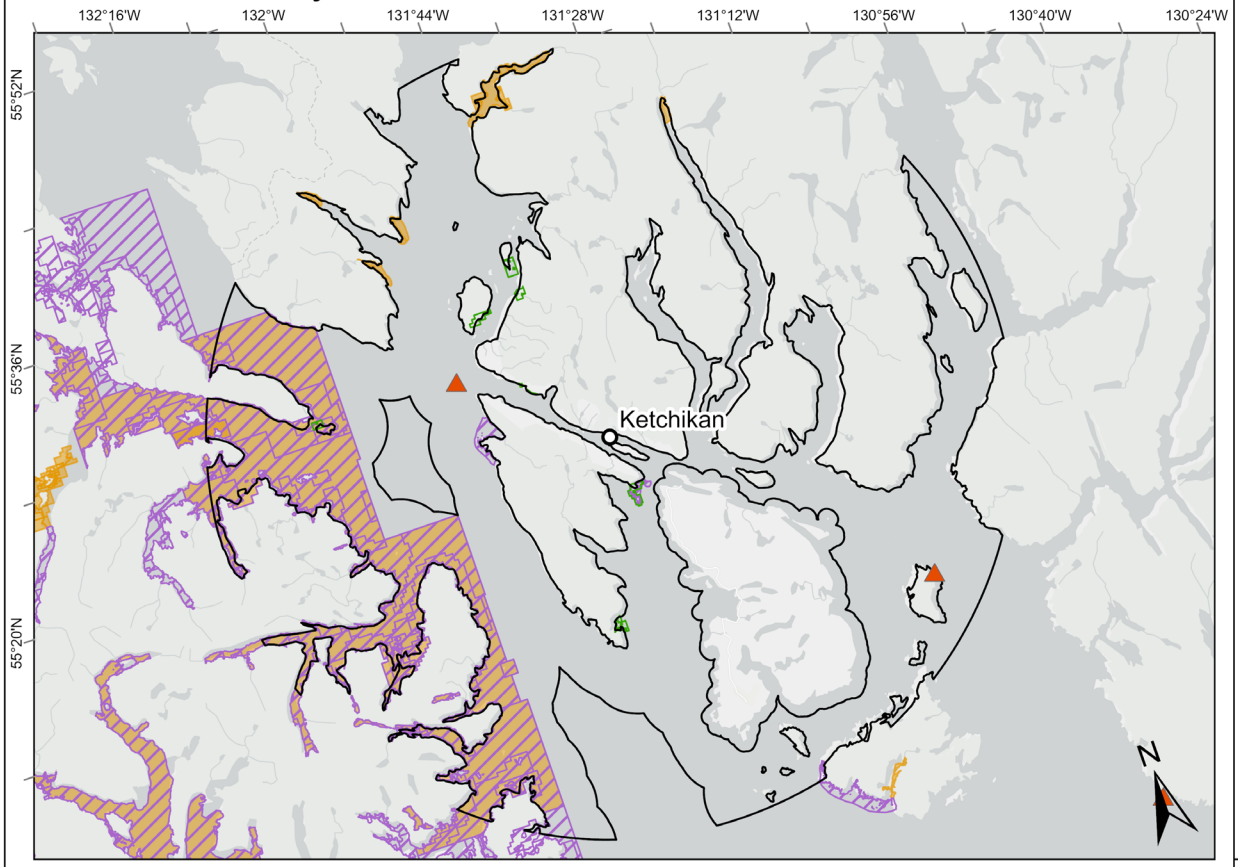
- Coastal Populated Places
- Final AOA Study Areas
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Ketchikan Study Area



0 10 20 km
0 5 10 nm
Scale: 1:556,126

Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Historic Lighthouses: NOAA OCM (2018)
State Parks Boundary: Alaska DNR (2019)

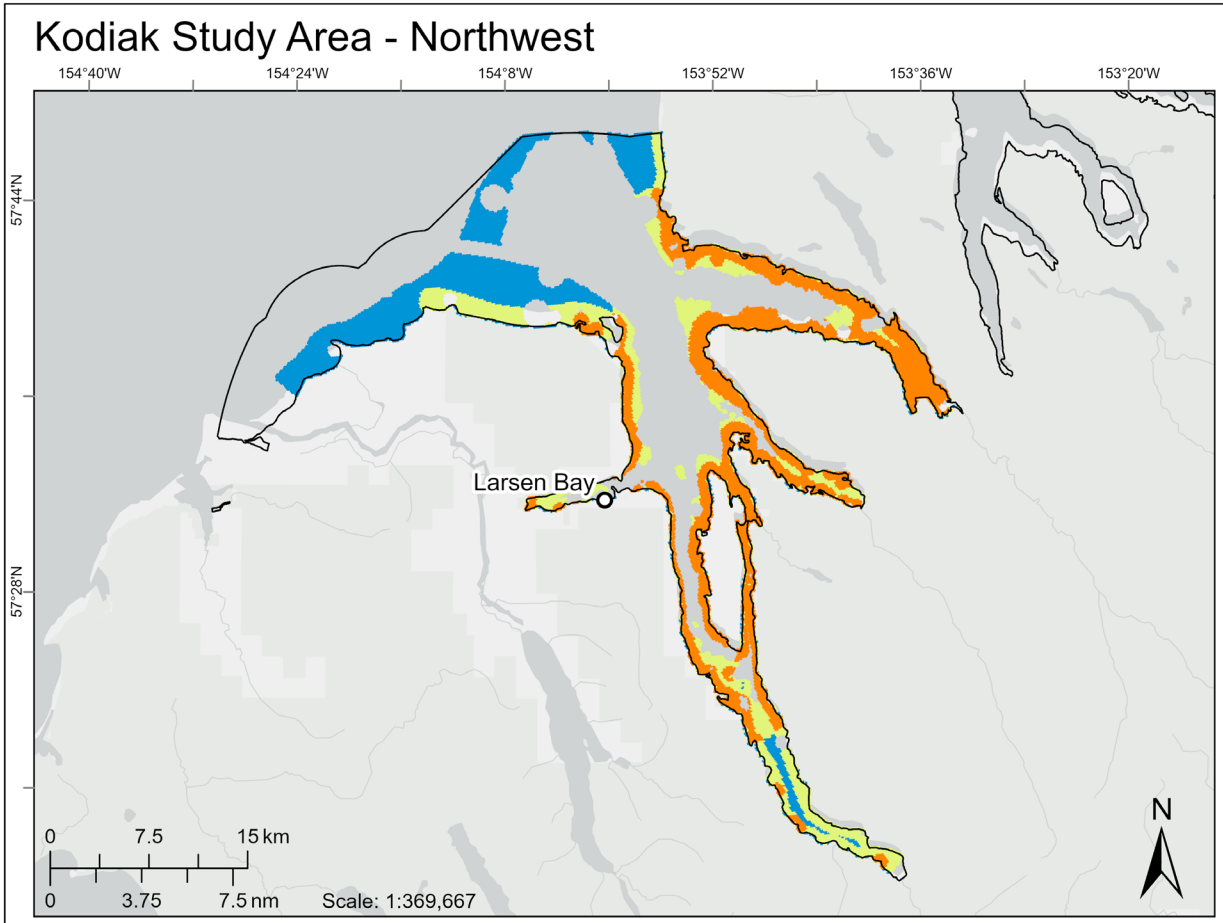
Cultural Resources

- Coastal Populated Places
- Final AOA Study Areas
- Historic Lighthouses*
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service



Coastal Populated Places: NOAA OCM (2024)

Cultural Resources

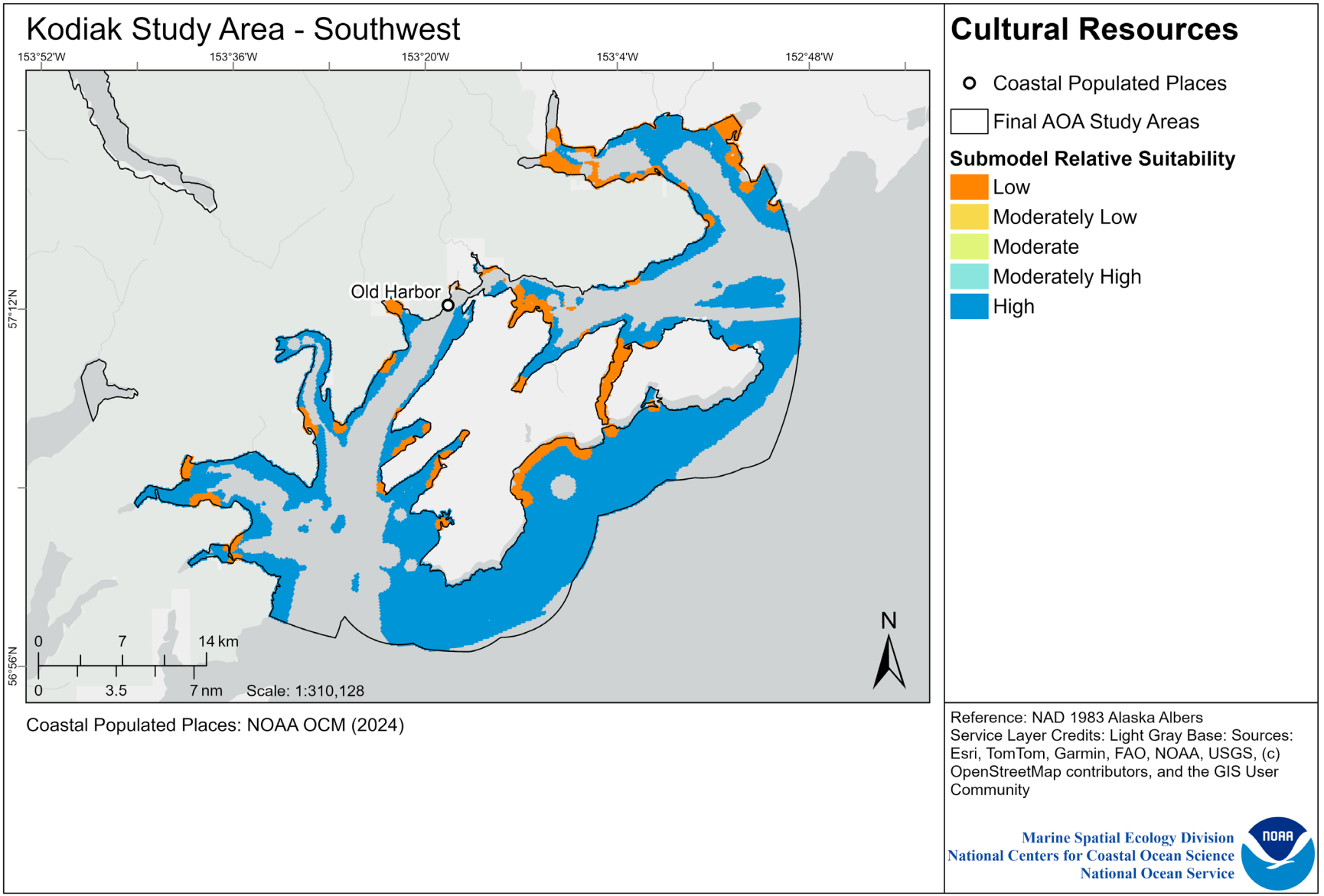
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

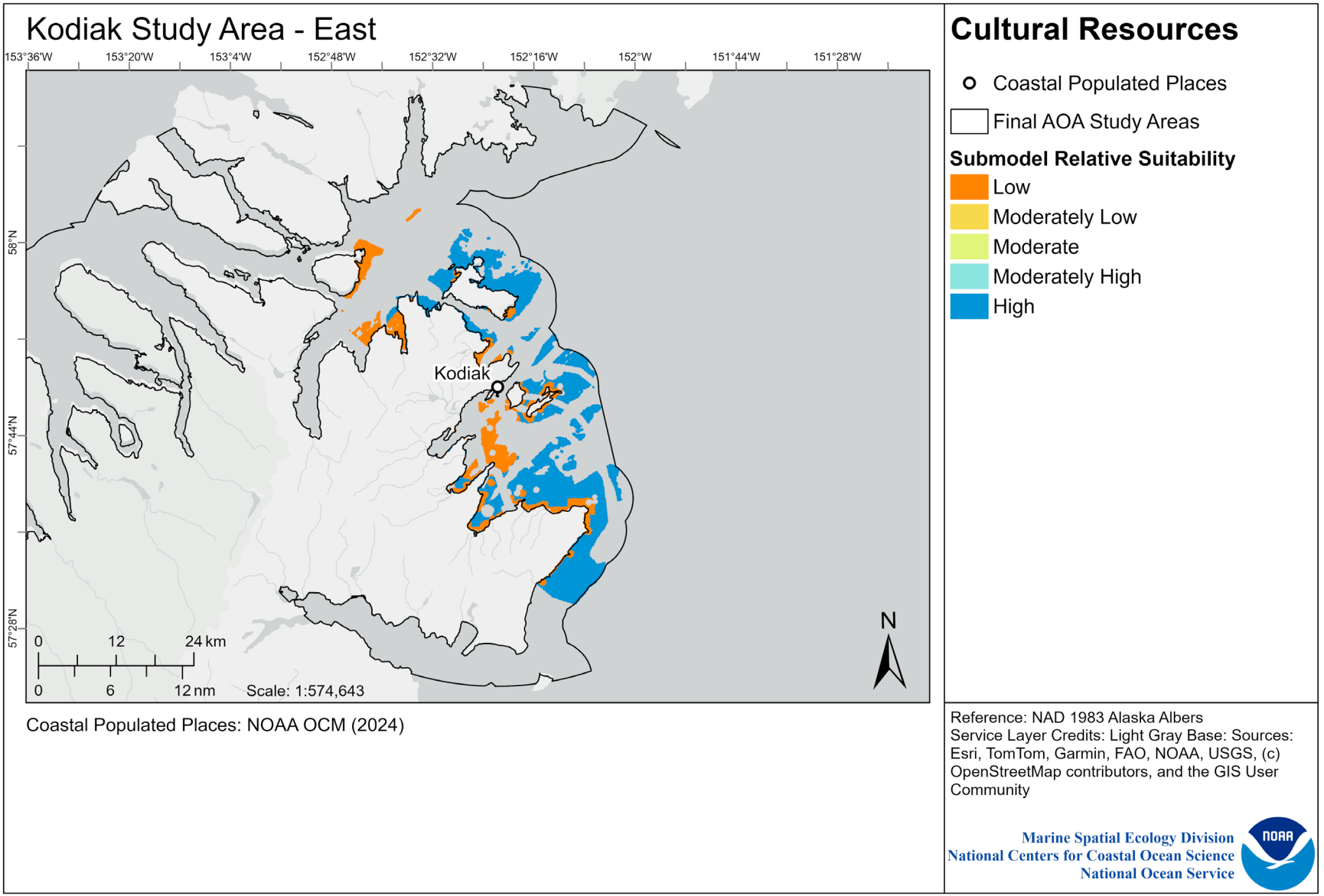
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

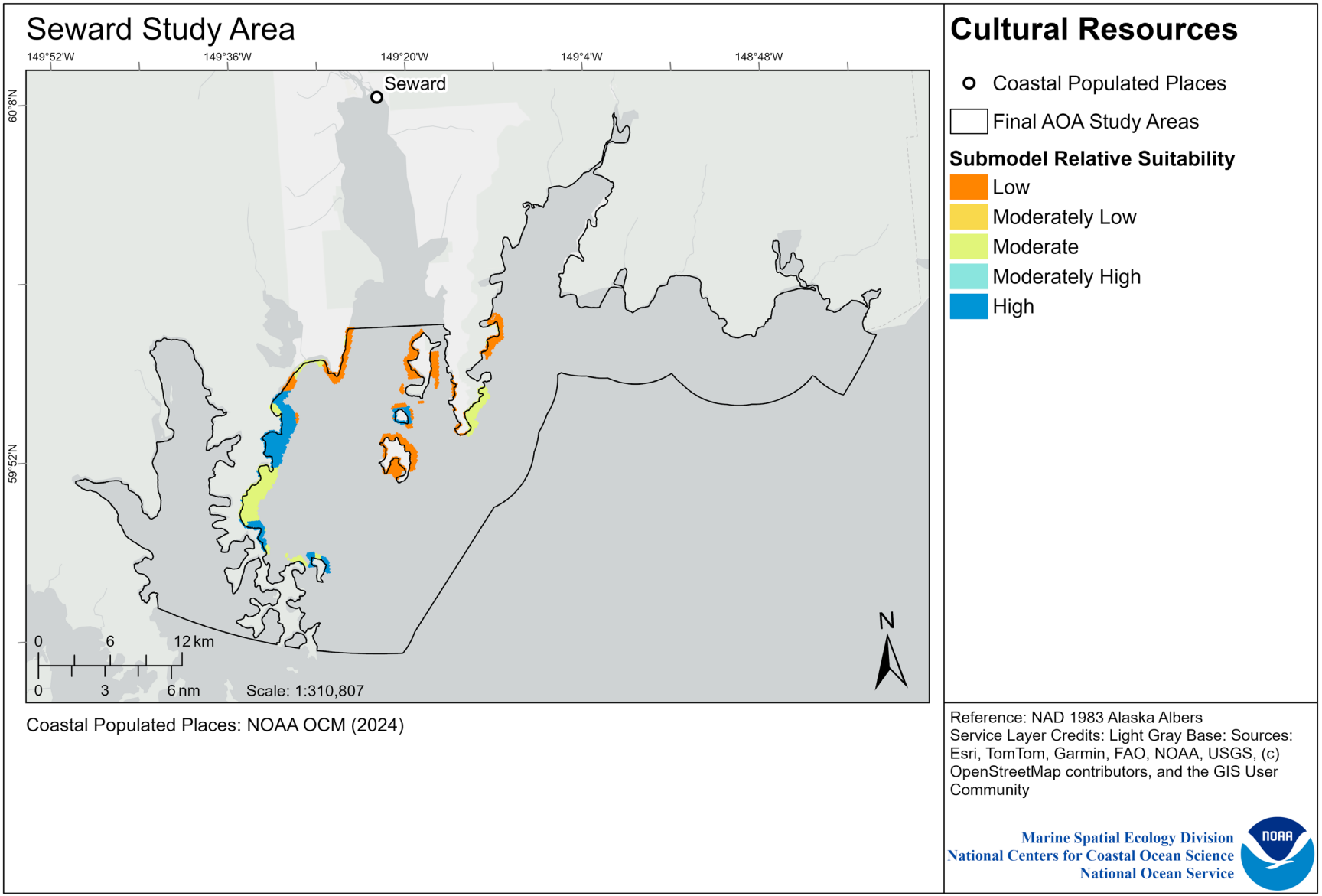


Coastal Populated Places: NOAA OCM (2024)

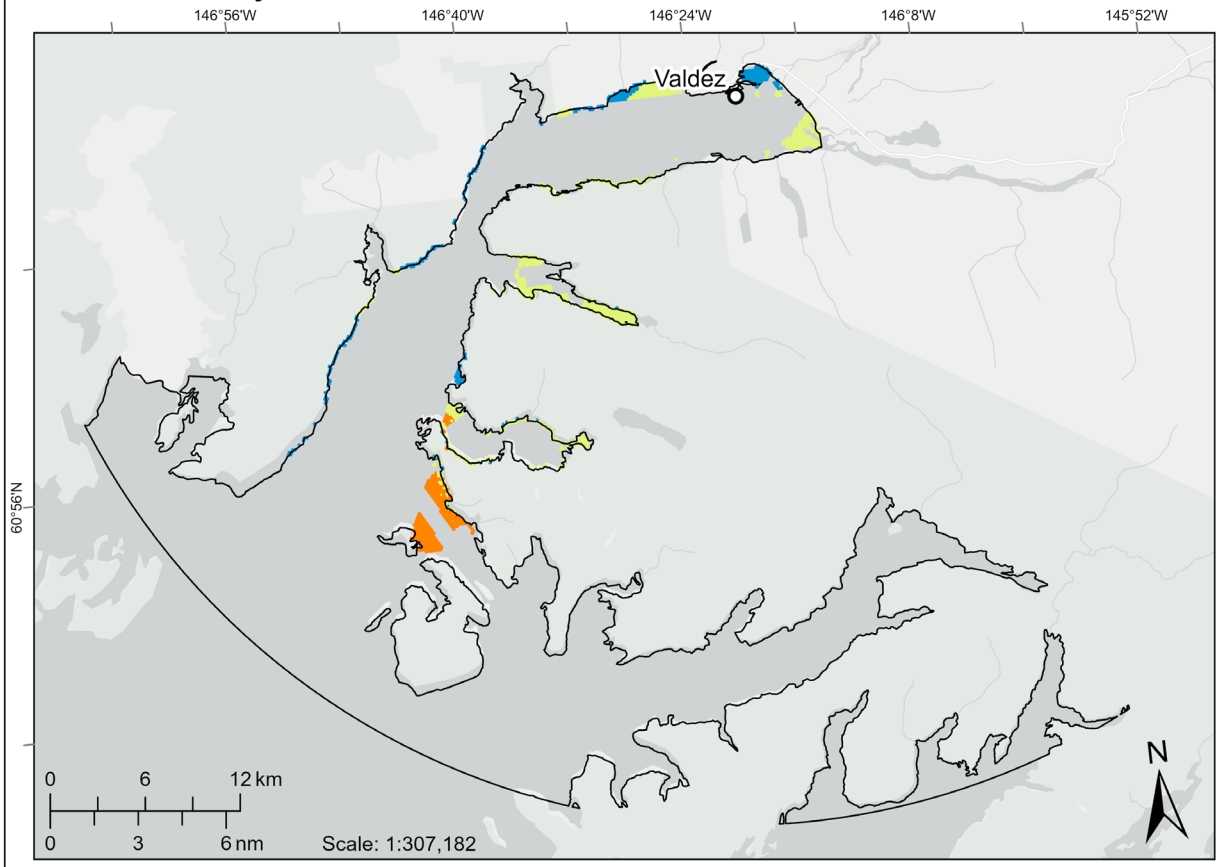
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Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
Cultural Resources
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Seward Study Area
149°52'W
149°36'W
149°20'W
149°4'W
148°48'W
60°8'N
59°52'N
Seward
0
6
12 km
0
3
6 nm
Scale: 1:310,807
N
Cultural Resources
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

Valdez Study Area



Coastal Populated Places: NOAA OCM (2024)

Cultural Resources

- Coastal Populated Places
- Final AOA Study Areas

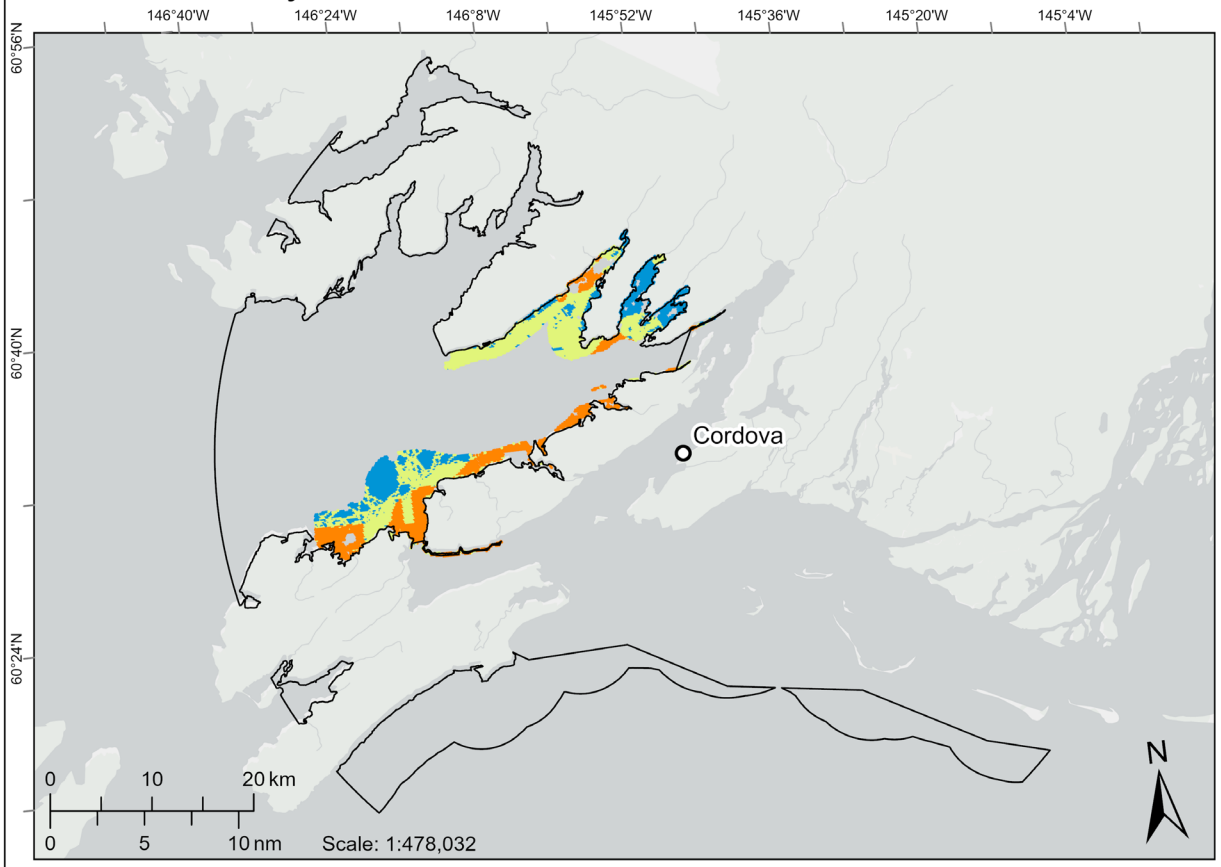
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)

Cultural Resources

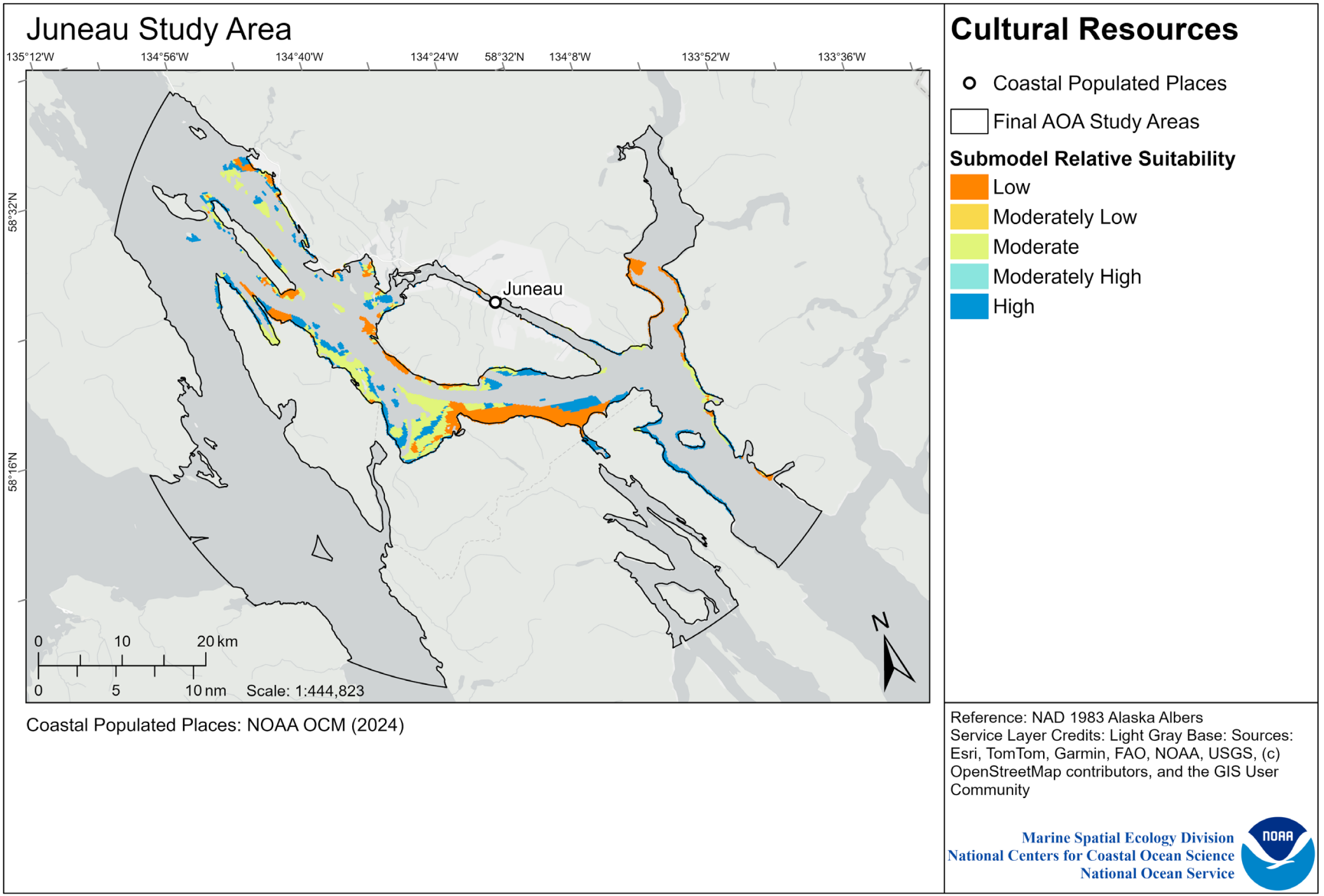
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

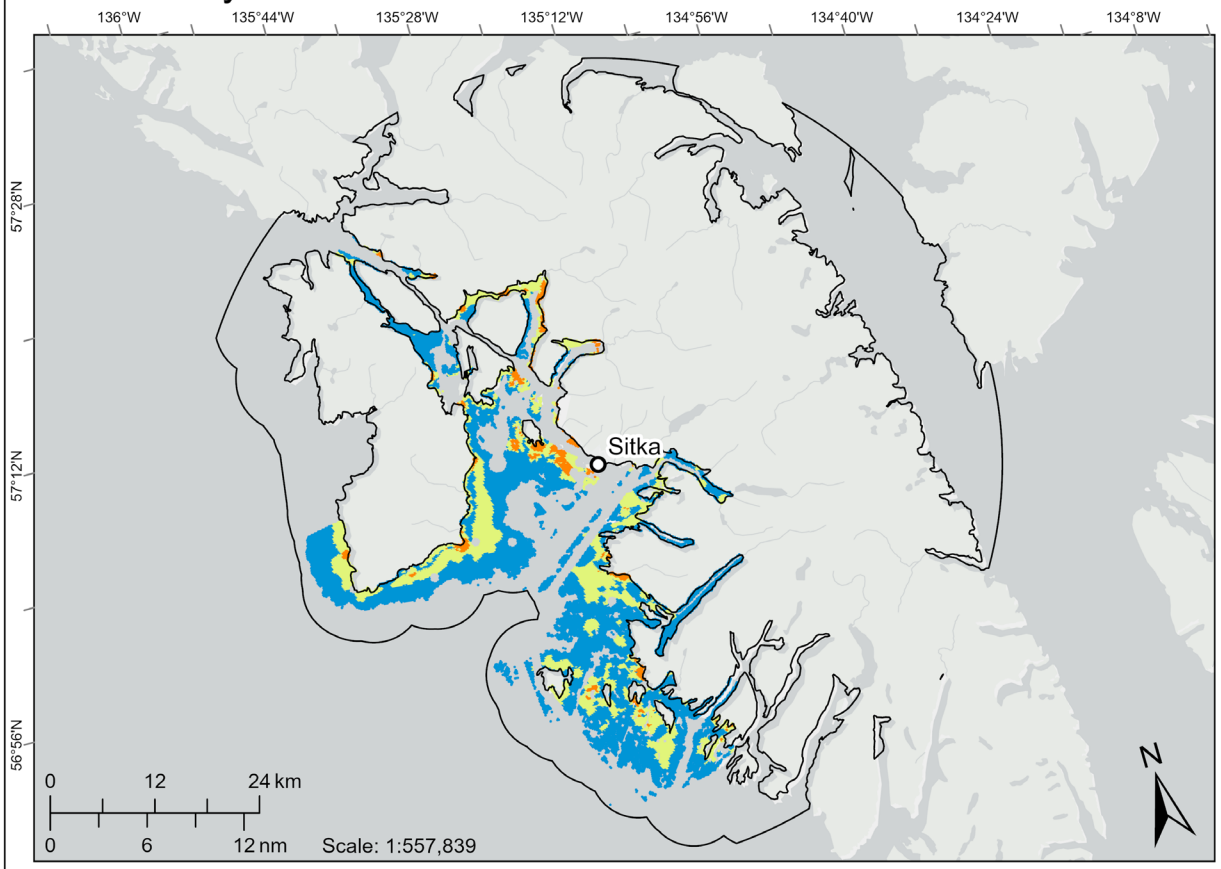
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Juneau Study Area
135°12'W
134°56'W
134°40'W
134°24'W
58°32'N
134°8'W
133°52'W
133°36'W
58°32'N
58°16'N
Juneau
0
10
20 km
0
5
10 nm
Scale: 1:444,823
N
Cultural Resources
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Sitka Study Area



Coastal Populated Places: NOAA OCM (2024)

Cultural Resources

- Coastal Populated Places
- Final AOA Study Areas

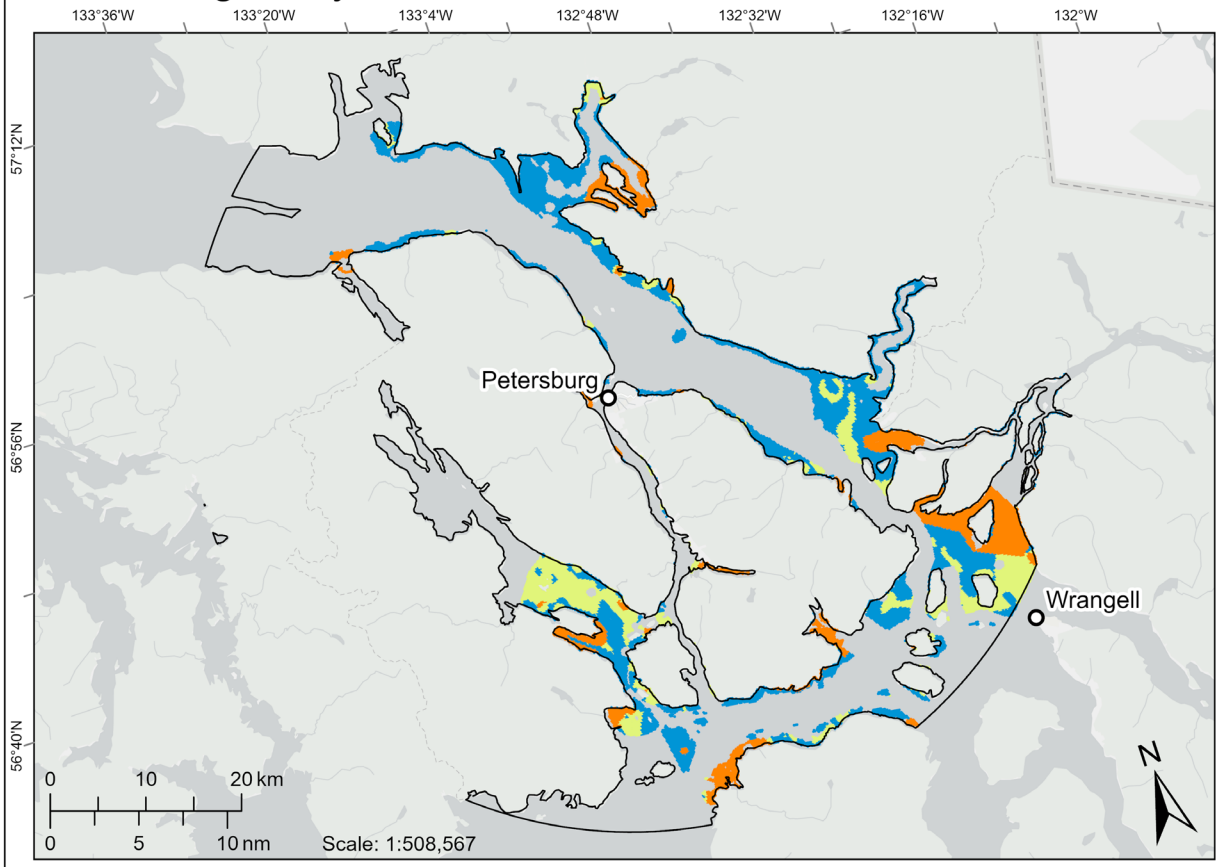
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)

Cultural Resources

- Coastal Populated Places
- Final AOA Study Areas

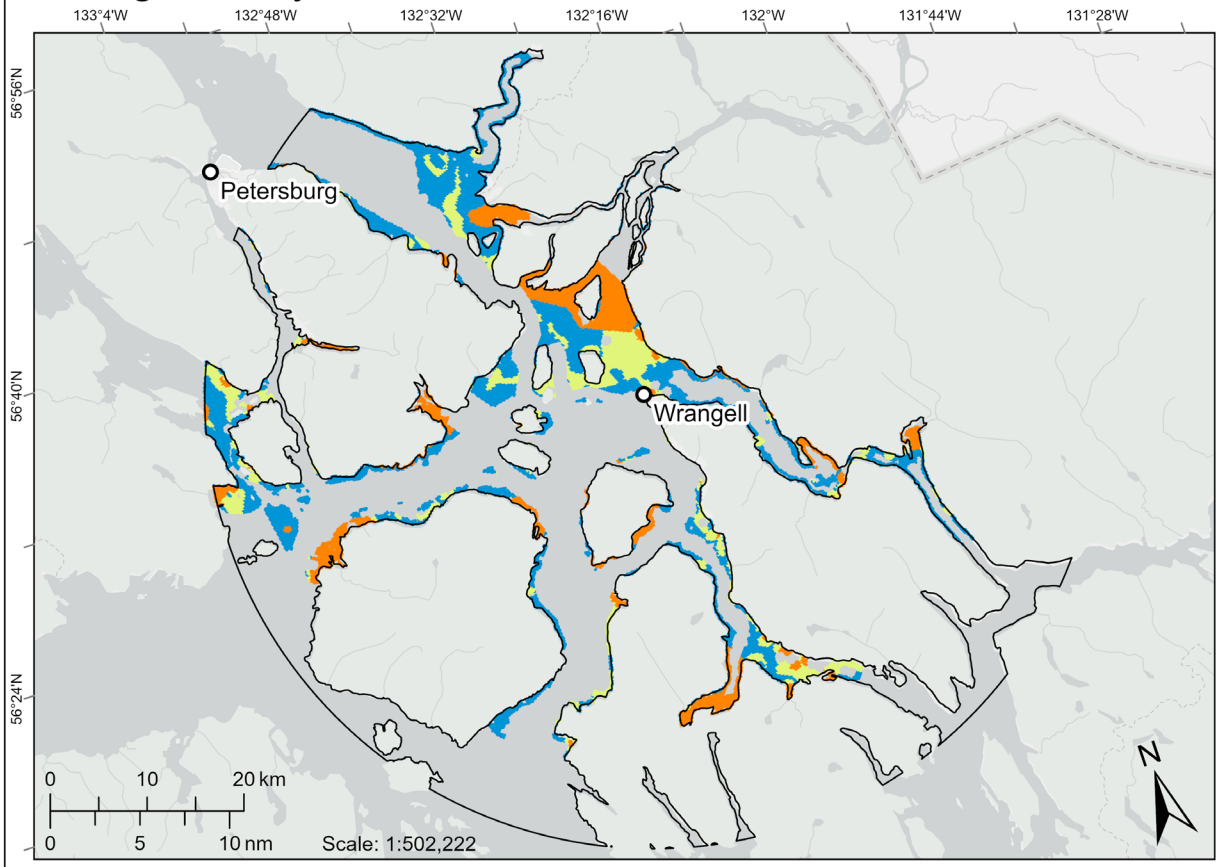
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Wrangell Study Area



Coastal Populated Places: NOAA OCM (2024)

Cultural Resources

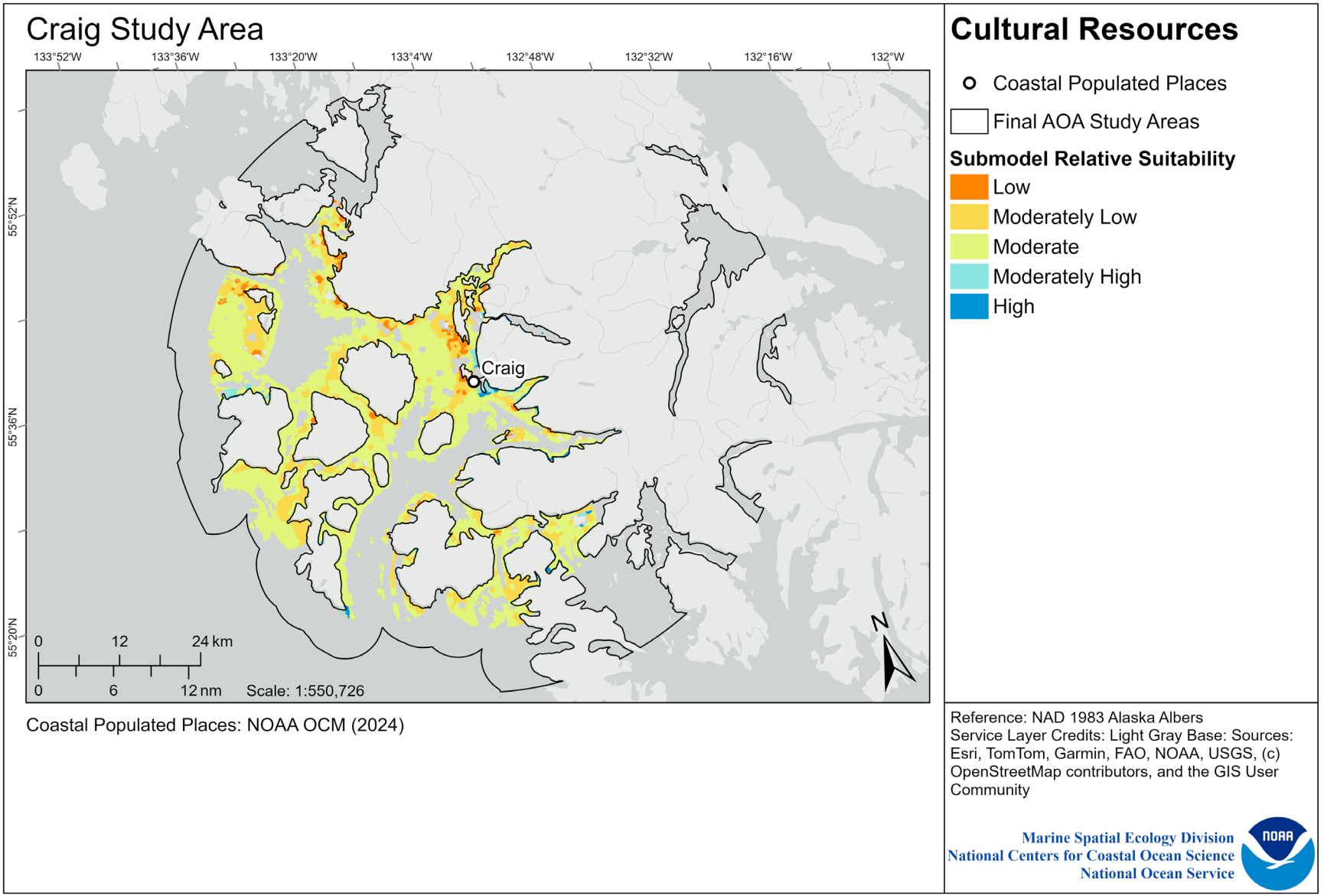
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

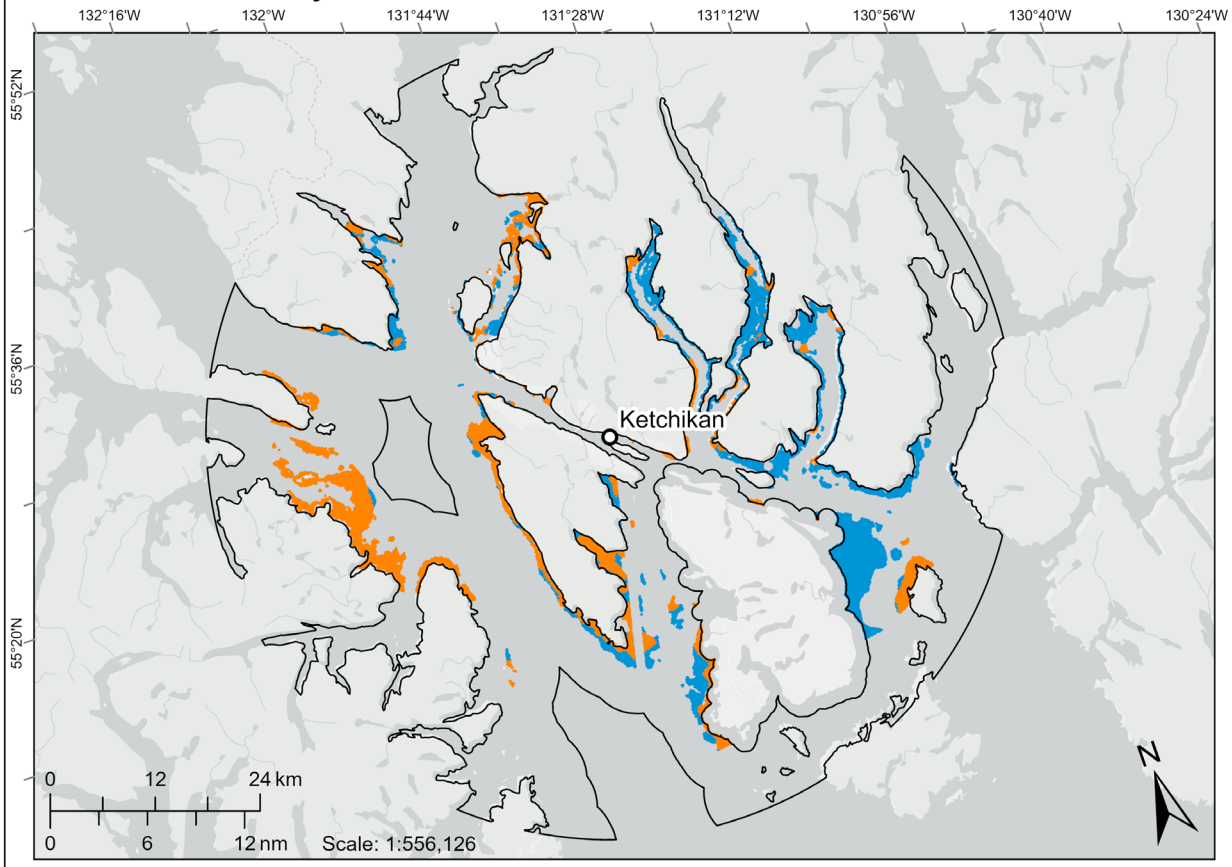
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Craig Study Area
133°52'W
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
55°52'N
55°36'N
55°20'N
Craig
0
12
24 km
0
6
12 nm
Scale: 1:550,726
N
Cultural Resources
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)

Cultural Resources

- Coastal Populated Places
- Final AOA Study Areas

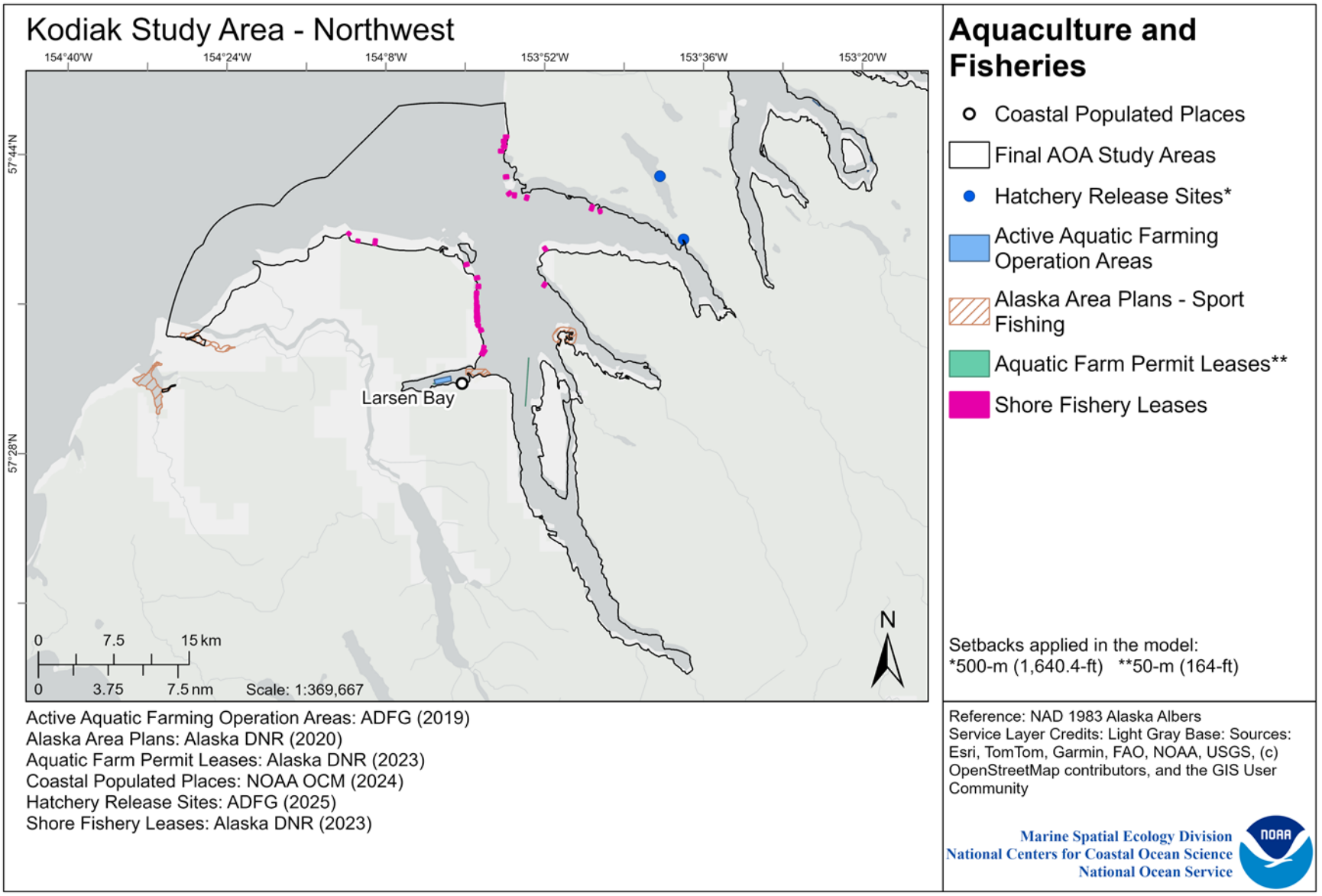
Submodel Relative Suitability

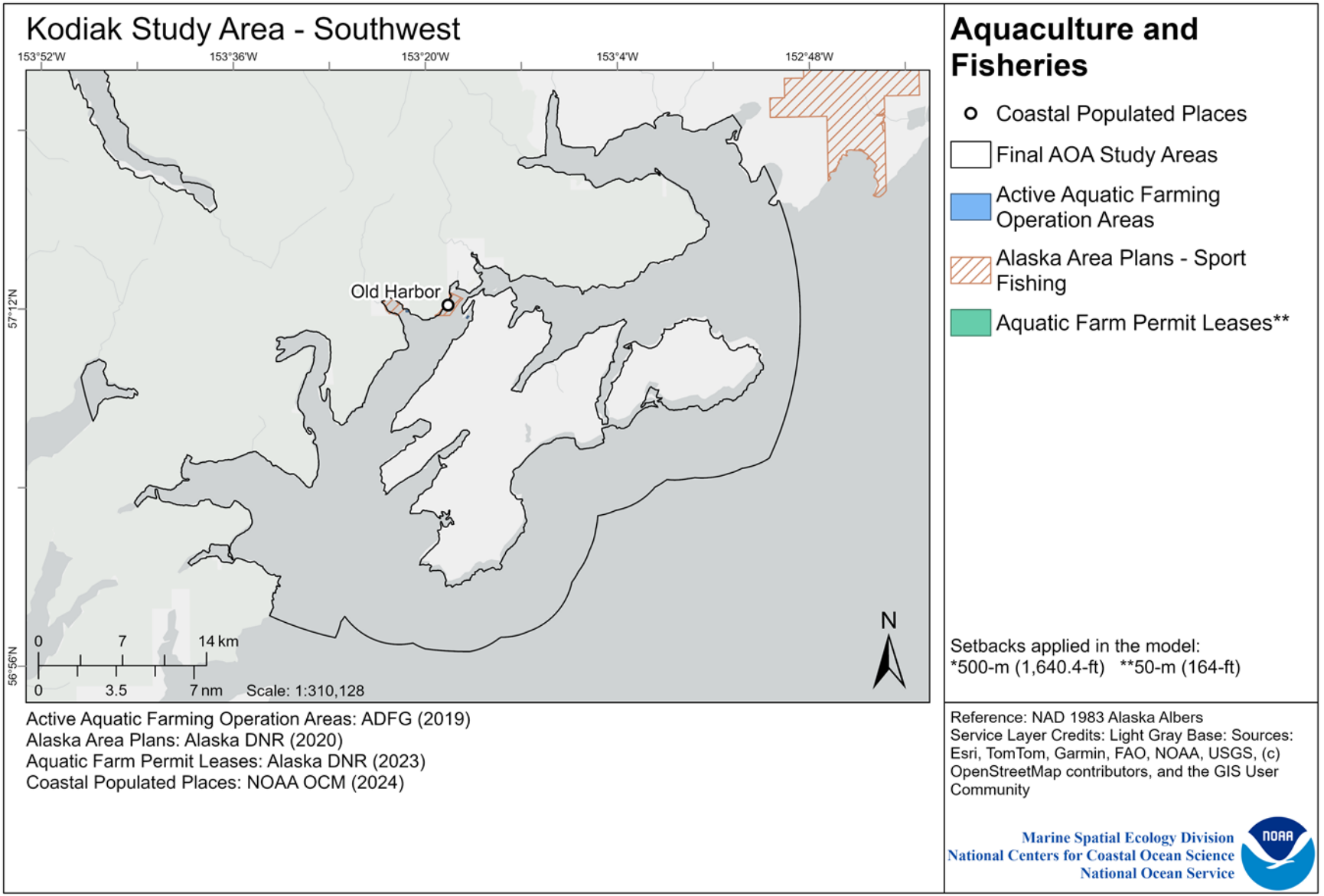
- Low
- Moderately Low
- Moderate
- Moderately High
- High

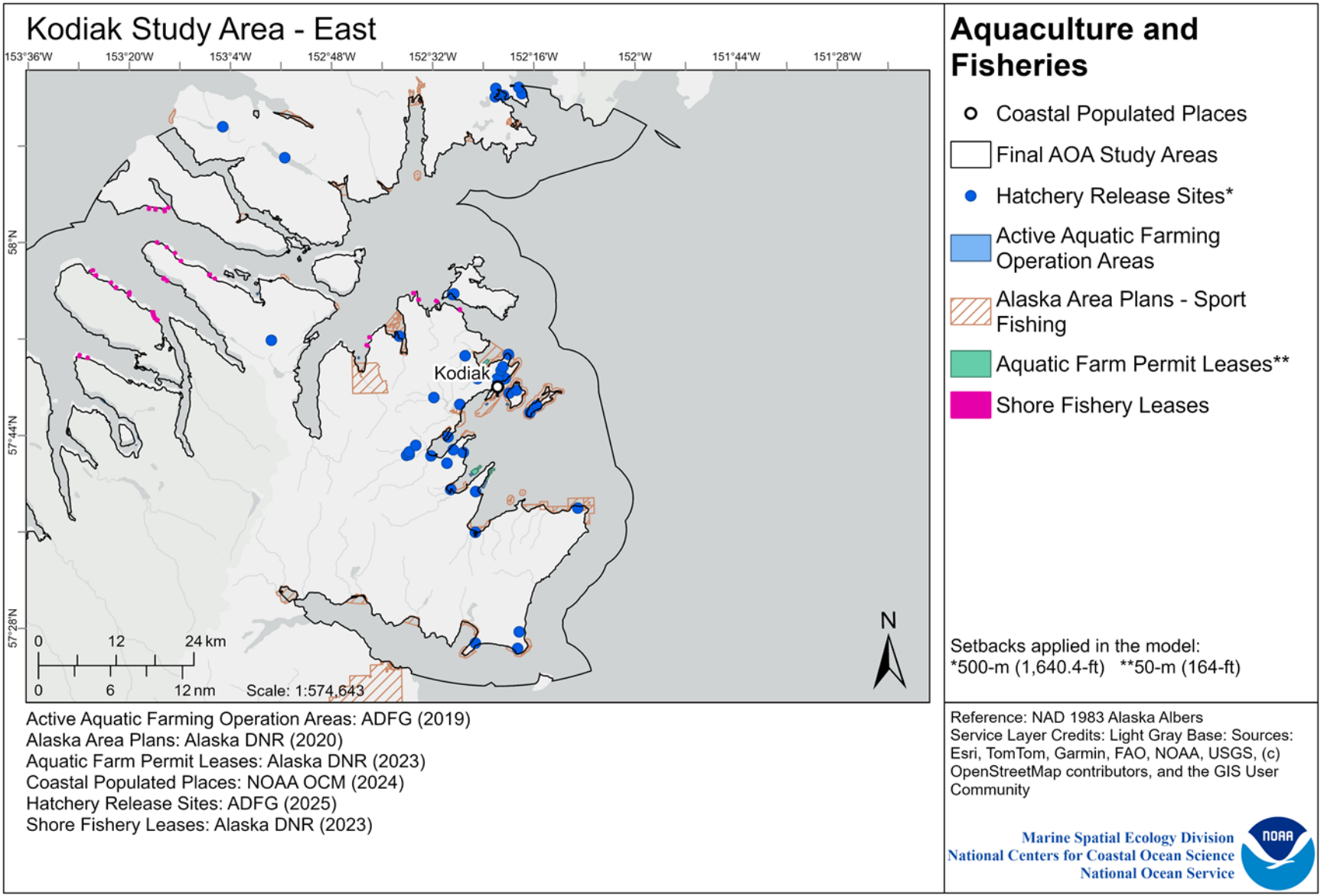
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Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

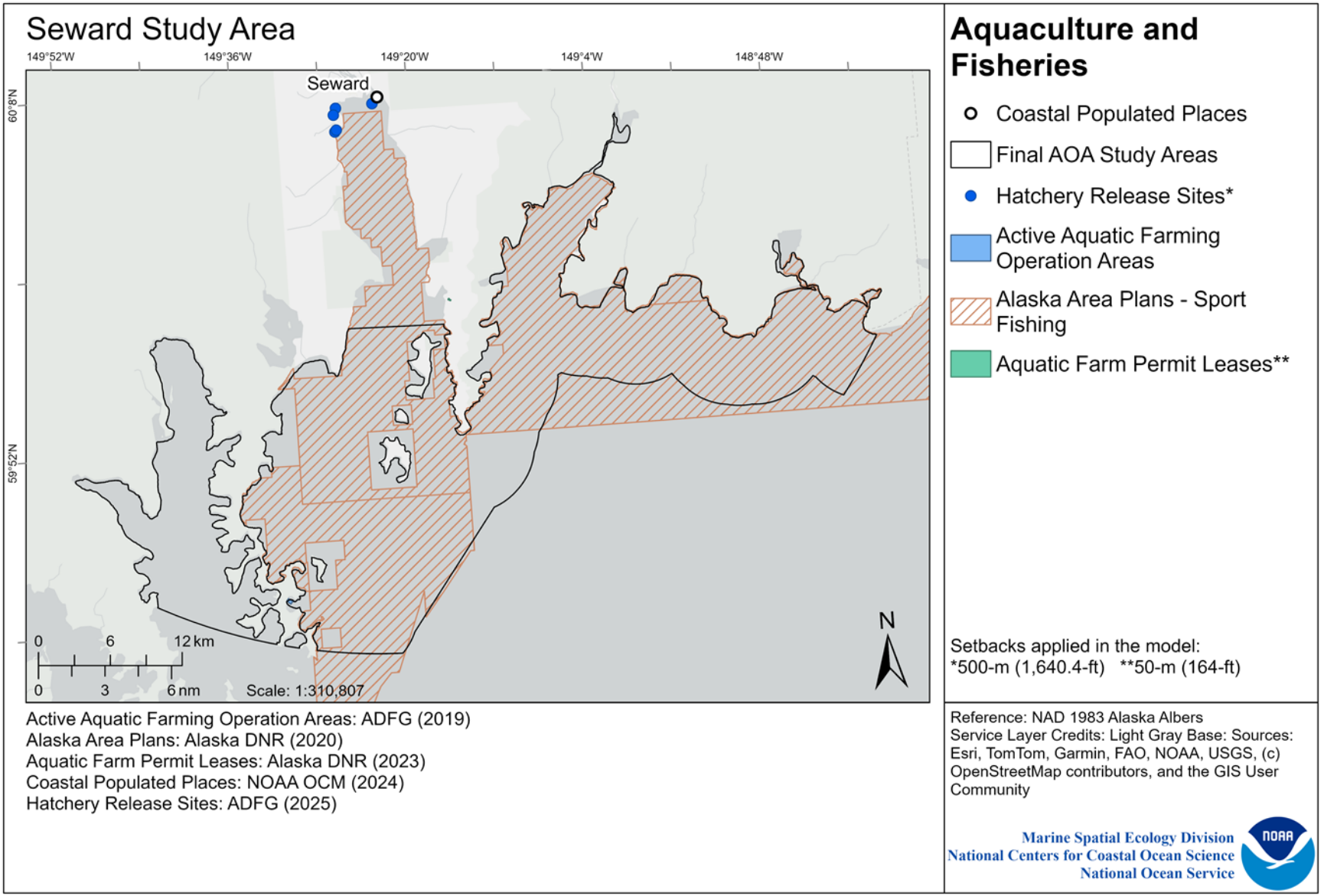
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

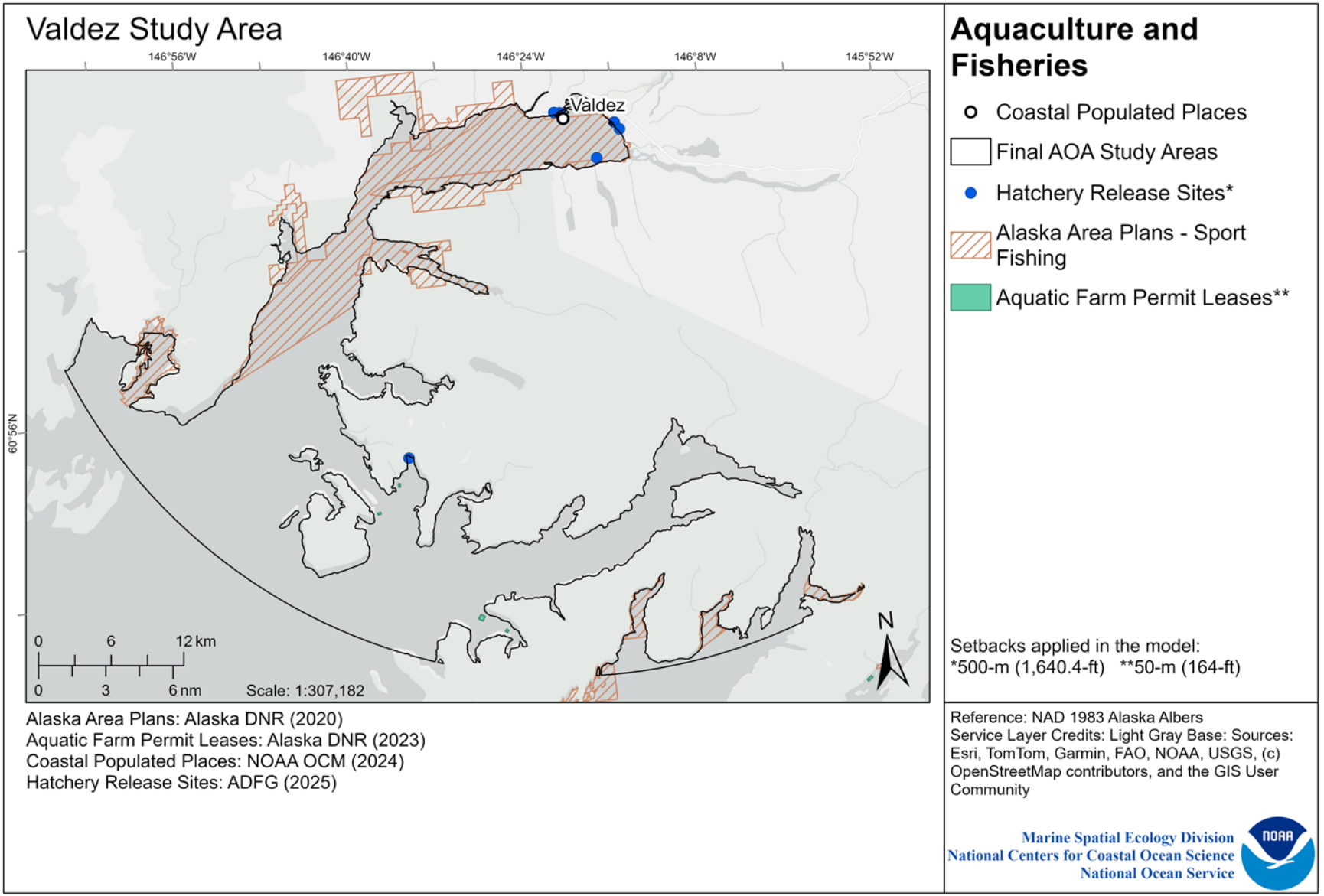
Aquaculture and Fisheries Submodel Maps



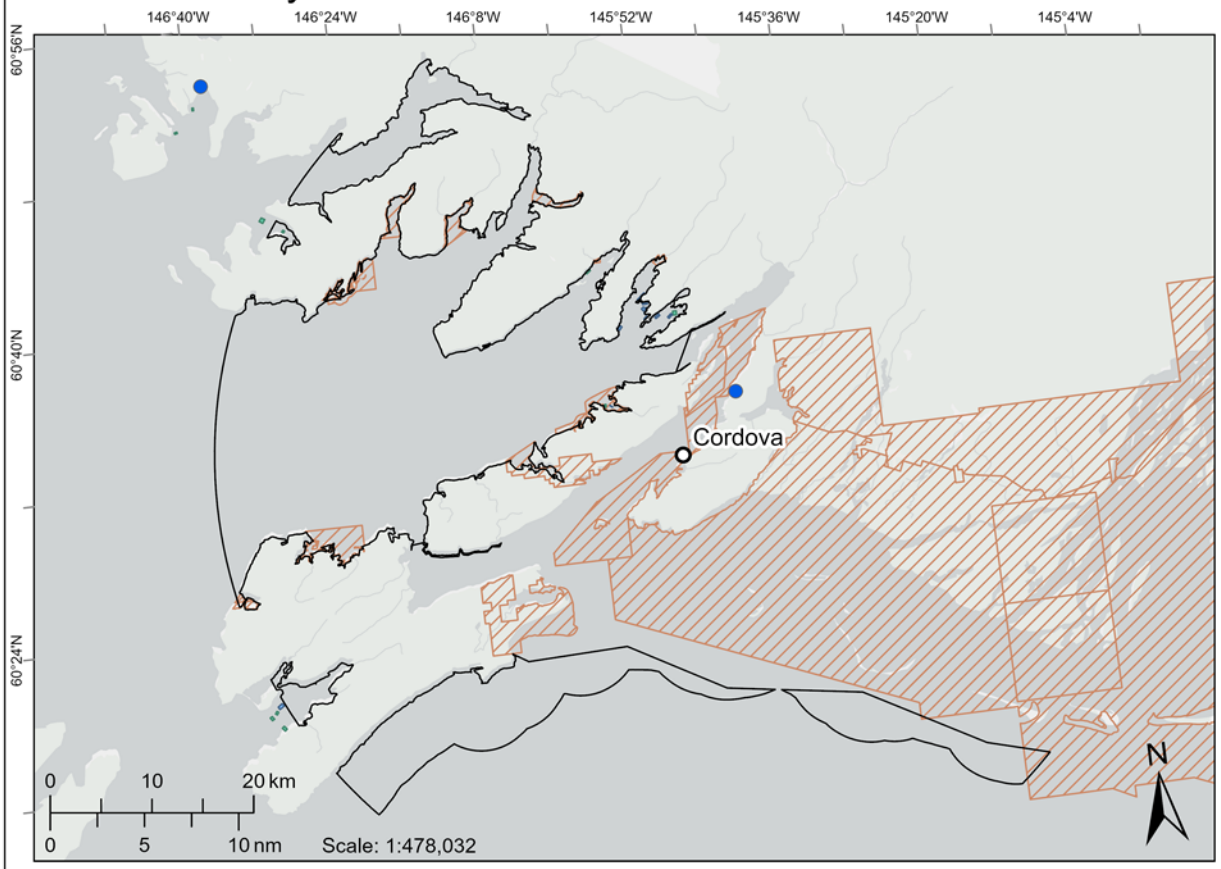

Kodiak Study Area - Southwest
153°52'W
153°36'W
153°20'W
153°4'W
152°48'W
57°12'N
56°56'N
Old Harbor
0
7
14 km
0
3.5
7 nm
Scale: 1:310,128
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Active Aquatic Farming Operation Areas
Alaska Area Plans - Sport Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Hatchery Release Sites*
Active Aquatic Farming Operation Areas
Alaska Area Plans - Sport Fishing
Aquatic Farm Permit Leases**
Shore Fishery Leases
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)
Shore Fishery Leases: Alaska DNR (2023)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Seward Study Area
149°52'W
149°36'W
149°20'W
149°4'W
148°48'W
60°8'N
59°52'N
Seward
0
6
12 km
0
3
6 nm
Scale: 1:310,807
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Hatchery Release Sites*
Active Aquatic Farming Operation Areas
Alaska Area Plans - Sport Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Valdez Study Area
146°56'W
146°40'W
146°24'W
146°8'W
145°52'W
60°56'N
Valdez
0 6 12 km
0 3 6 nm
Scale: 1:307,182
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Hatchery Release Sites*
Alaska Area Plans - Sport Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

Cordova Study Area



Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)

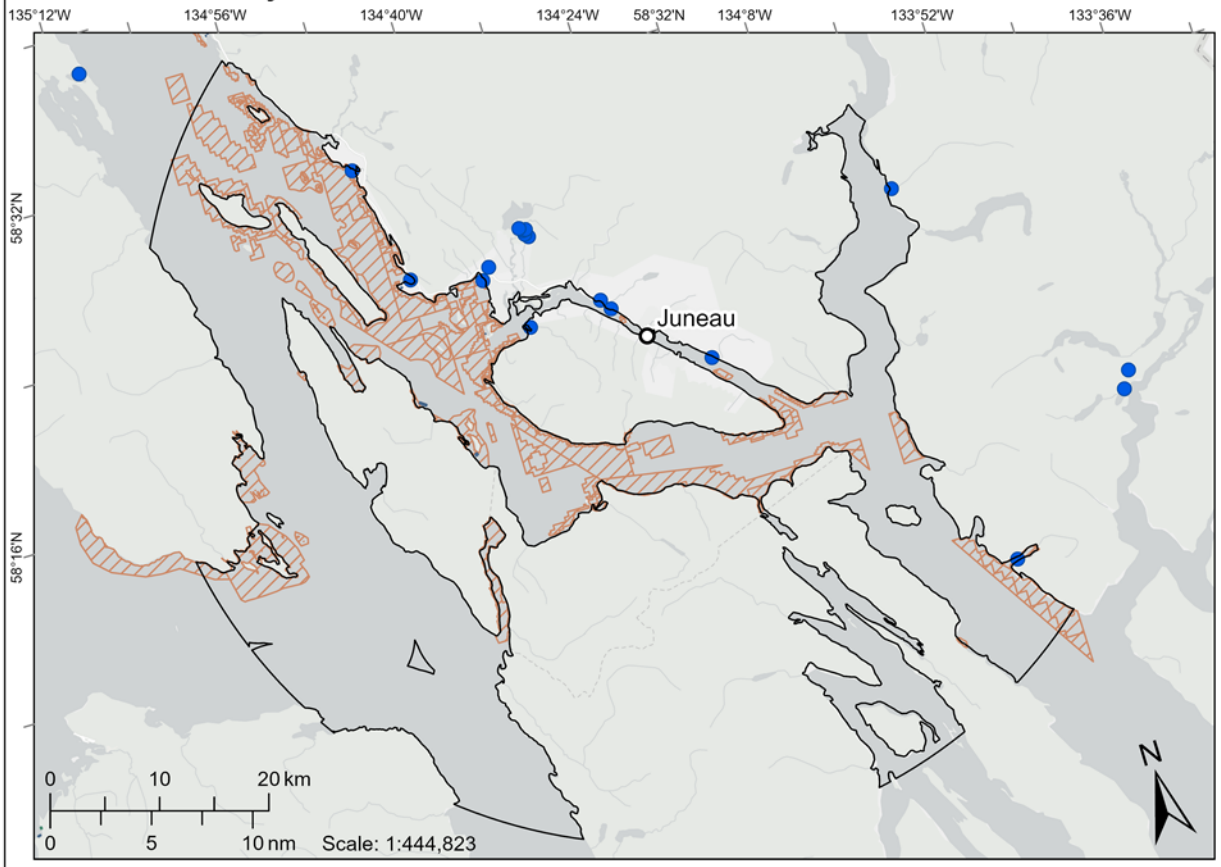
Aquaculture and Fisheries

- Coastal Populated Places
- Final AOA Study Areas
- Hatchery Release Sites*
- Active Aquatic Farming Operation Areas
- Alaska Area Plans - Sport Fishing
- Aquatic Farm Permit Leases**

Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)

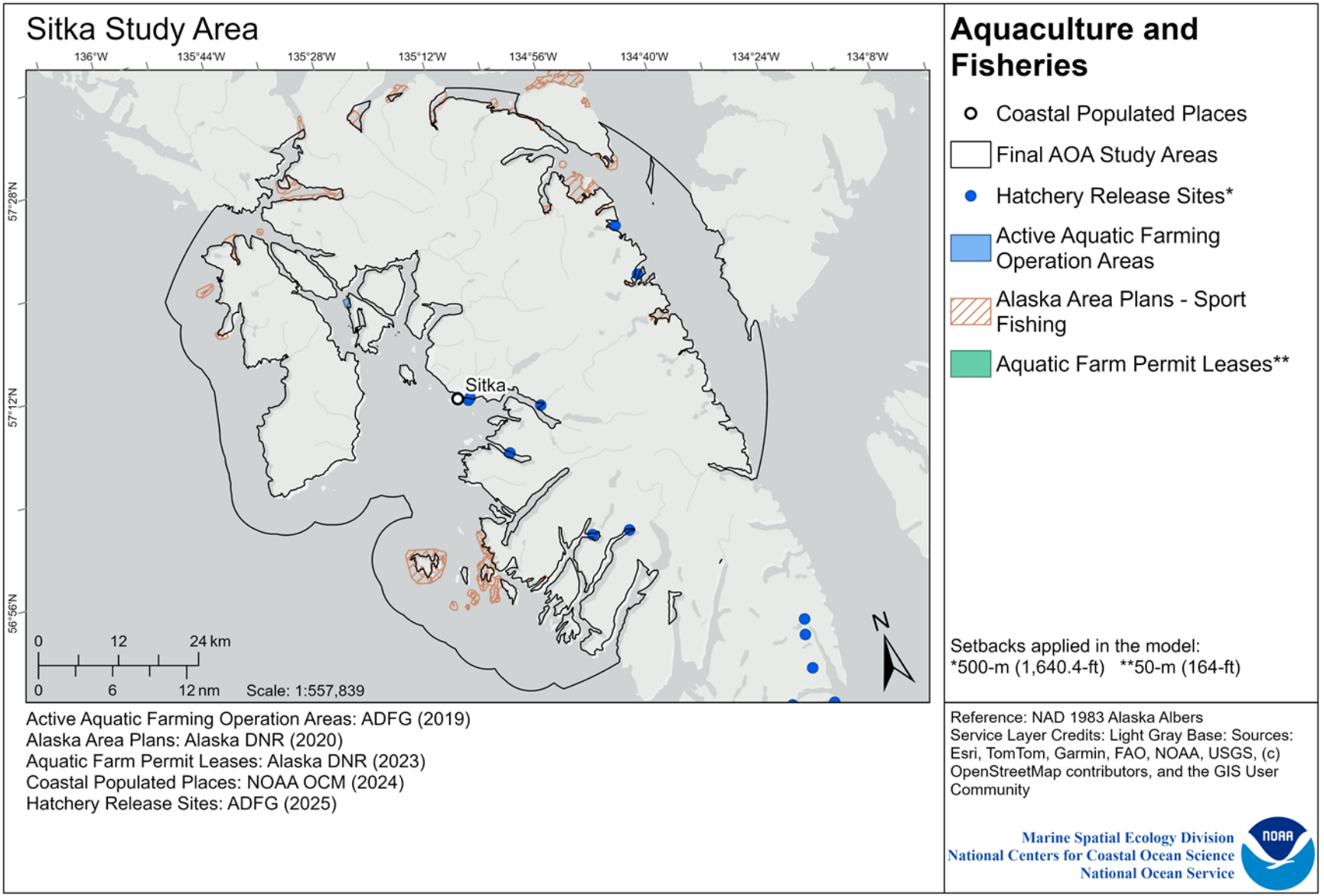
Aquaculture and Fisheries

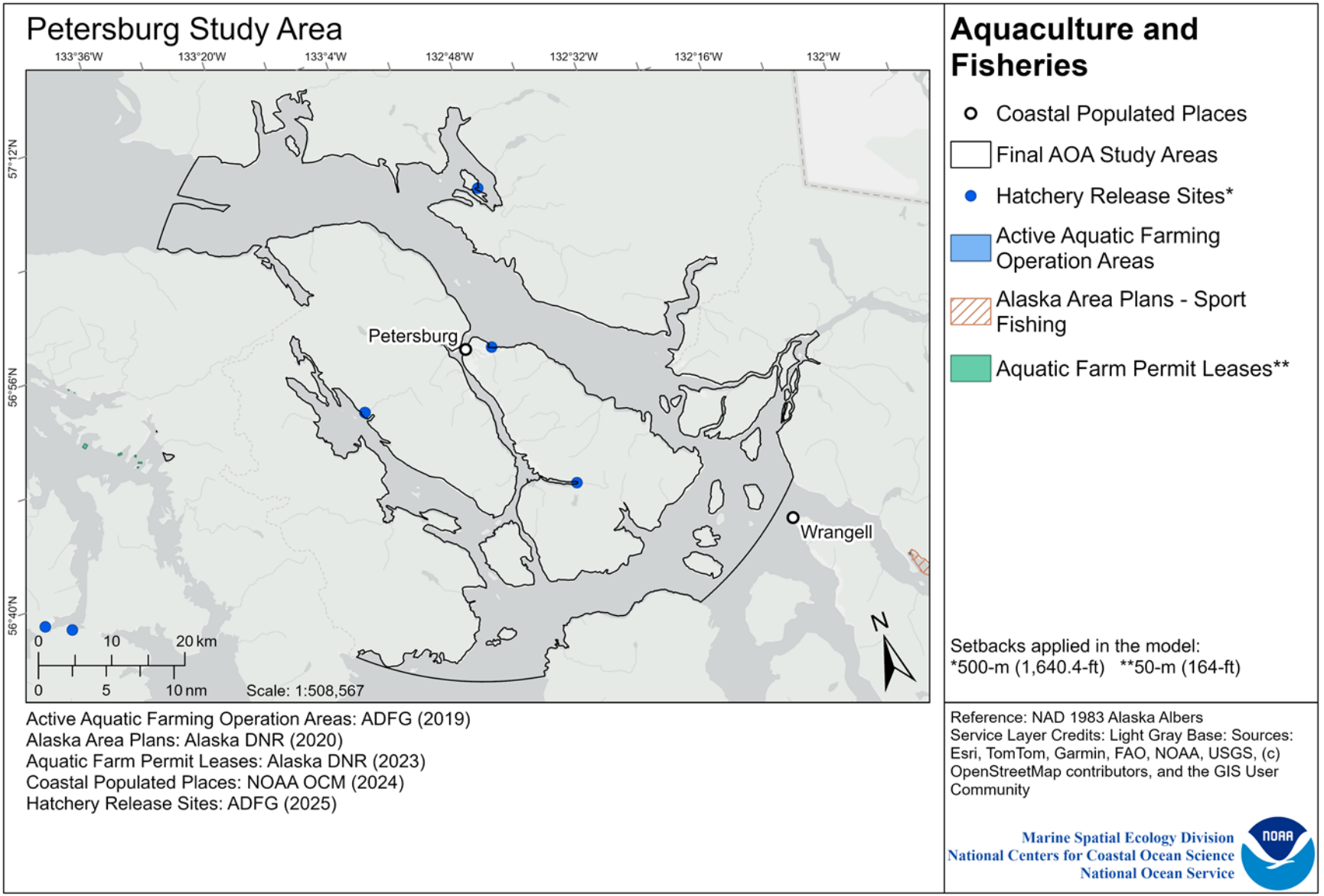
- Coastal Populated Places
- Final AOA Study Areas
- Hatchery Release Sites*
- Active Aquatic Farming Operation Areas
- Alaska Area Plans - Sport Fishing
- Aquatic Farm Permit Leases**

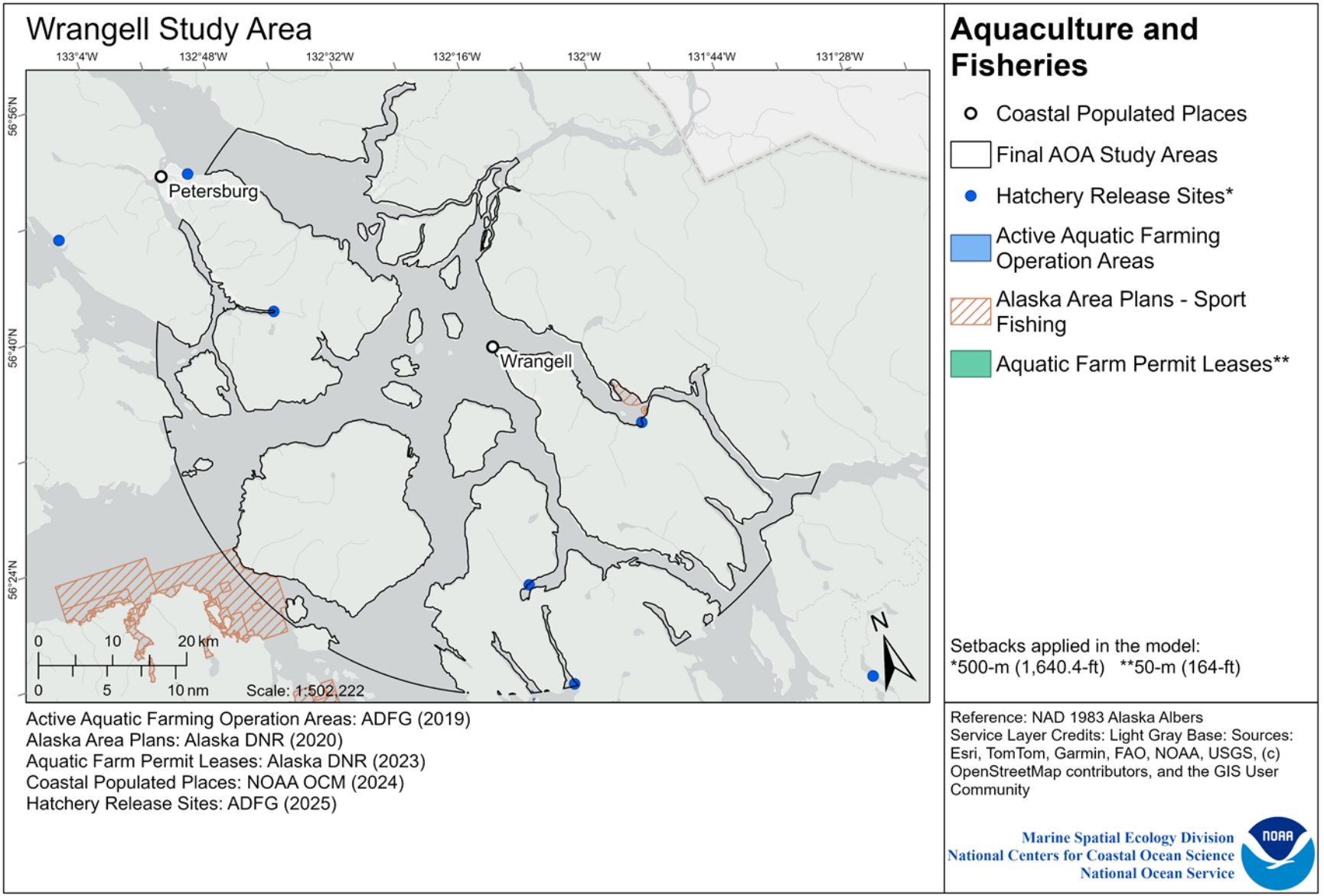
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)

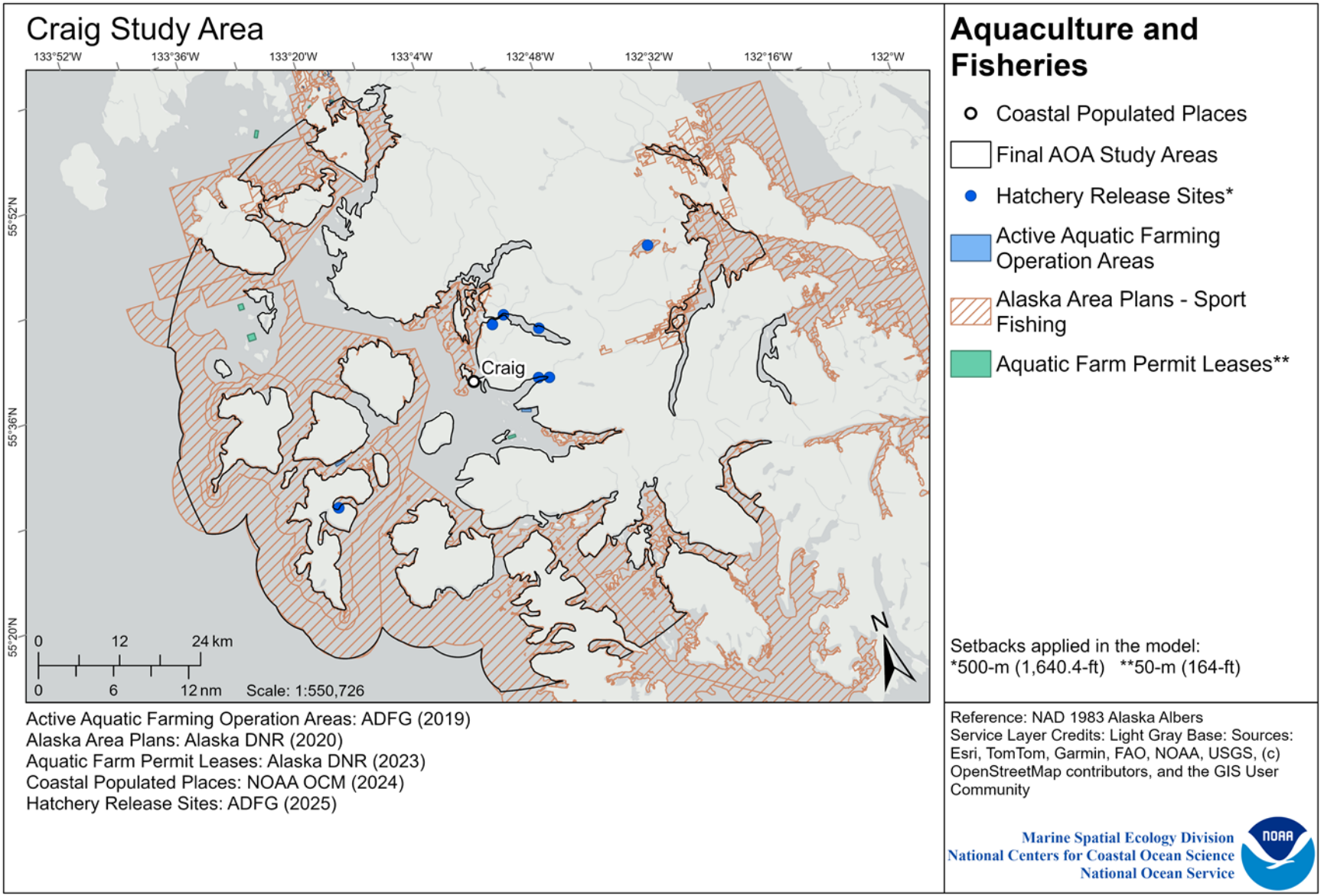
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

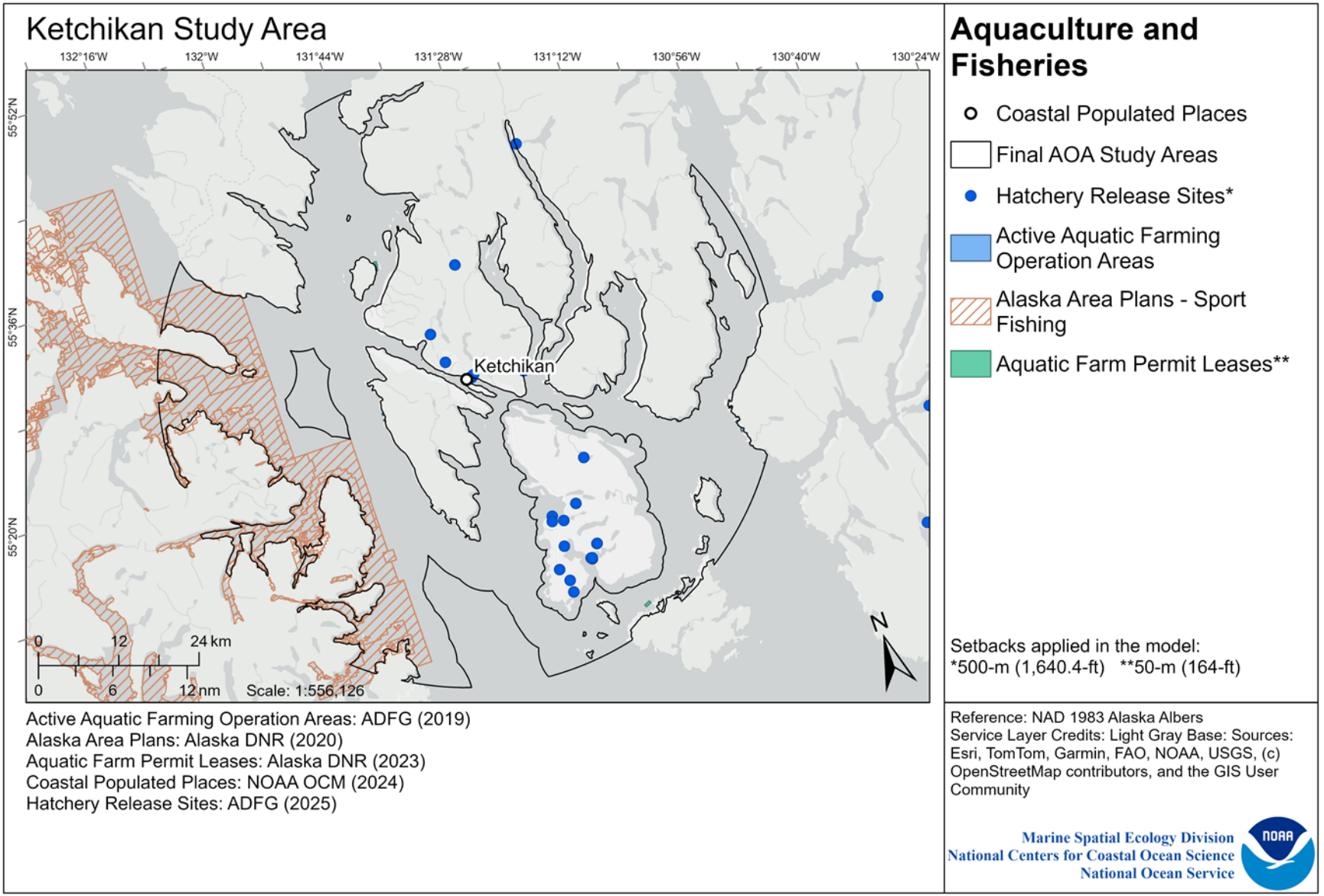
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

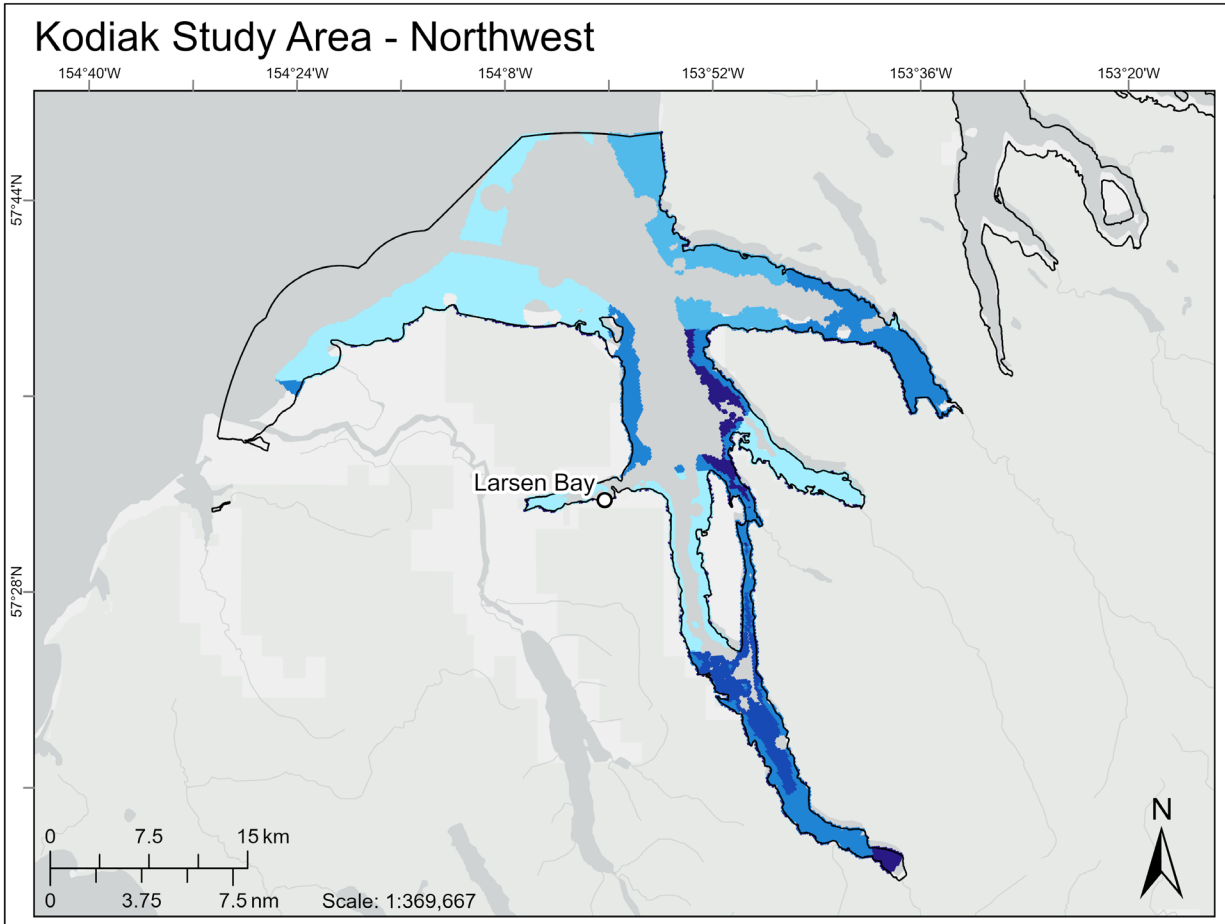

Sitka Study Area
136°W
135°44'W
135°28'W
135°12'W
134°56'W
134°40'W
134°24'W
134°8'W
57°28'N
57°12'N
56°56'N
Sitka
0
12
24 km
0
6
12 nm
Scale: 1:557,839
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Hatchery Release Sites*
Active Aquatic Farming Operation Areas
Alaska Area Plans - Sport Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Petersburg Study Area
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
57°12'N
56°56'N
56°40'N
Petersburg
Wrangell
0
10
20 km
0
5
10 nm
Scale: 1:508,567
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Hatchery Release Sites*
Active Aquatic Farming Operation Areas
Alaska Area Plans - Sport Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Wrangell Study Area
133°4'W
132°48'W
132°32'W
132°16'W
132°W
131°44'W
131°28'W
56°56'N
56°40'N
56°24'N
Petersburg
Wrangell
0
10
20 km
0
5
10 nm
Scale: 1:502,222
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Hatchery Release Sites*
Active Aquatic Farming Operation Areas
Alaska Area Plans - Sport Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Craig Study Area
133°52'W
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
55°52'N
55°36'N
55°20'N
Craig
0
12
24 km
0
6
12 nm
Scale: 1:550,726
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Hatchery Release Sites*
Active Aquatic Farming Operation Areas
Alaska Area Plans - Sport Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Ketchikan Study Area
132°16'W
132°W
131°44'W
131°28'W
131°12'W
130°56'W
130°40'W
130°24'W
55°52'N
55°36'N
55°20'N
Ketchikan
0
12
24 km
0
6
12 nm
Scale: 1:556,126
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Hatchery Release Sites*
Active Aquatic Farming Operation Areas
Alaska Area Plans - Sport Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Fisheries Landings Combined Data Layer

- Coastal Populated Places
- Final AOA Study Areas

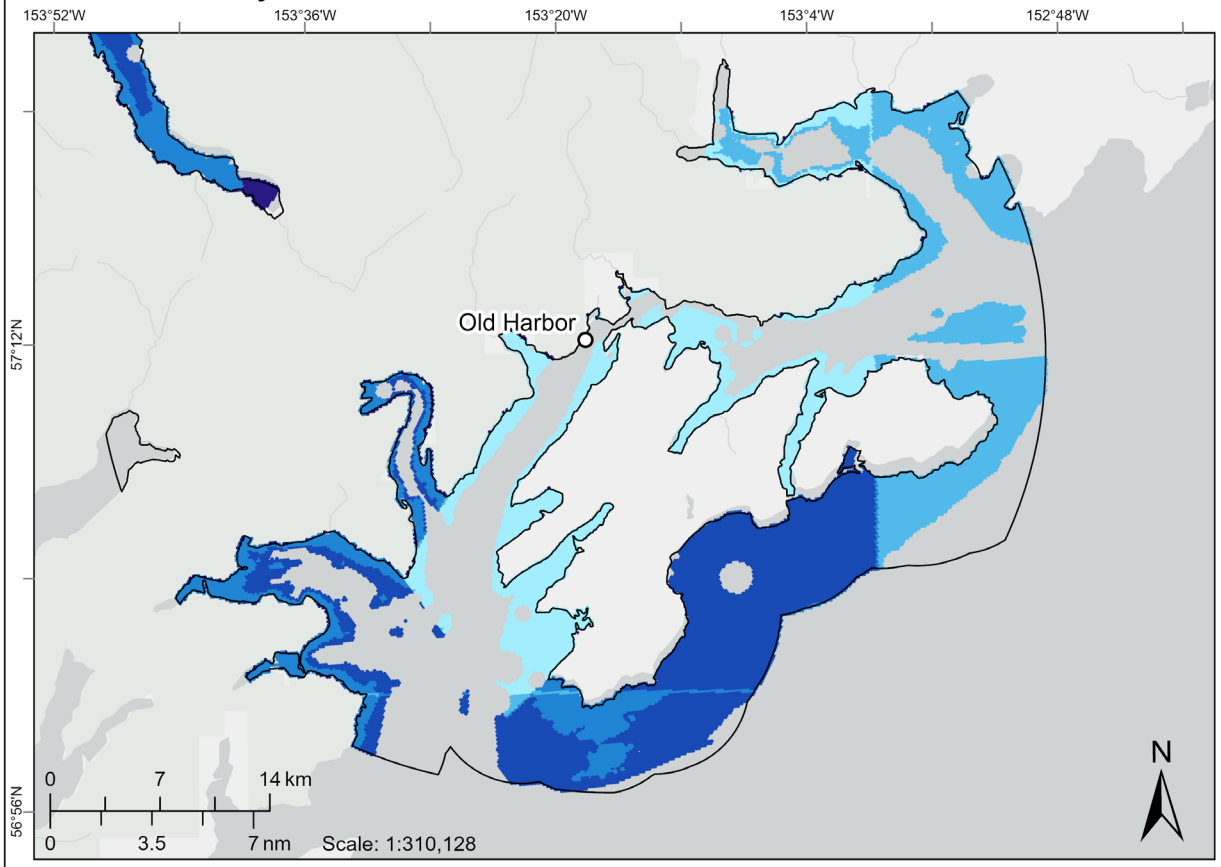
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Fisheries Landings Combined Data Layer

- Coastal Populated Places
- Final AOA Study Areas

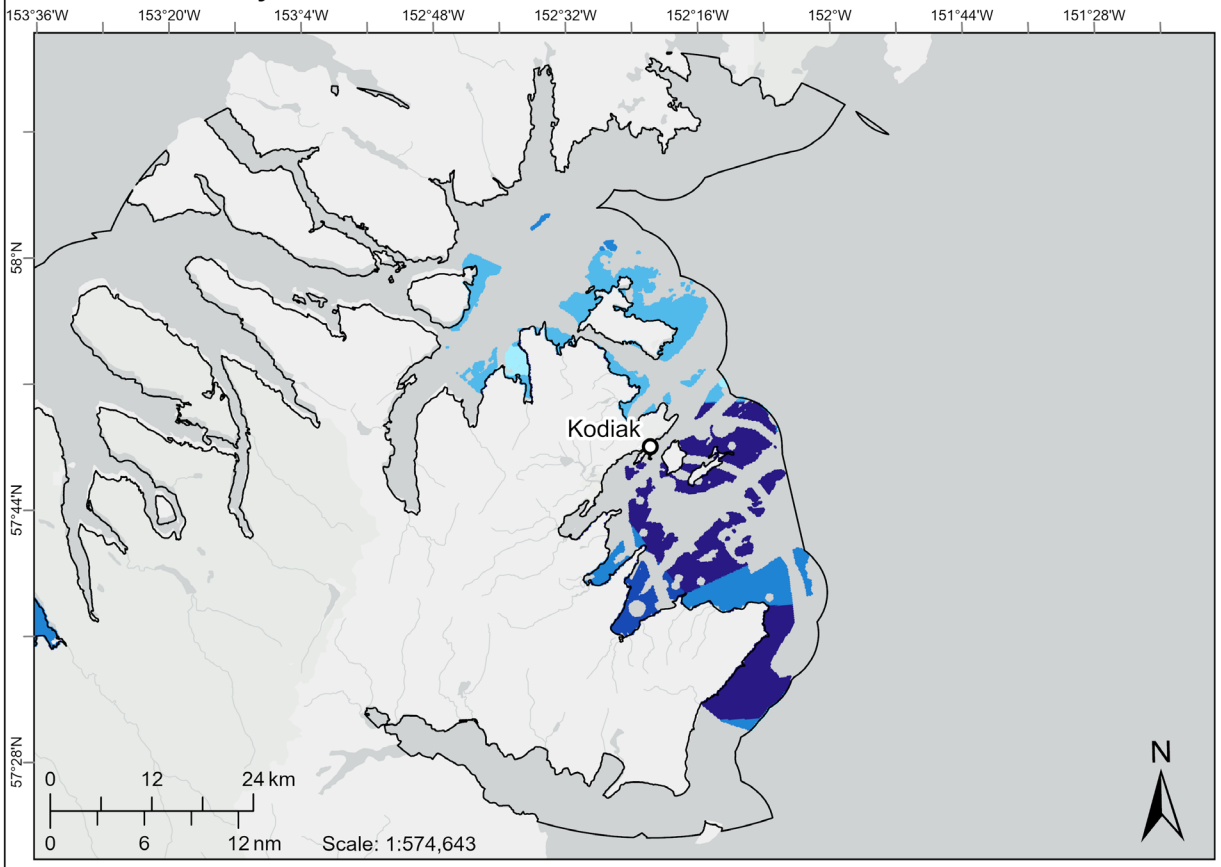
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Kodiak Study Area - East



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Fisheries Landings Combined Data Layer

- Coastal Populated Places
- Final AOA Study Areas

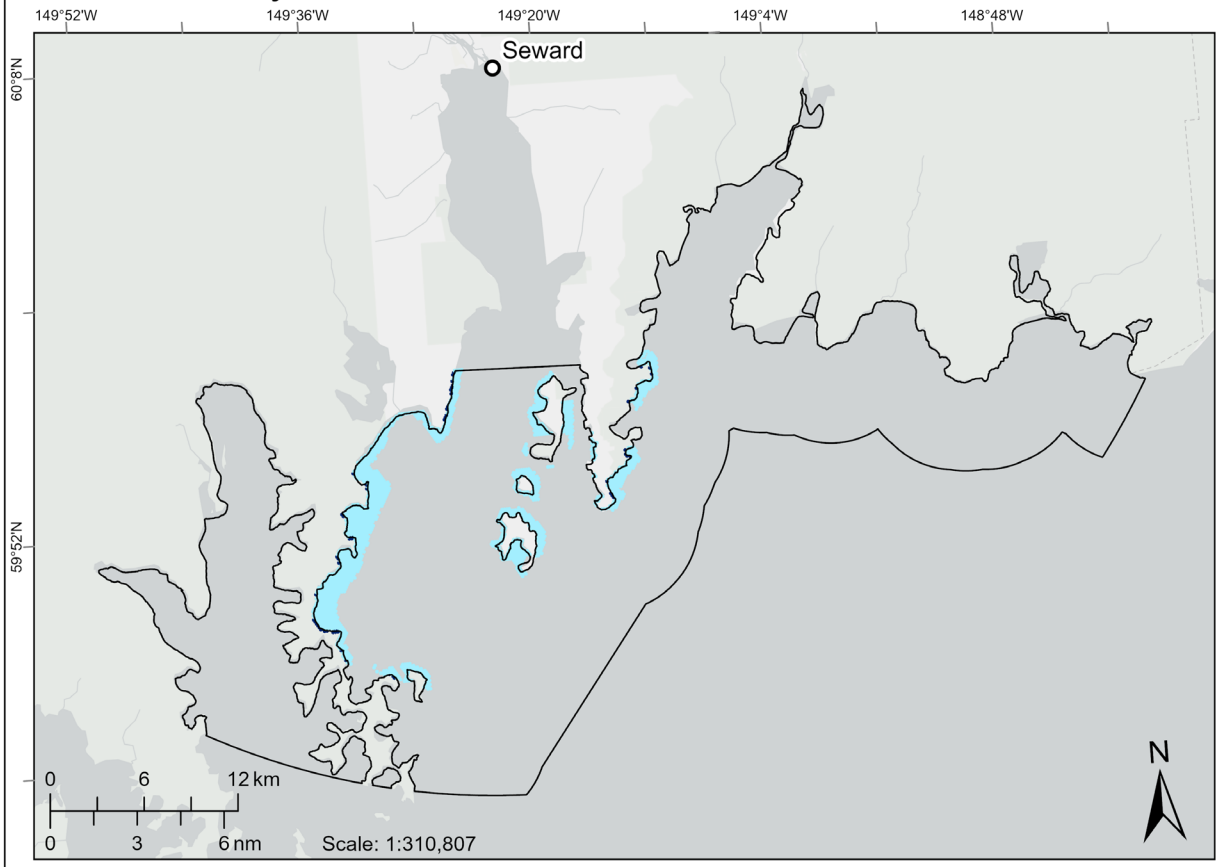
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Seward Study Area



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Fisheries Landings Combined Data Layer

- Coastal Populated Places
- Final AOA Study Areas

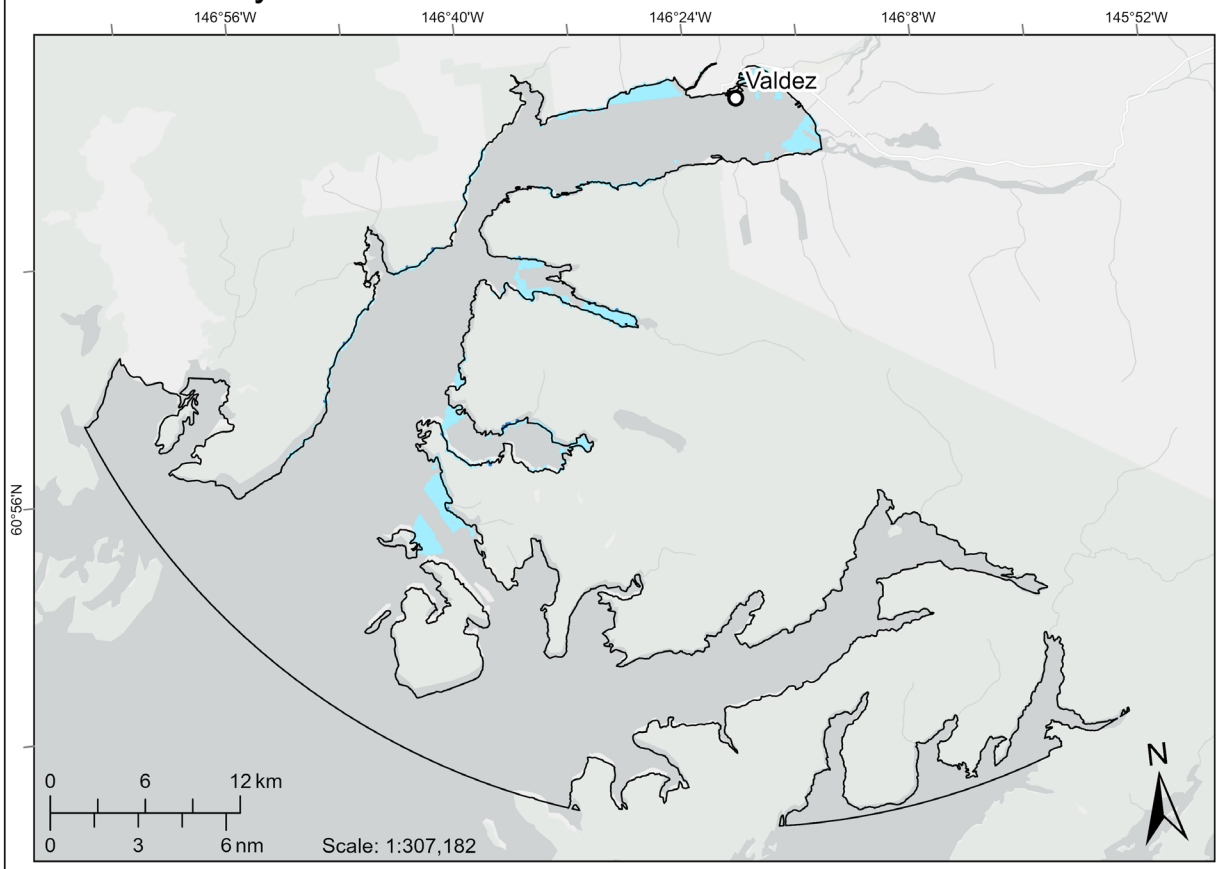
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Valdez Study Area



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Fisheries Landings Combined Data Layer

- Coastal Populated Places
- Final AOA Study Areas

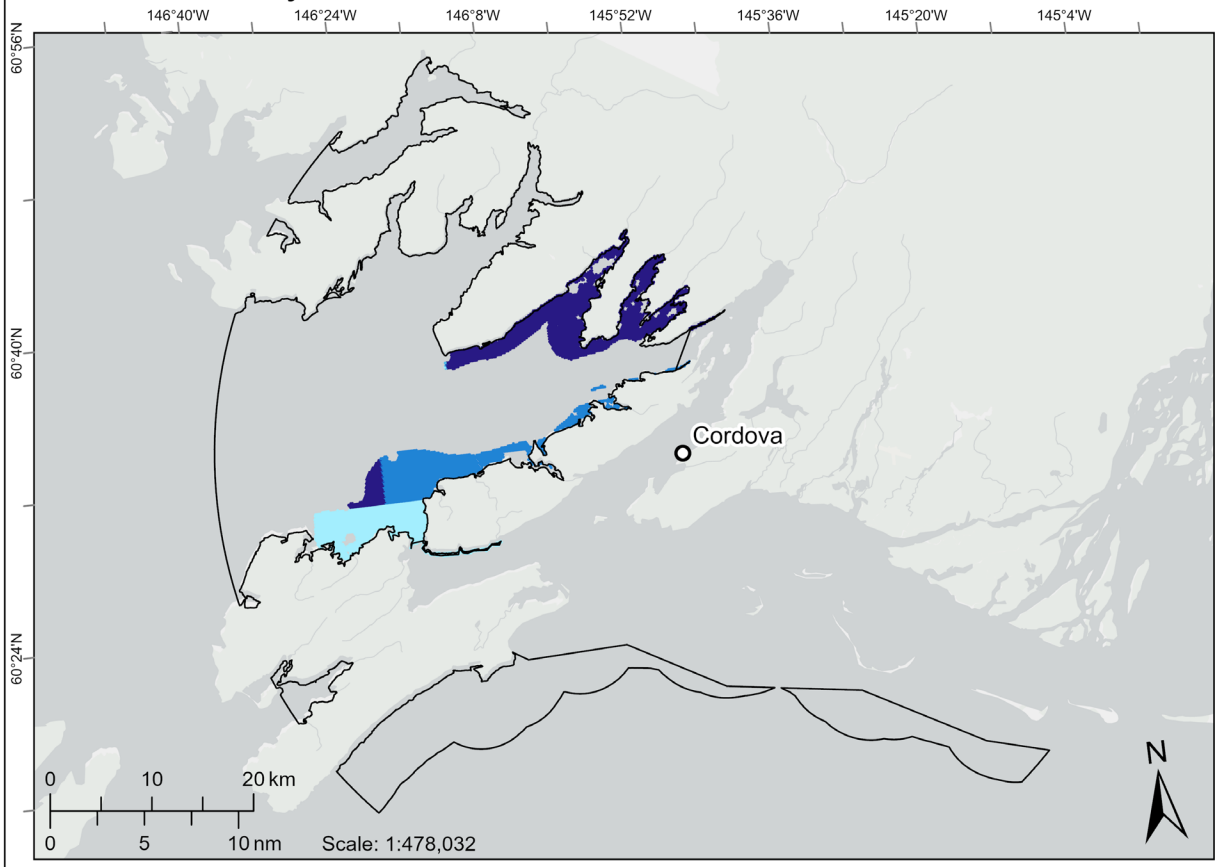
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Cordova Study Area



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Fisheries Landings Combined Data Layer

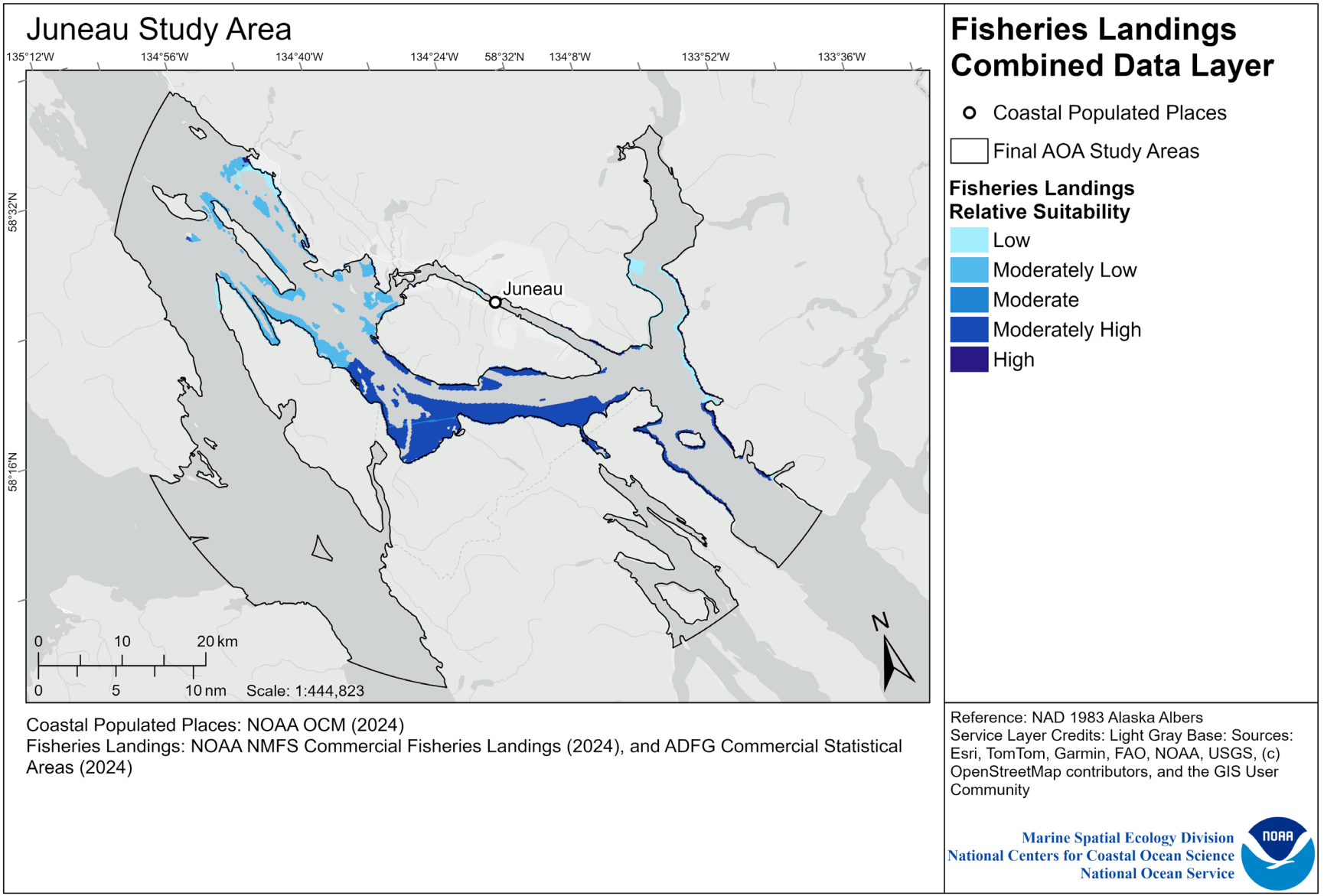
- Coastal Populated Places
- Final AOA Study Areas

Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

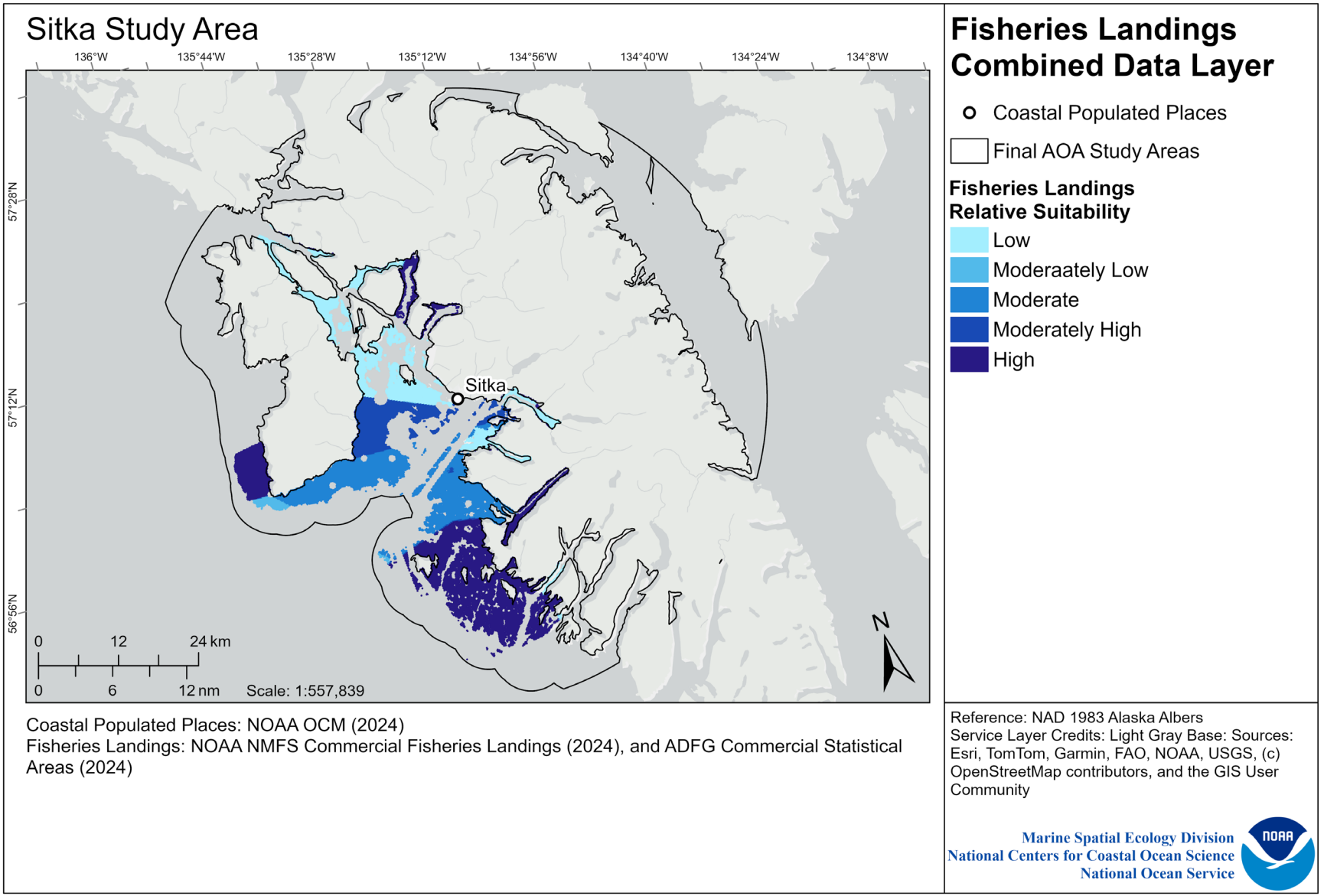
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National Ocean Service



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

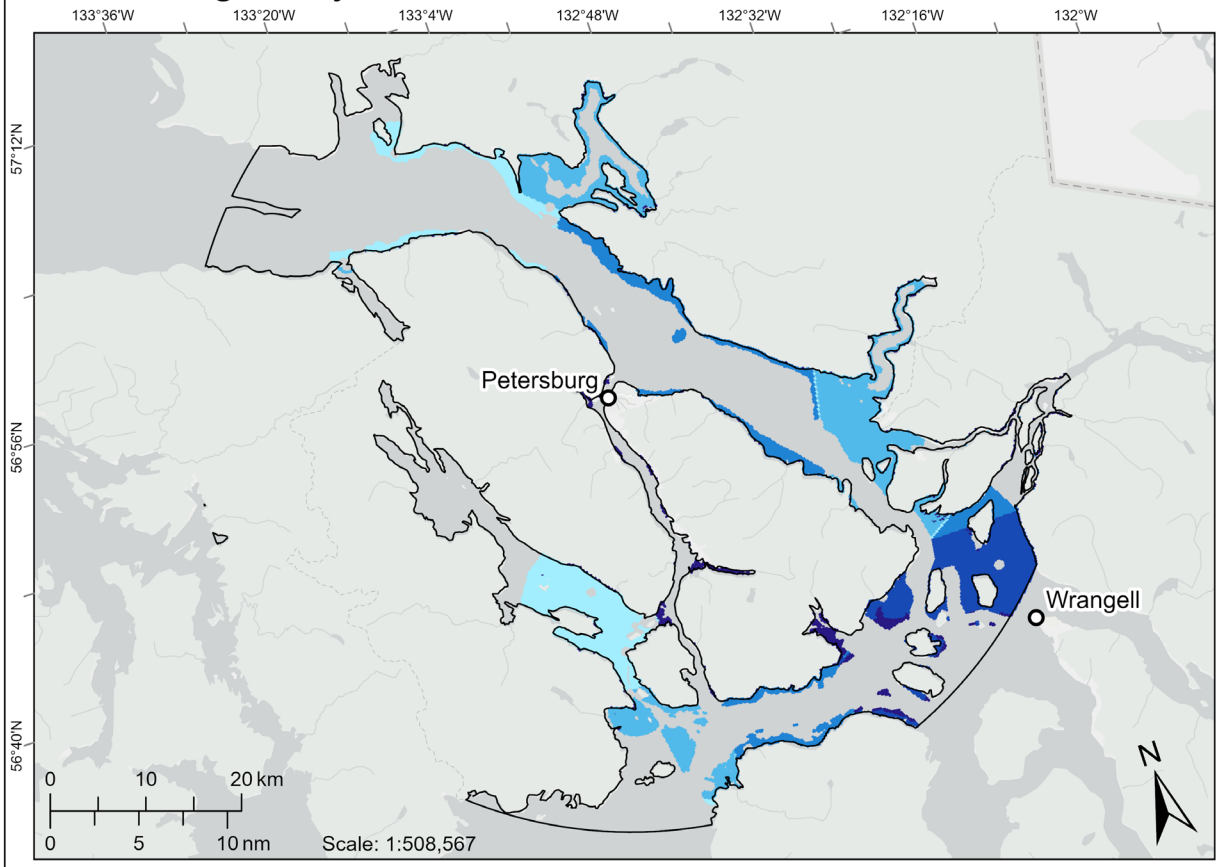


Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Fisheries Landings Combined Data Layer

- Coastal Populated Places
- Final AOA Study Areas

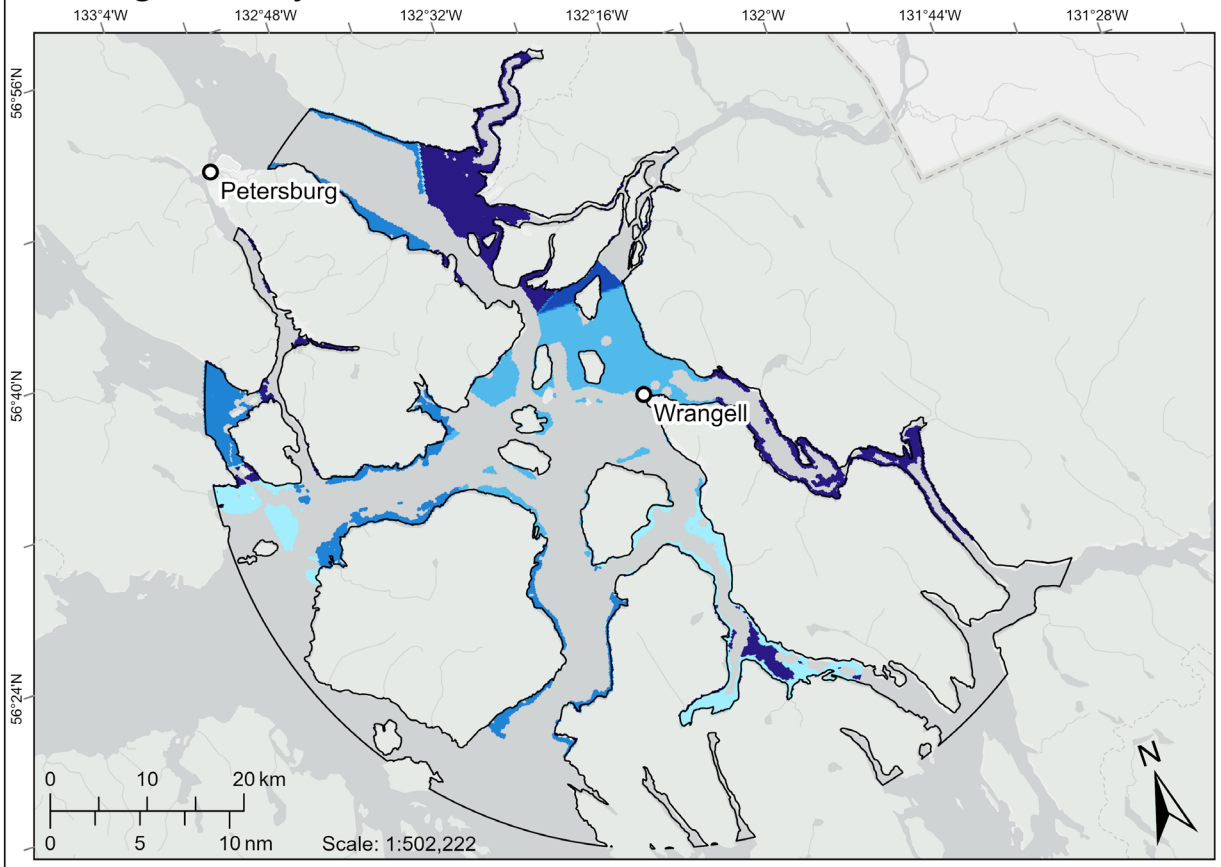
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Wrangell Study Area



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Fisheries Landings Combined Data Layer

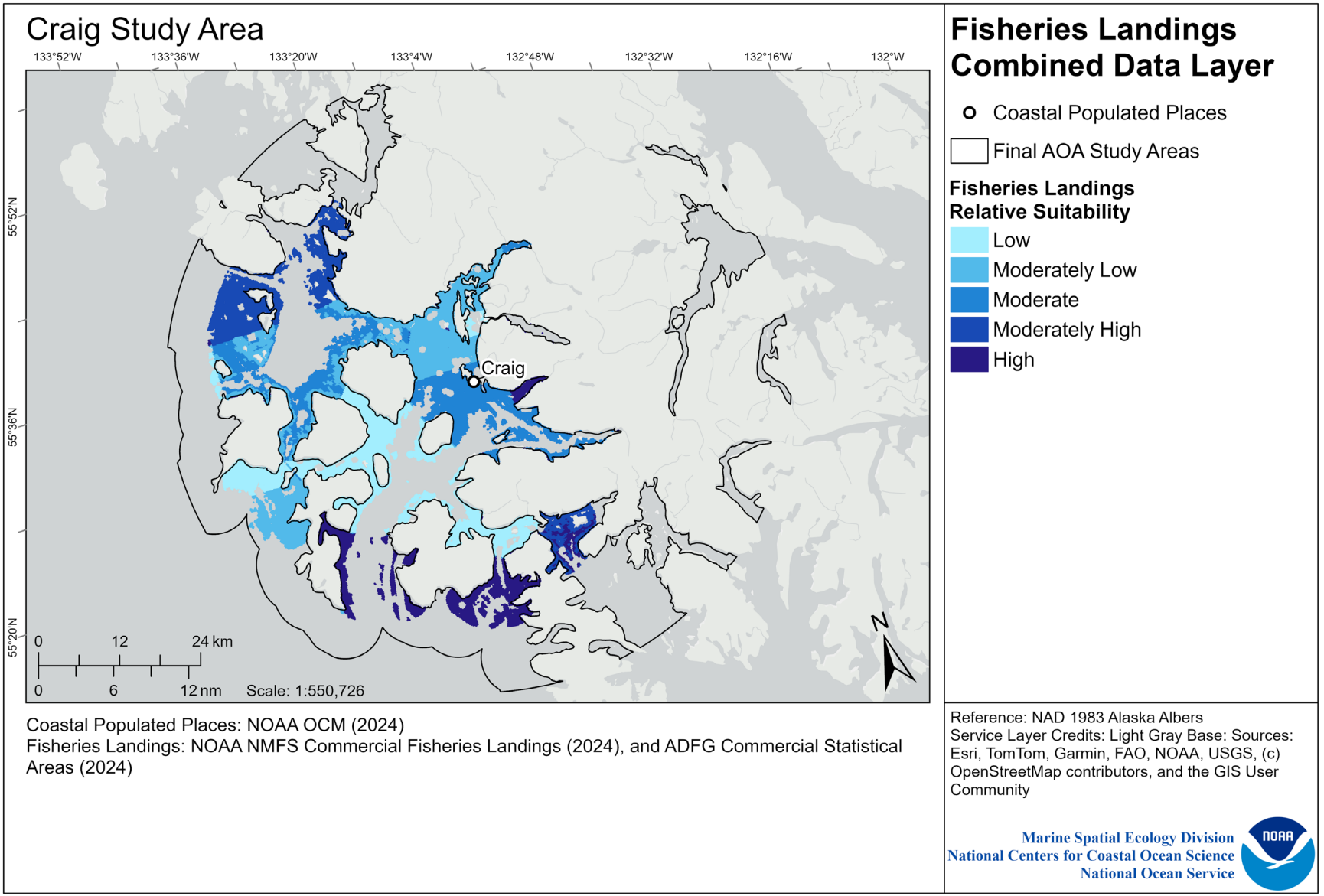
- Coastal Populated Places
- Final AOA Study Areas

Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

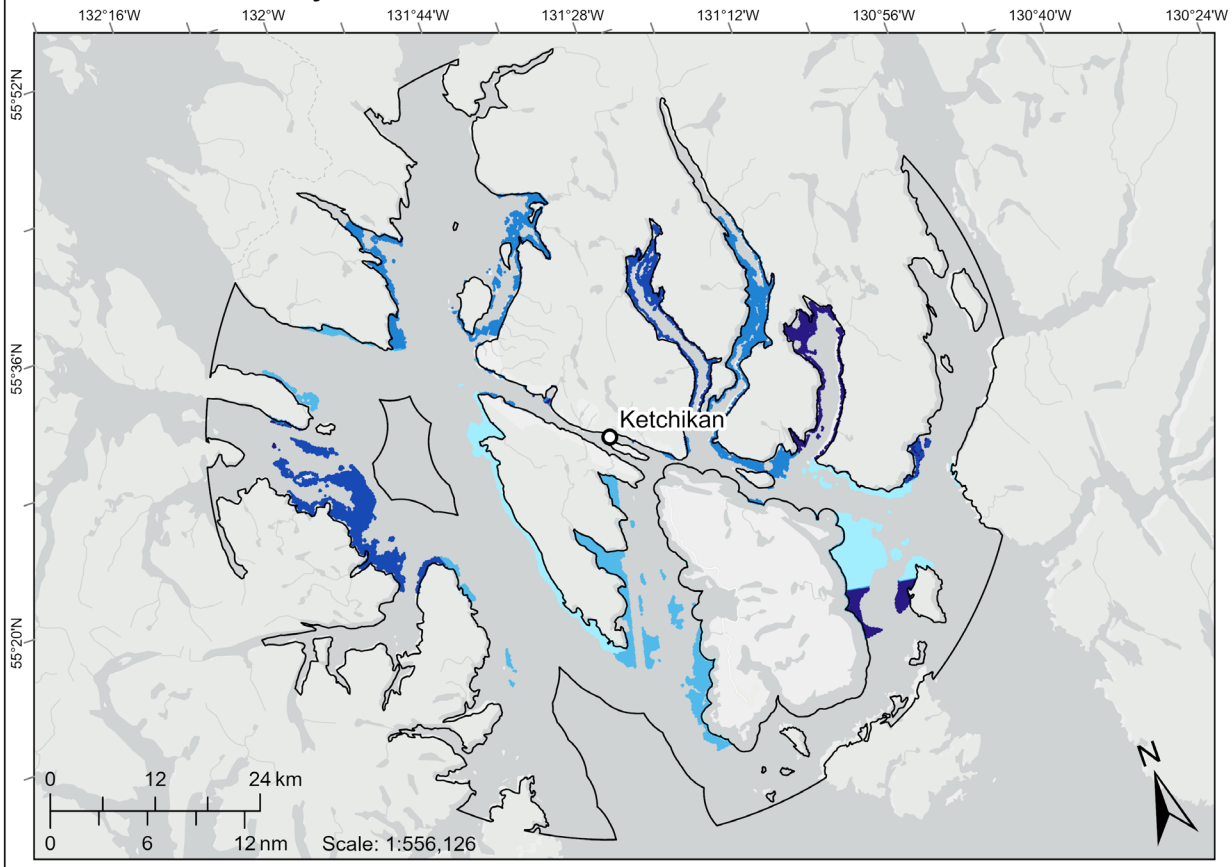


Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Fisheries Landings Combined Data Layer

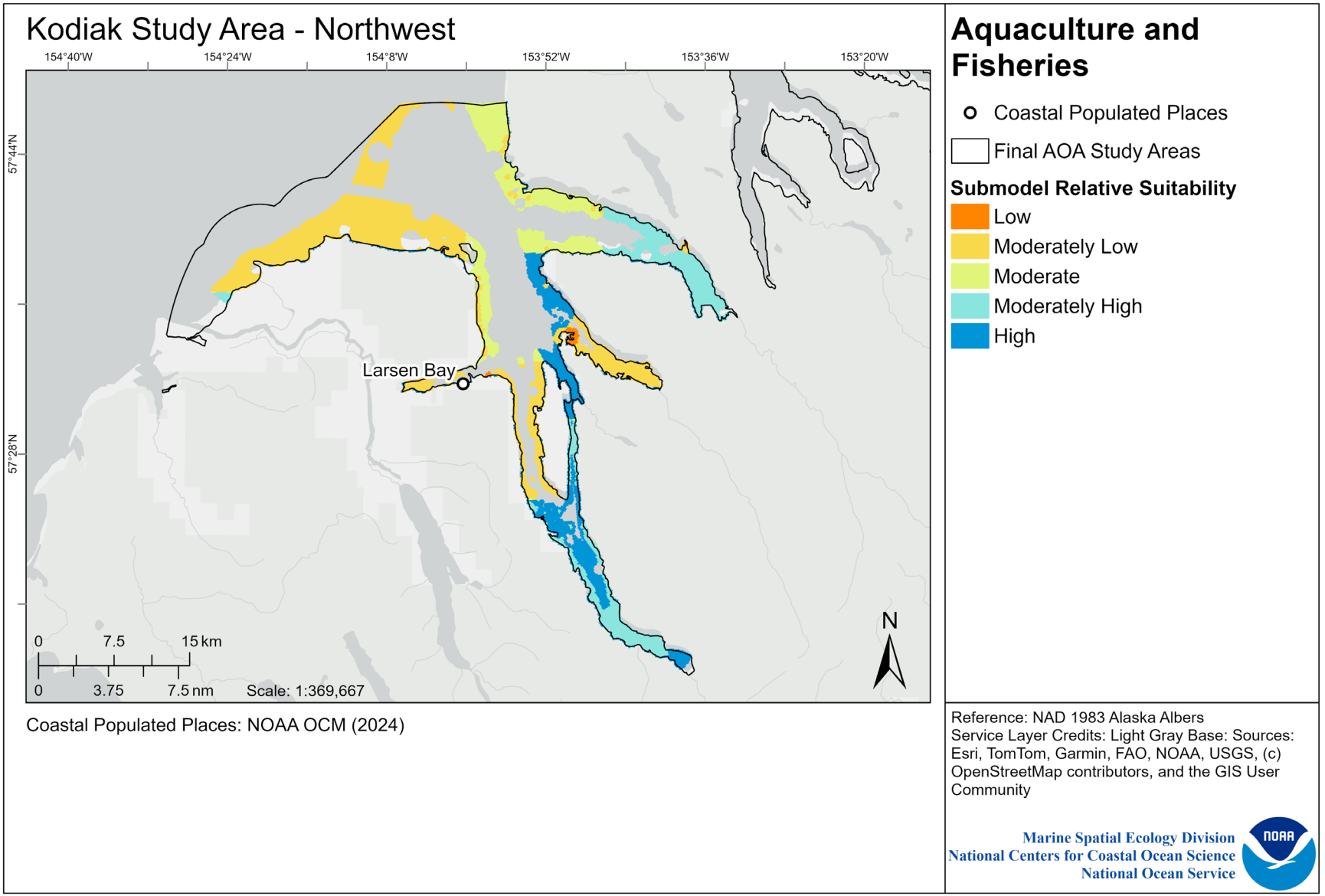
- Coastal Populated Places
- Final AOA Study Areas

Fisheries Landings Relative Suitability

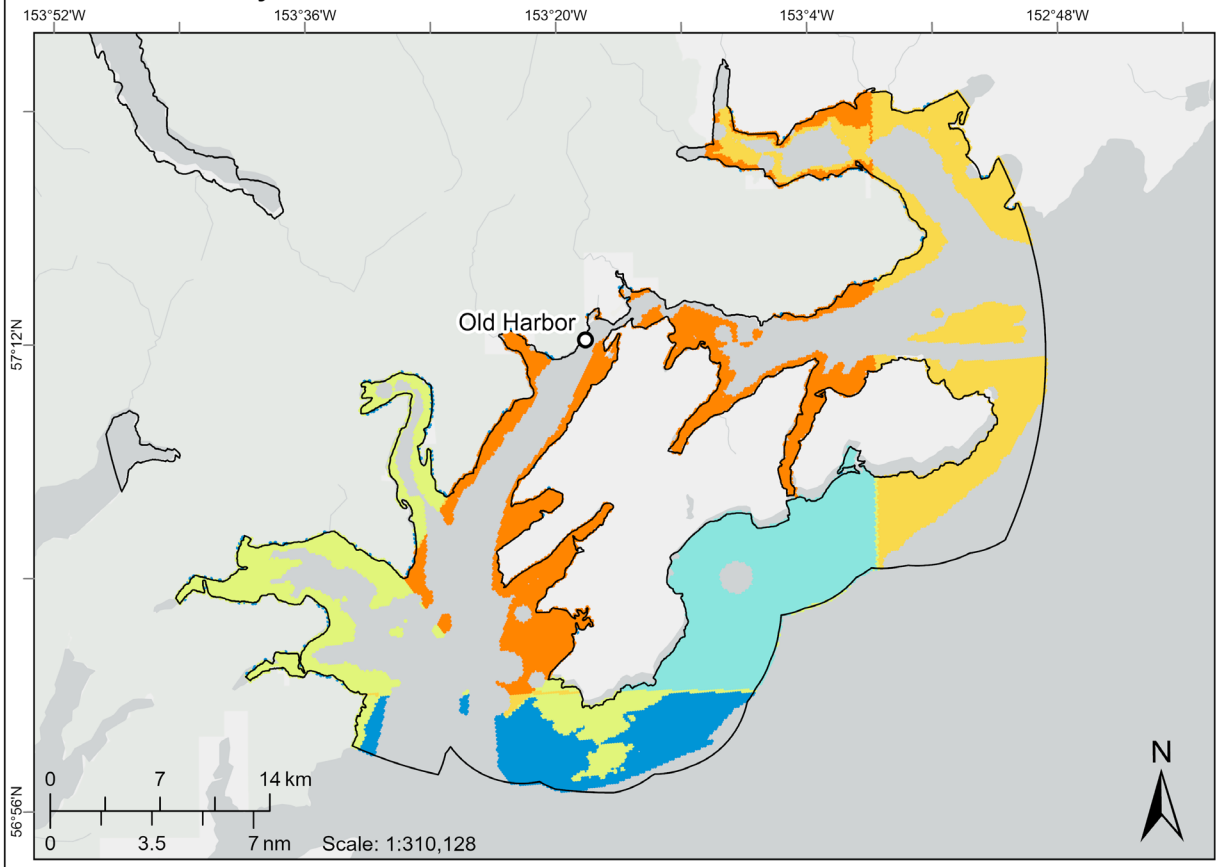
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service


Kodiak Study Area - Northwest
154°40'W
154°24'W
154°8'W
153°52'W
153°36'W
153°20'W
57°44'N
57°28'N
Larsen Bay
0
7.5
15 km
0
3.75
7.5 nm
Scale: 1:369,667
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)

Aquaculture and Fisheries

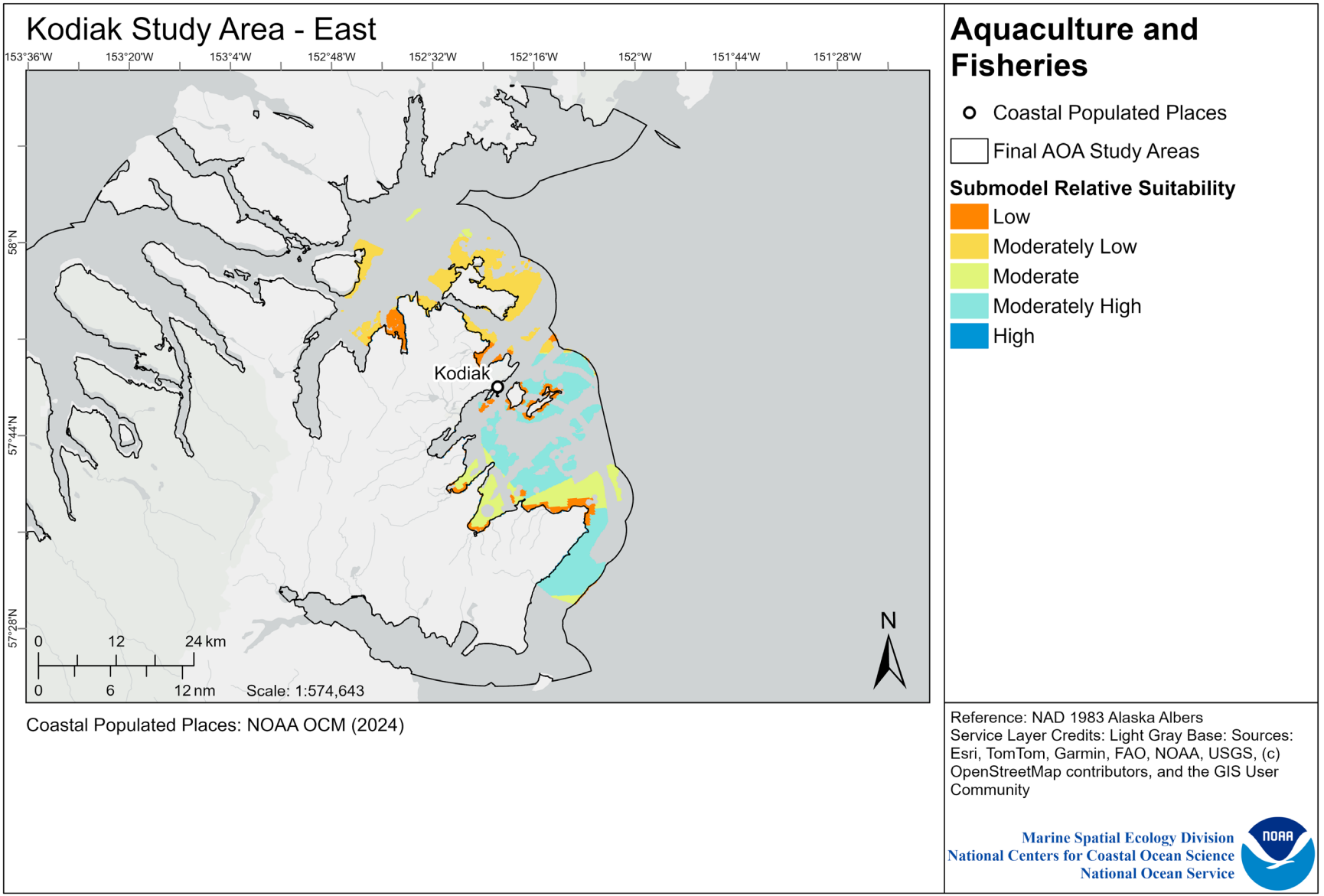
- Coastal Populated Places
- Final AOA Study Areas

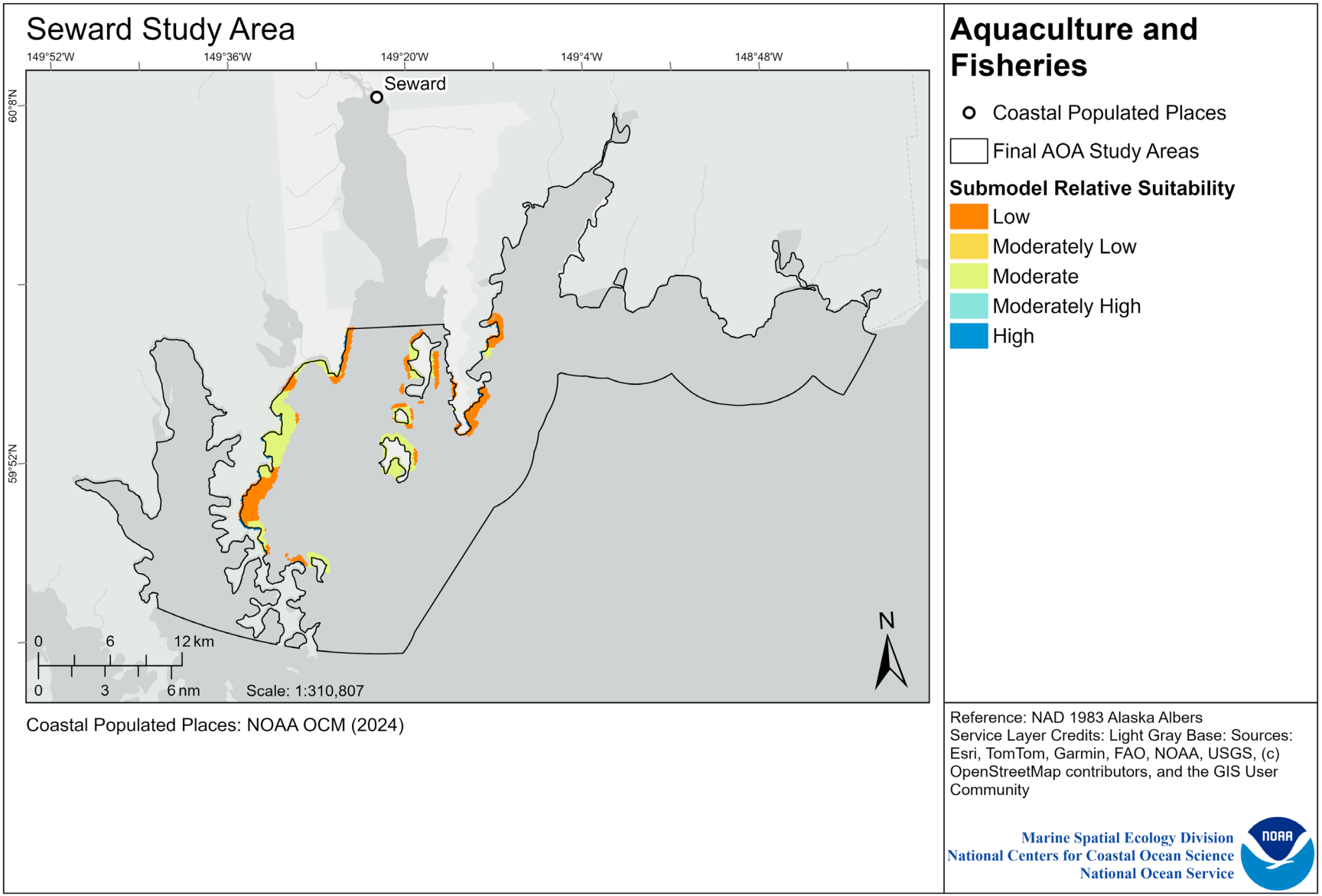
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

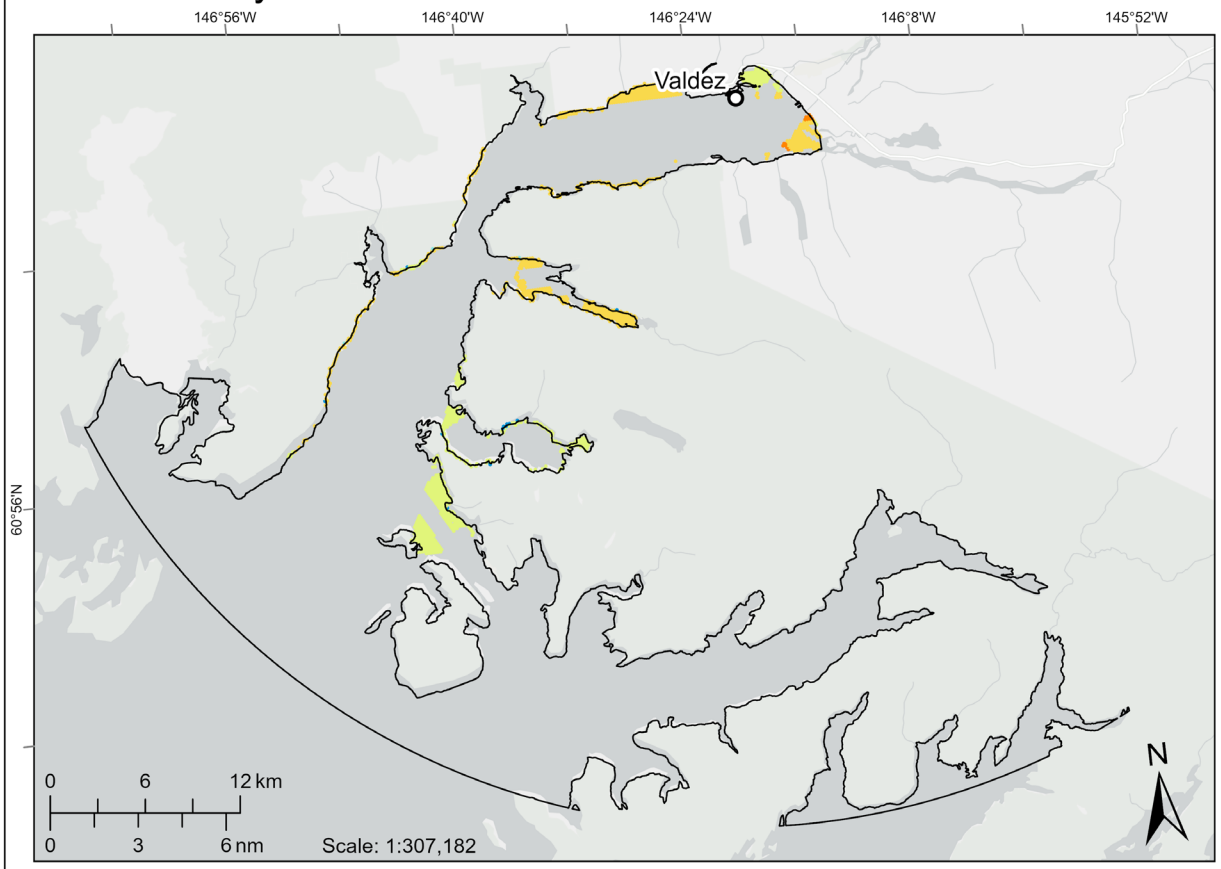
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service


Kodiak Study Area - East
153°36'W
153°20'W
153°4'W
152°48'W
152°32'W
152°16'W
152°W
151°44'W
151°28'W
58°N
57°44'N
57°28'N
Kodiak
0
12
24 km
0
6
12 nm
Scale: 1:574,643
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
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National Ocean Service
NOAA


Seward Study Area
149°52'W
149°36'W
149°20'W
149°4'W
148°48'W
60°8'N
59°52'N
Seward
0
6
12 km
0
3
6 nm
Scale: 1:310,807
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Valdez Study Area



Coastal Populated Places: NOAA OCM (2024)

Aquaculture and Fisheries

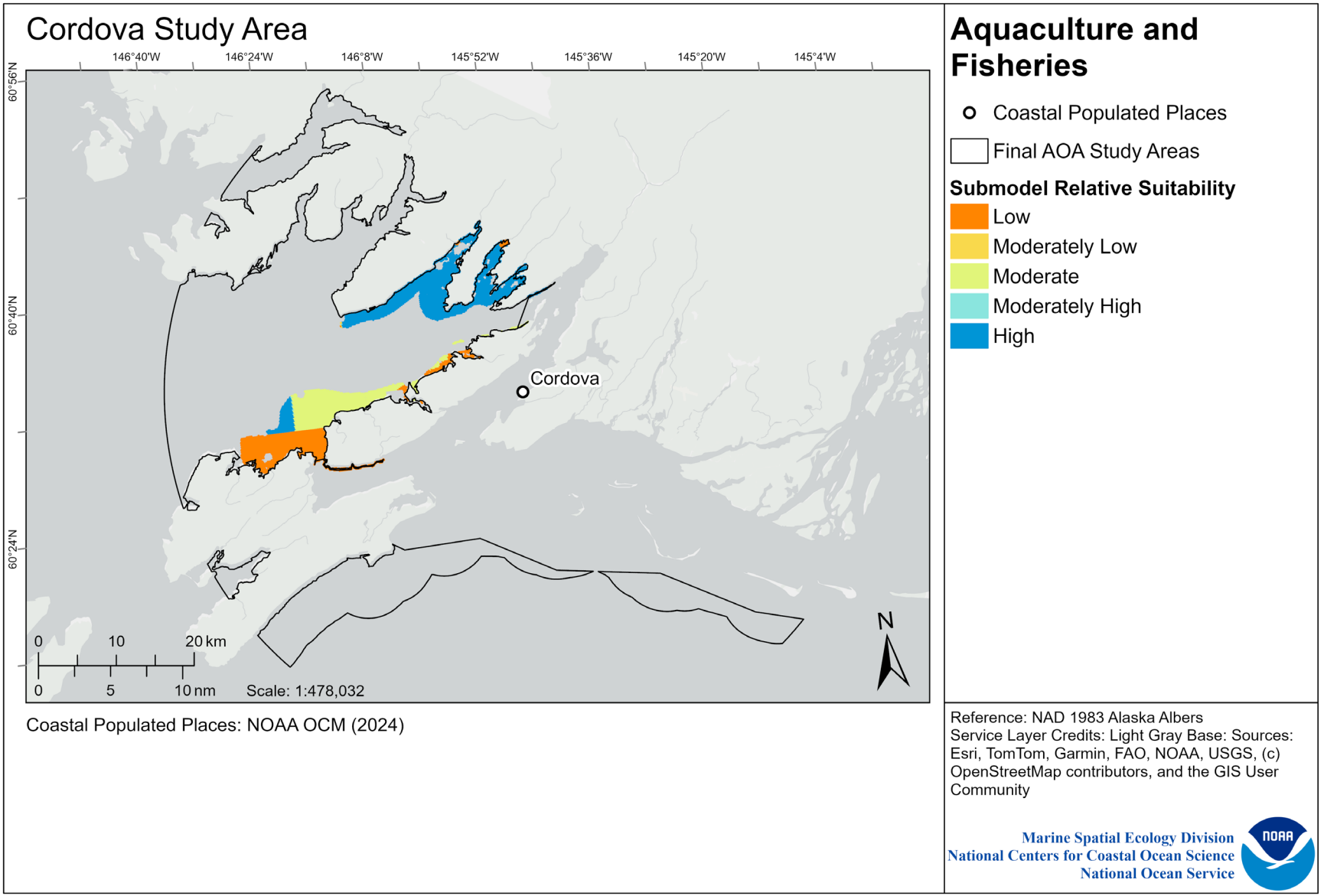
- Coastal Populated Places
- Final AOA Study Areas

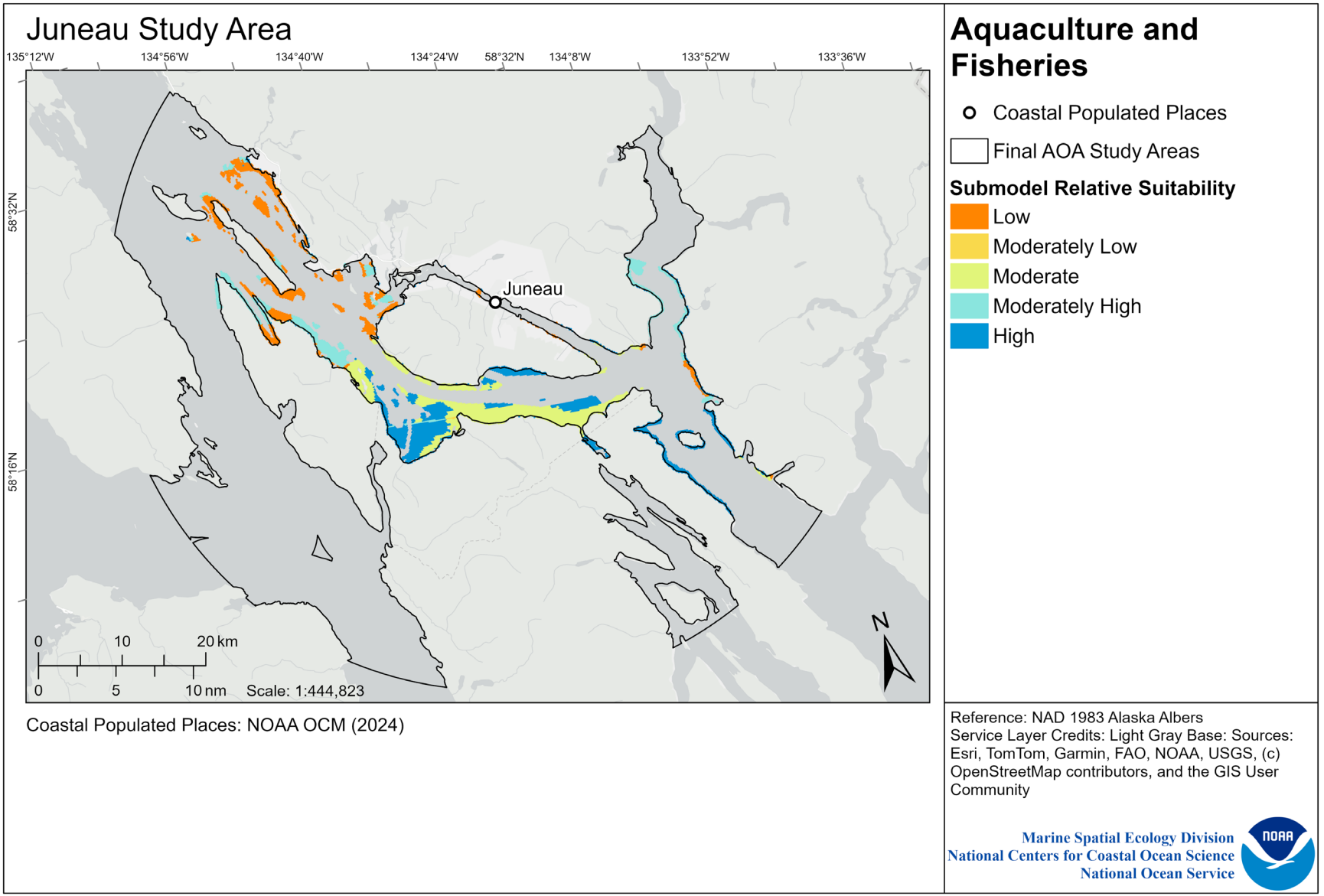
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service


Cordova Study Area
146°40'W
146°24'W
146°8'W
145°52'W
145°36'W
145°20'W
145°4'W
60°56'N
60°40'N
60°24'N
Cordova
0
10
20 km
0
5
10 nm
Scale: 1:478,032
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

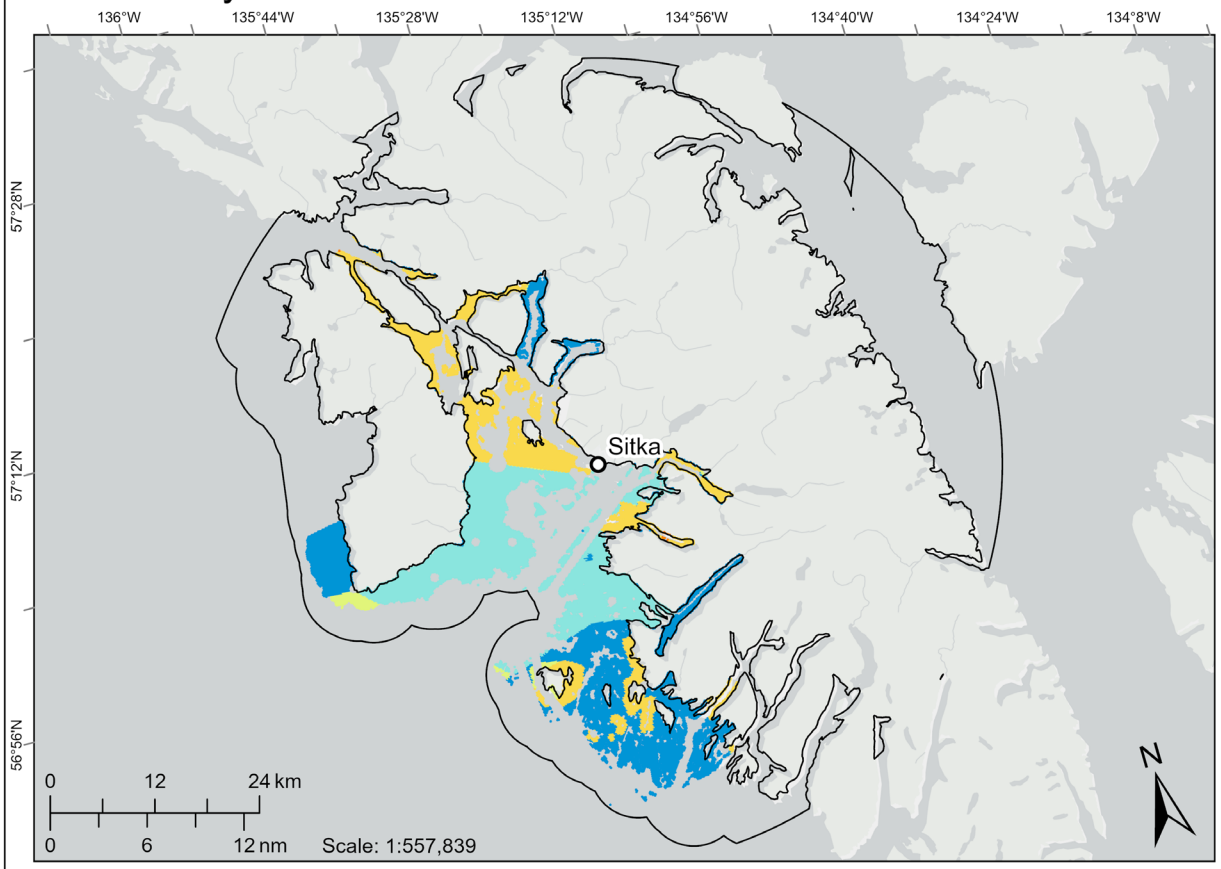


Coastal Populated Places: NOAA OCM (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Sitka Study Area



Coastal Populated Places: NOAA OCM (2024)

Aquaculture and Fisheries

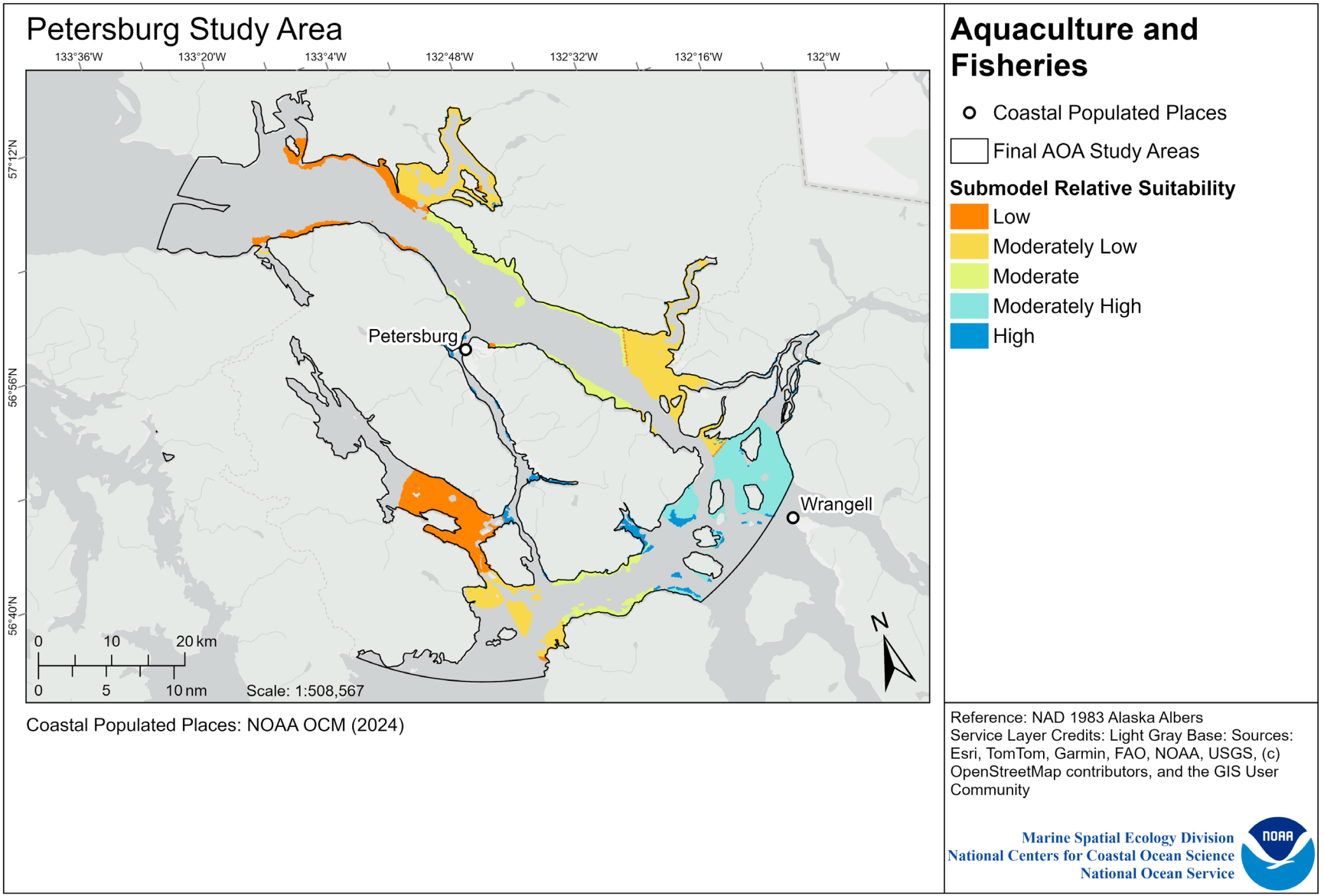
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

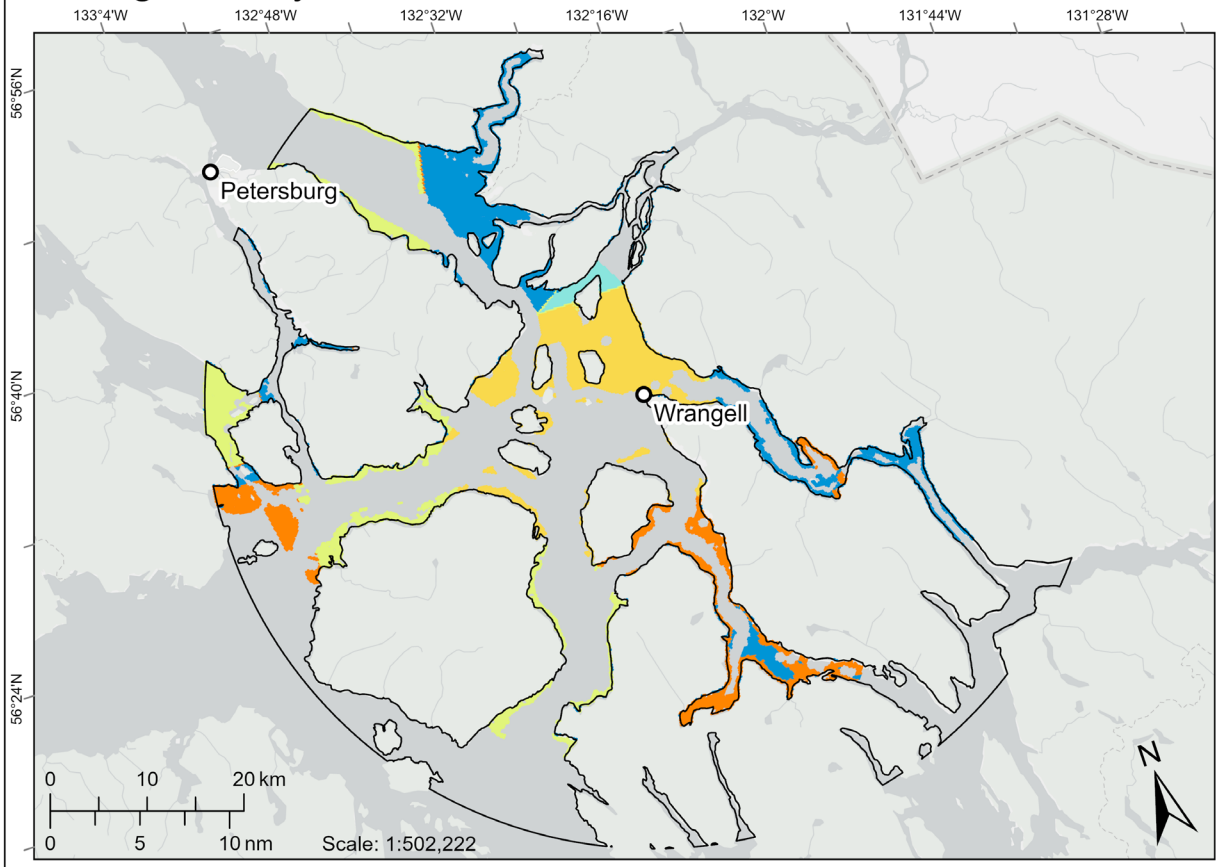
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Petersburg Study Area
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
57°12'N
56°56'N
56°40'N
Petersburg
Wrangell
0
10
20 km
0
5
10 nm
Scale: 1:508,567
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Wrangell Study Area



Coastal Populated Places: NOAA OCM (2024)

Aquaculture and Fisheries

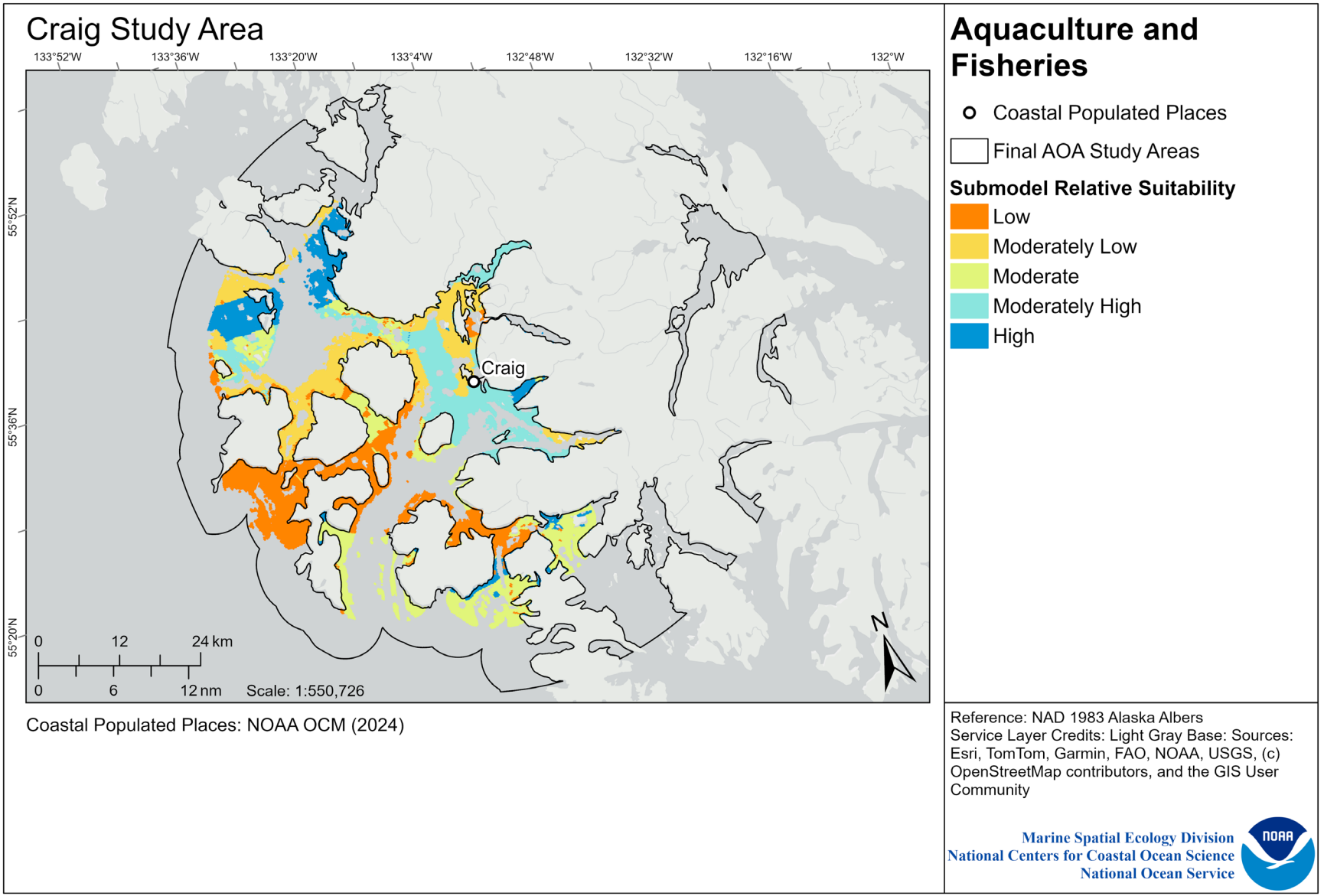
- Coastal Populated Places
- Final AOA Study Areas

Submodel Relative Suitability

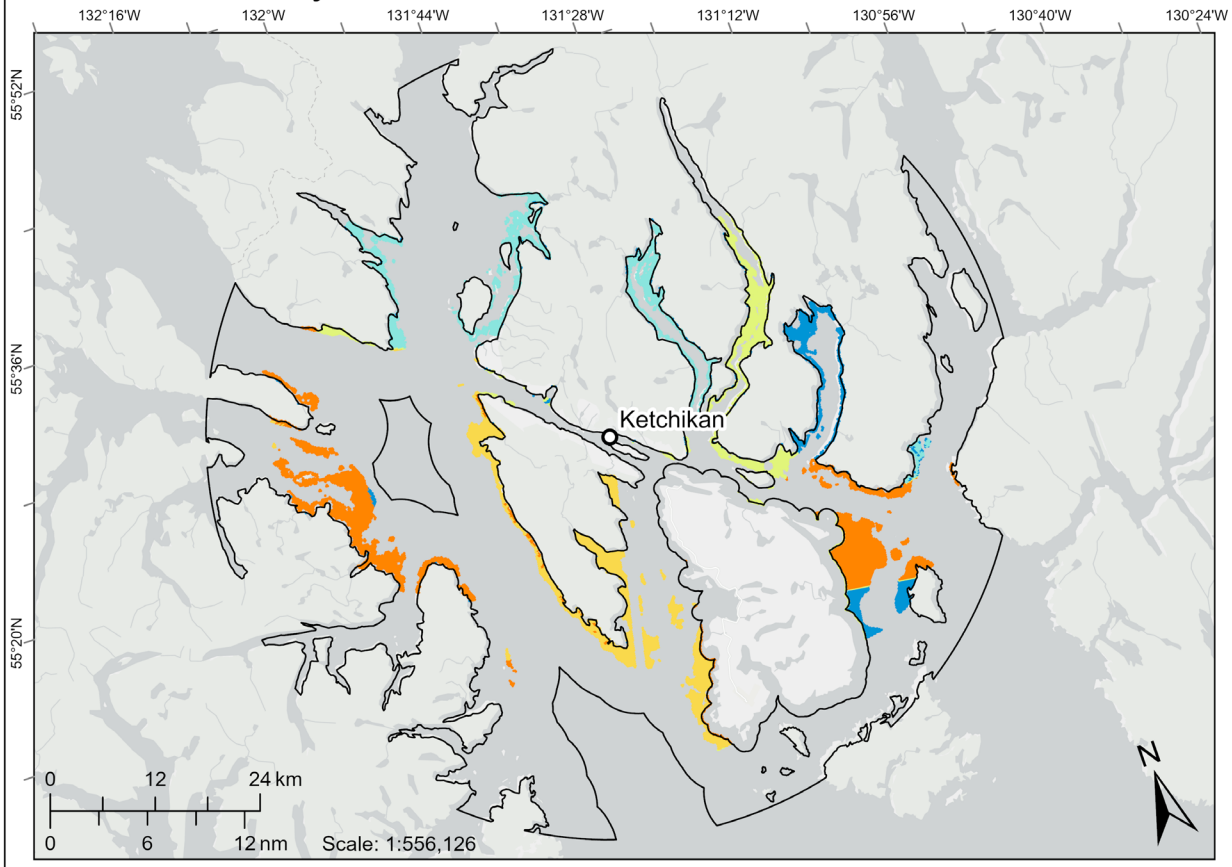
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Craig Study Area
133°52'W
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
55°52'N
55°36'N
55°20'N
Craig
0
12
24 km
0
6
12 nm
Scale: 1:550,726
N
Aquaculture and Fisheries
Coastal Populated Places
Final AOA Study Areas
Submodel Relative Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Ketchikan Study Area



Coastal Populated Places: NOAA OCM (2024)

Aquaculture and Fisheries

- Coastal Populated Places
- Final AOA Study Areas

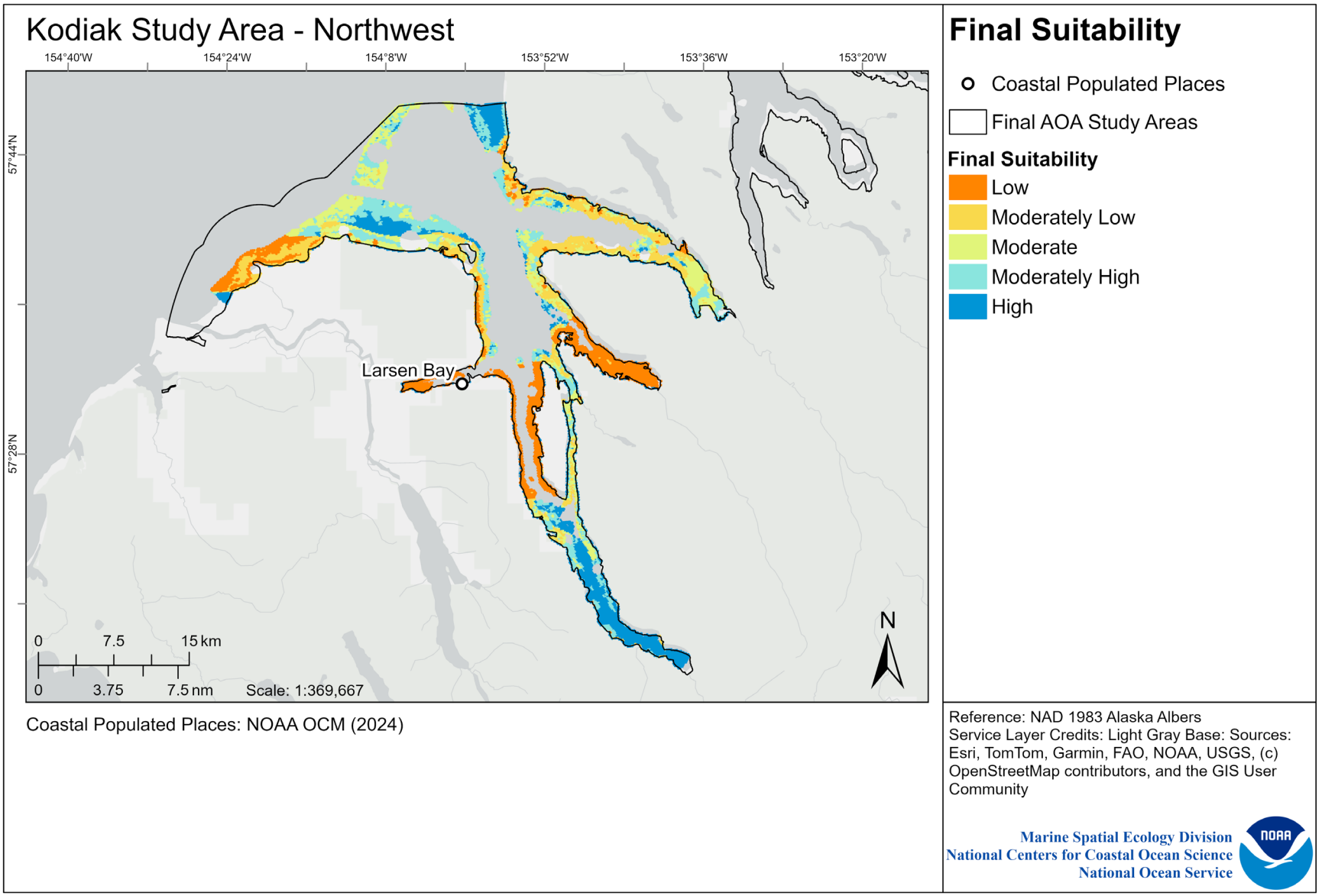
Submodel Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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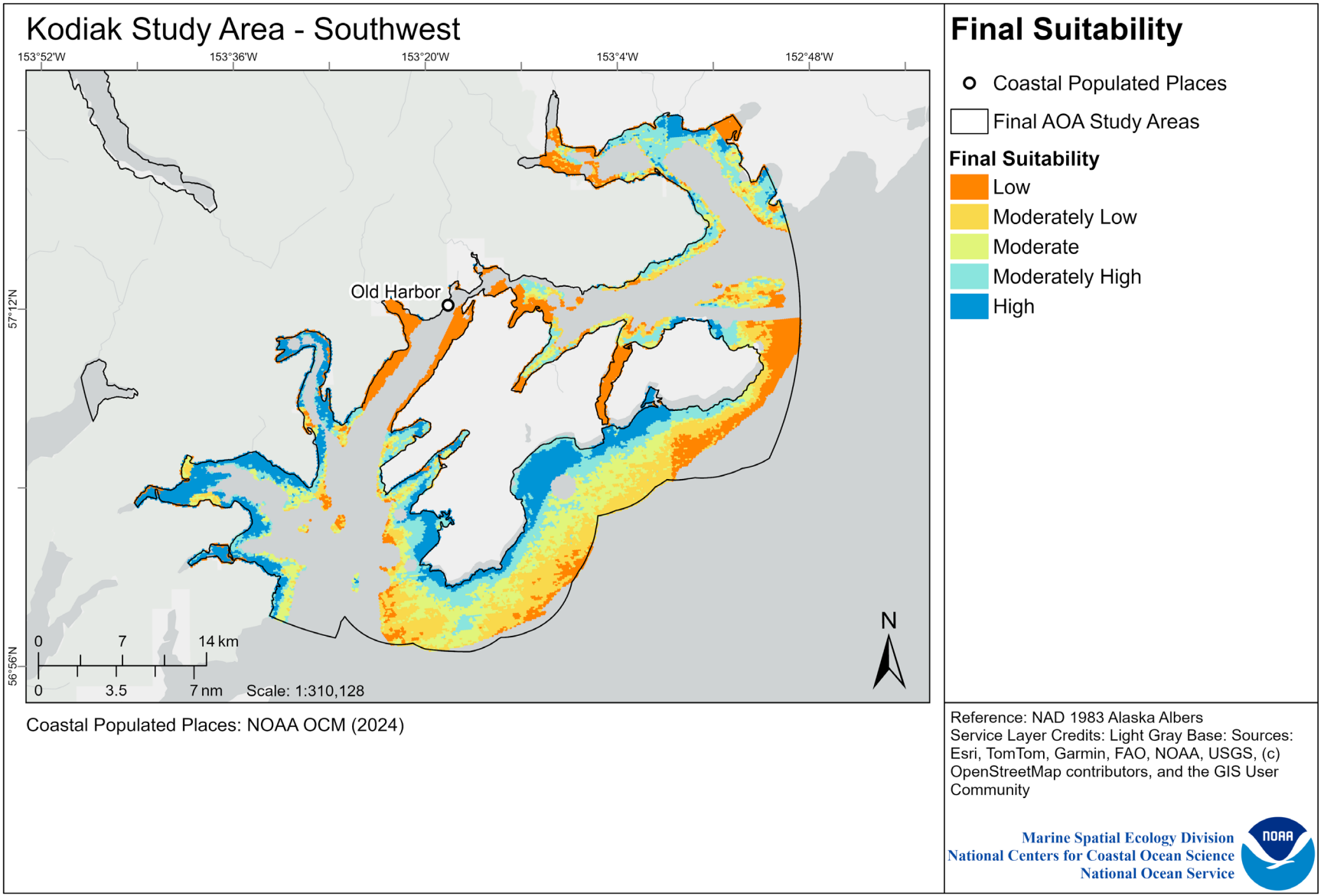
Final Suitability Maps



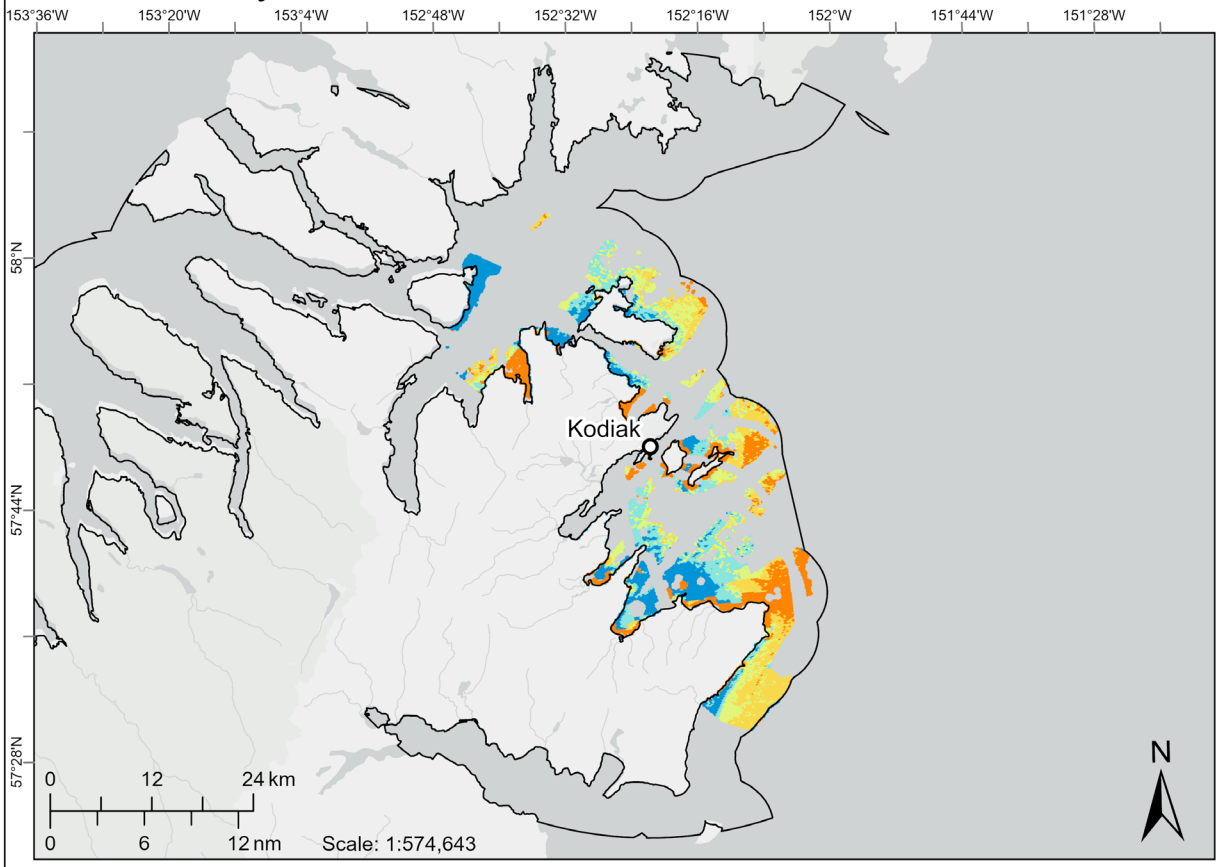
Coastal Populated Places: NOAA OCM (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service


Kodiak Study Area - Southwest
153°52'W
153°36'W
153°20'W
153°4'W
152°48'W
57°12'N
56°56'N
Old Harbor
0
7
14 km
0
3.5
7 nm
Scale: 1:310,128
N
Final Suitability
Coastal Populated Places
Final AOA Study Areas
Final Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Kodiak Study Area - East



Coastal Populated Places: NOAA OCM (2024)

Final Suitability

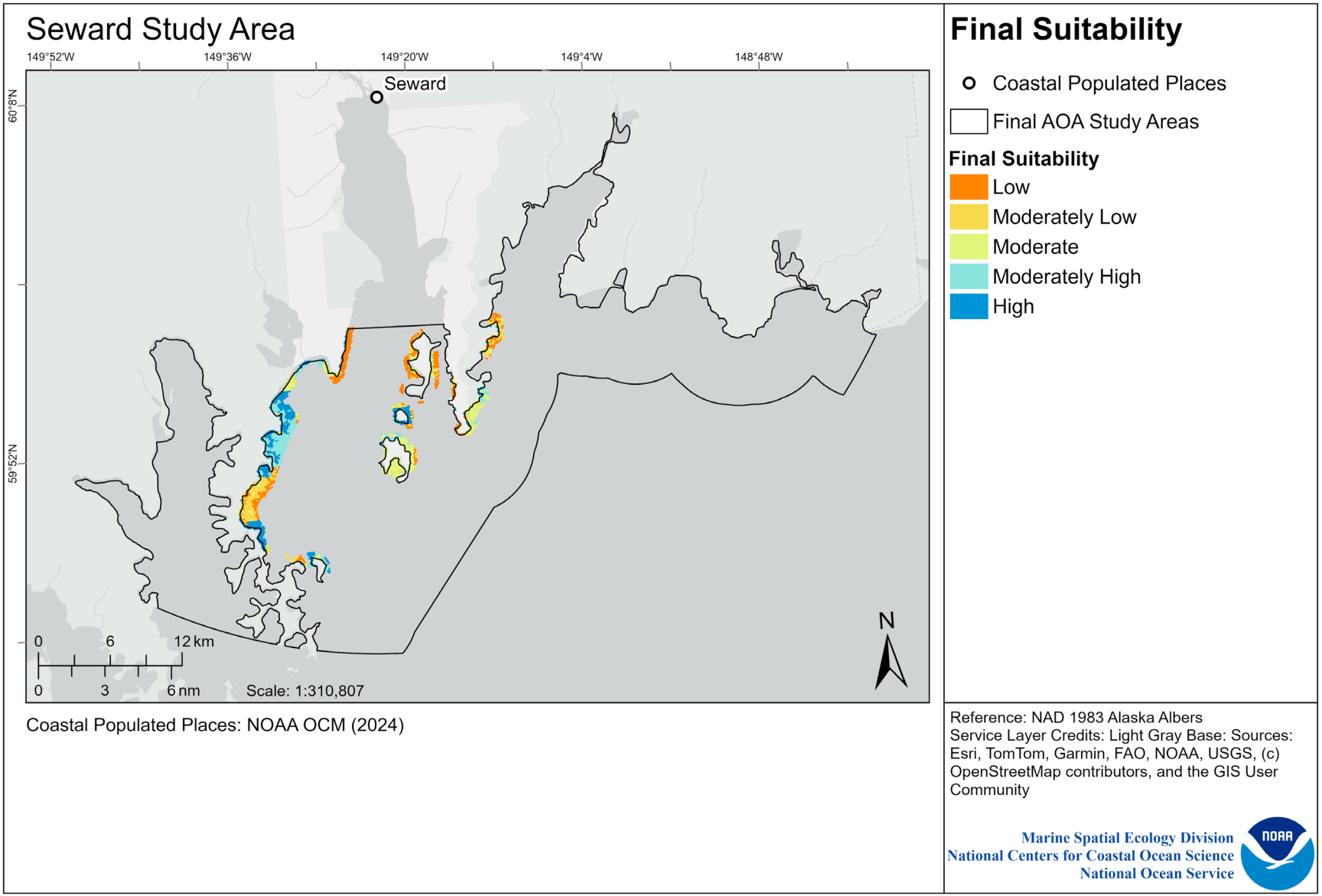
- Coastal Populated Places
- Final AOA Study Areas

Final Suitability

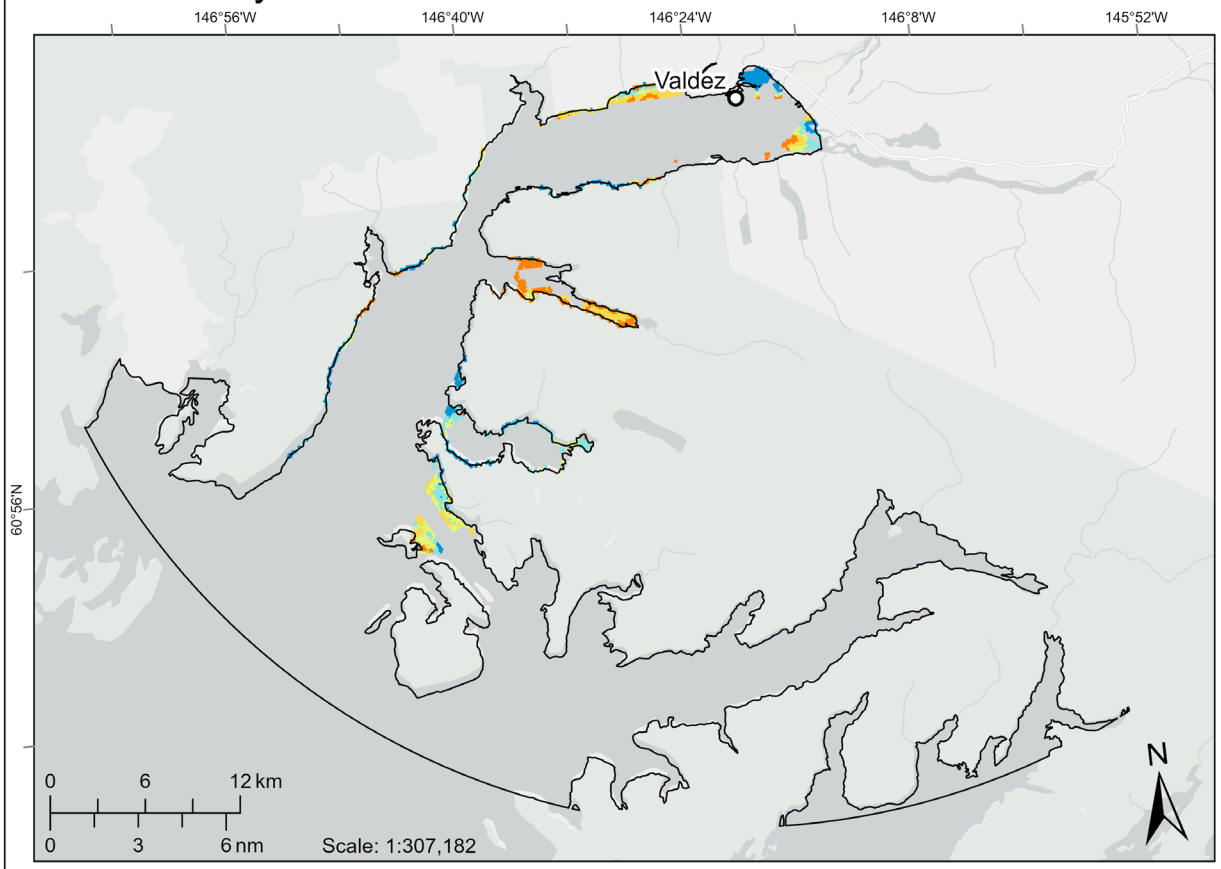
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Seward Study Area
149°52'W
149°36'W
149°20'W
149°4'W
148°48'W
60°8'N
59°52'N
Seward
0
6
12 km
0
3
6 nm
Scale: 1:310,807
N
Final Suitability
Coastal Populated Places
Final AOA Study Areas
Final Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Valdez Study Area



Coastal Populated Places: NOAA OCM (2024)

Final Suitability

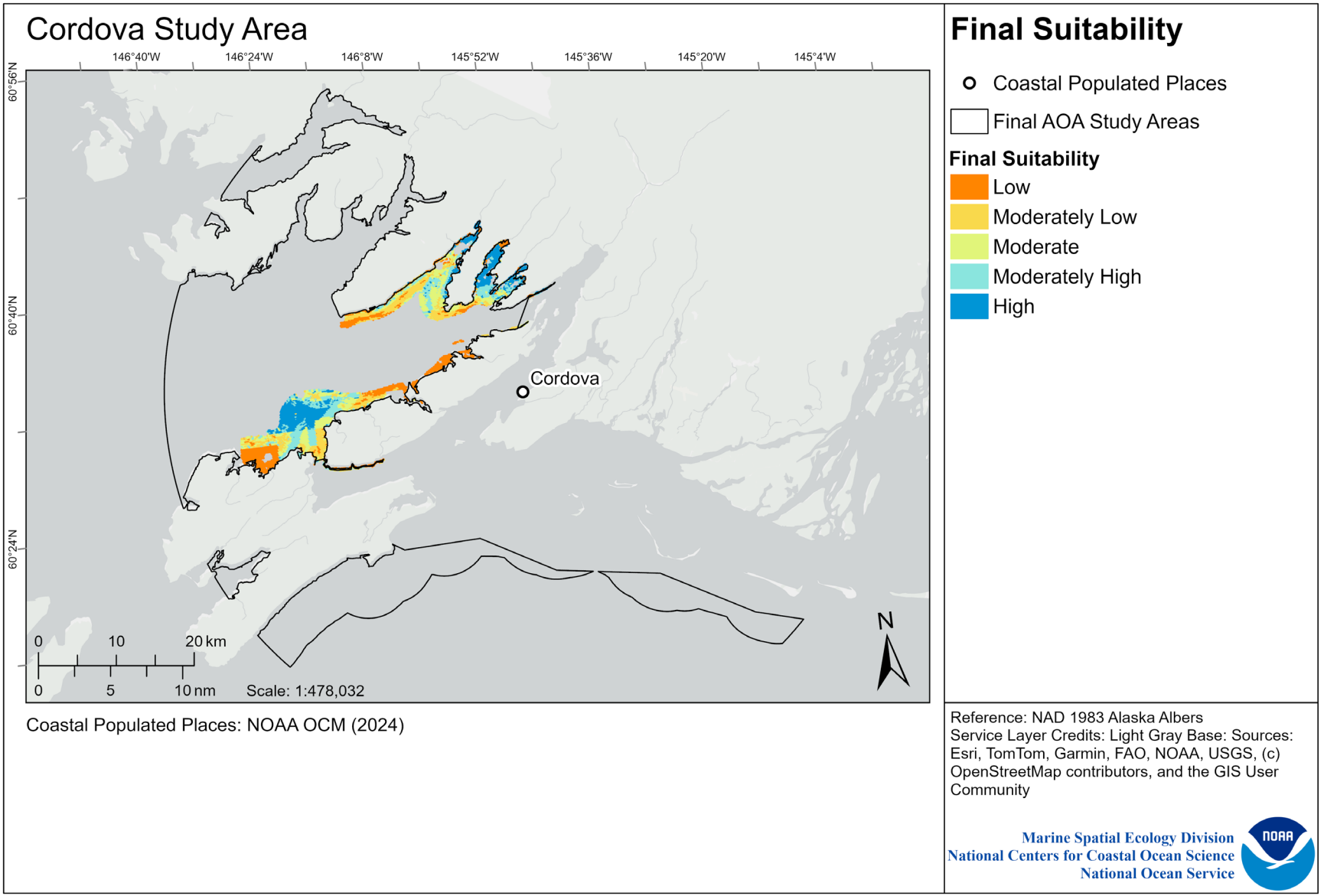
- Coastal Populated Places
- Final AOA Study Areas

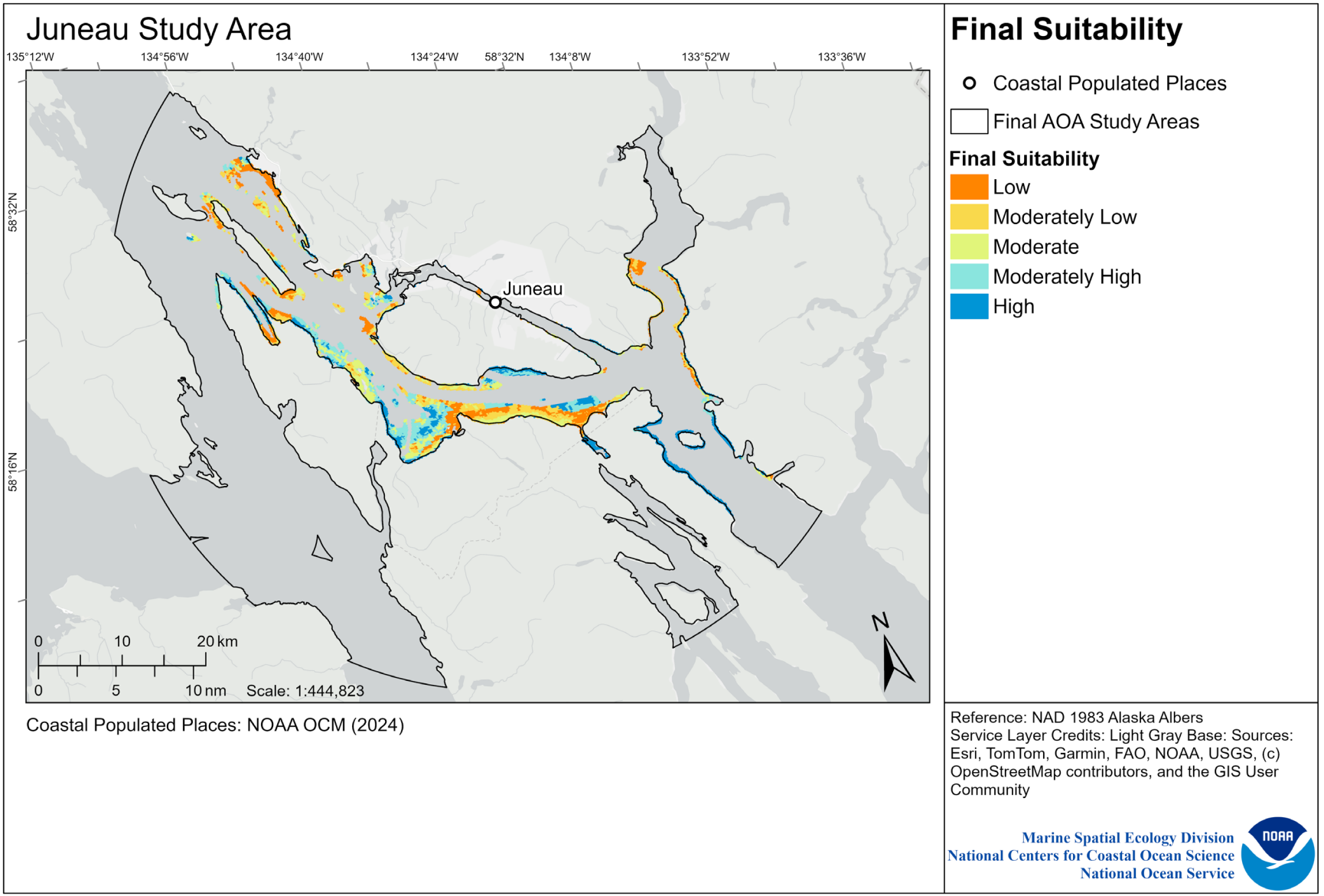
Final Suitability

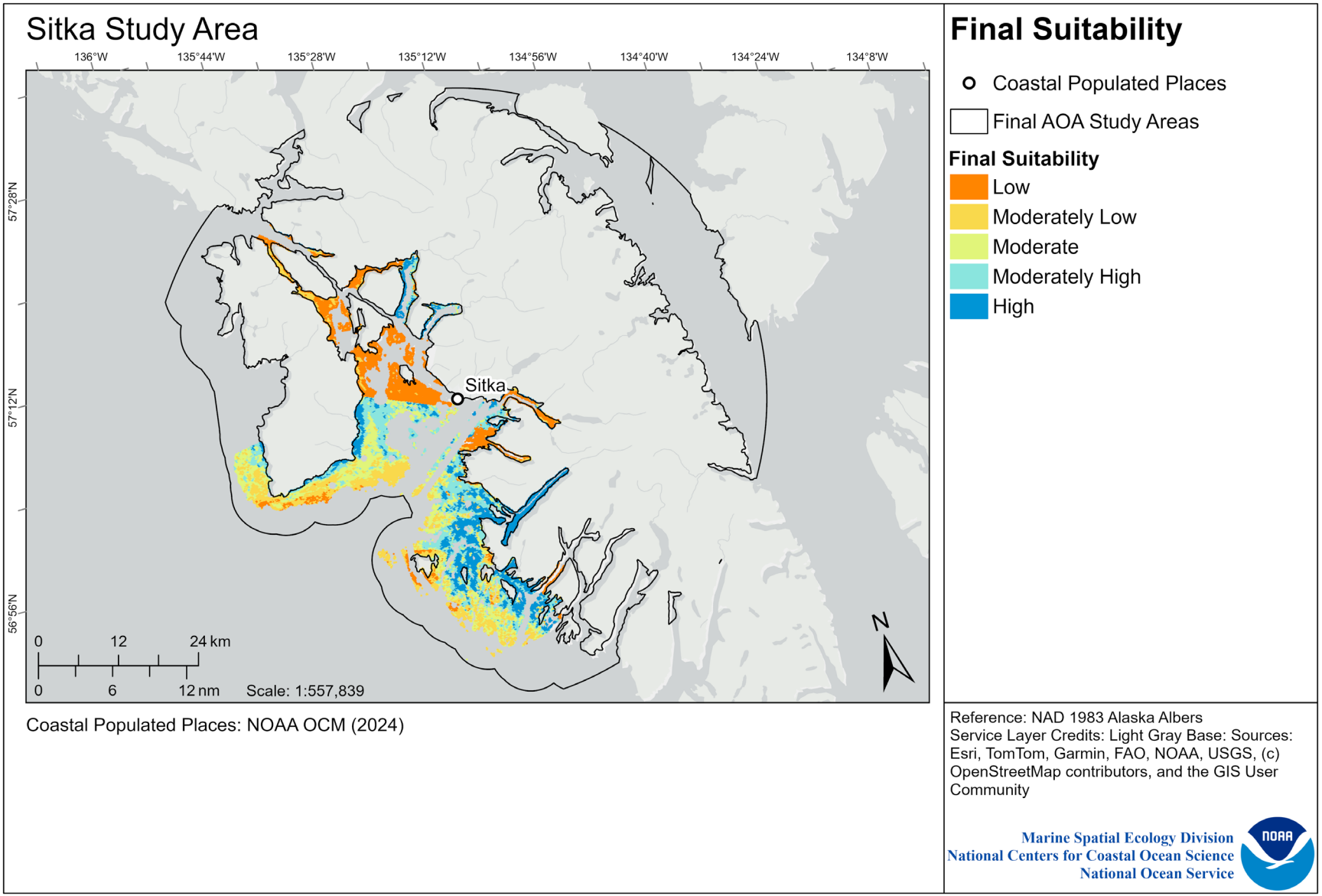
- Low
- Moderately Low
- Moderate
- Moderately High
- High

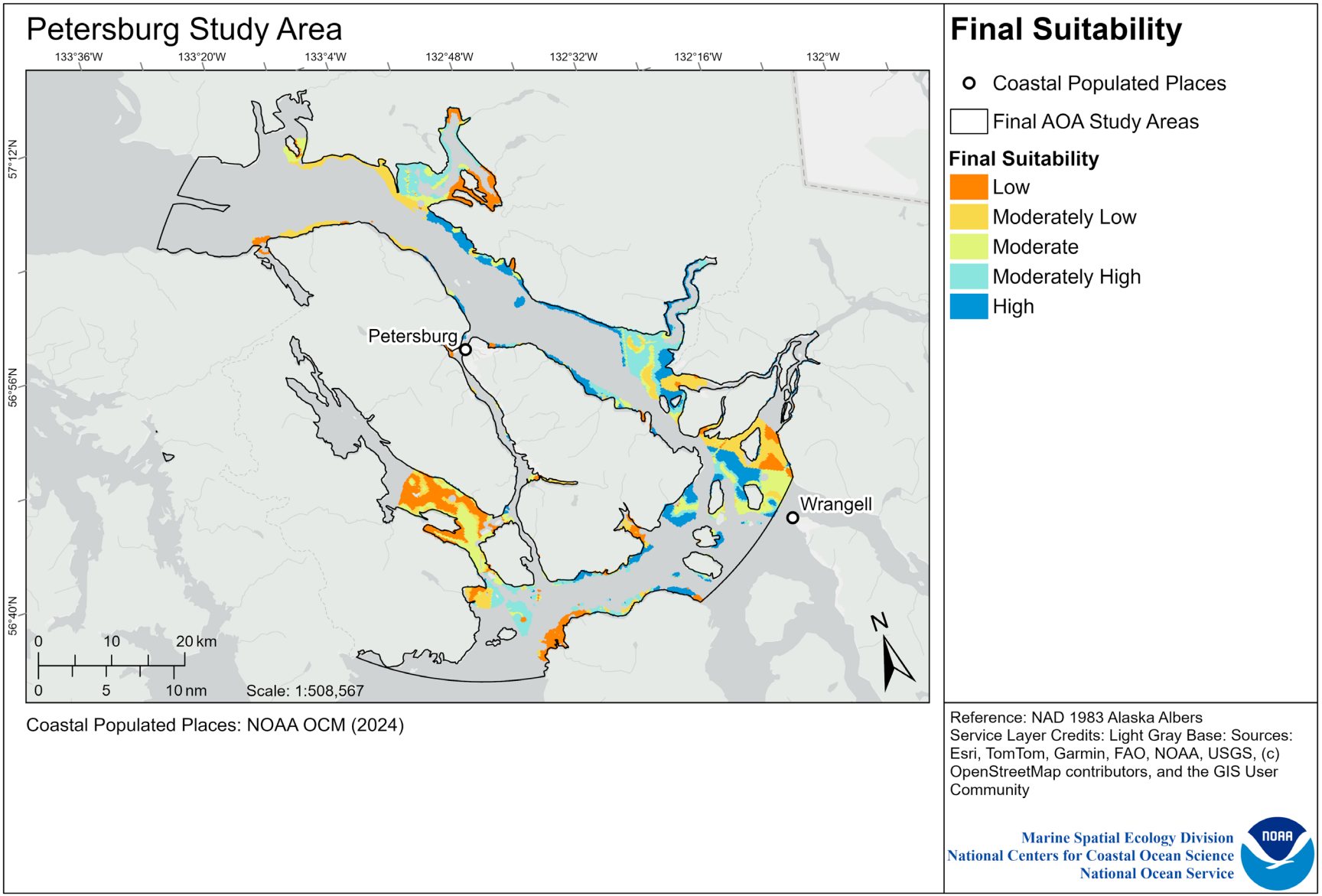
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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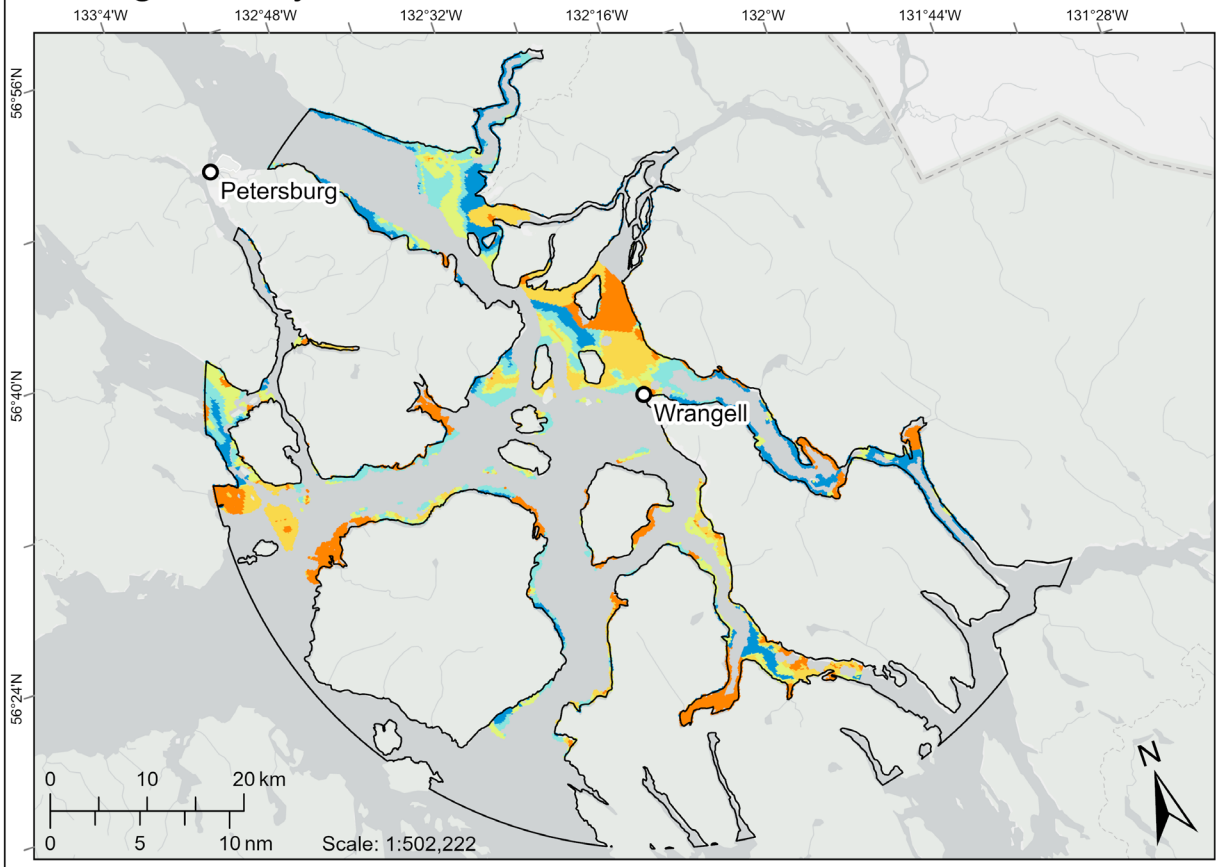

Cordova Study Area
146°40'W
146°24'W
146°8'W
145°52'W
145°36'W
145°20'W
145°4'W
60°56'N
60°40'N
60°24'N
Cordova
0
10
20 km
0
5
10 nm
Scale: 1:478,032
N
Final Suitability
Coastal Populated Places
Final AOA Study Areas
Final Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA


Juneau Study Area
135°12'W
134°56'W
134°40'W
134°24'W
58°32'N
134°8'W
133°52'W
133°36'W
58°32'N
58°16'N
Juneau
0
10
20 km
0
5
10 nm
Scale: 1:444,823
N
Final Suitability
Coastal Populated Places
Final AOA Study Areas
Final Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA


Sitka Study Area
136°W
135°44'W
135°28'W
135°12'W
134°56'W
134°40'W
134°24'W
134°8'W
57°28'N
57°12'N
56°56'N
Sitka
0
12
24 km
0
6
12 nm
Scale: 1:557,839
N
Final Suitability
Coastal Populated Places
Final AOA Study Areas
Final Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Petersburg Study Area
133°36'W
133°20'W
133°4'W
132°48'W
132°32'W
132°16'W
132°W
57°12'N
56°56'N
56°40'N
Petersburg
Wrangell
0
10
20 km
0
5
10 nm
Scale: 1:508,567
N
Final Suitability
Coastal Populated Places
Final AOA Study Areas
Final Suitability
Low
Moderately Low
Moderate
Moderately High
High
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Wrangell Study Area



Coastal Populated Places: NOAA OCM (2024)

Final Suitability

- Coastal Populated Places
- Final AOA Study Areas

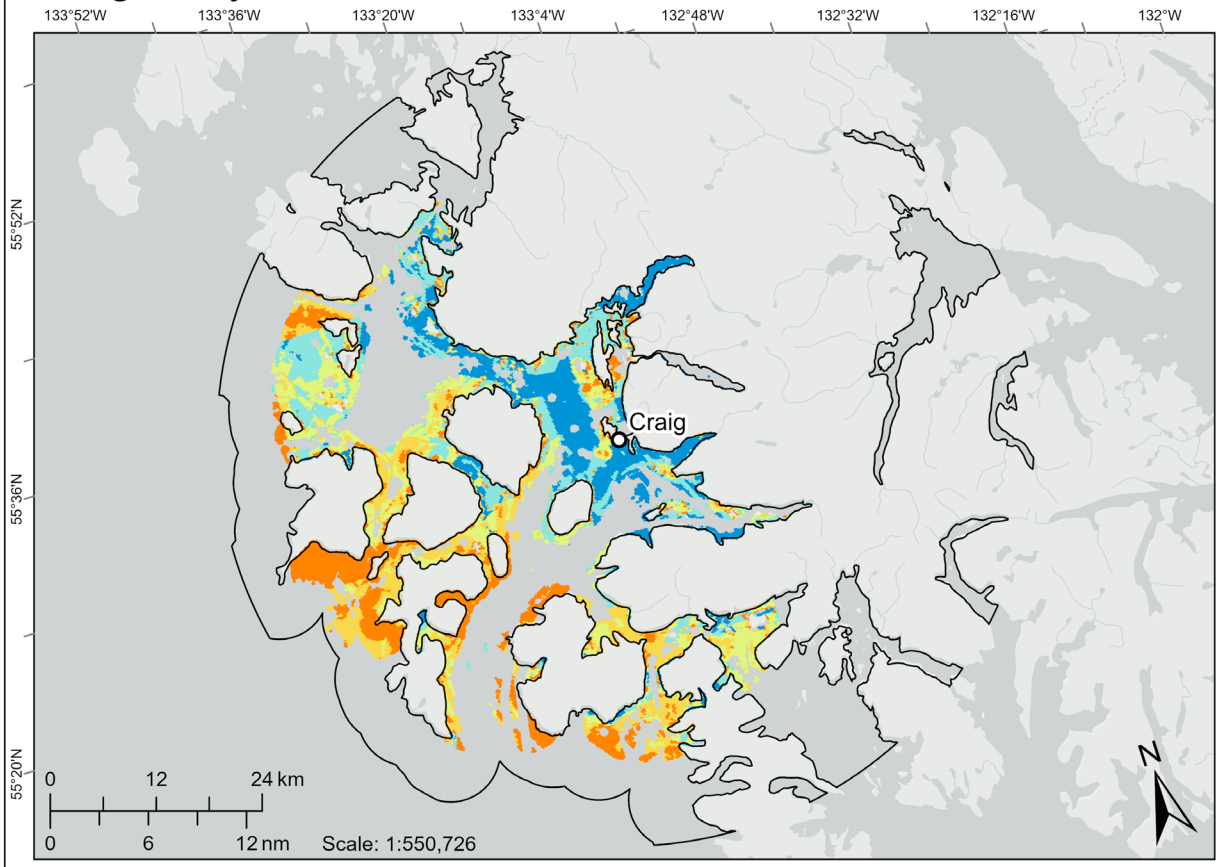
Final Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Craig Study Area



Coastal Populated Places: NOAA OCM (2024)

Final Suitability

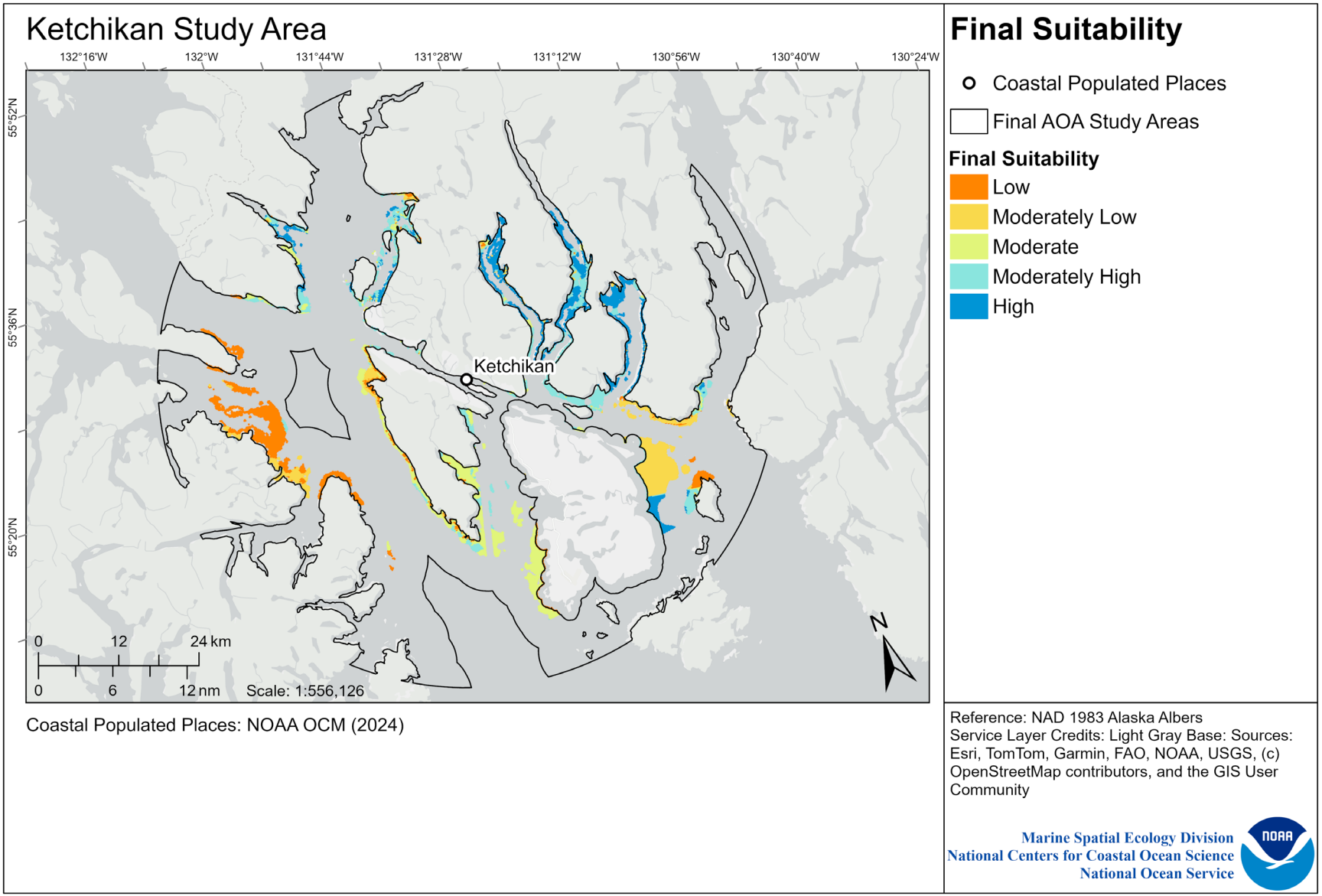
- Coastal Populated Places
- Final AOA Study Areas

Final Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

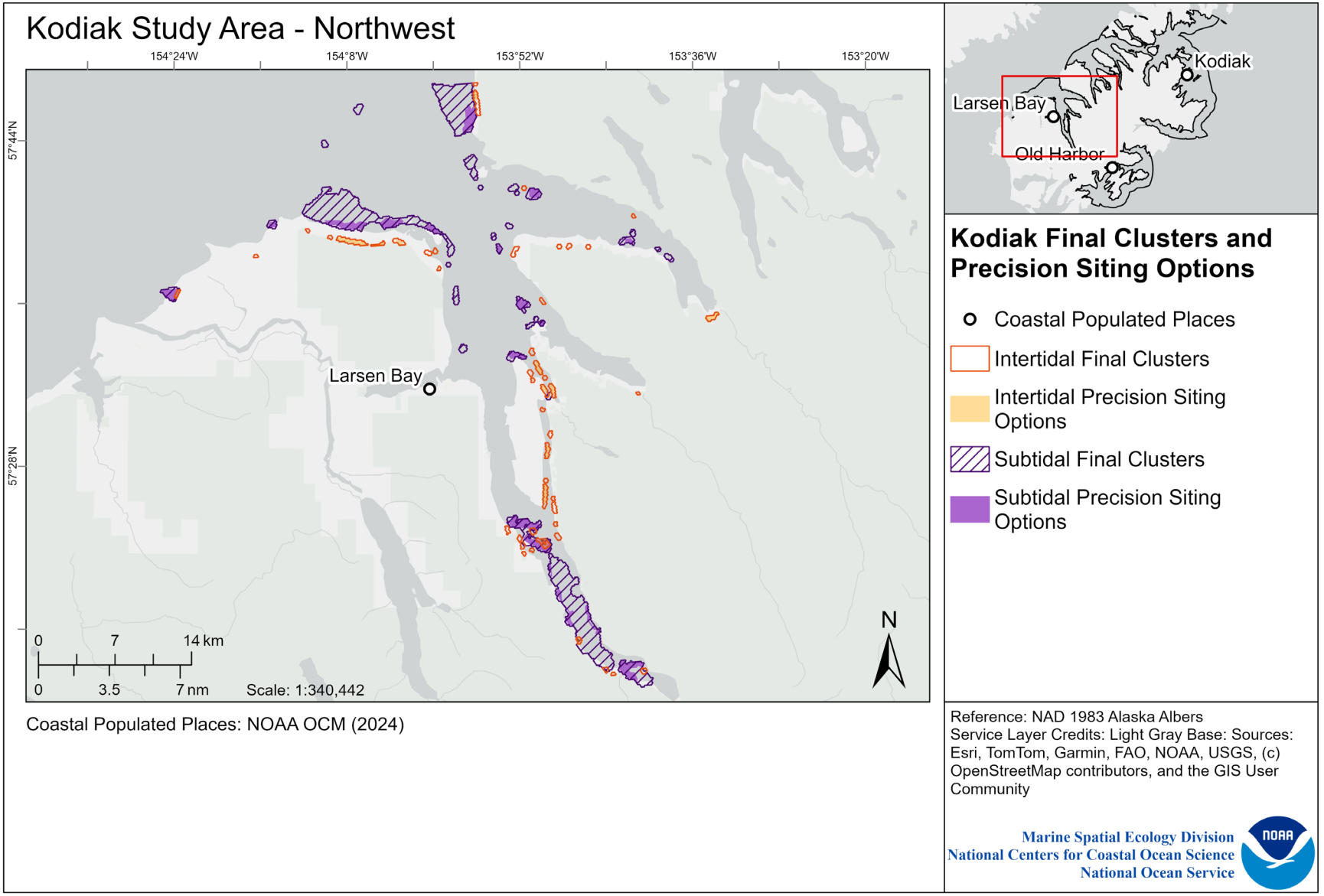


Coastal Populated Places: NOAA OCM (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

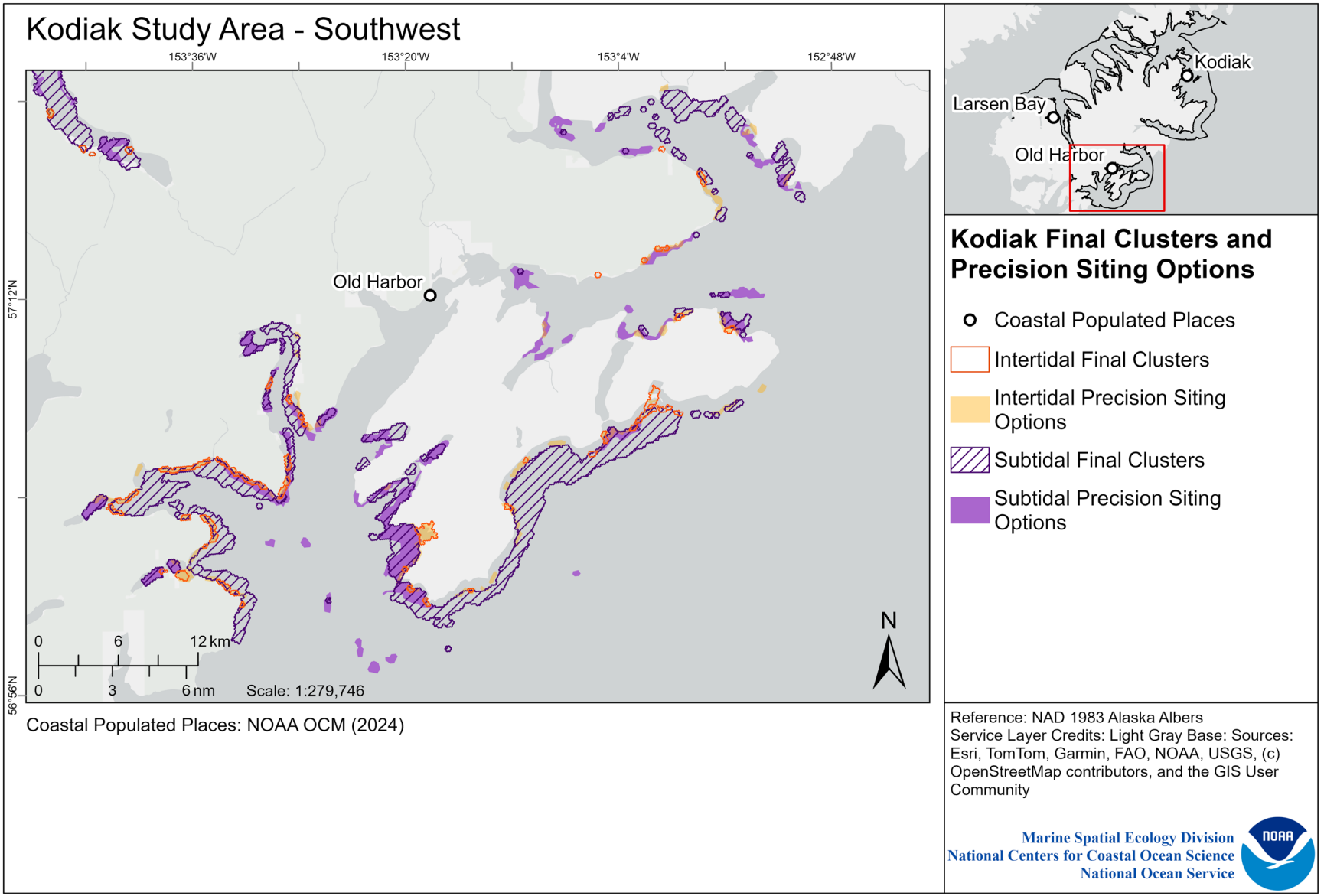
Final Clusters and Precision Siting Options

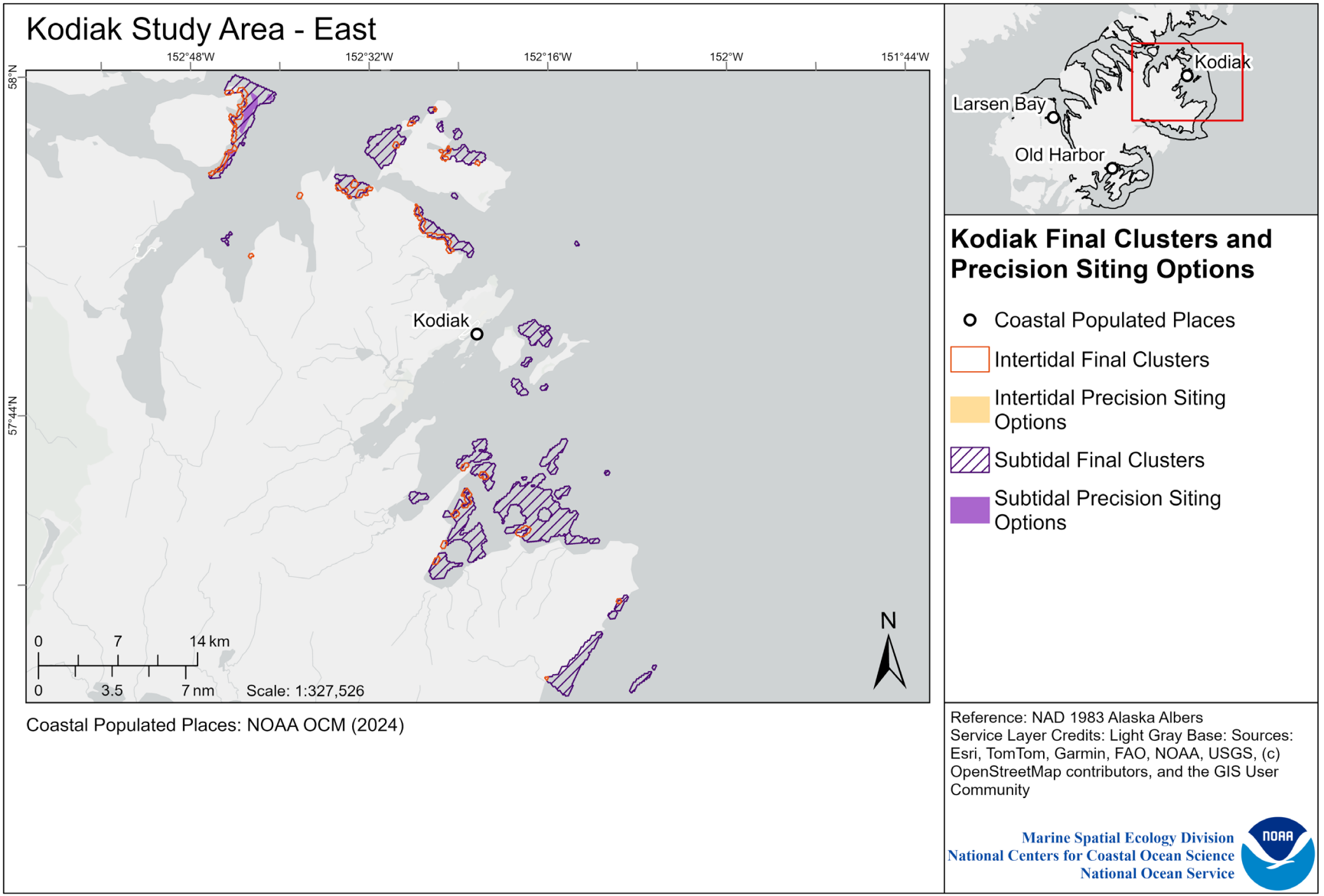


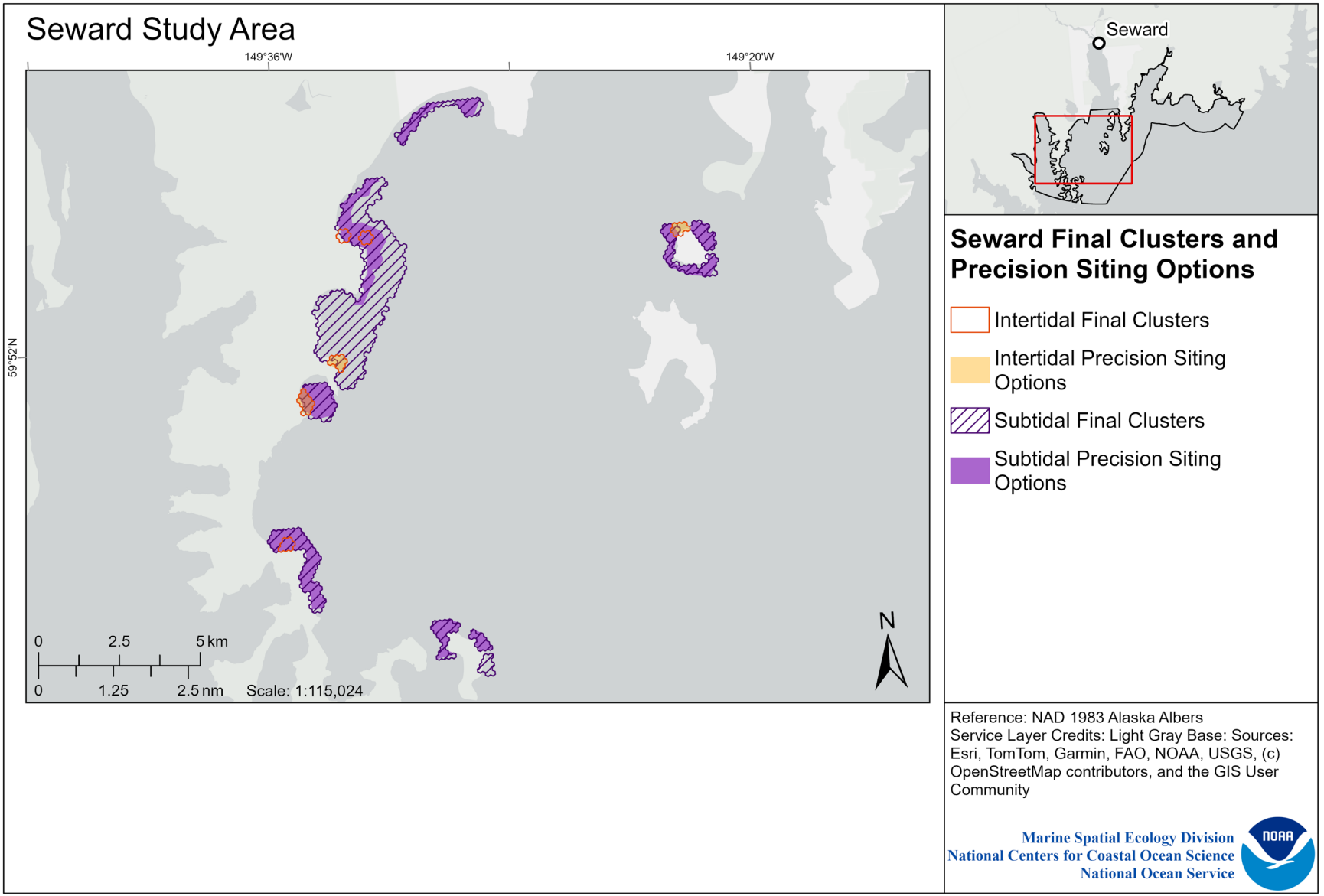
Coastal Populated Places: NOAA OCM (2024)

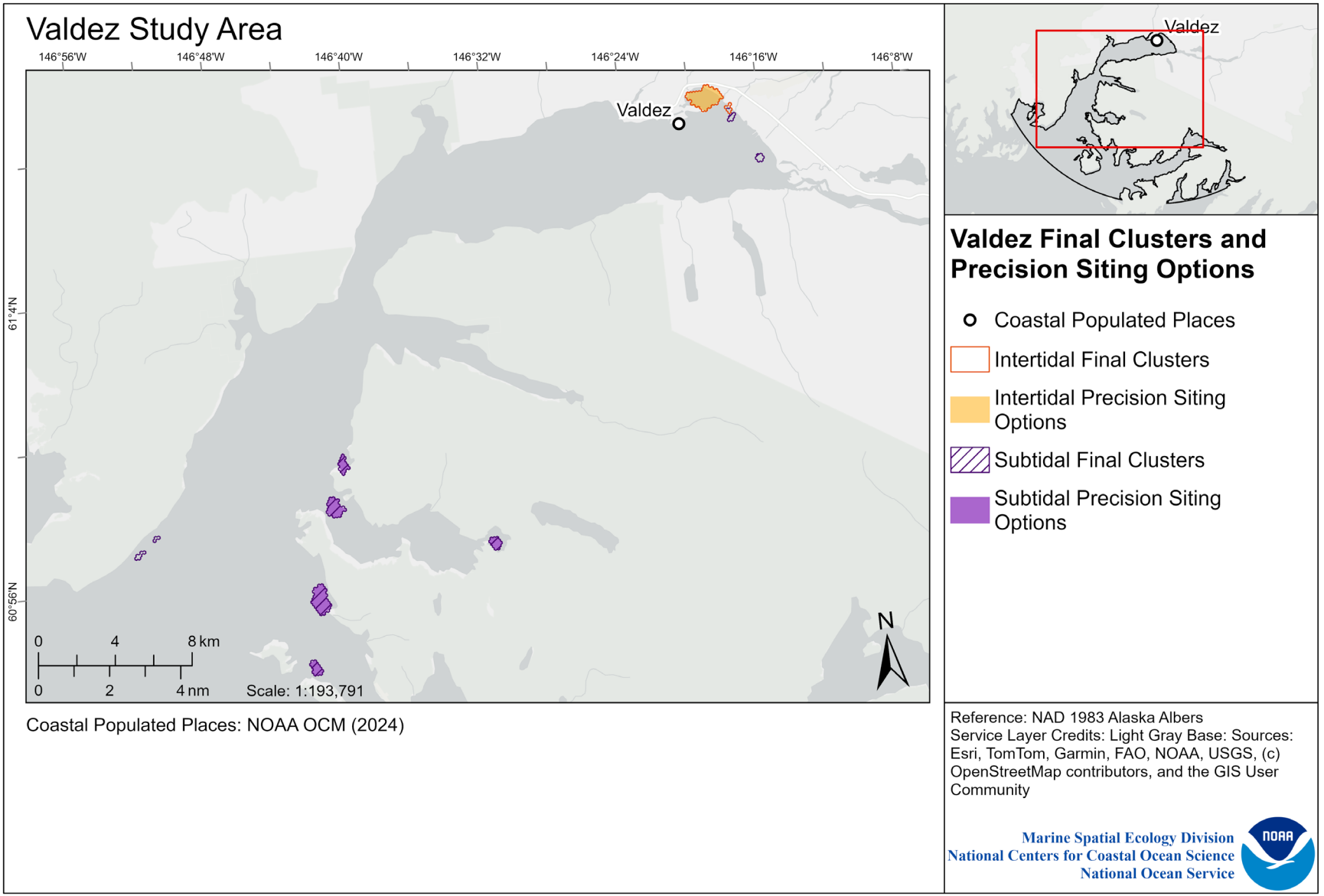
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Kodiak Study Area - Southwest
153°36'W
153°20'W
153°4'W
152°48'W
57°12'N
56°56'N
Old Harbor
0
6
12 km
0
3
6 nm
Scale: 1:279,746
N
Kodiak
Larsen Bay
Old Harbor
Kodiak Final Clusters and Precision Siting Options
Coastal Populated Places
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Kodiak Study Area - East
152°48'W
152°32'W
152°16'W
152°W
151°44'W
58°N
57°44'N
Kodiak
0
7
14 km
0
3.5
7 nm
Scale: 1:327,526
N
Larsen Bay
Old Harbor
Kodiak
Kodiak Final Clusters and Precision Siting Options
Coastal Populated Places
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

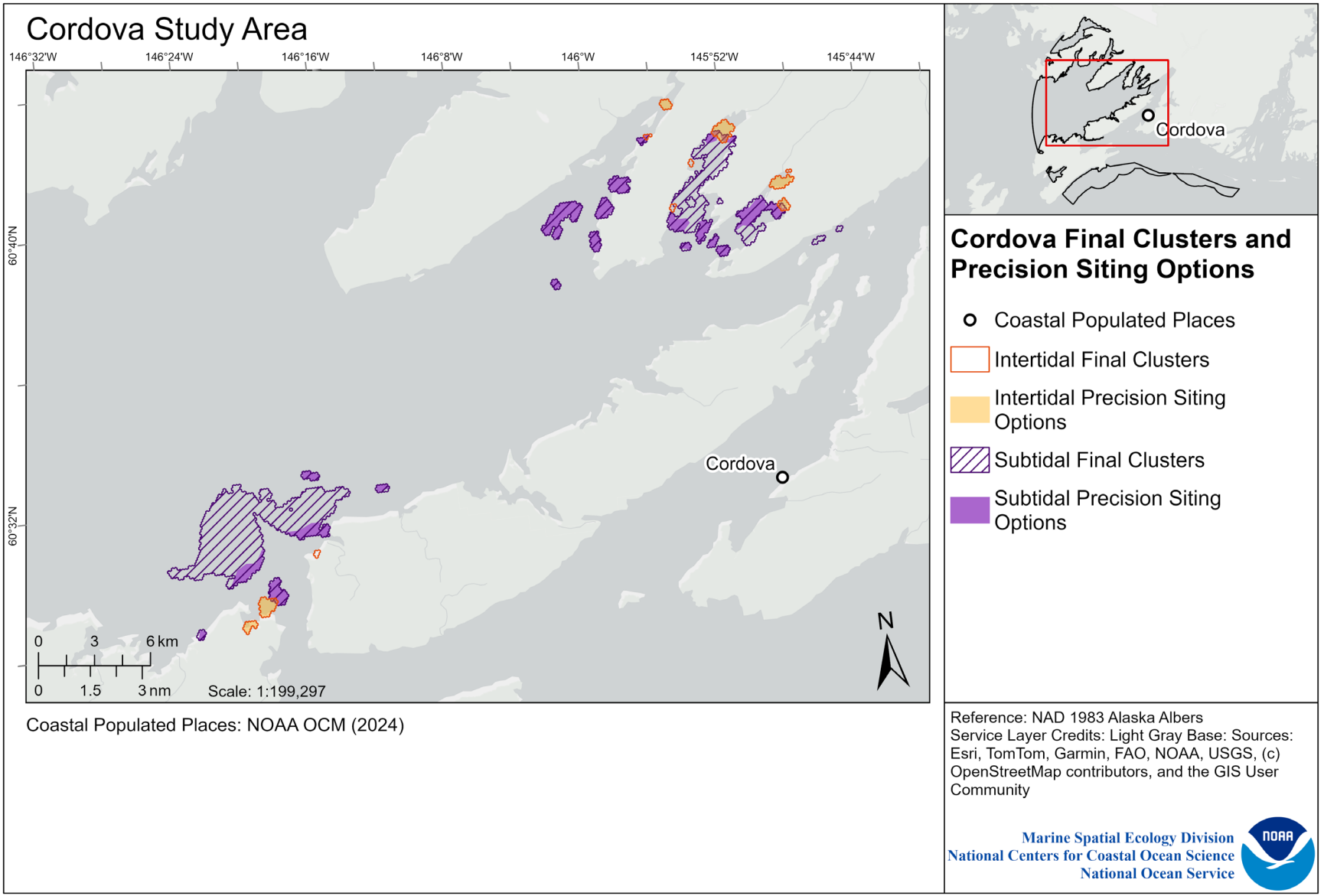

Seward Study Area
149°36'W
149°20'W
59°52'N
0
2.5
5 km
0
1.25
2.5 nm
Scale: 1:115,024
N
Seward
Seward Final Clusters and Precision Siting Options
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

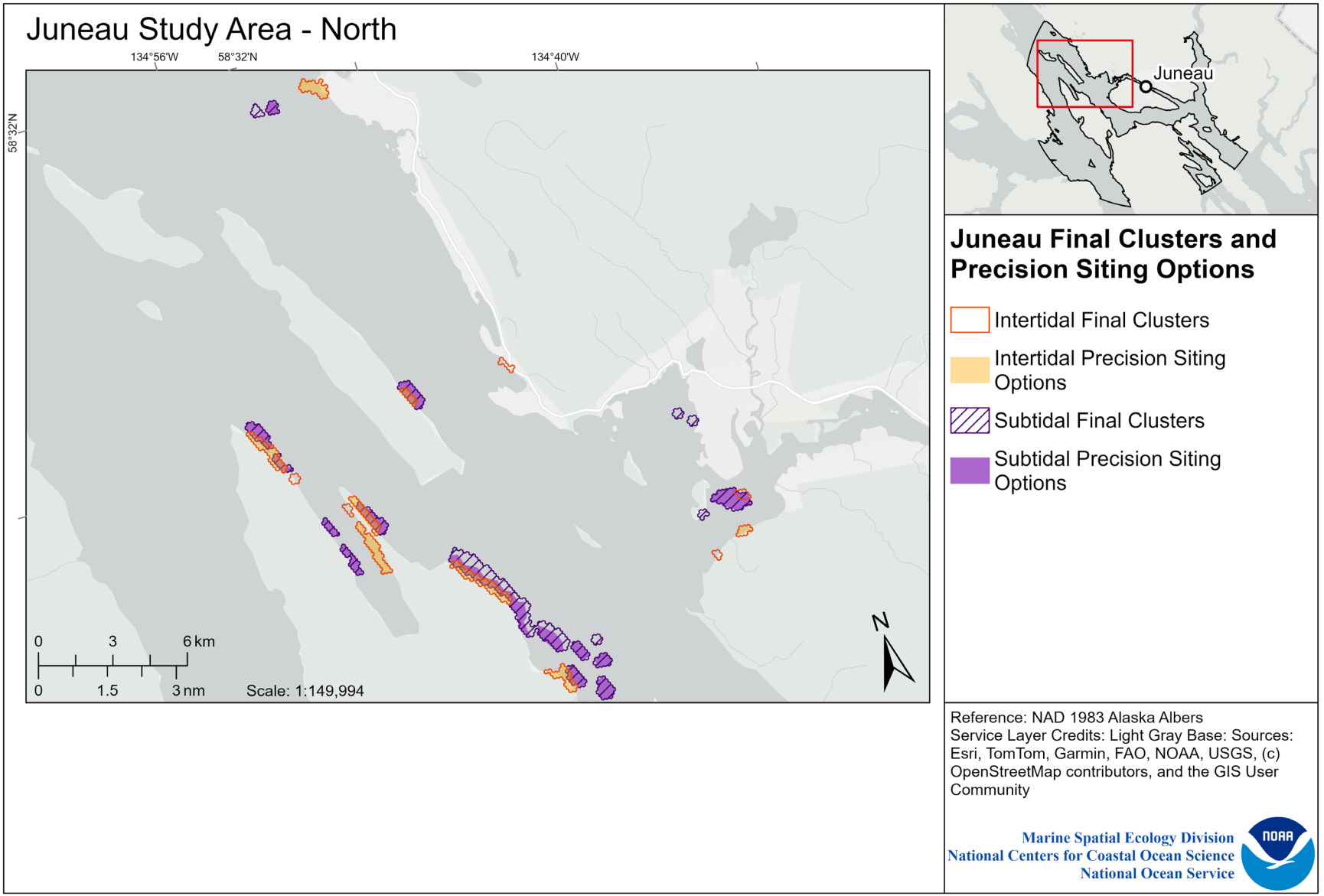


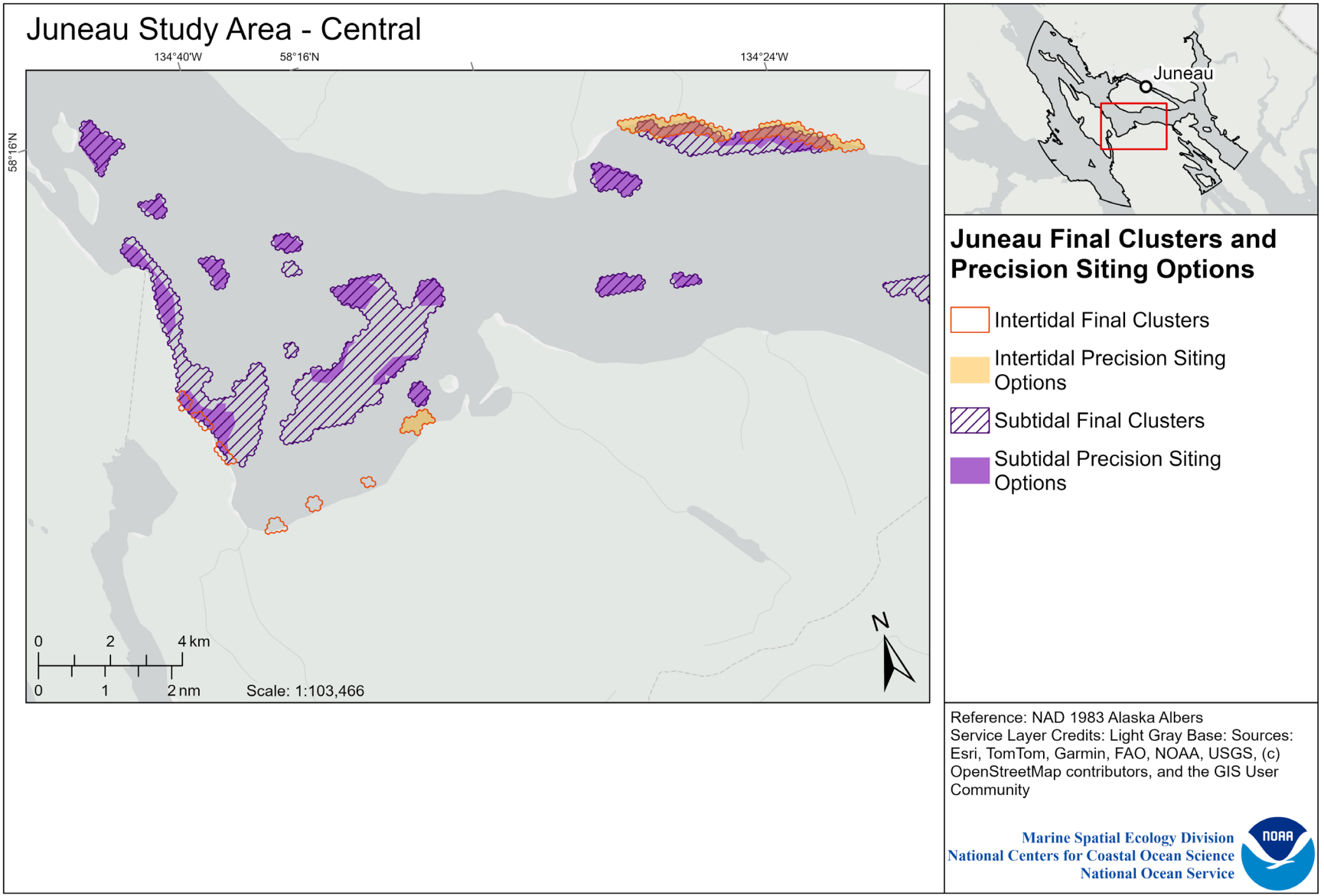
Coastal Populated Places: NOAA OCM (2024)

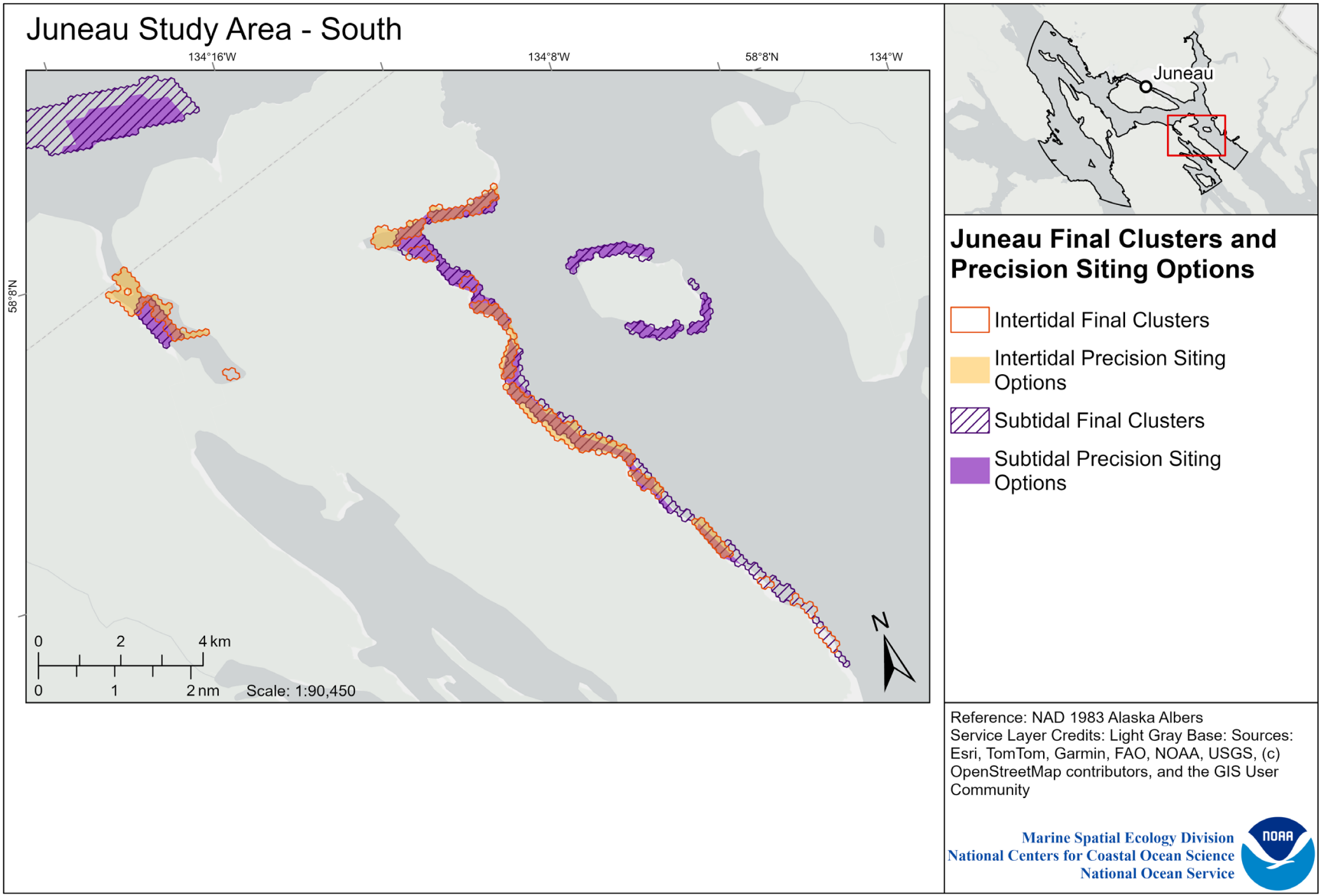
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

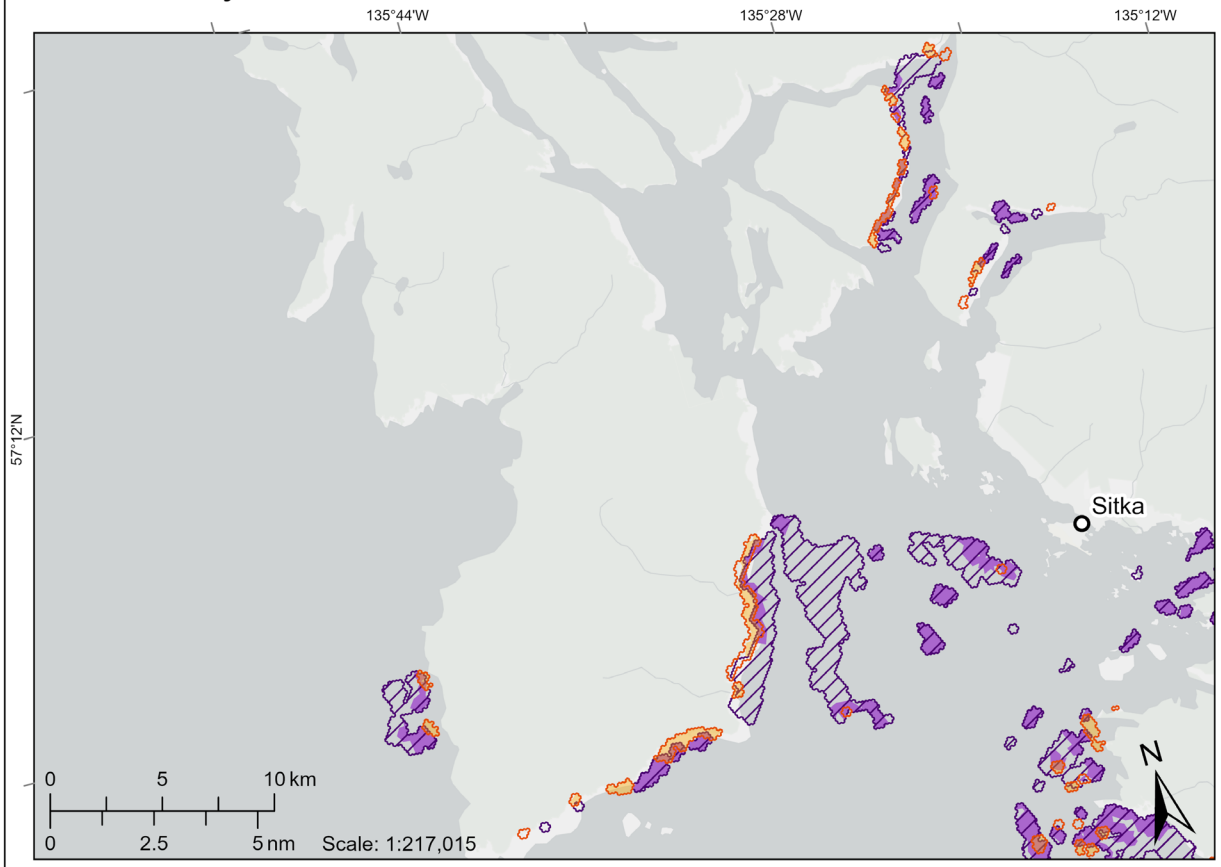

Cordova Study Area
146°32'W
146°24'W
146°16'W
146°8'W
146°W
145°52'W
145°44'W
60°40'N
60°32'N
Cordova
0
3
6 km
0
1.5
3 nm
Scale: 1:199,297
N
Cordova
Cordova Final Clusters and Precision Siting Options
Coastal Populated Places
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Juneau Study Area - North
134°56'W
58°32'N
134°40'W
58°32'N
0
3
6 km
0
1.5
3 nm
Scale: 1:149,994
N
Juneau
Juneau Final Clusters and Precision Siting Options
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Juneau Study Area - Central
134°40'W
58°16'N
134°24'W
58°16'N
0
2
4 km
0
1
2 nm
Scale: 1:103,466
N
Juneau
Juneau Final Clusters and Precision Siting Options
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Juneau Study Area - South
134°16'W
134°8'W
58°8'N
134°W
58°8'N
0
2
4 km
0
1
2 nm
Scale: 1:90,450
N
Juneau
Juneau Final Clusters and Precision Siting Options
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Sitka Study Area - North



Coastal Populated Places: NOAA OCM (2024)

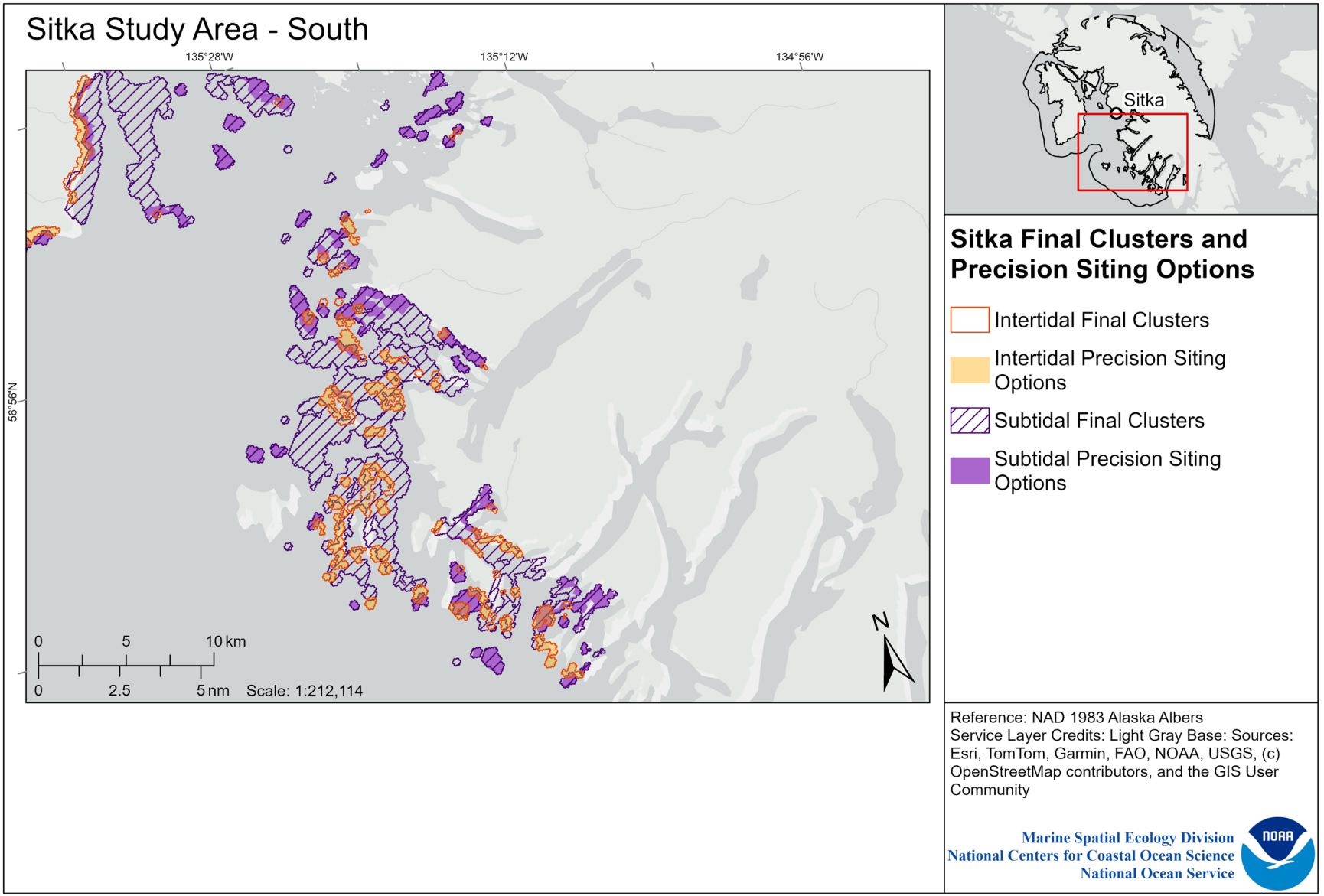


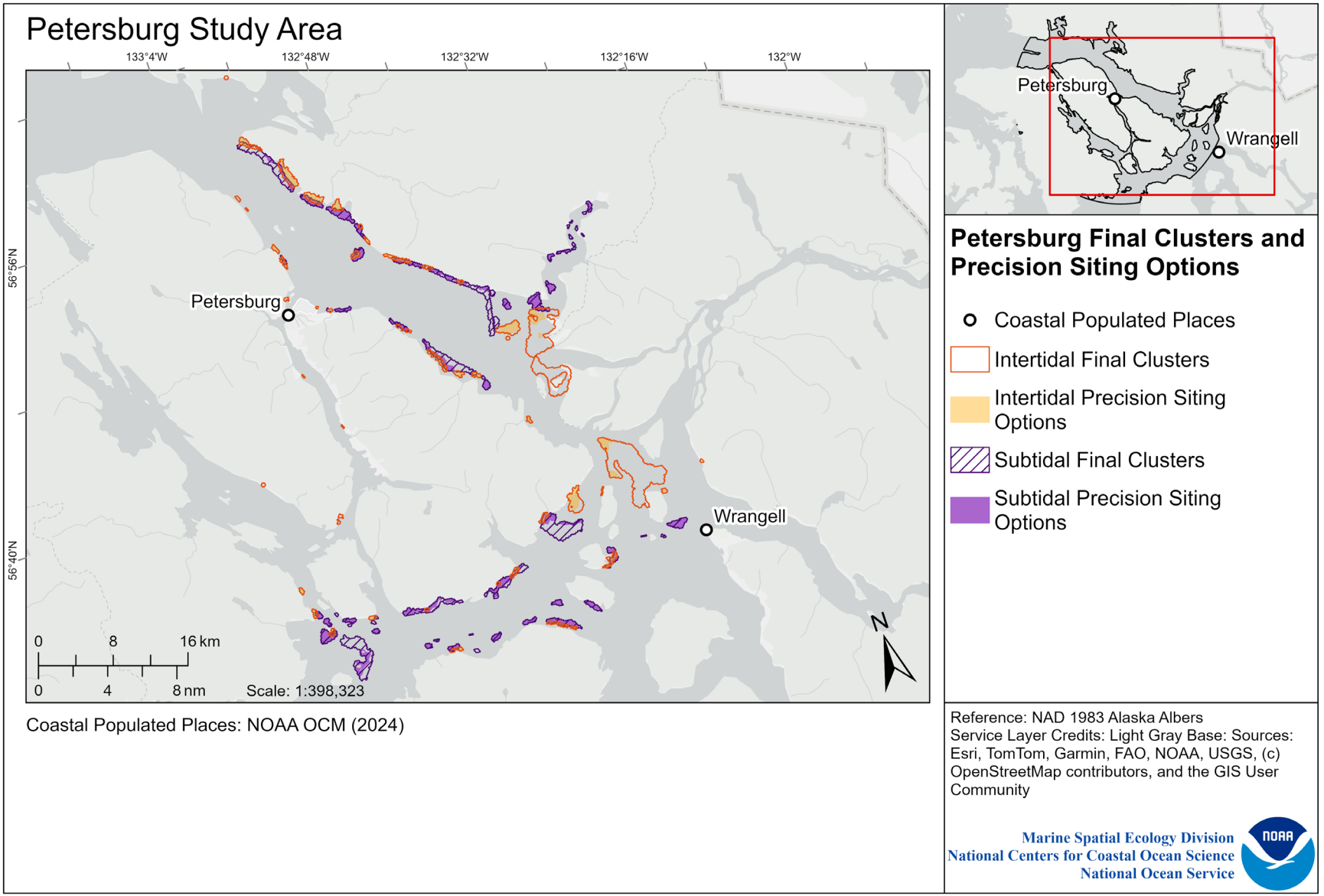
Sitka Final Clusters and Precision Siting Options

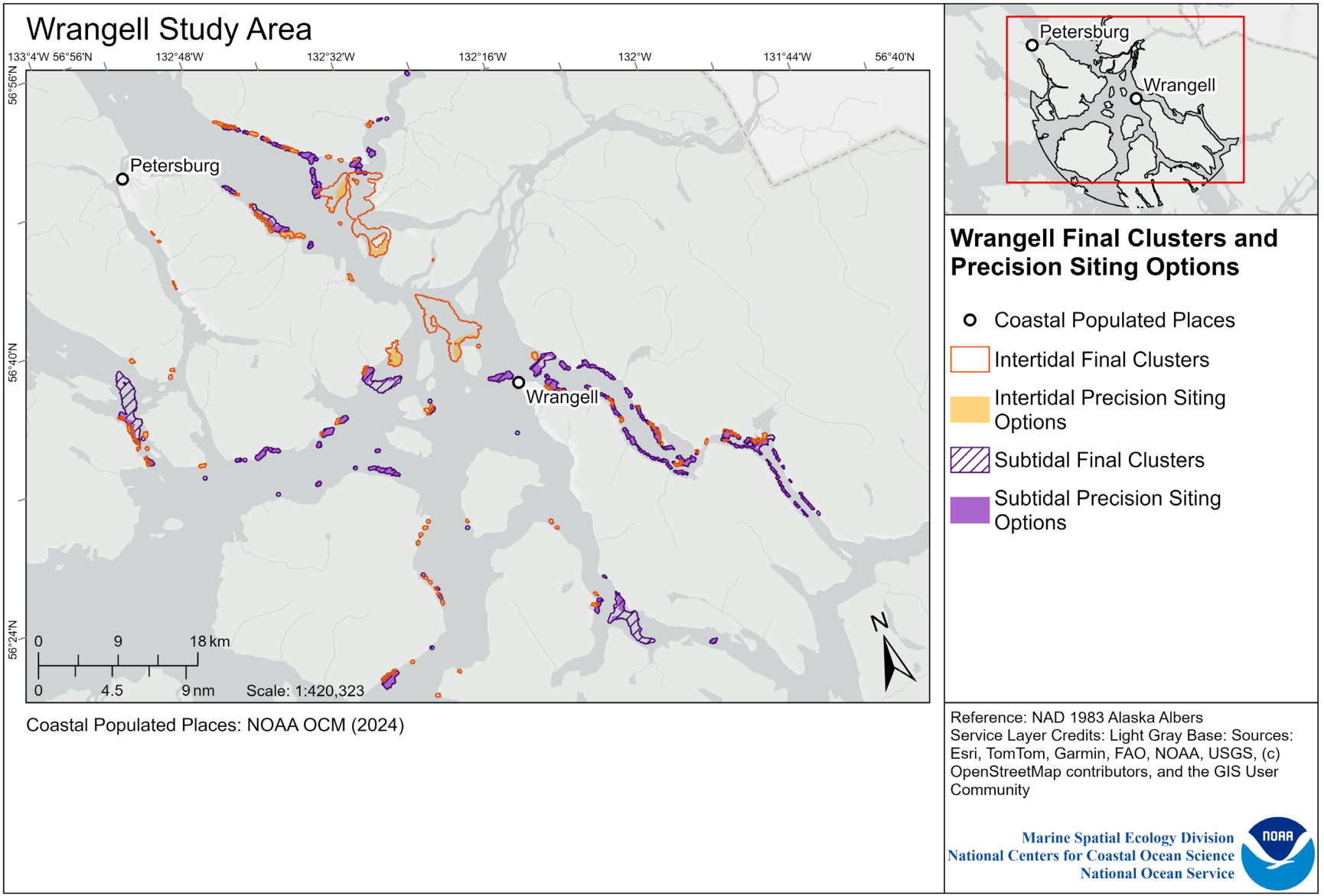
- Coastal Populated Places
- Intertidal Final Clusters
- Intertidal Precision Siting Options
- Subtidal Final Clusters
- Subtidal Precision Siting Options

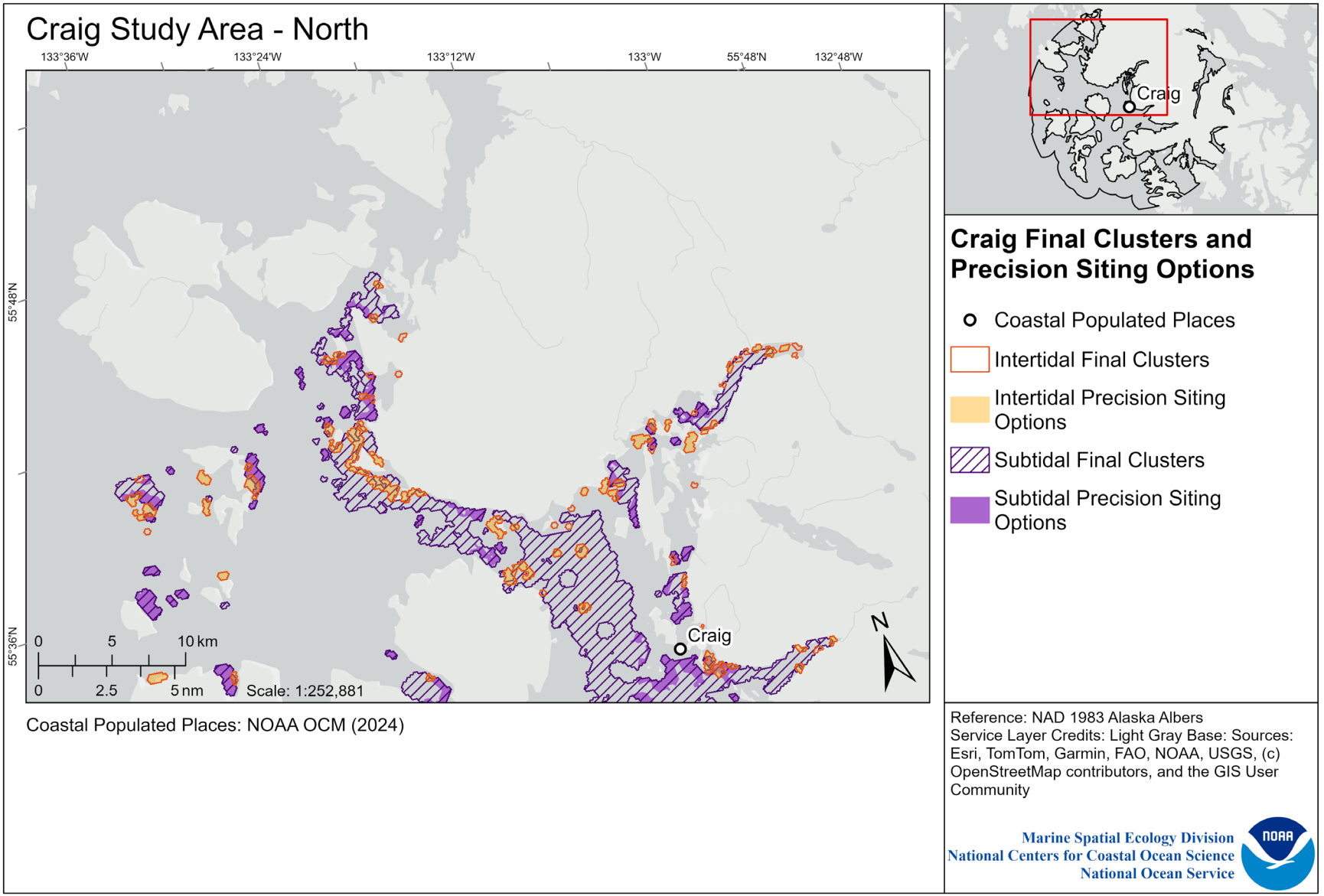
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

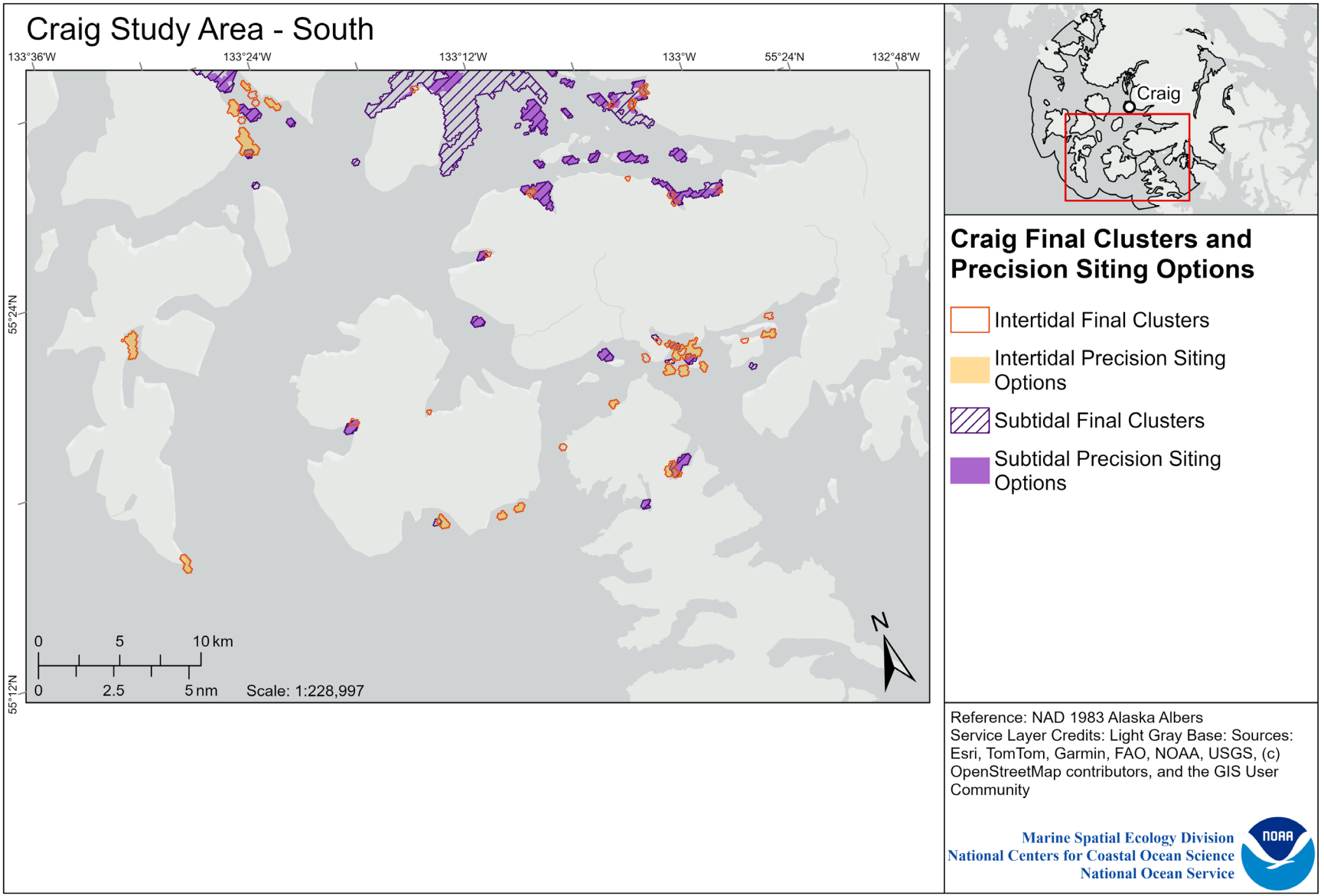
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

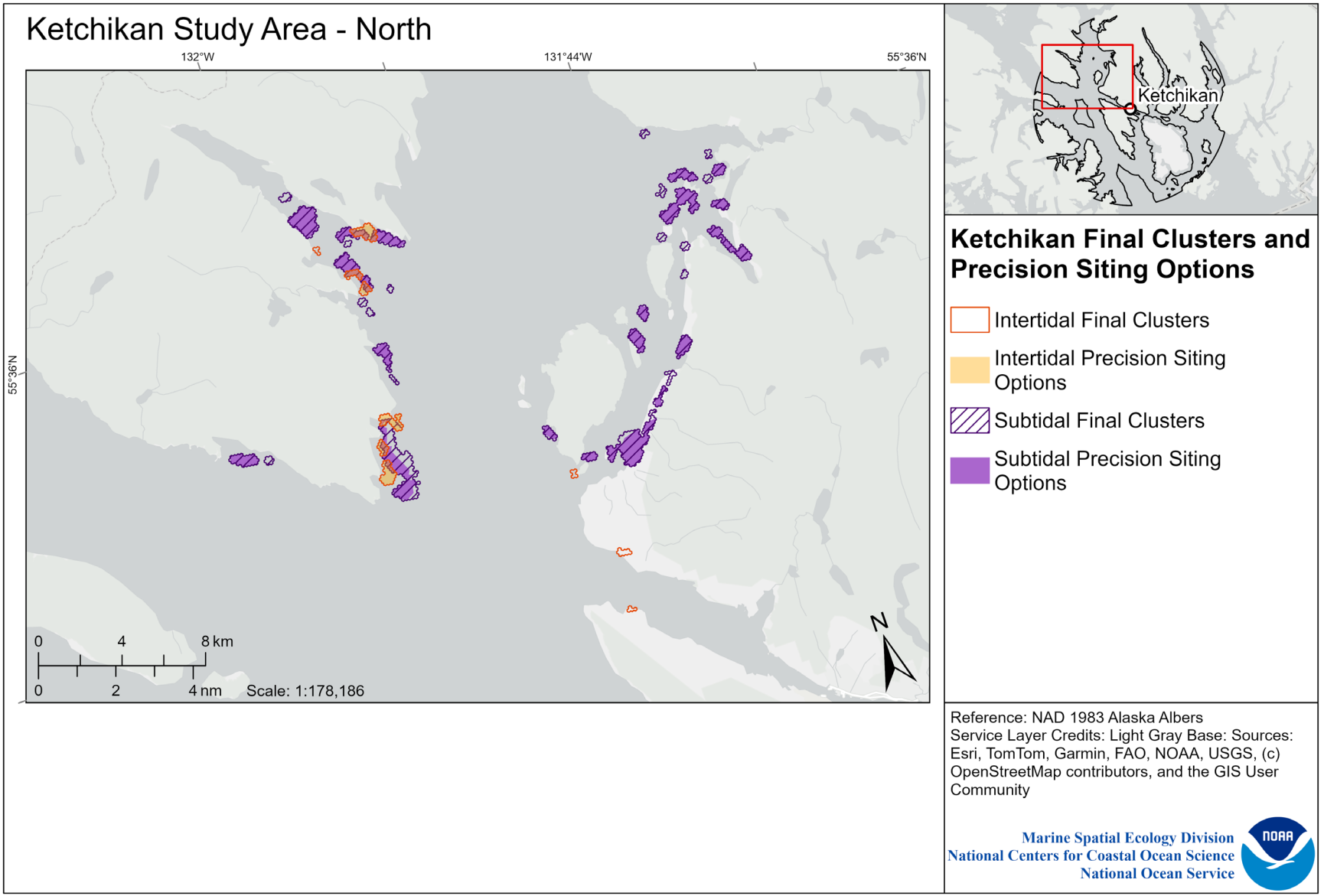

Sitka Study Area - South
135°28'W
135°12'W
134°56'W
56°56'N
0
5
10 km
0
2.5
5 nm
Scale: 1:212,114
N
Sitka
Sitka Final Clusters and Precision Siting Options
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Petersburg Study Area
133°4'W
132°48'W
132°32'W
132°16'W
132°W
56°56'N
56°40'N
Petersburg
Wrangell
0
8
16 km
0
4
8 nm
Scale: 1:398,323
N
Petersburg
Wrangell
Petersburg Final Clusters and Precision Siting Options
Coastal Populated Places
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
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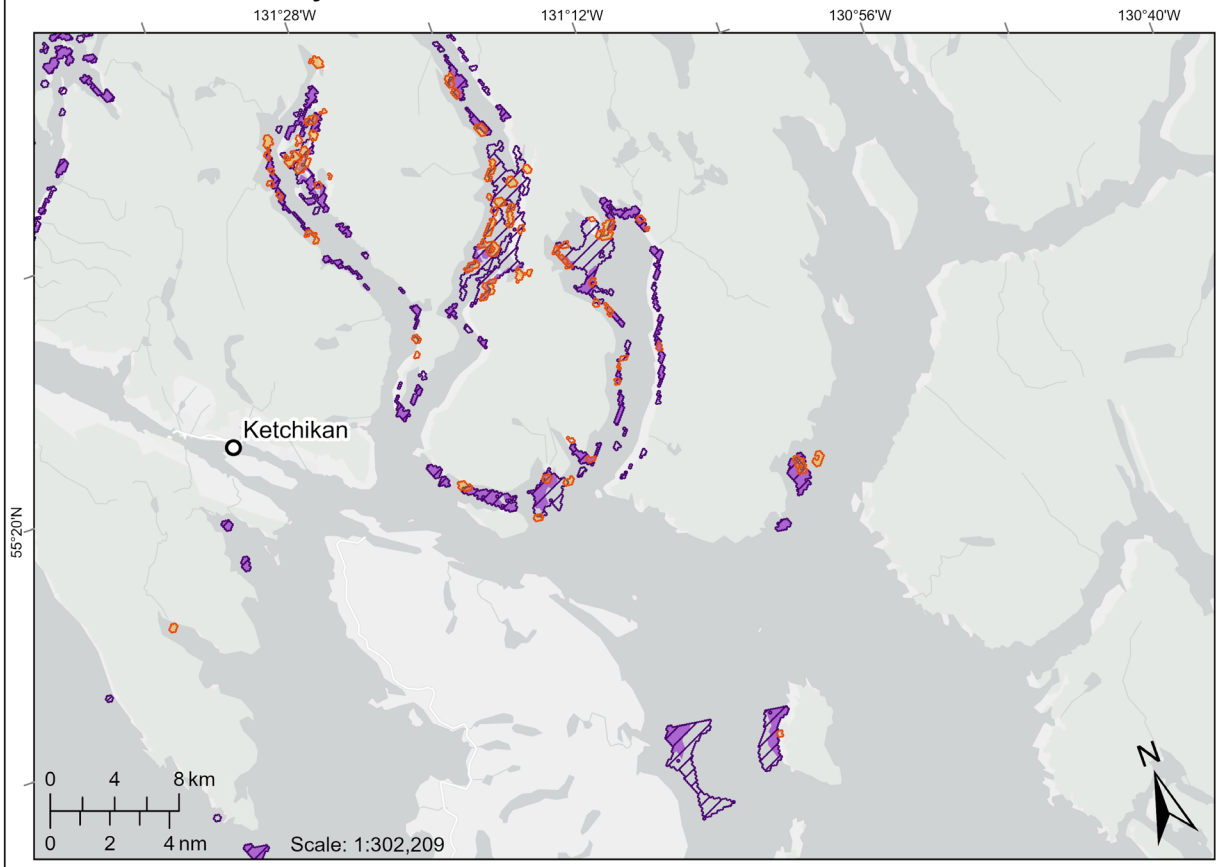

Wrangell Study Area
133°4'W 56°56'N
132°48'W
132°32'W
132°16'W
132°W
131°44'W
56°40'N
56°56'N
56°40'N
56°24'N
Petersburg
Wrangell
0
9
18 km
0
4.5
9 nm
Scale: 1:420,323
N
Petersburg
Wrangell
Wrangell Final Clusters and Precision Siting Options
Coastal Populated Places
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA


Craig Study Area - North
133°36'W
133°24'W
133°12'W
133°W
55°48'N
132°48'W
55°48'N
55°36'N
0
5
10 km
0
2.5
5 nm
Scale: 1:252,881
Craig
N
Craig
Craig Final Clusters and Precision Siting Options
Coastal Populated Places
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Coastal Populated Places: NOAA OCM (2024)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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NOAA


Craig Study Area - South
133°36'W
133°24'W
133°12'W
133°W
55°24'N
132°48'W
55°24'N
55°12'N
0
5
10 km
0
2.5
5 nm
Scale: 1:228,997
N
Craig
Craig Final Clusters and Precision Siting Options
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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Ketchikan Study Area - North
132°W
131°44'W
55°36'N
55°36'N
0
4
8 km
0
2
4 nm
Scale: 1:178,186
N
Ketchikan
Ketchikan Final Clusters and Precision Siting Options
Intertidal Final Clusters
Intertidal Precision Siting Options
Subtidal Final Clusters
Subtidal Precision Siting Options
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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Ketchikan Study Area - South



Coastal Populated Places: NOAA OCM (2024)



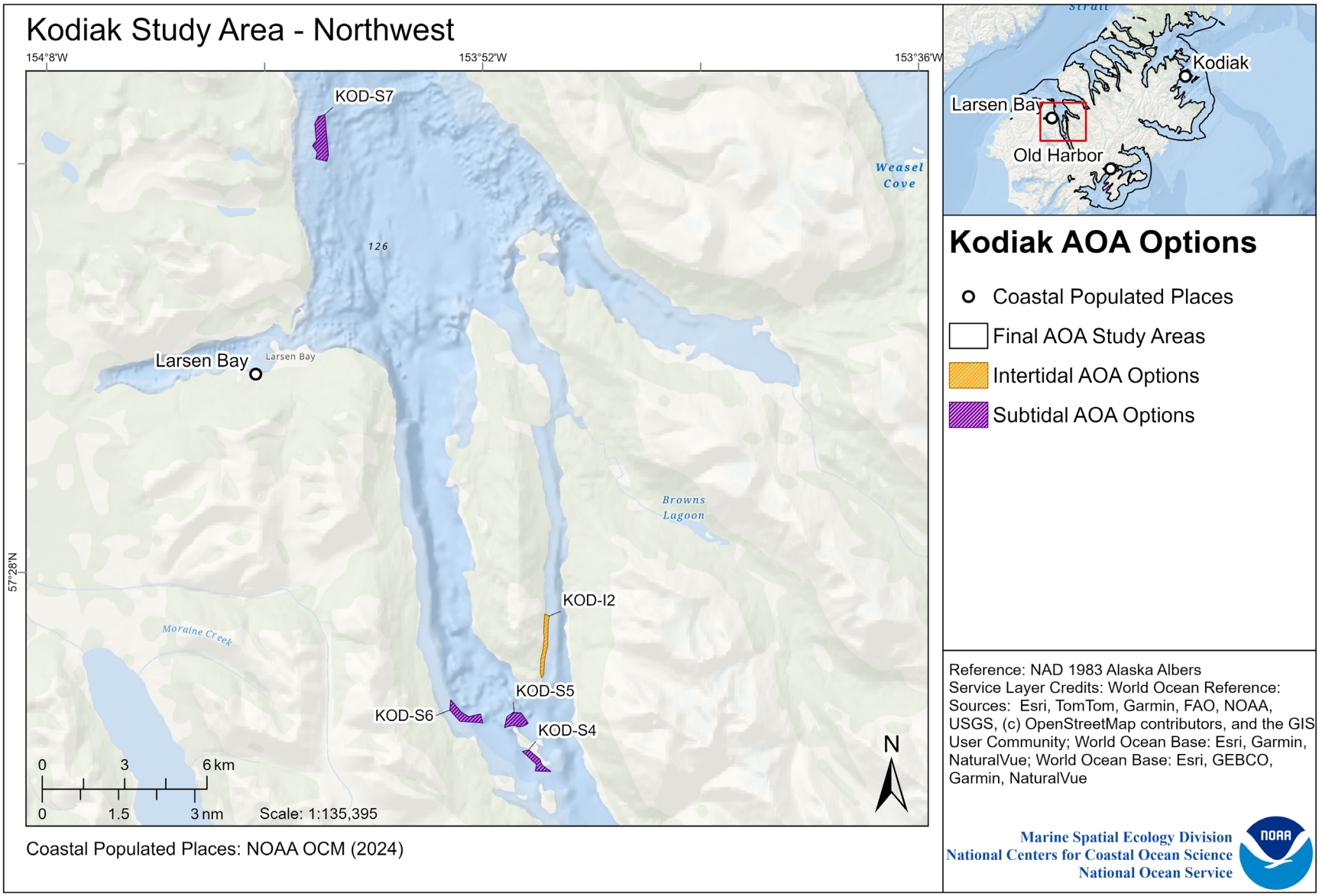
Ketchikan Final Clusters and Precision Siting Options

- Coastal Populated Places
- Intertidal Final Clusters
- Intertidal Precision Siting Options
- Subtidal Final Clusters
- Subtidal Precision Siting Options

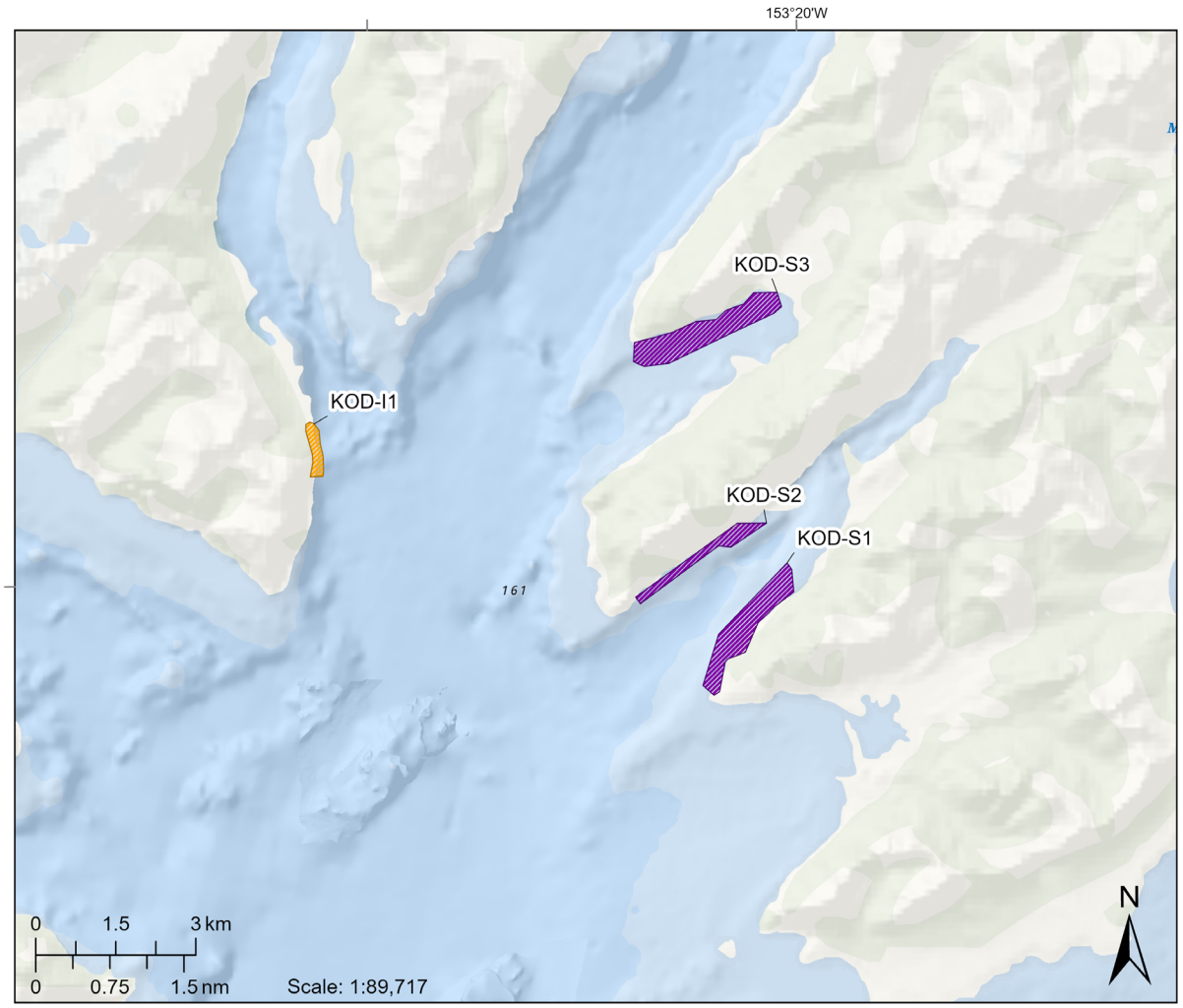
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak AOA Options Maps



Kodiak Study Area - Southwest



Coastal Populated Places: NOAA OCM (2024)



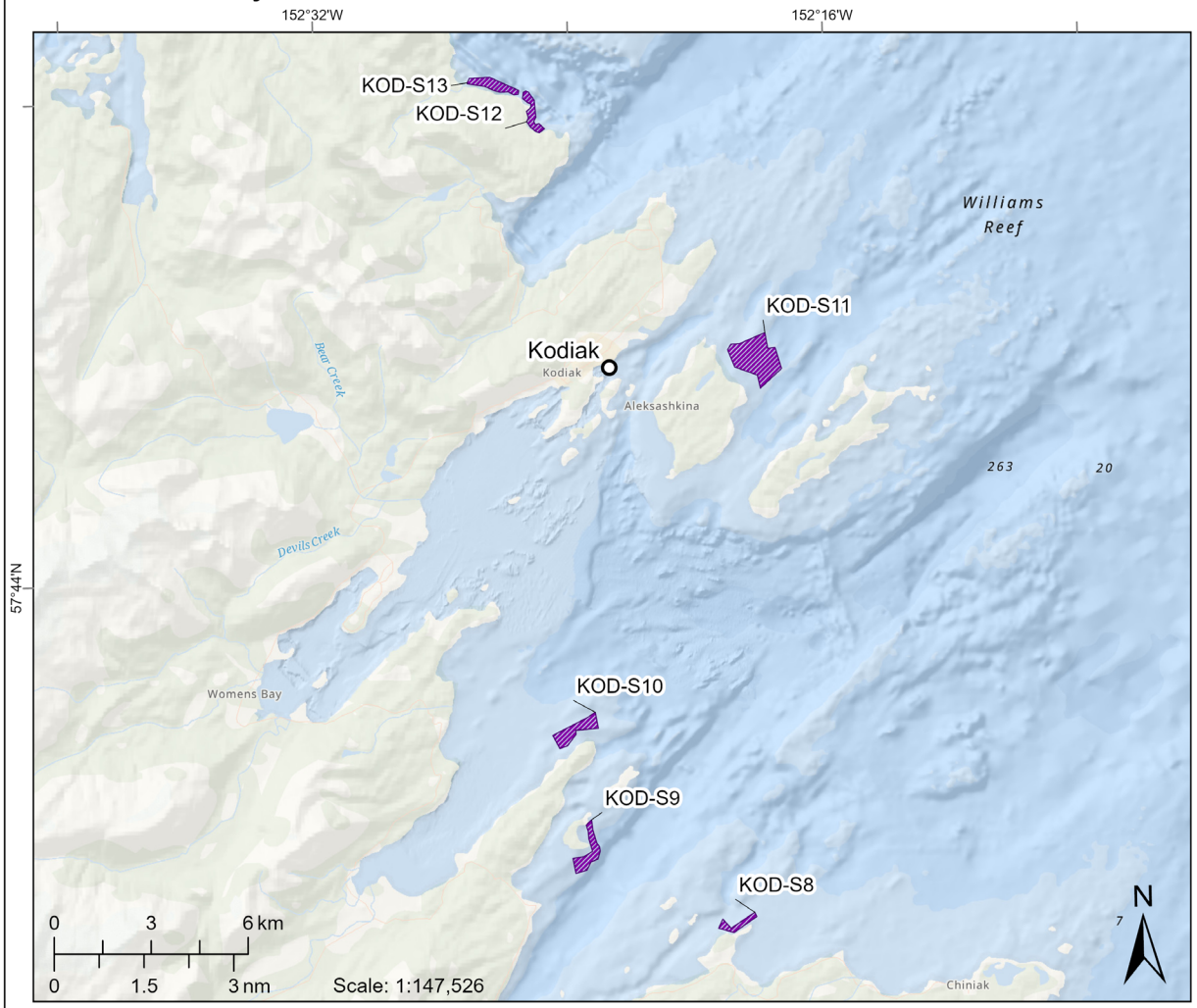
Kodiak AOA Options

- Coastal Populated Places
- Final AOA Study Areas
- Intertidal AOA Options
- Subtidal AOA Options

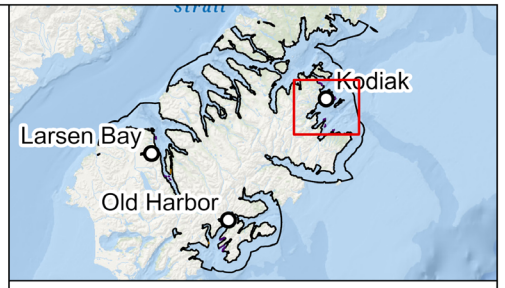
Reference: NAD 1983 Alaska Albers
Service Layer Credits: World Ocean Reference: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community; World Ocean Base: Esri, Garmin, NaturalVue; World Ocean Base: Esri, GEBCO, Garmin, NaturalVue

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Kodiak Study Area - East



Coastal Populated Places: NOAA OCM (2024)

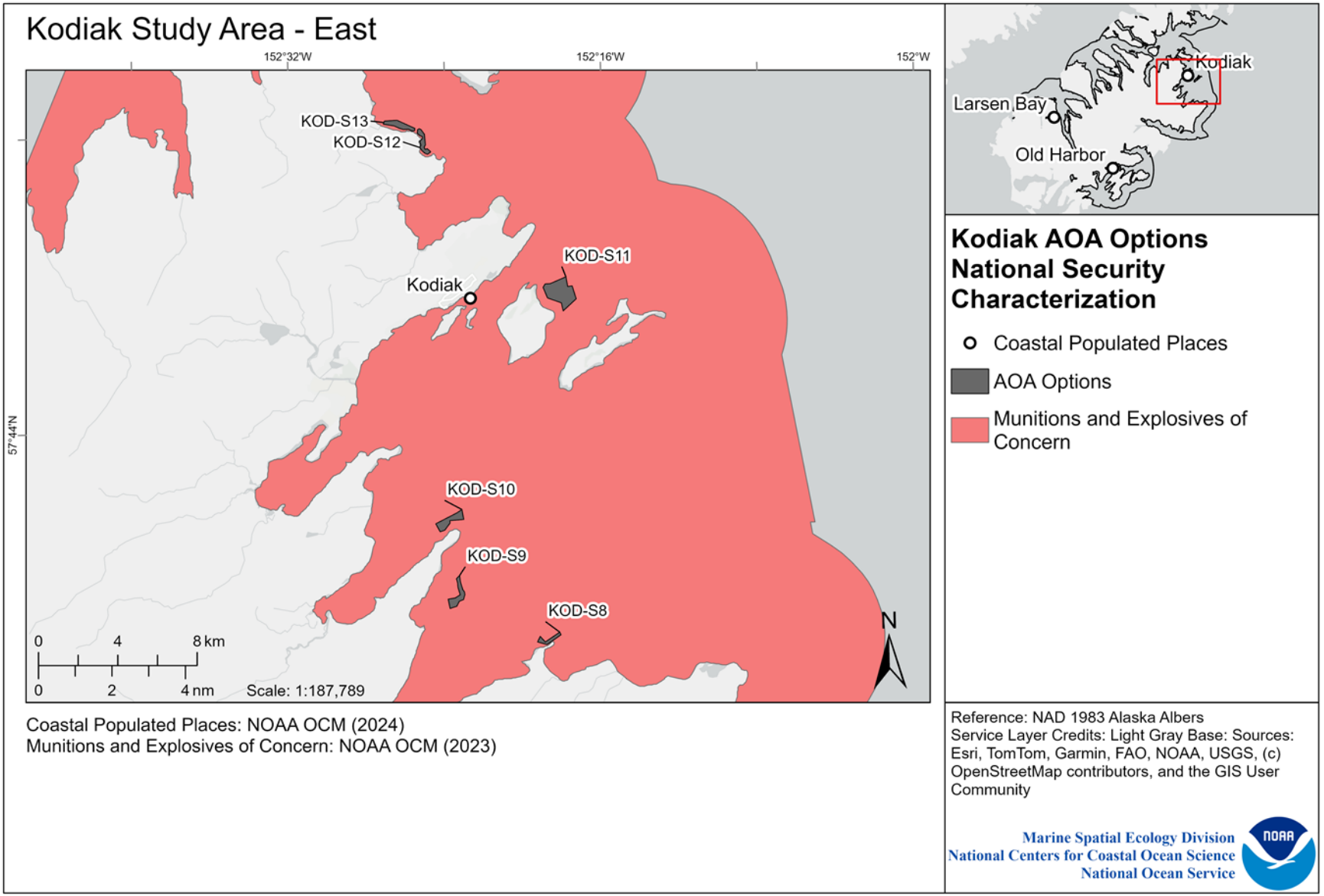


Kodiak AOA Options

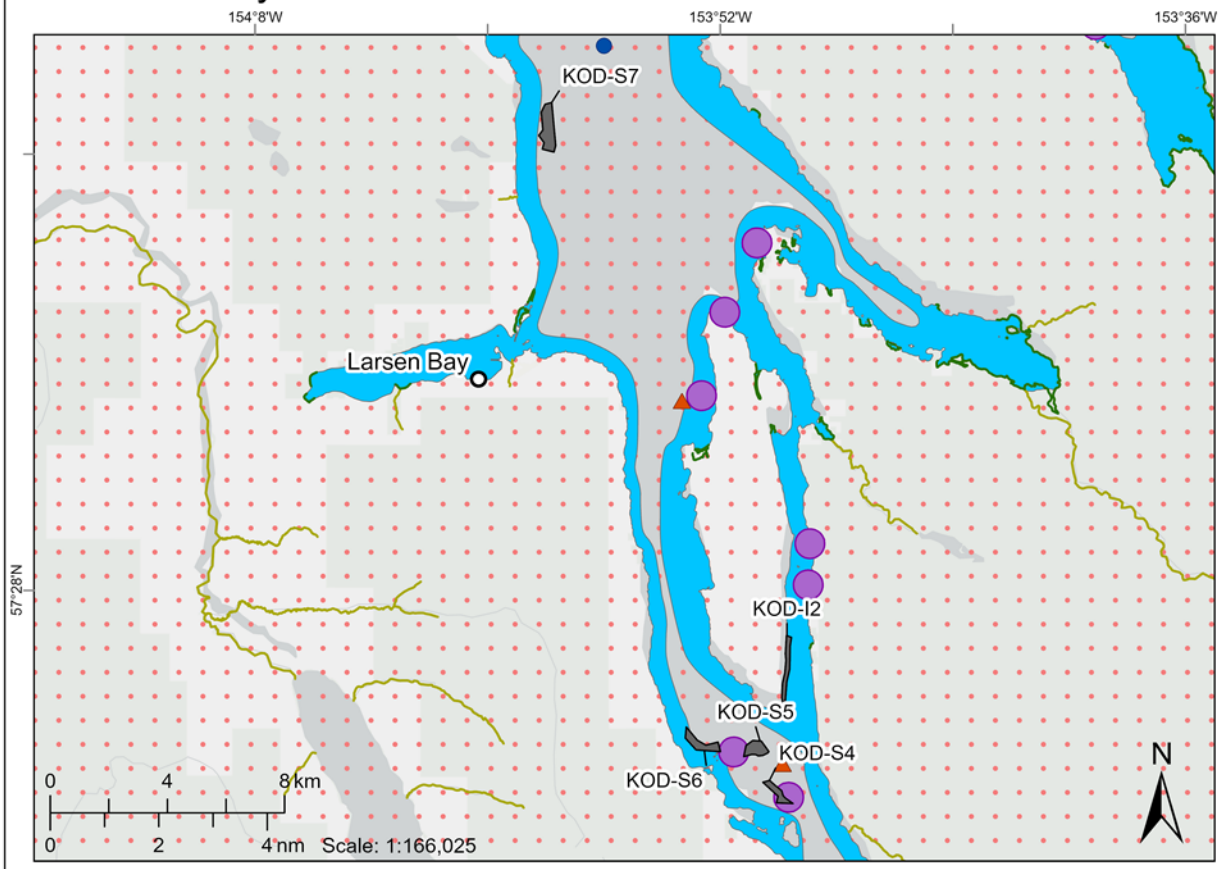
- Coastal Populated Places
- Final AOA Study Areas
- Intertidal AOA Options
- Subtidal AOA Options

Reference: NAD 1983 Alaska Albers
Service Layer Credits: World Ocean Reference: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community; World Ocean Base: Esri, Garmin, NaturalVue; World Ocean Base: Esri, GEBCO, Garmin, NaturalVue

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Kodiak Study Area - East
152°32'W
152°16'W
152°W
57°44'N
KOD-S13
KOD-S12
KOD-S11
Kodiak
KOD-S10
KOD-S9
KOD-S8
0
4
8 km
0
2
4 nm
Scale: 1:187,789
N
Kodiak
Larsen Bay
Old Harbor
Kodiak AOA Options National Security Characterization
Coastal Populated Places
AOA Options
Munitions and Explosives of Concern
Coastal Populated Places: NOAA OCM (2024)
Munitions and Explosives of Concern: NOAA OCM (2023)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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Kodiak Study Area - Northwest





Kodiak AOA Options Natural Resources Characterization

- Coastal Populated Places
- AOA Options
- Deep-sea Coral and Sponge Observations*
- Key Harbor Seal Haulouts**
- Anadromous Streams***
- Shorezone Eelgrass
- Fin Whale Feeding BIA
- Pacific Herring Spawning Areas
- Seabird Colonies

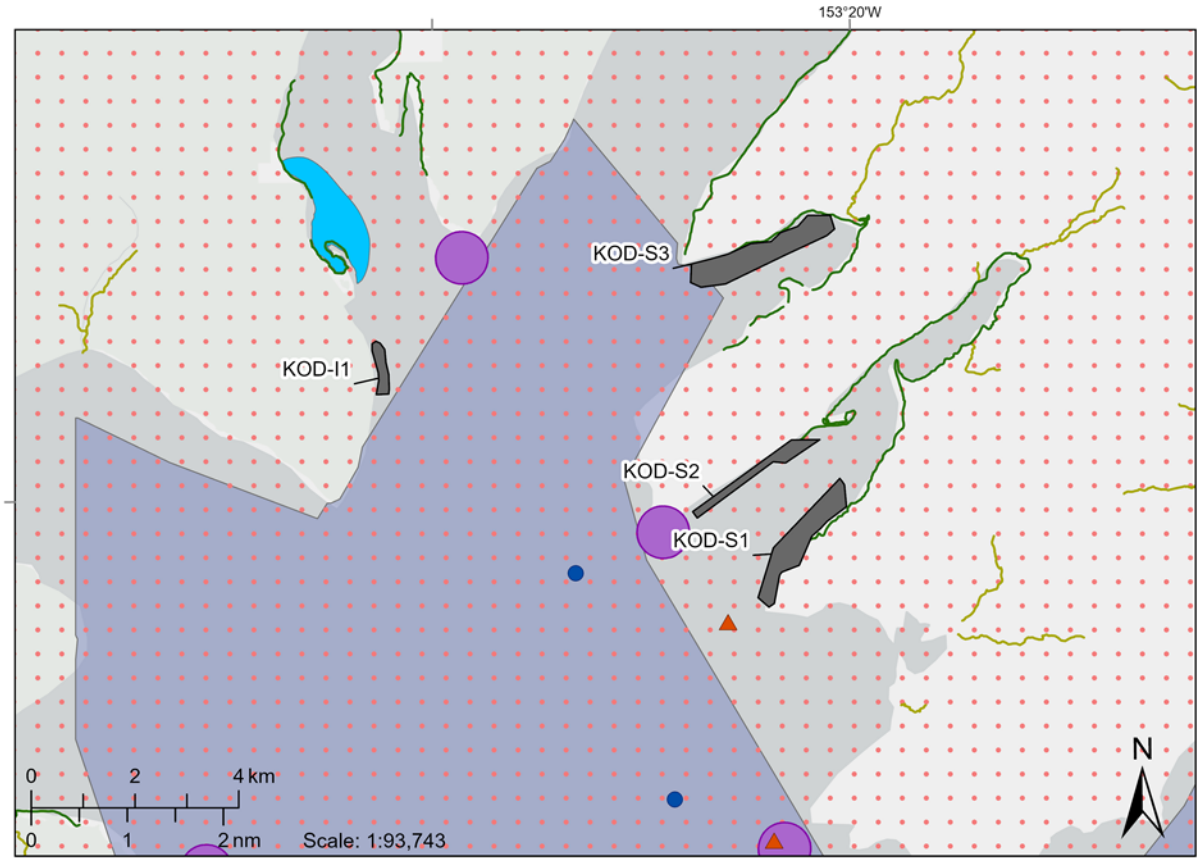
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)

Anadromous Streams: ADFG (2023)
Biologically Important Areas - Feeding: Wild et al. (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Southwest





Kodiak AOA Options Natural Resources Characterization

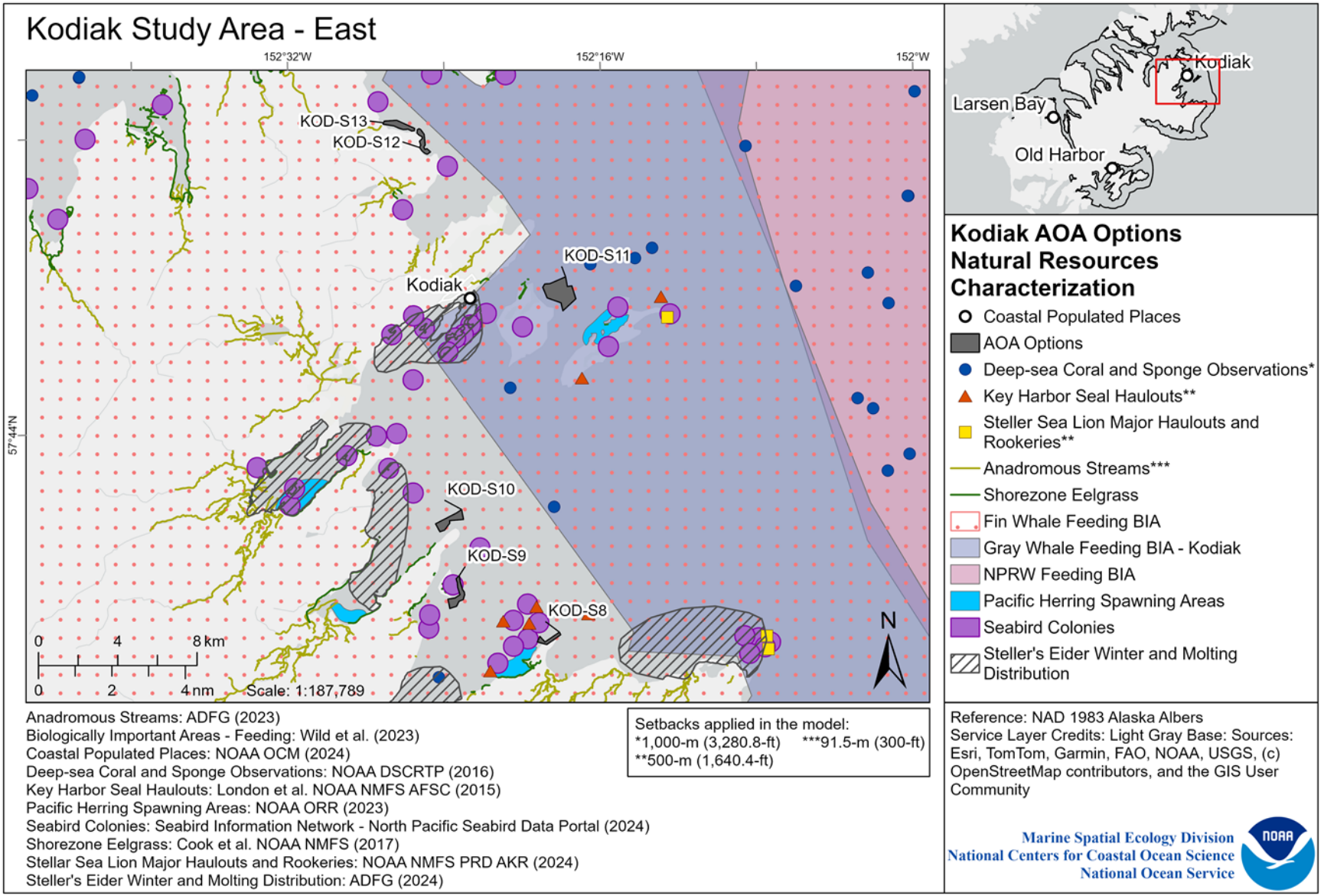
- AOA Options
- Key Harbor Seal Haulouts**
- Deep-sea Coral and Sponge Observations*
- Anadromous Streams***
- Shorezone Eelgrass
- Fin Whale Feeding BIA
- Gray Whale Feeding BIA - Kodiak
- Pacific Herring Spawning Areas
- Seabird Colonies

Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)

Anadromous Streams: ADFG (2023)
Biologically Important Areas - Feeding: Wild et al. (2023)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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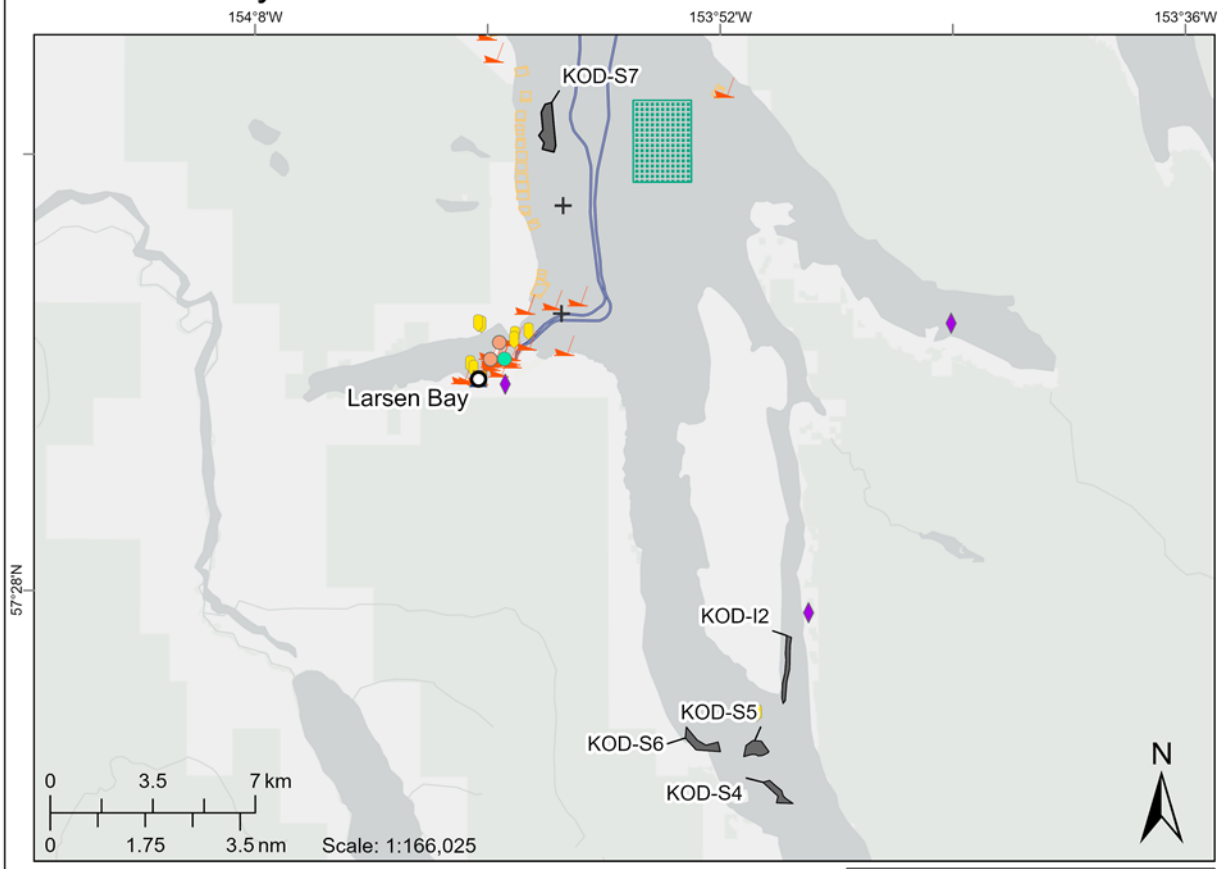
Anadromous Streams: ADFG (2023)
Biologically Important Areas - Feeding: Wild et al. (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)
Steller's Eider Winter and Molting Distribution: ADFG (2024)

Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Northwest





Kodiak AOA Options Industry, Navigation, and Transportation Characterization

- Coastal Populated Places
- AOA Options
- Aids to Navigation*
- AOOS Sensor Stations
- Harbors*
- Offshore Seafood Processors Permitted Vessels
- POA Navigation Projects*
- Seafood Processing Discharge Locations
- Seafood Processing Facility Locations
- Wrecks and Obstructions****
- Land Permit Leases
- Ocean Disposal Sites
- Submarine Cable Areas***

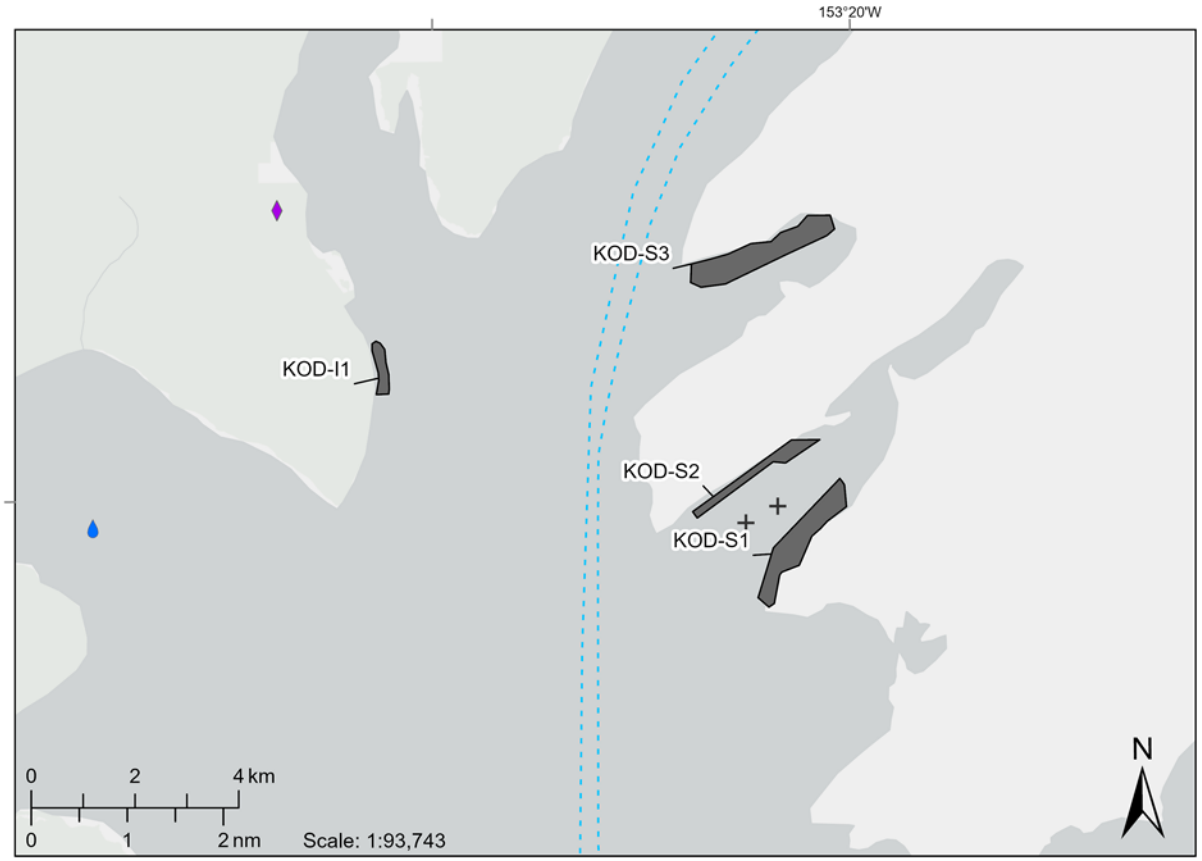
Aids to Navigation: NOAA OCM (2022), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations: Alaska DEC (2019), Submarine Cable Areas: NOAA OCM (2023), Wrecks and Obstructions: NOAA OCM (2023)

Setbacks applied in the model:
*500-m (1,640.4-ft)
**350-m (1,148.3-ft)
***200-m (656.2-ft)
****152.5-m (500-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Southwest





Kodiak AOA Options Industry, Navigation, and Transportation Characterization

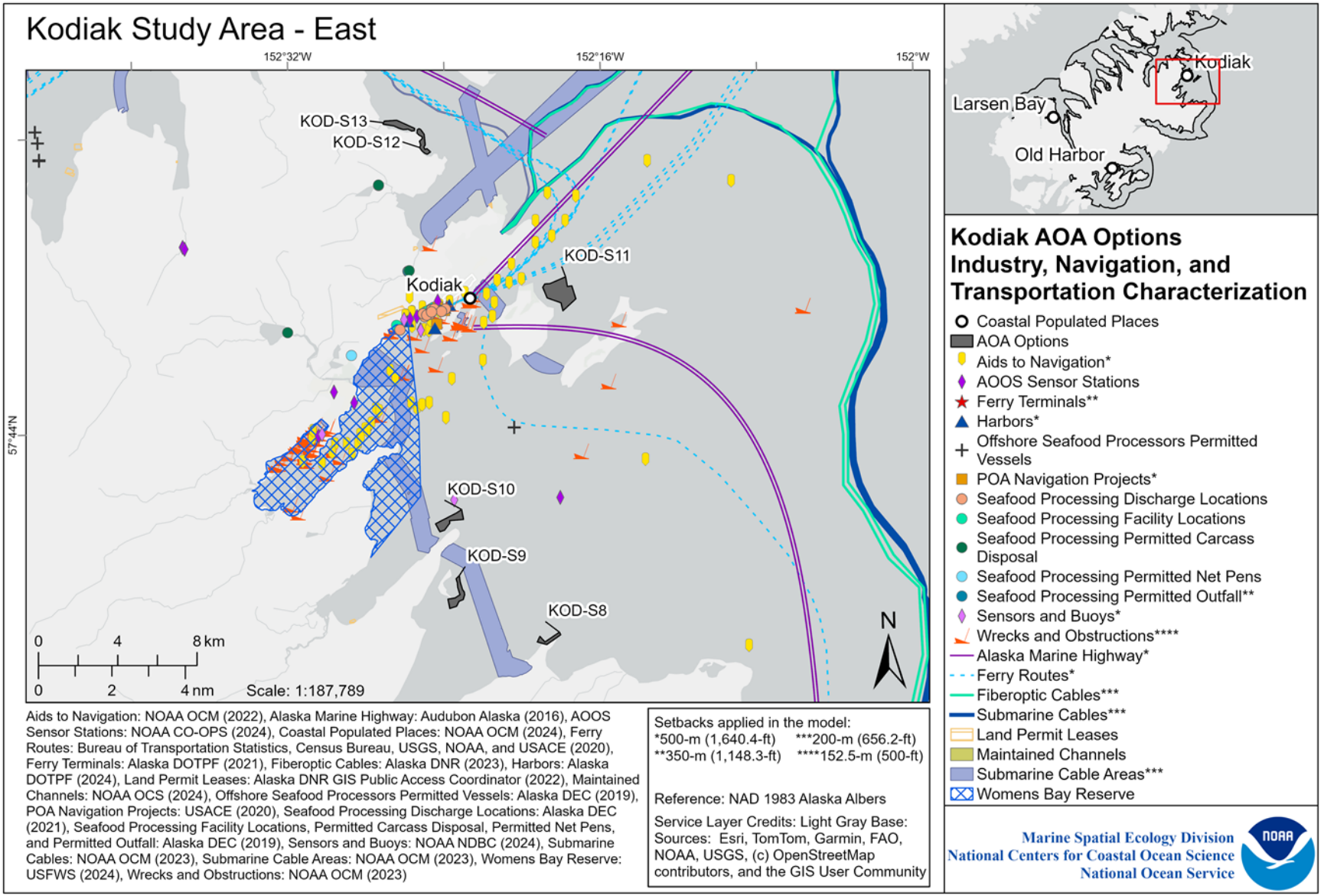
- AOA Options
- Alaska DEC WQ Monitoring Locations
- AOOS Sensor Stations
- Offshore Seafood Processors Permitted Vessels
- Ferry Routes*

Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)

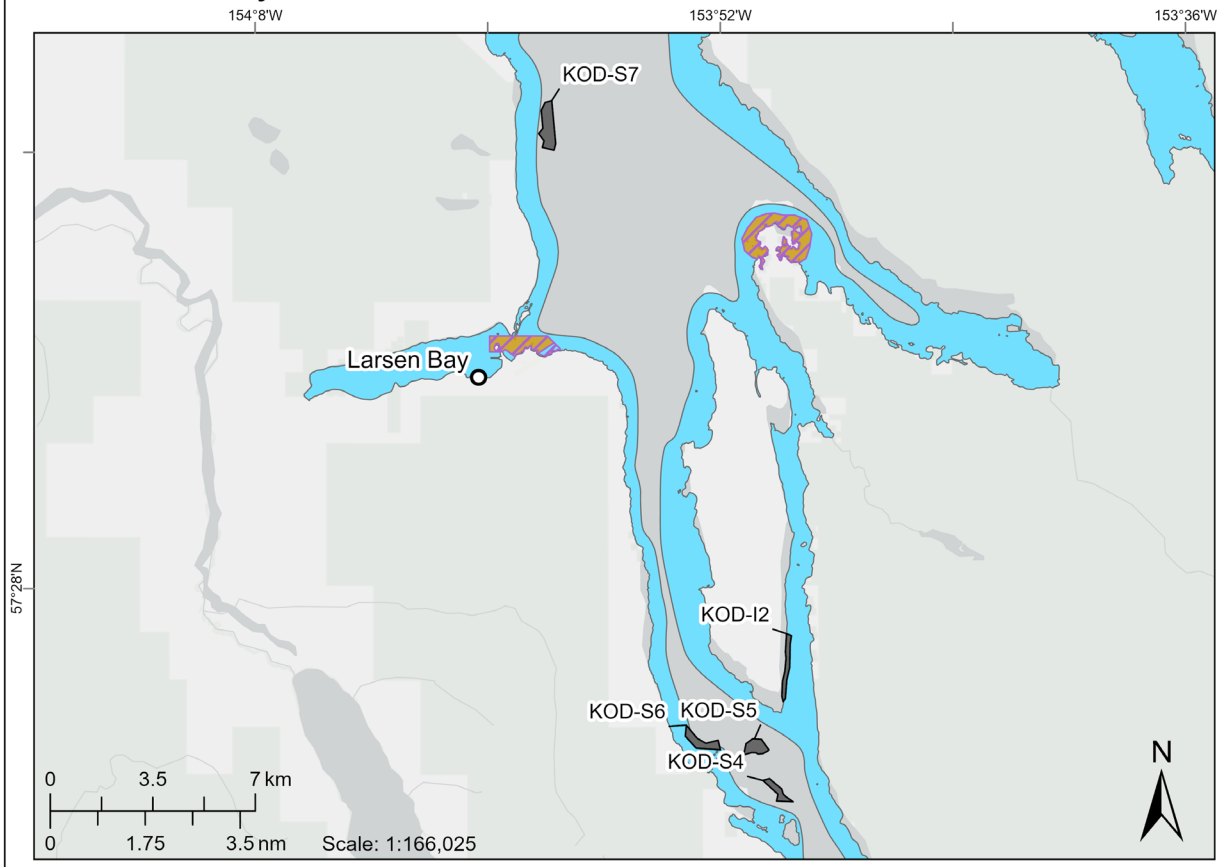
Alaska DEC WQ Monitoring Locations: Alaska DEC (2014)
AOOS Sensor Stations: NOAA CO-OPS (2024)
Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020)
Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019)

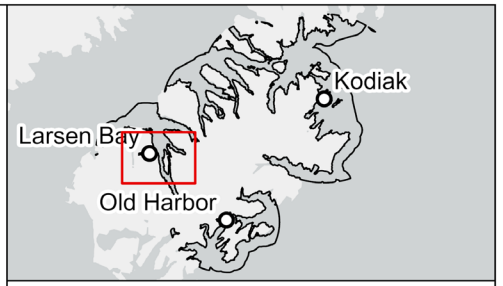
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service


Kodiak Study Area - East
152°32'W
152°16'W
152°W
57°44'N
KOD-S13
KOD-S12
KOD-S11
Kodiak
KOD-S10
KOD-S9
KOD-S8
0 4 8 km
0 2 4 nm
Scale: 1:187,789
N
Kodiak
Larsen Bay
Old Harbor
Kodiak AOA Options
Industry, Navigation, and
Transportation Characterization
Coastal Populated Places
AOA Options
Aids to Navigation*
AOOS Sensor Stations
Ferry Terminals**
Harbors*
Offshore Seafood Processors Permitted Vessels
POA Navigation Projects*
Seafood Processing Discharge Locations
Seafood Processing Facility Locations
Seafood Processing Permitted Carcass Disposal
Seafood Processing Permitted Net Pens
Seafood Processing Permitted Outfall**
Sensors and Buoys*
Wrecks and Obstructions****
Alaska Marine Highway*
Ferry Routes*
Fiberoptic Cables***
Submarine Cables***
Land Permit Leases
Maintained Channels
Submarine Cable Areas***
Womens Bay Reserve
Aids to Navigation: NOAA OCM (2022), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Fiberoptic Cables: Alaska DNR (2023), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Maintained Channels: NOAA OCS (2024), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Carcass Disposal, Permitted Net Pens, and Permitted Outfall: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), Womens Bay Reserve: USFWS (2024), Wrecks and Obstructions: NOAA OCM (2023)
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

Kodiak Study Area - Northwest





Kodiak AOA Options Cultural Resources Characterization

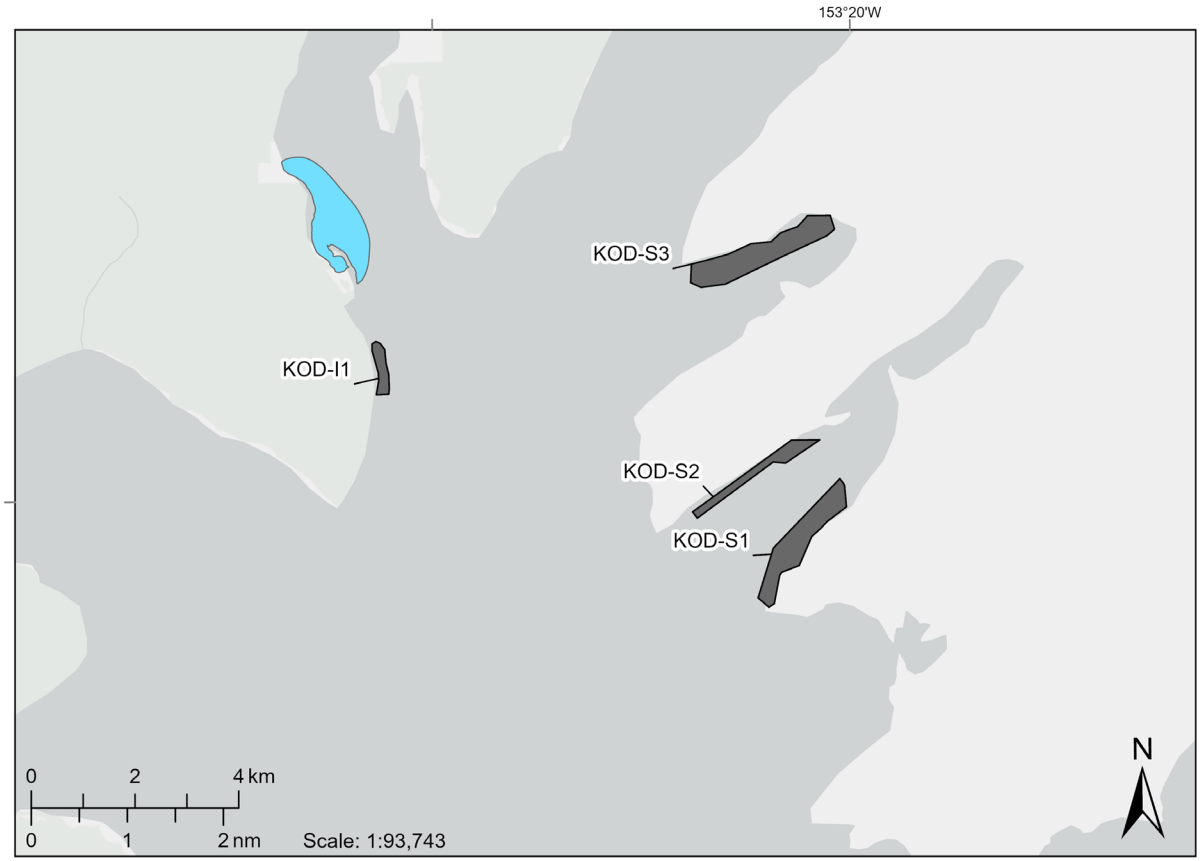
- Coastal Populated Places
- AOA Options
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- Pacific Herring Spawning Areas

Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Spawning Areas: NOAA ORR (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Southwest



Pacific Herring Spawning Areas: NOAA ORR (2023)



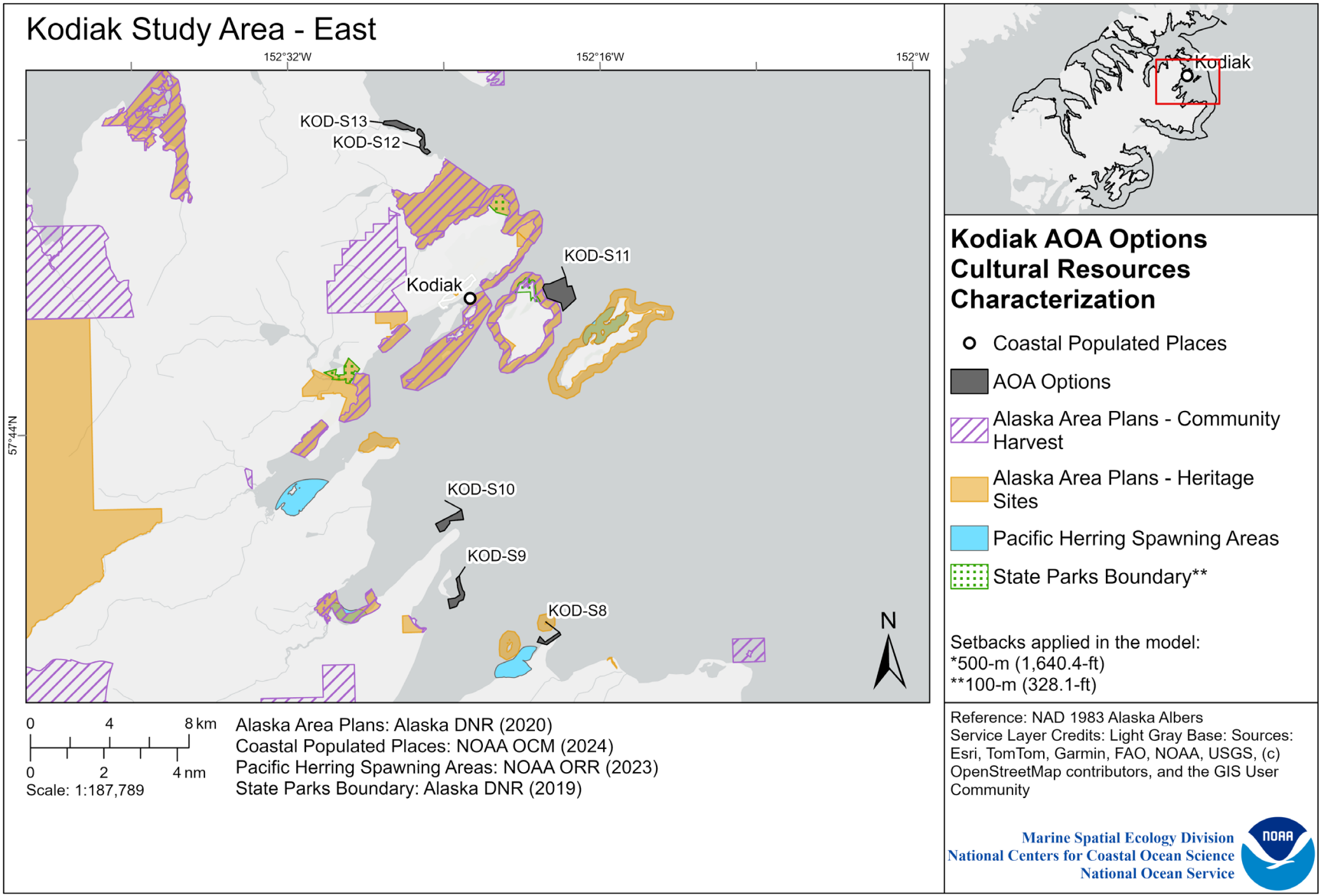
Kodiak AOA Options Cultural Resources Characterization

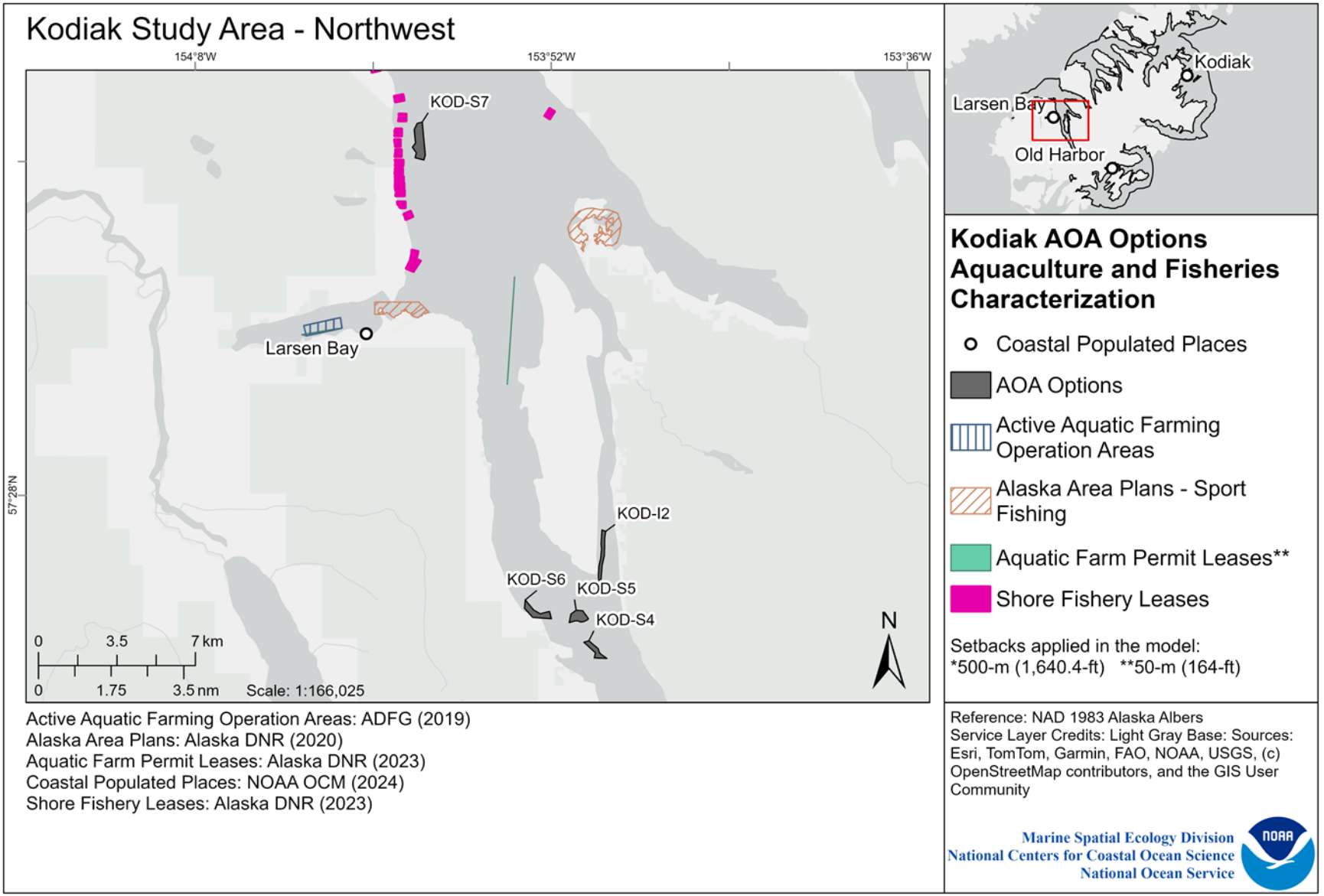
AOA Options

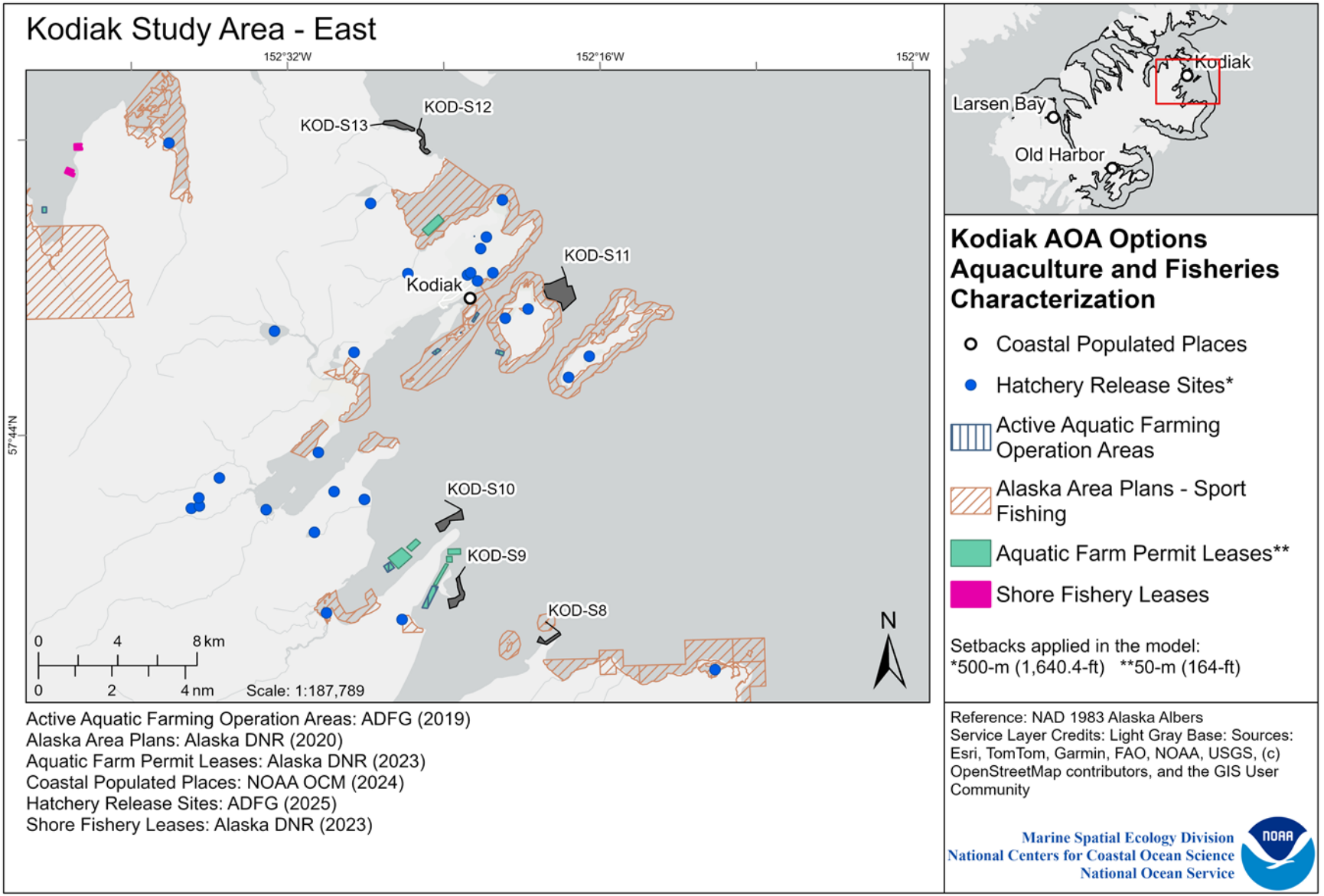
Pacific Herring Spawning Areas

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Kodiak Study Area - East
152°32'W
152°16'W
152°W
57°44'N
KOD-S13
KOD-S12
KOD-S11
Kodiak
KOD-S10
KOD-S9
KOD-S8
N
0 4 8 km
0 2 4 nm
Scale: 1:187,789
Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Pacific Herring Spawning Areas: NOAA ORR (2023)
State Parks Boundary: Alaska DNR (2019)
Kodiak
Kodiak AOA Options
Cultural Resources
Characterization
Coastal Populated Places
AOA Options
Alaska Area Plans - Community Harvest
Alaska Area Plans - Heritage Sites
Pacific Herring Spawning Areas
State Parks Boundary**
Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
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National Ocean Service
NOAA


Kodiak Study Area - Northwest
154°8'W
153°52'W
153°36'W
57°28'N
KOD-S7
Larsen Bay
KOD-I2
KOD-S6
KOD-S5
KOD-S4
0
3.5
7 km
0
1.75
3.5 nm
Scale: 1:166,025
N
Kodiak
Larsen Bay
Old Harbor
Kodiak AOA Options Aquaculture and Fisheries Characterization
Coastal Populated Places
AOA Options
Active Aquatic Farming Operation Areas
Alaska Area Plans - Sport Fishing
Aquatic Farm Permit Leases**
Shore Fishery Leases
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Shore Fishery Leases: Alaska DNR (2023)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

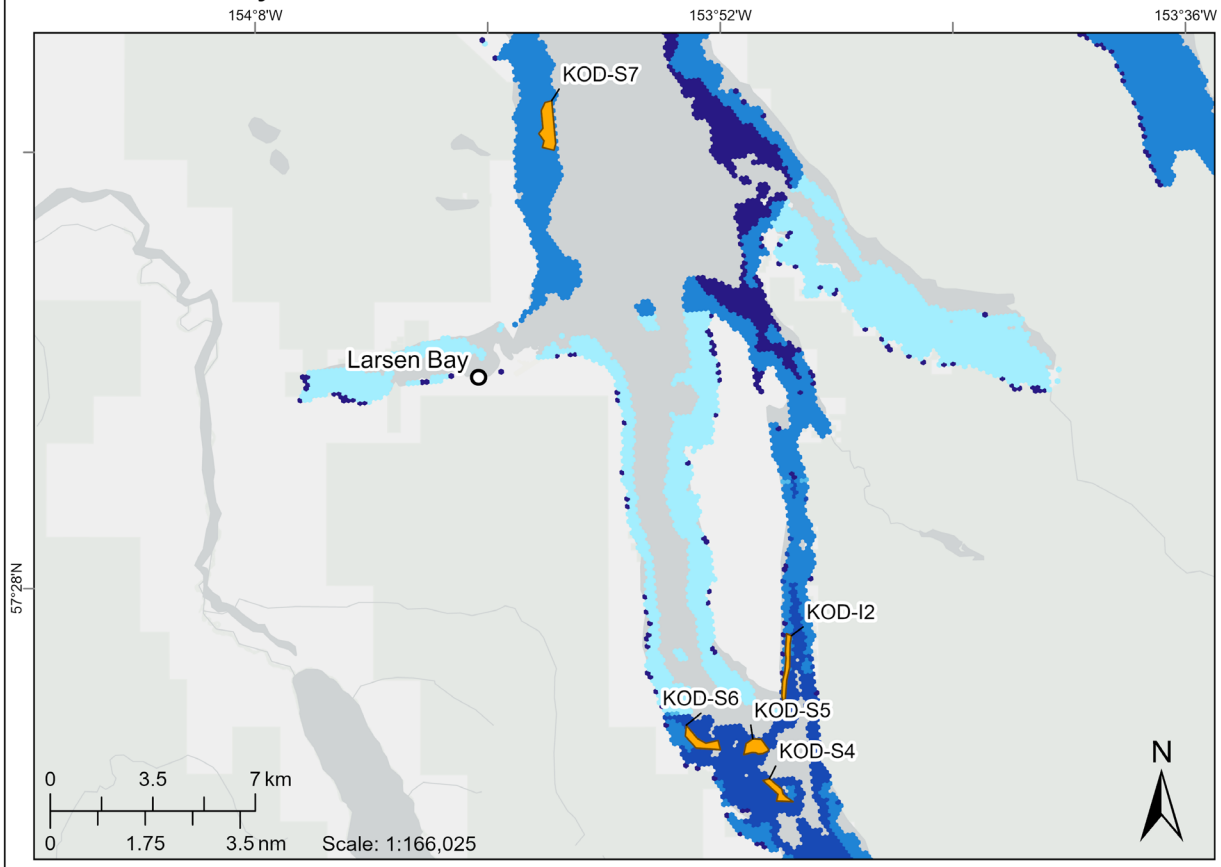


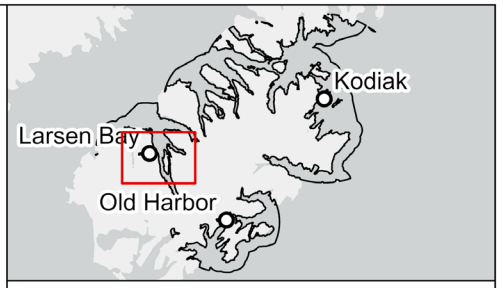
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)
Shore Fishery Leases: Alaska DNR (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Northwest





Kodiak AOA Options Aquaculture and Fisheries Characterization

- Coastal Populated Places
- AOA Options

Fisheries Landings Relative Suitability

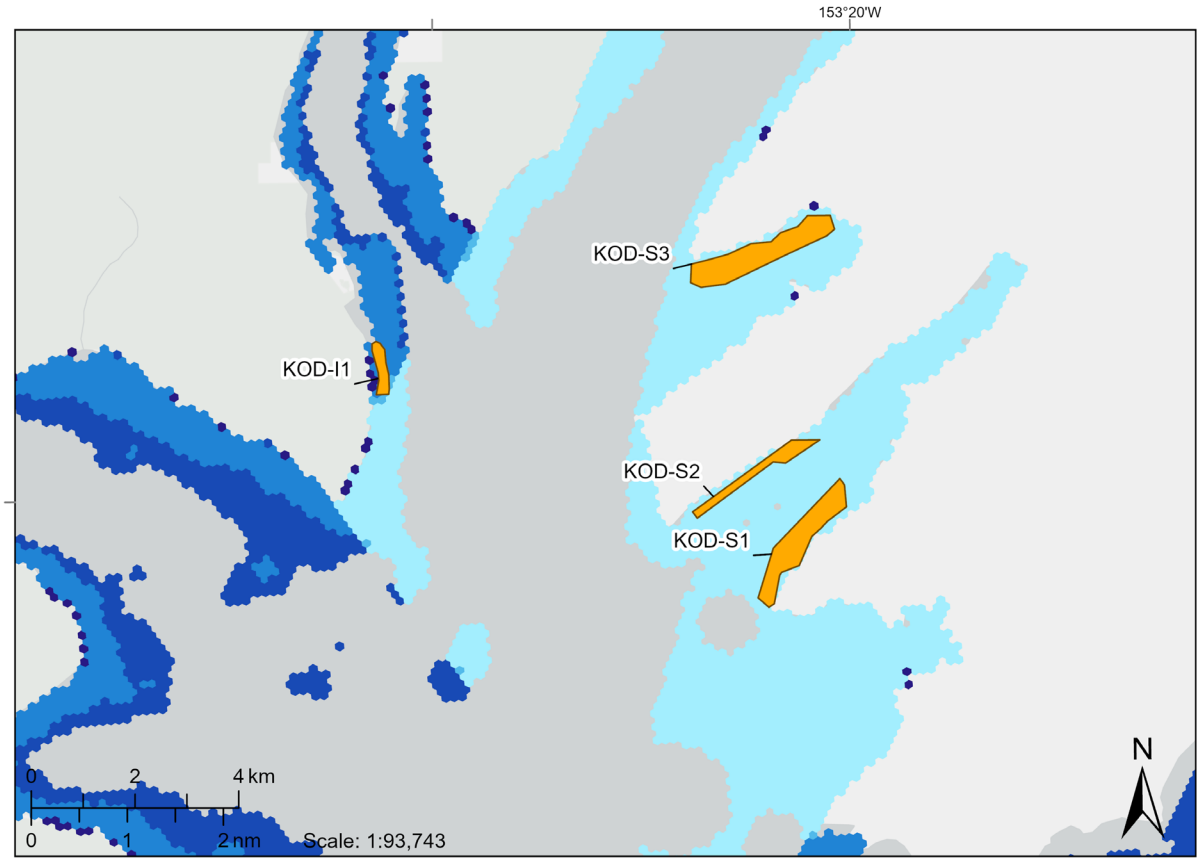
- Low
- Moderately Low
- Moderate
- Moderately High
- High

Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Kodiak Study Area - Southwest



Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)



Kodiak AOA Options Aquaculture and Fisheries Characterization

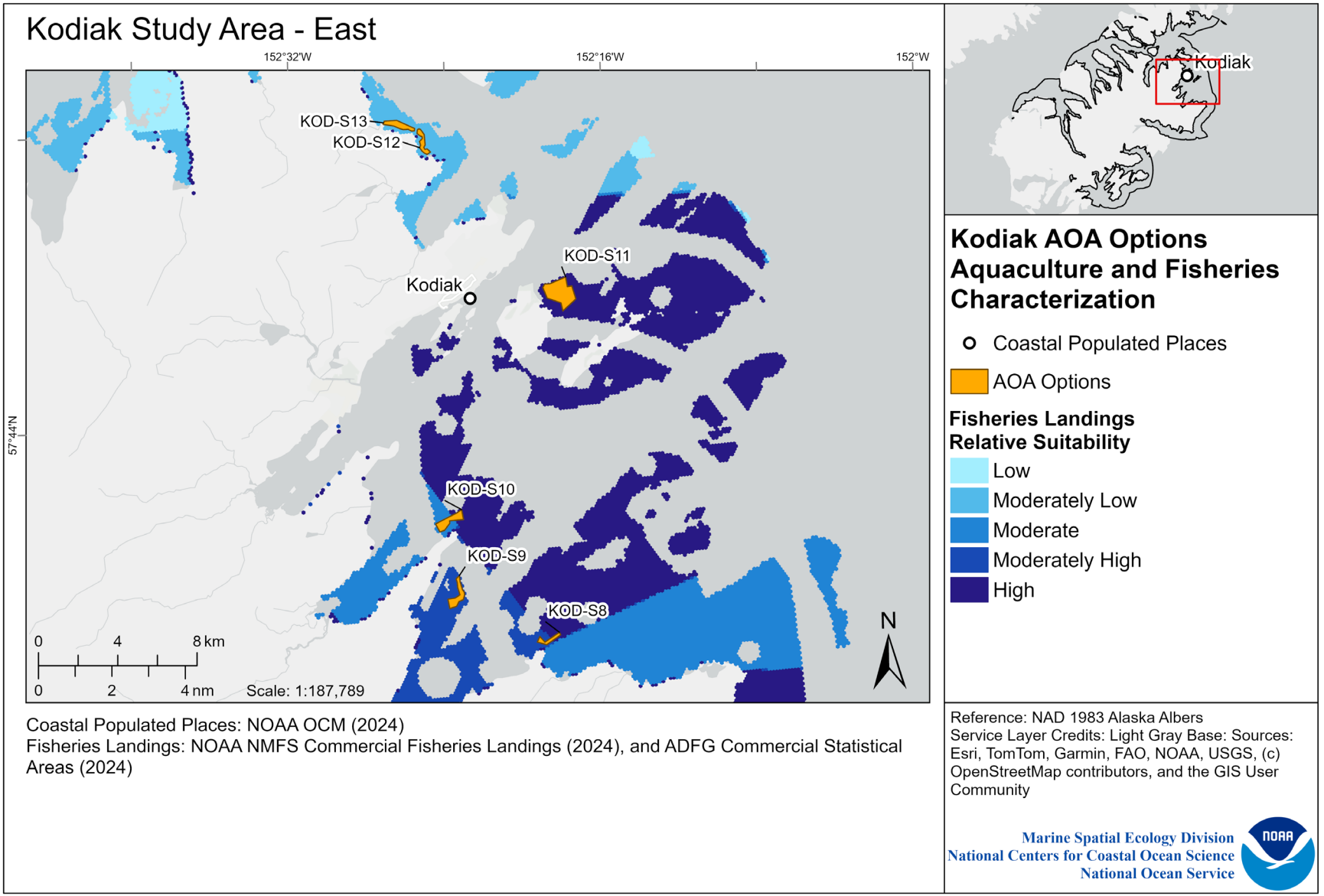
AOA Options

Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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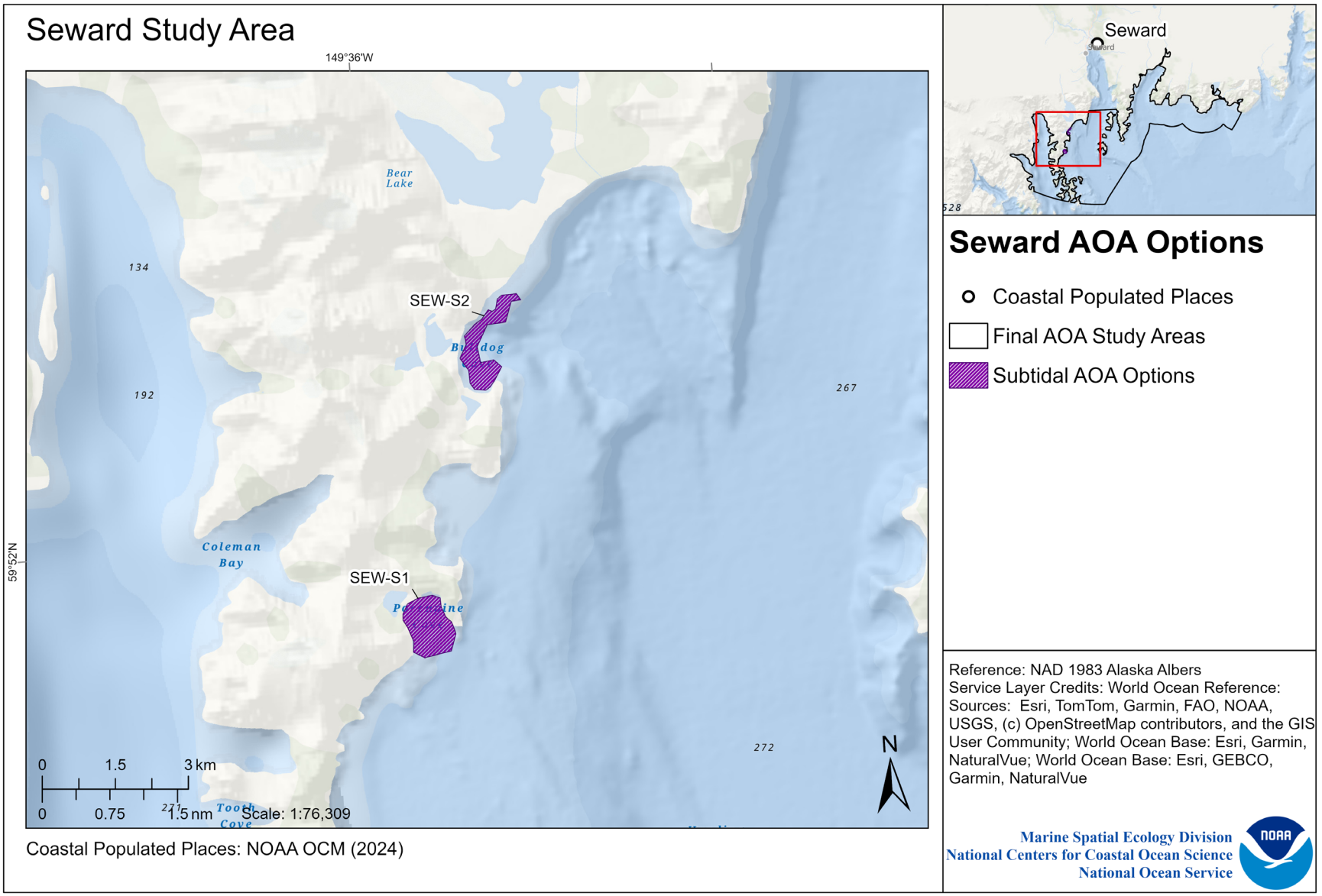


Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

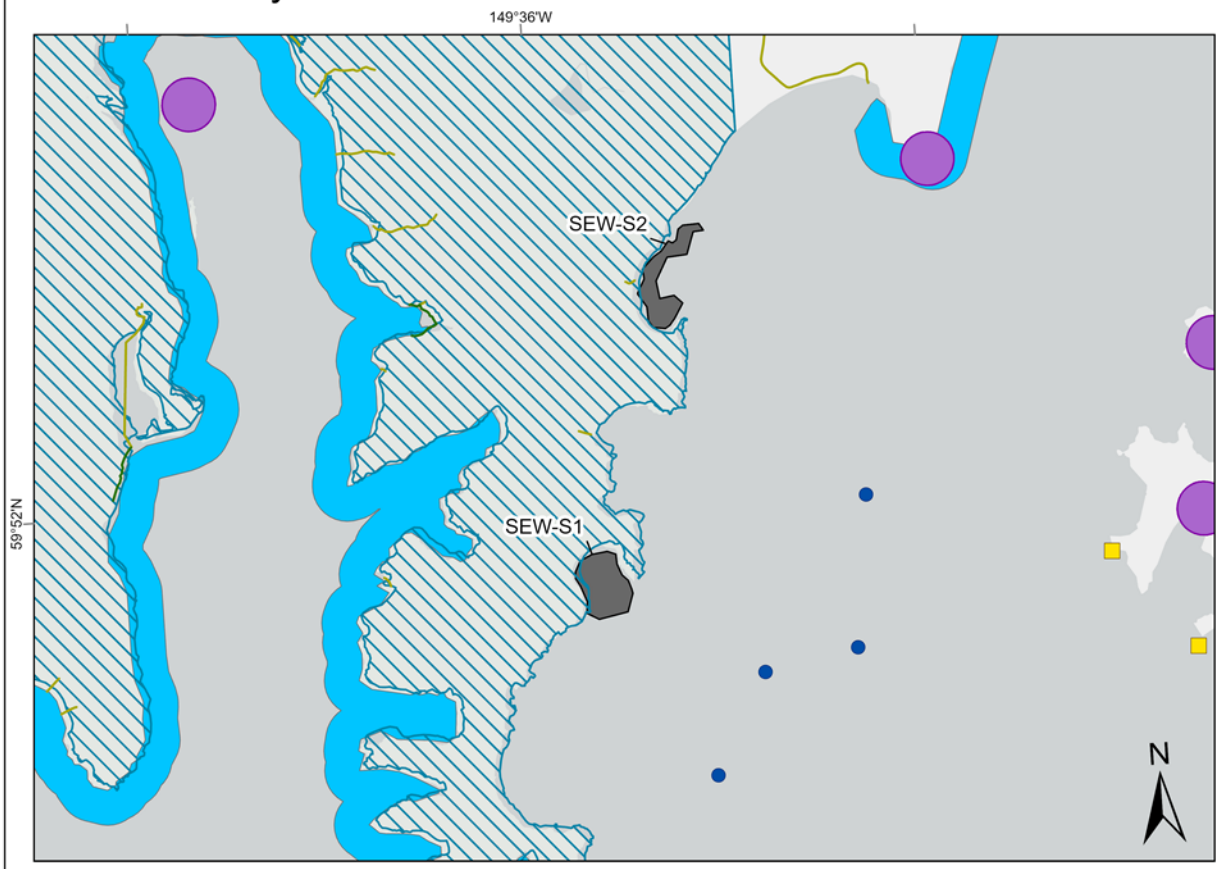
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Seward AOA Options Maps



Seward Study Area





Seward AOA Options Natural Resources Characterization

- AOA Options
- Deep-sea Coral and Sponge Observations*
- Steller Sea Lion Major Haulouts and Rookeries**
- Anadromous Streams***
- Shorezone Eelgrass
- Alaska National Parks, Preserves, and Monuments
- Pacific Herring Spawning Areas
- Seabird Colonies

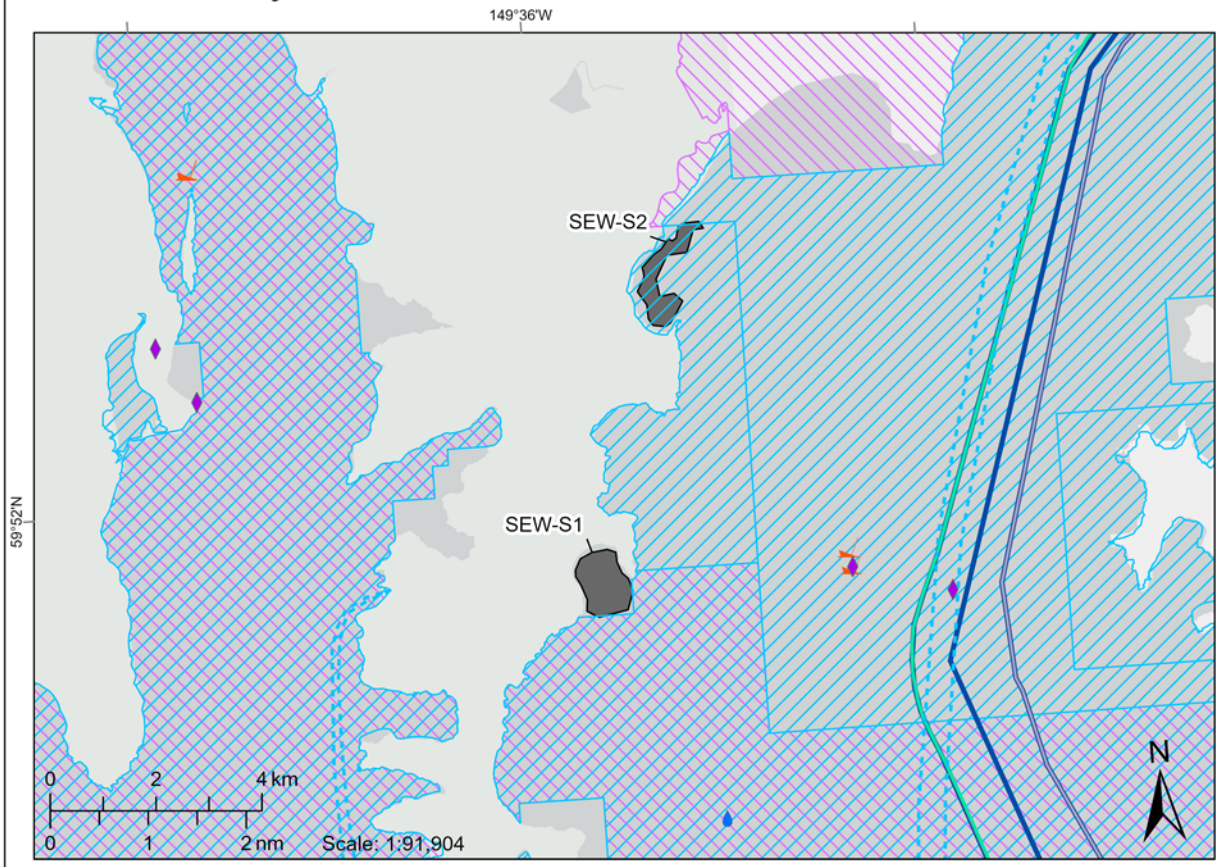
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)

Alaska National Parks, Preserves, Monuments: Alaska DEC (2020), Anadromous Streams: ADFG (2023)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Seward Study Area





Seward AOA Options Industry, Navigation, and Transportation Characterization

- AOA Options
- Alaska DEC WQ Monitoring Locations
- AOOS Sensor Stations
- Wrecks and Obstructions****
- Ferry Routes*
- Fiberoptic Cables***
- Submarine Cables***
- Alaska Area Plans - Anchorages
- Alaska Area Plans - Species Management
- Submarine Cable Areas***

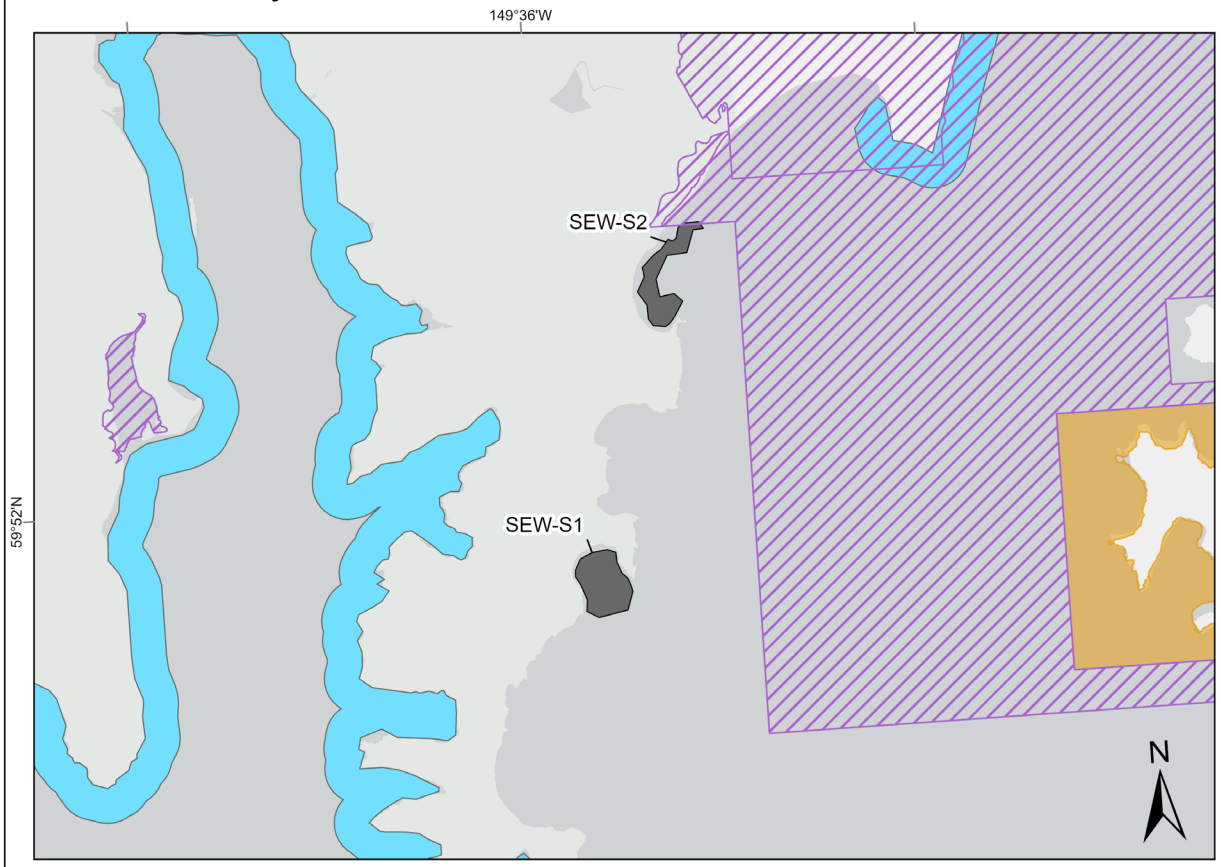
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)

Alaska Area Plans: Alaska DNR (2020)
Alaska DEC WQ Monitoring Locations: Alaska DEC (2014)
AOOS Sensor Stations: NOAA CO-OPS (2024)
Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020)
Fiberoptic Cables: Alaska DNR (2023)
Submarine Cables: NOAA OCM (2023)
Submarine Cable Areas: NOAA OCM (2023)
Wrecks and Obstructions: NOAA OCM (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

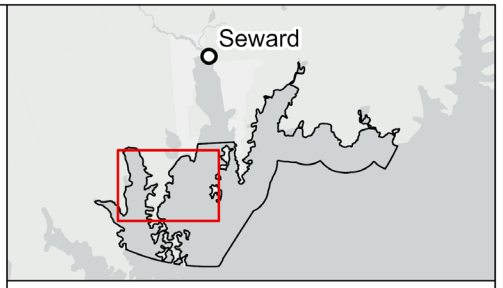
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Seward Study Area



0 2 4 km
0 1 2 nm
Scale: 1:91,904

Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Historic Lighthouses: NOAA OCM (2018)
Pacific Herring Spawning Areas: NOAA ORR (2023)
State Parks Boundary: Alaska DNR (2019)

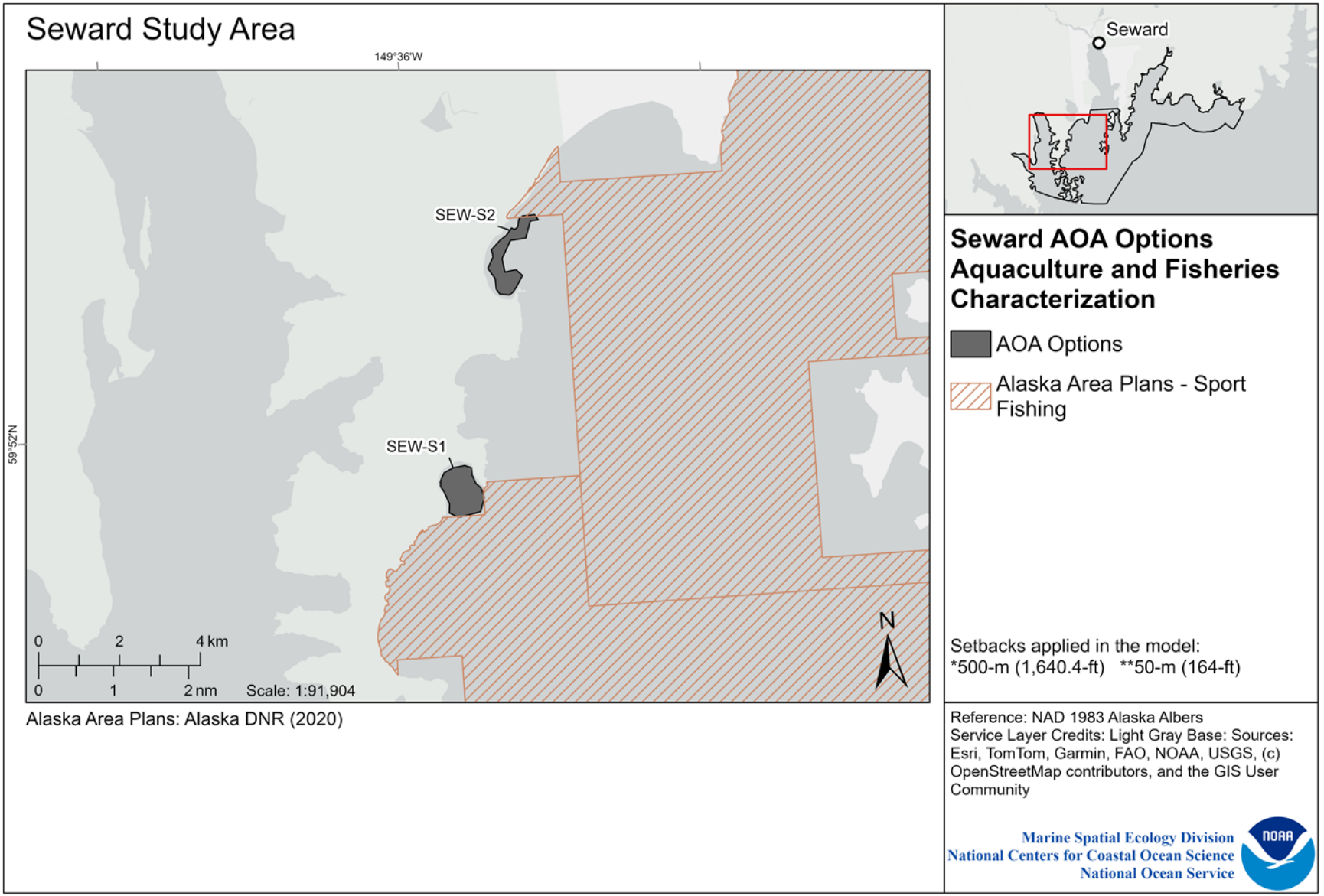


Seward AOA Options Cultural Resources Characterization

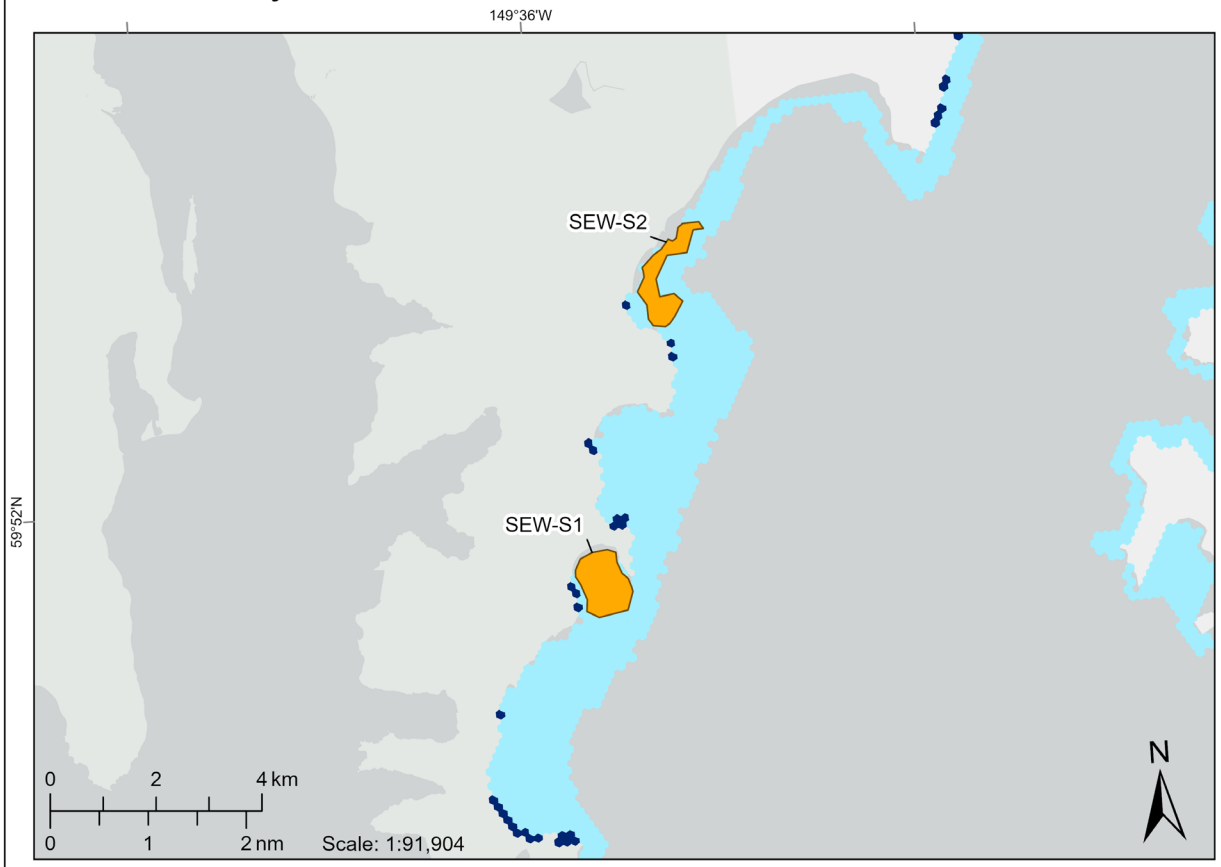
- AOA Options
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- Pacific Herring Spawning Areas

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

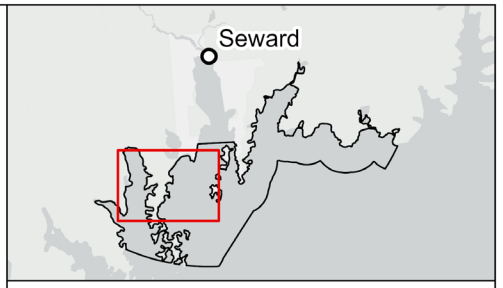
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Seward Study Area
149°36'W
59°52'N
SEW-S2
SEW-S1
0
2
4 km
0
1
2 nm
Scale: 1:91,904
N
Seward
Seward AOA Options
Aquaculture and Fisheries
Characterization
AOA Options
Alaska Area Plans - Sport
Fishing
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Alaska Area Plans: Alaska DNR (2020)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources:
Esri, TomTom, Garmin, FAO, NOAA, USGS, (c)
OpenStreetMap contributors, and the GIS User
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Seward Study Area



Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)



Seward AOA Options Aquaculture and Fisheries Characterization

AOA Options

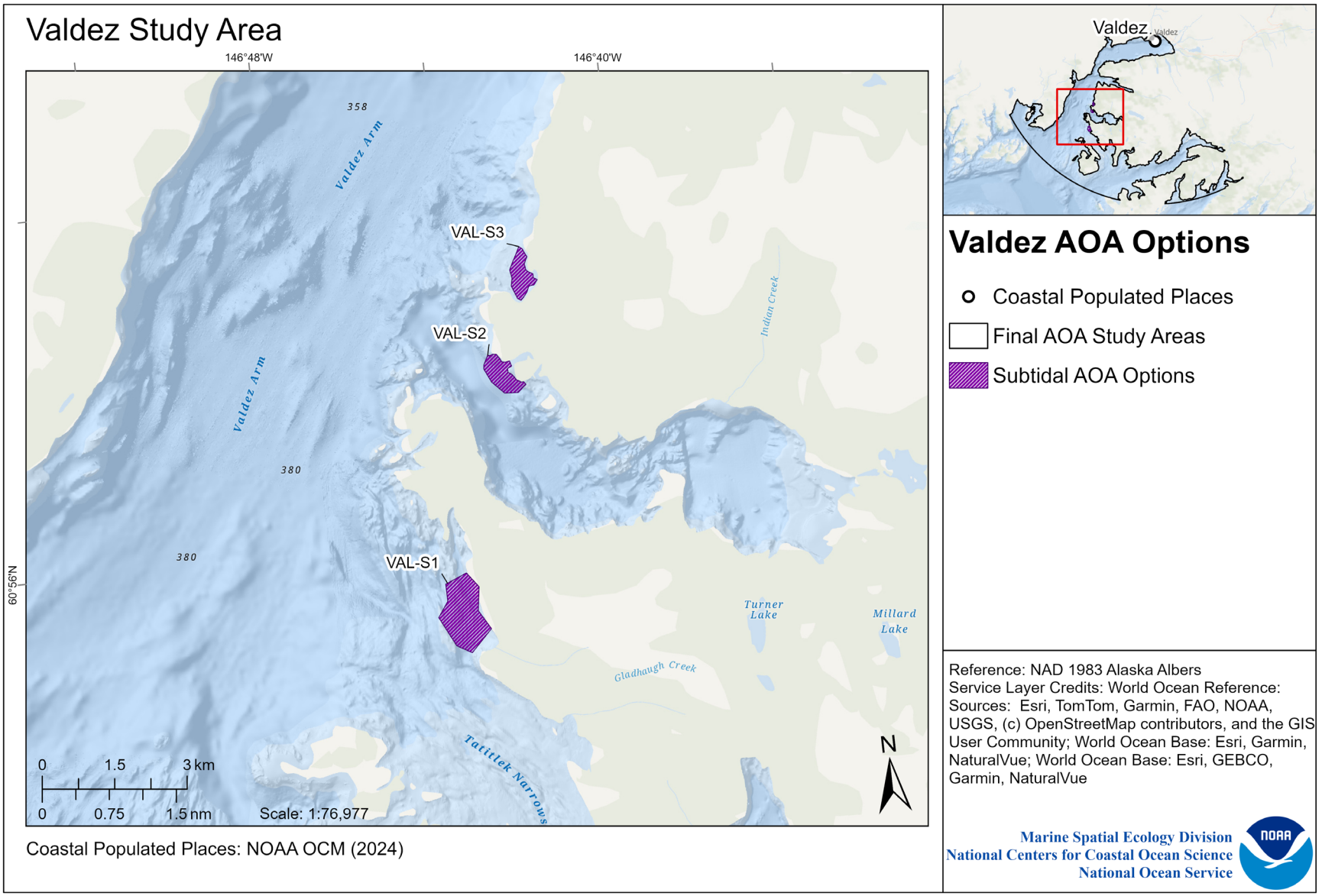
Fisheries Landings Relative Suitability

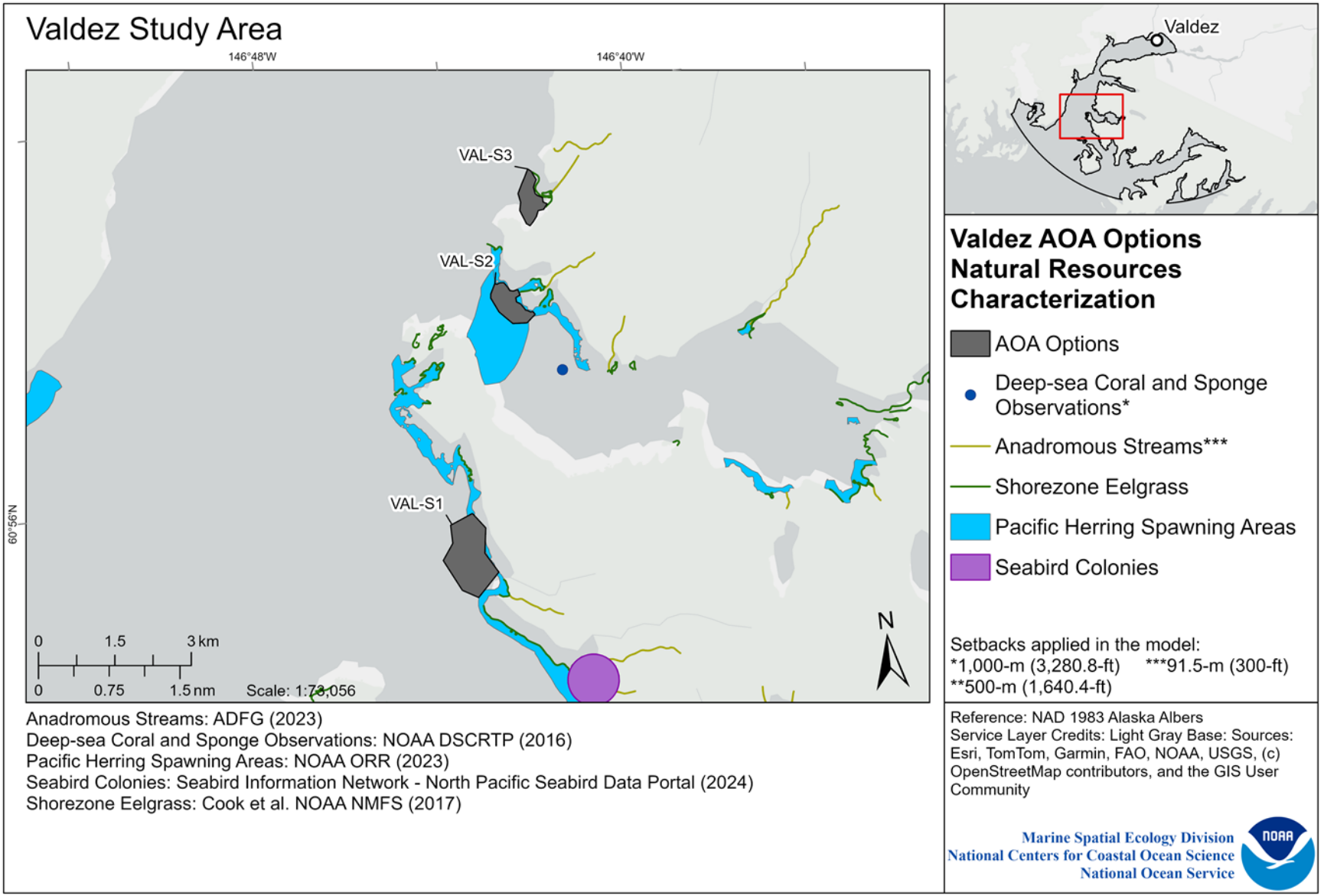
- Low
- Moderately Low
- Moderate
- Moderately High
- High

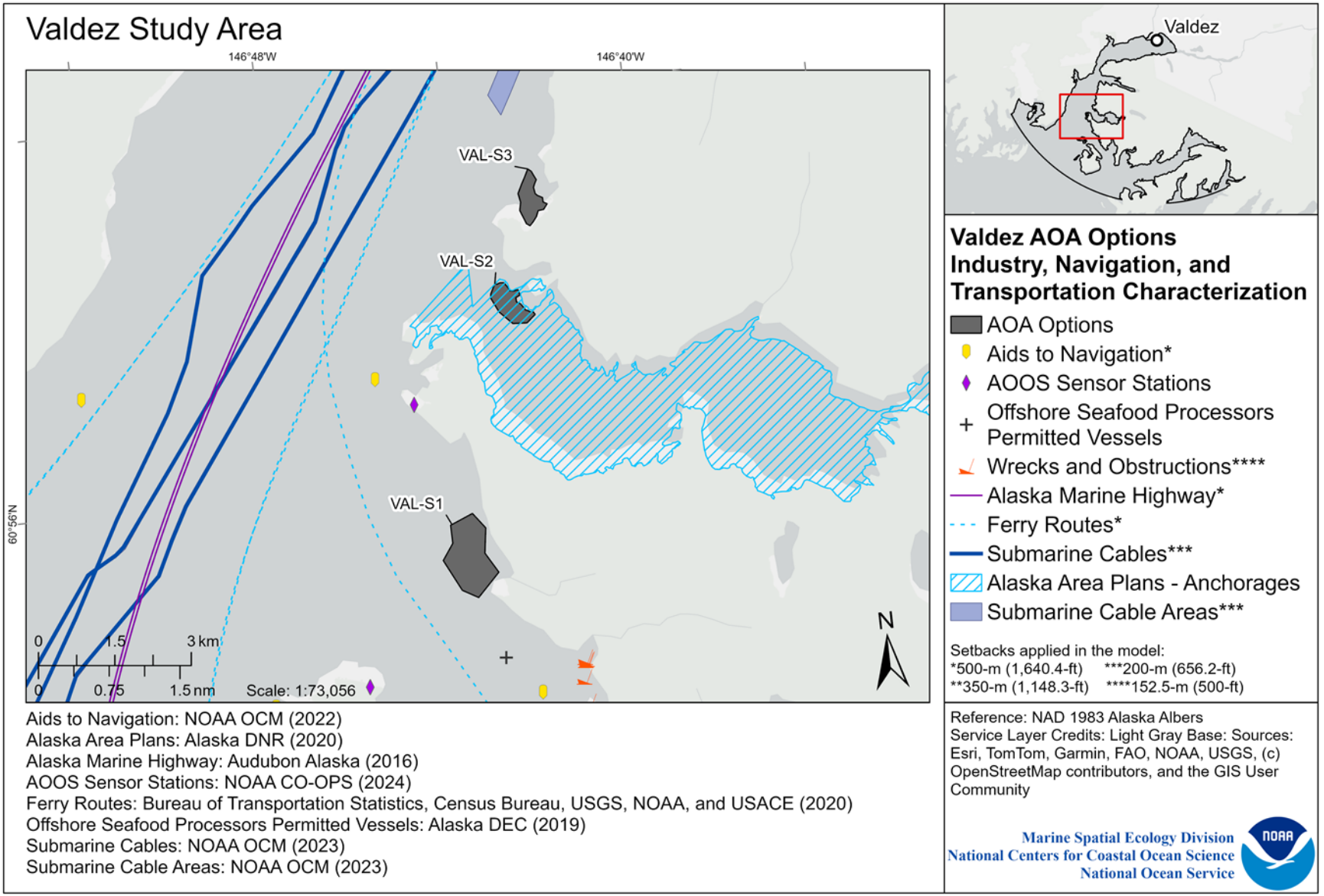
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

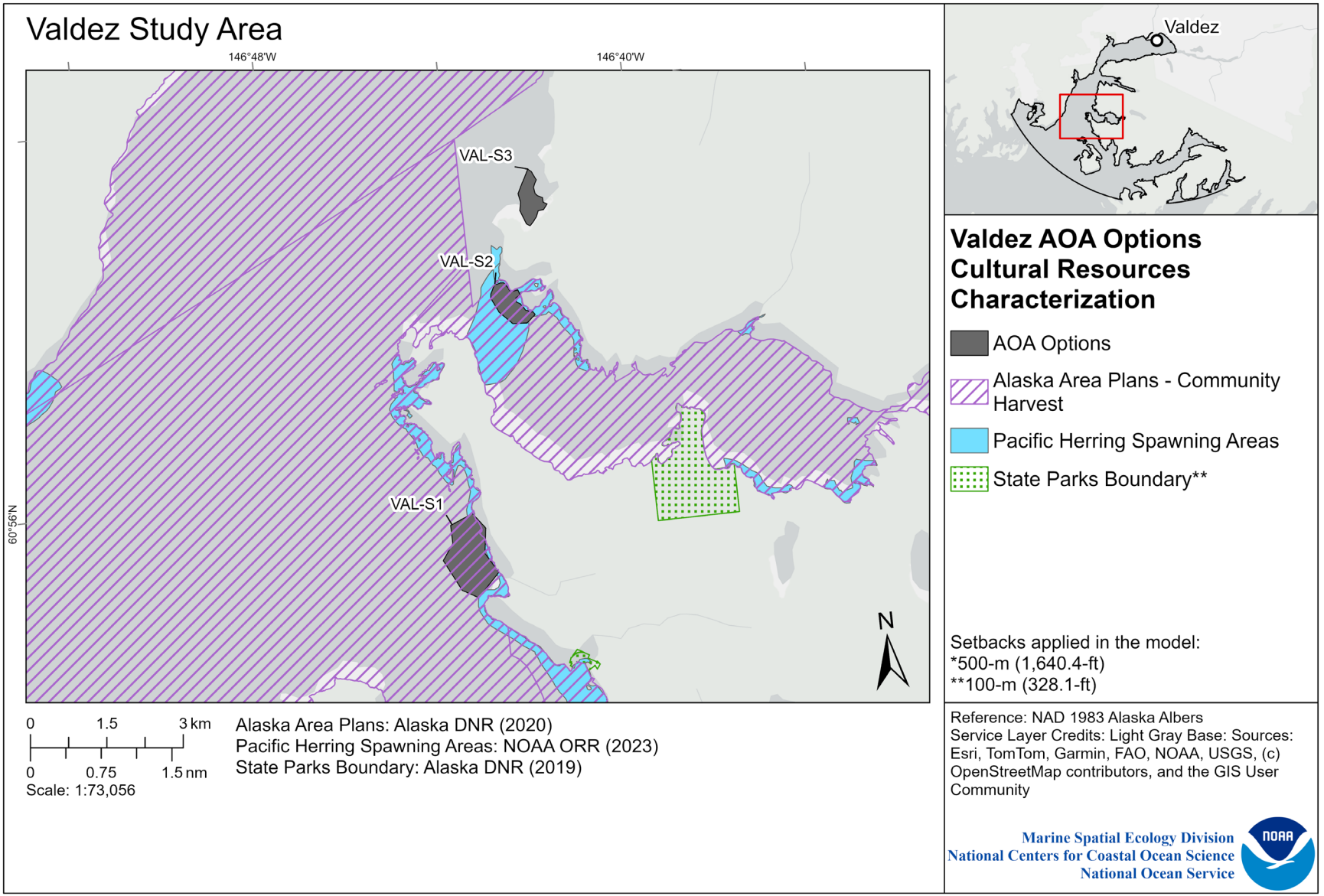
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

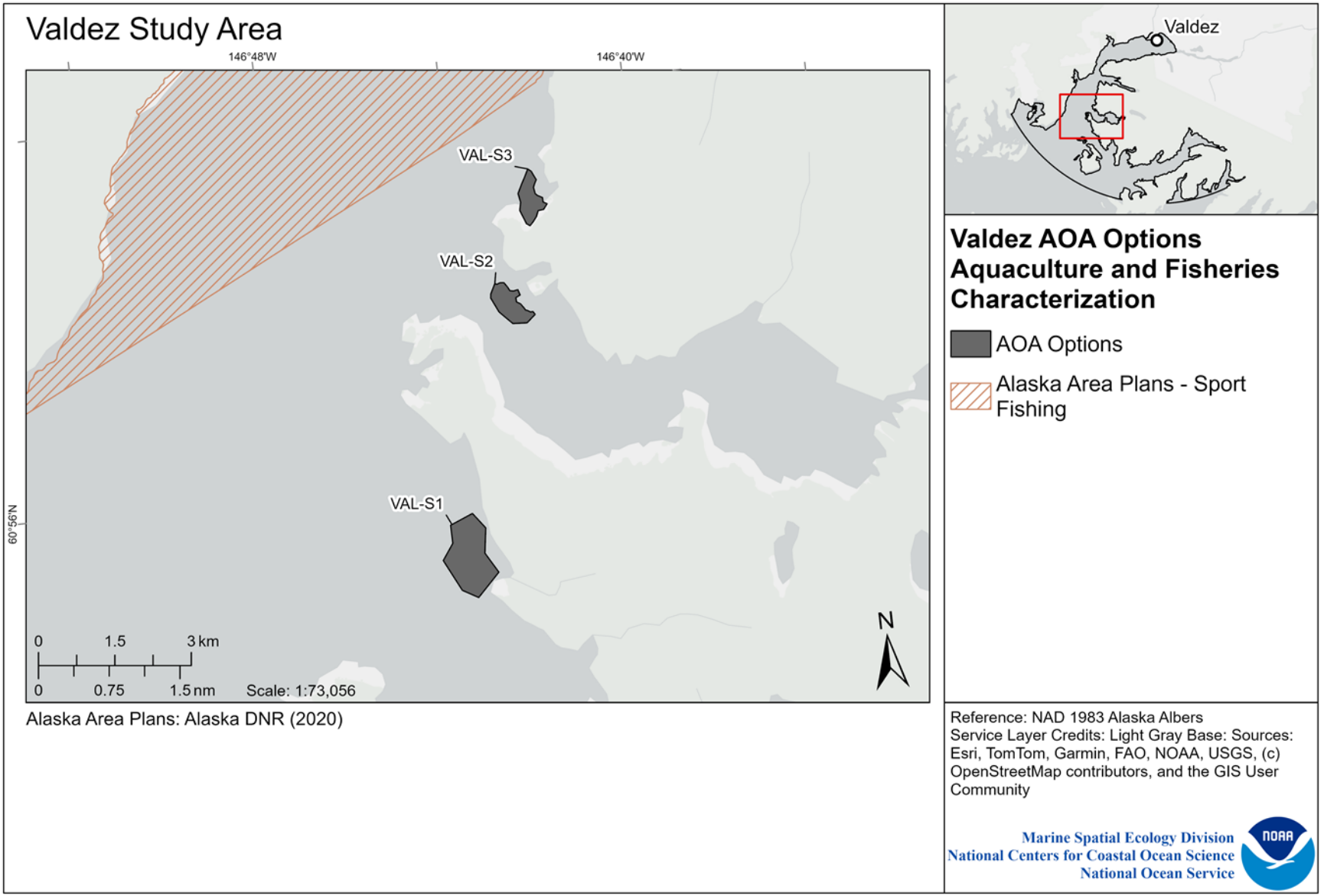
Valdez AOA Options Maps



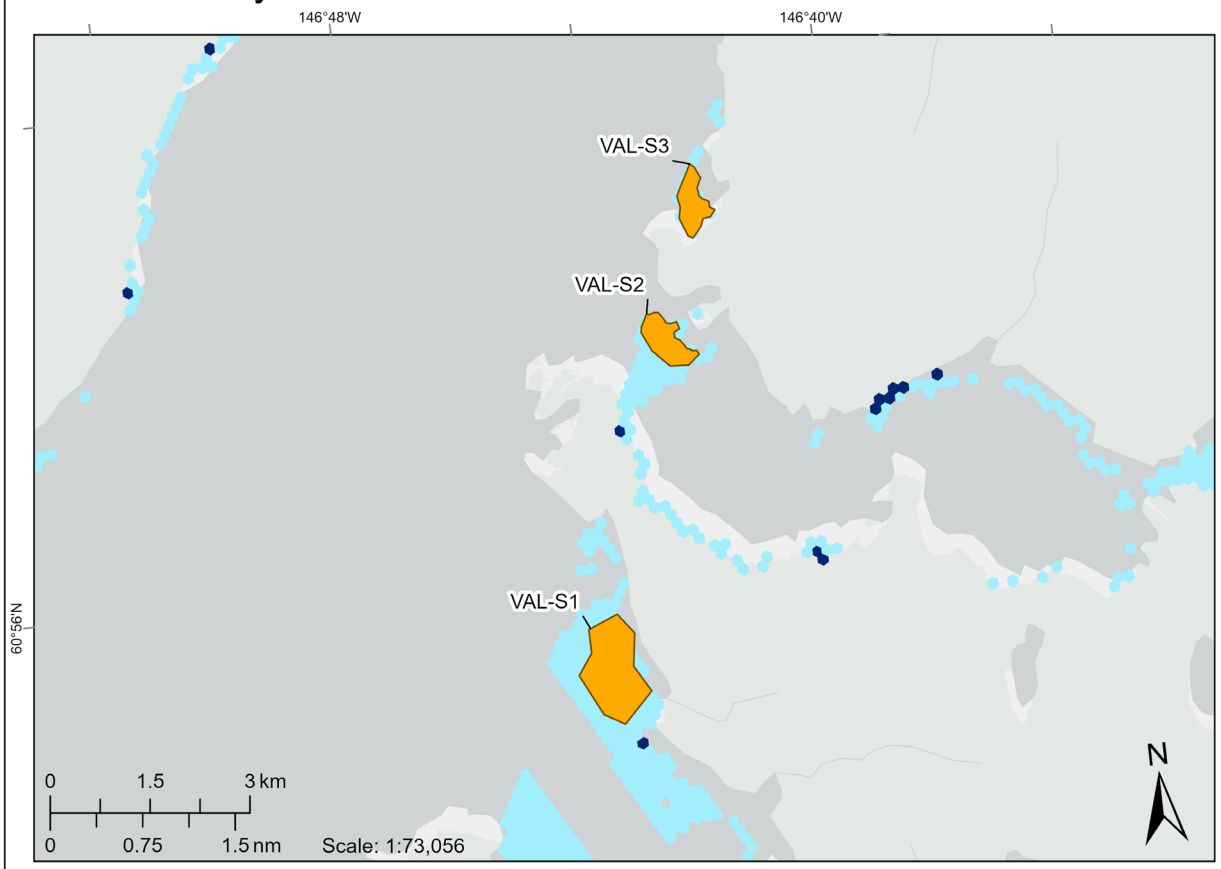

Valdez Study Area
146°48'W
146°40'W
60°56'N
VAL-S3
VAL-S2
VAL-S1
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:73,056
N
Valdez
Valdez AOA Options
Natural Resources
Characterization
AOA Options
Deep-sea Coral and Sponge Observations*
Anadromous Streams***
Shorezone Eelgrass
Pacific Herring Spawning Areas
Seabird Colonies
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
Anadromous Streams: ADFG (2023)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Valdez Study Area
146°48'W
146°40'W
60°56'N
VAL-S3
VAL-S2
VAL-S1
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:73,056
N
Valdez
Valdez AOA Options
Industry, Navigation, and
Transportation Characterization
AOA Options
Aids to Navigation*
AOOS Sensor Stations
Offshore Seafood Processors
Permitted Vessels
Wrecks and Obstructions****
Alaska Marine Highway*
Ferry Routes*
Submarine Cables***
Alaska Area Plans - Anchorages
Submarine Cable Areas***
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)
Aids to Navigation: NOAA OCM (2022)
Alaska Area Plans: Alaska DNR (2020)
Alaska Marine Highway: Audubon Alaska (2016)
AOOS Sensor Stations: NOAA CO-OPS (2024)
Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020)
Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019)
Submarine Cables: NOAA OCM (2023)
Submarine Cable Areas: NOAA OCM (2023)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

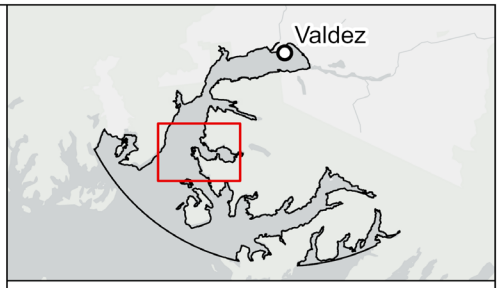

Valdez Study Area
146°48'W
146°40'W
60°56'N
VAL-S3
VAL-S2
VAL-S1
N
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:73,056
Alaska Area Plans: Alaska DNR (2020)
Pacific Herring Spawning Areas: NOAA ORR (2023)
State Parks Boundary: Alaska DNR (2019)
Valdez
Valdez AOA Options
Cultural Resources
Characterization
AOA Options
Alaska Area Plans - Community Harvest
Pacific Herring Spawning Areas
State Parks Boundary**
Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Valdez Study Area
146°48'W
146°40'W
60°56'N
VAL-S3
VAL-S2
VAL-S1
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:73,056
N
Valdez
Valdez AOA Options
Aquaculture and Fisheries
Characterization
AOA Options
Alaska Area Plans - Sport
Fishing
Alaska Area Plans: Alaska DNR (2020)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources:
Esri, TomTom, Garmin, FAO, NOAA, USGS, (c)
OpenStreetMap contributors, and the GIS User
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Valdez Study Area



Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)



Valdez AOA Options Aquaculture and Fisheries Characterization

AOA Options

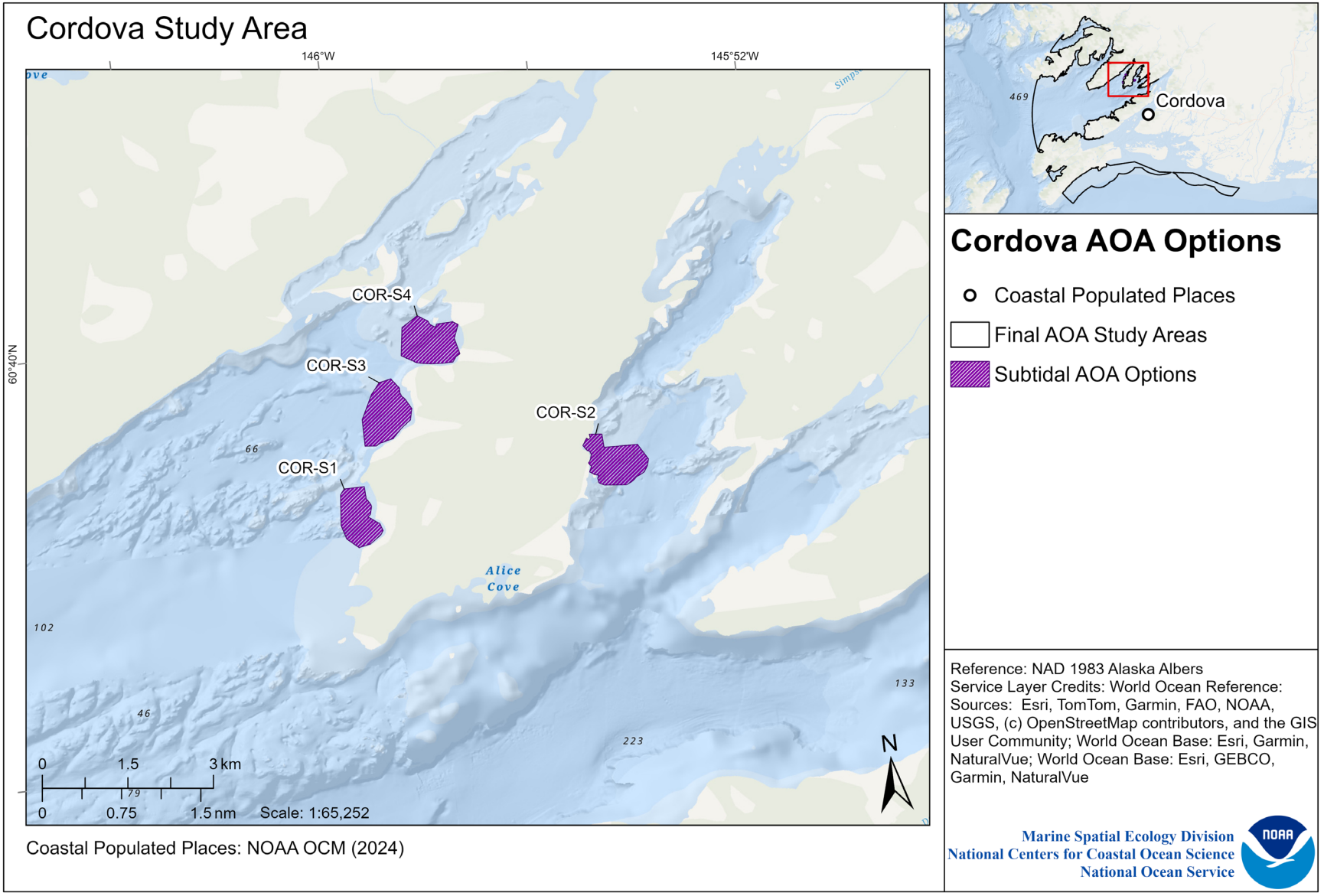
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

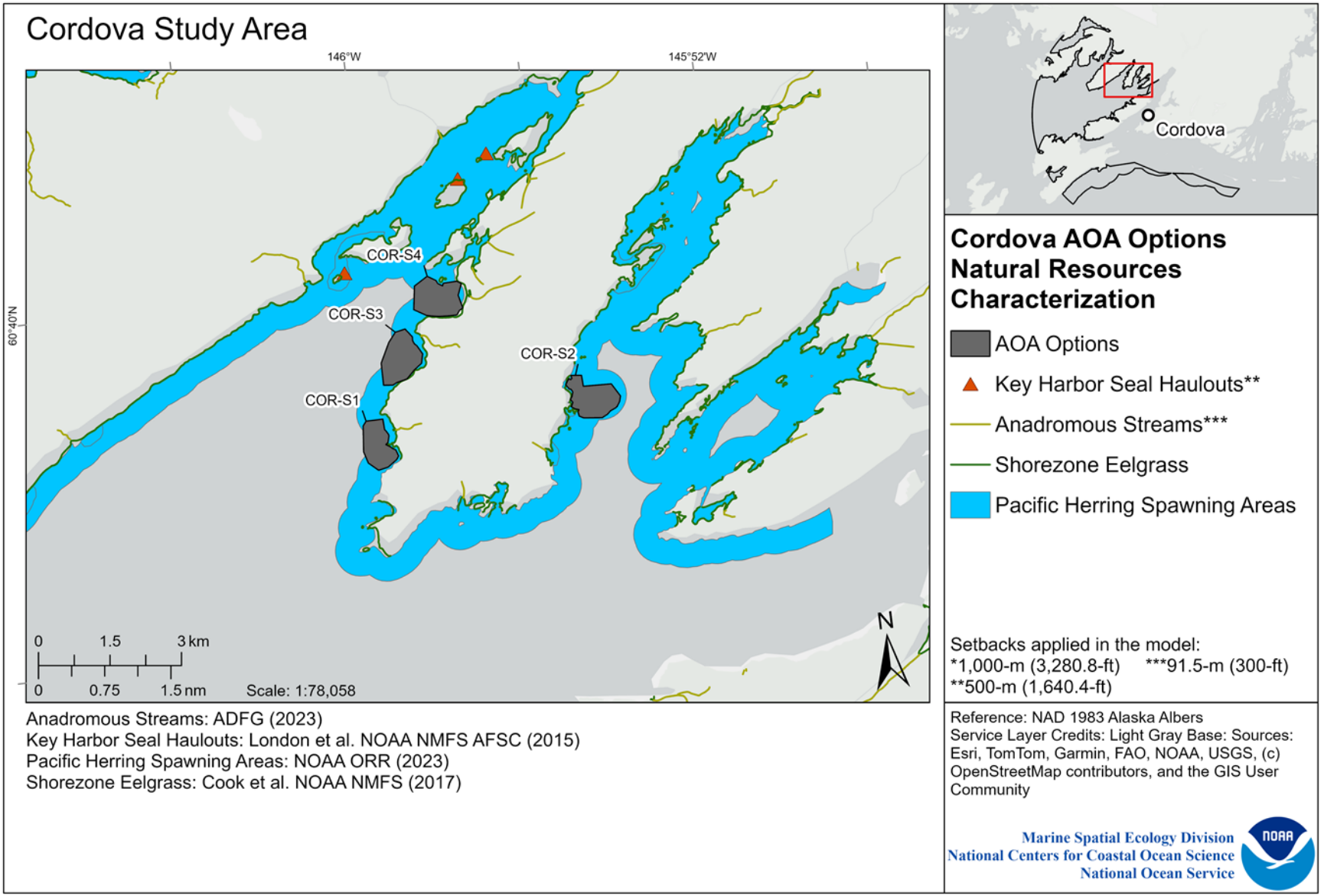
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

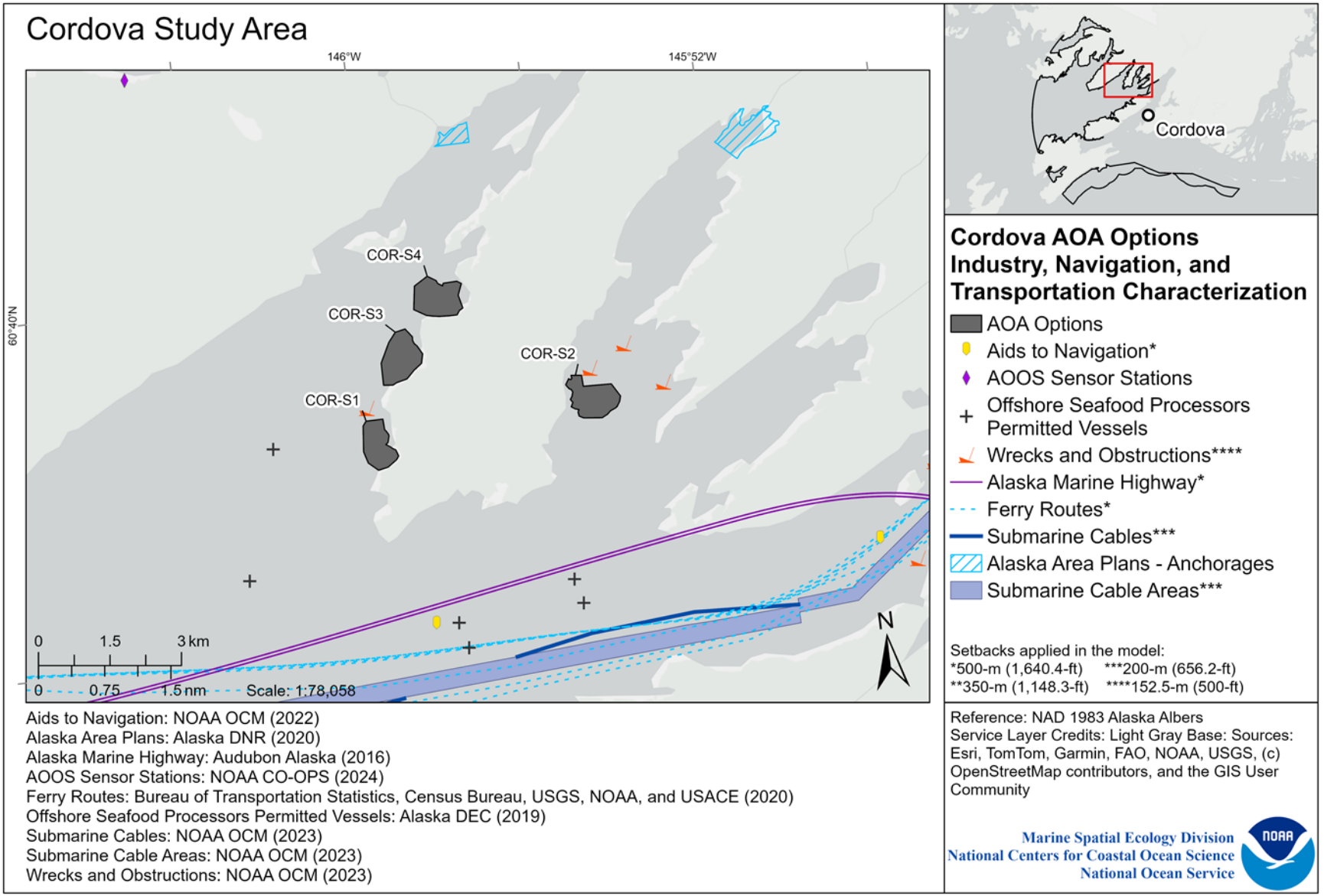
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

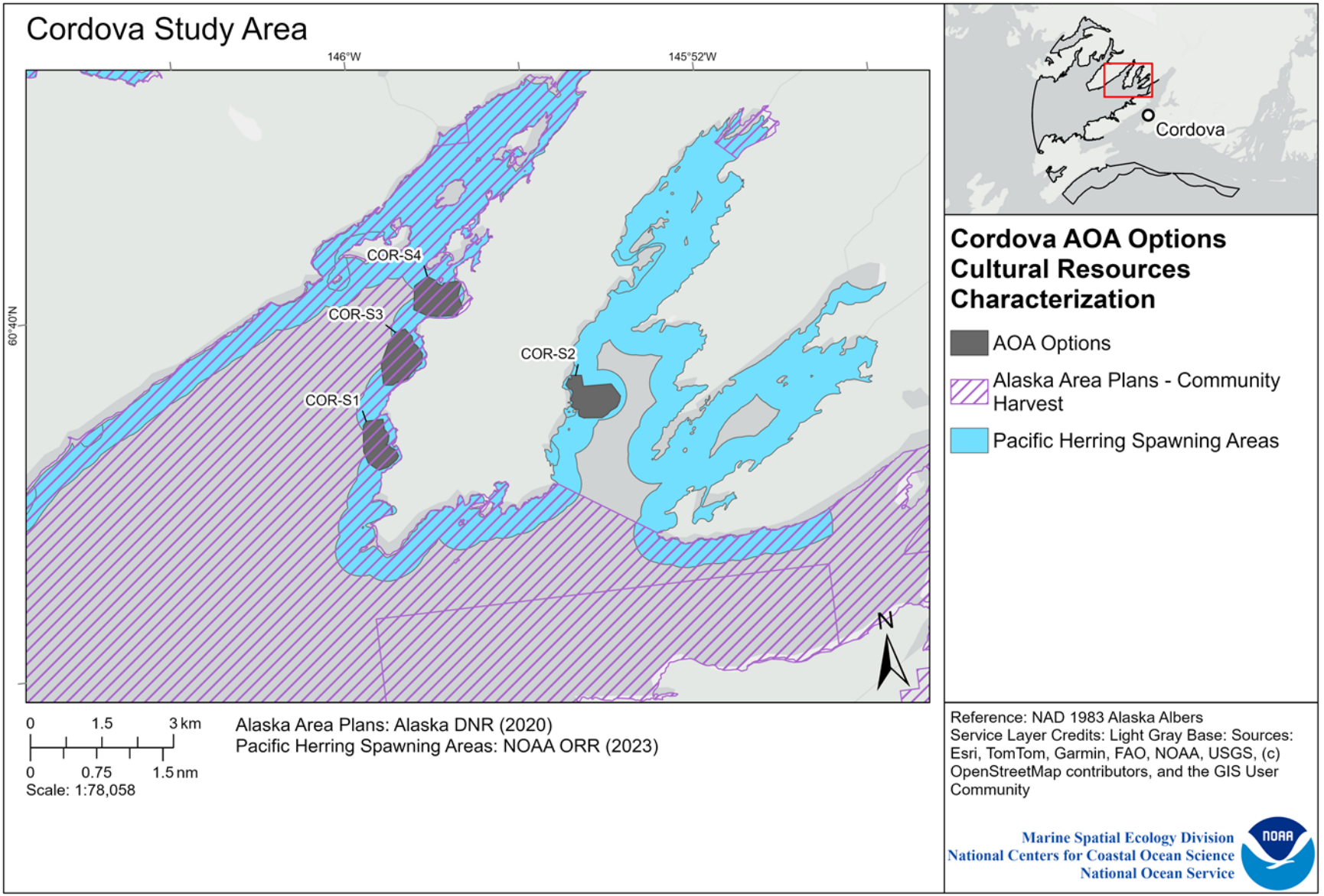
Cordova AOA Options Maps

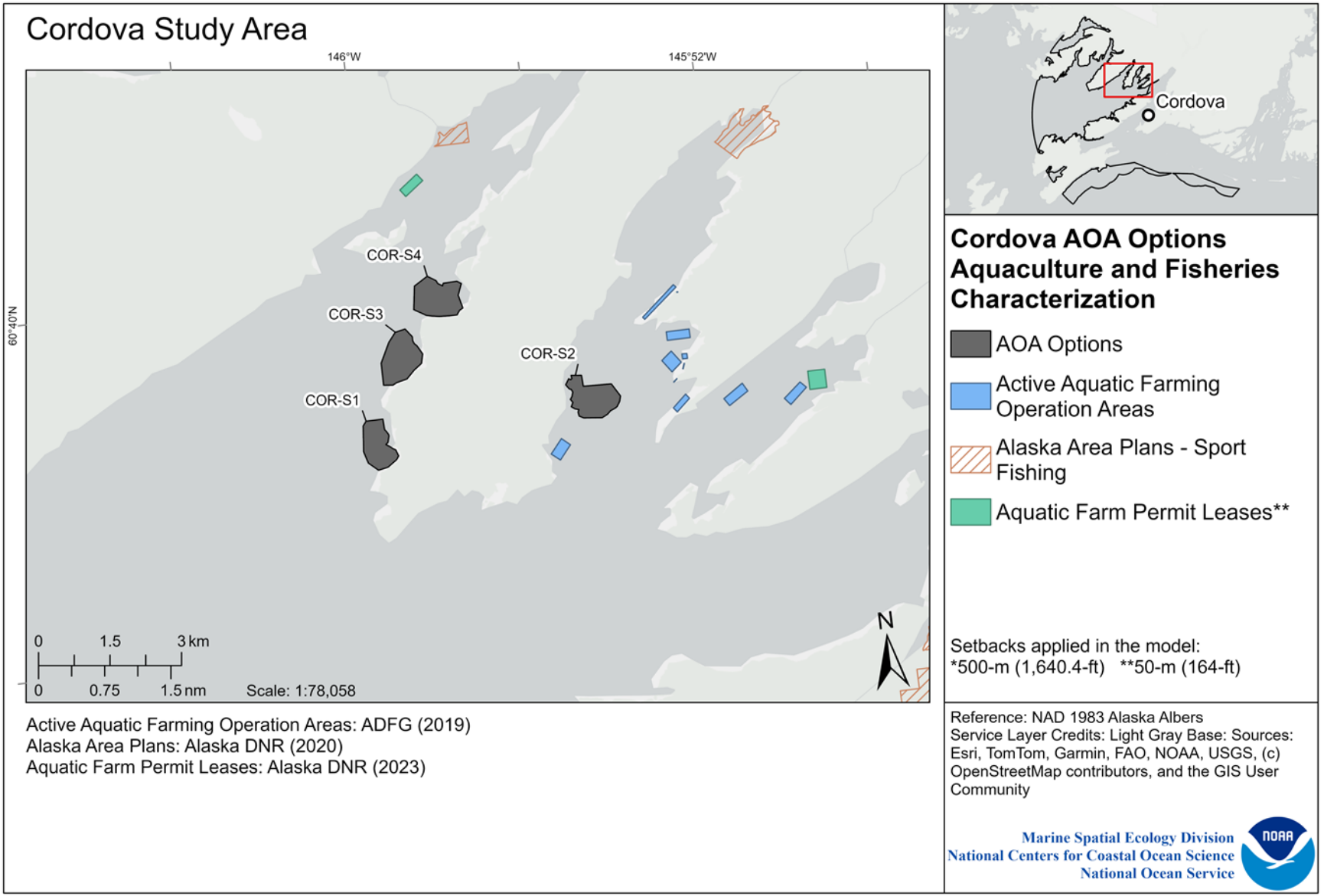


Coastal Populated Places: NOAA OCM (2024)

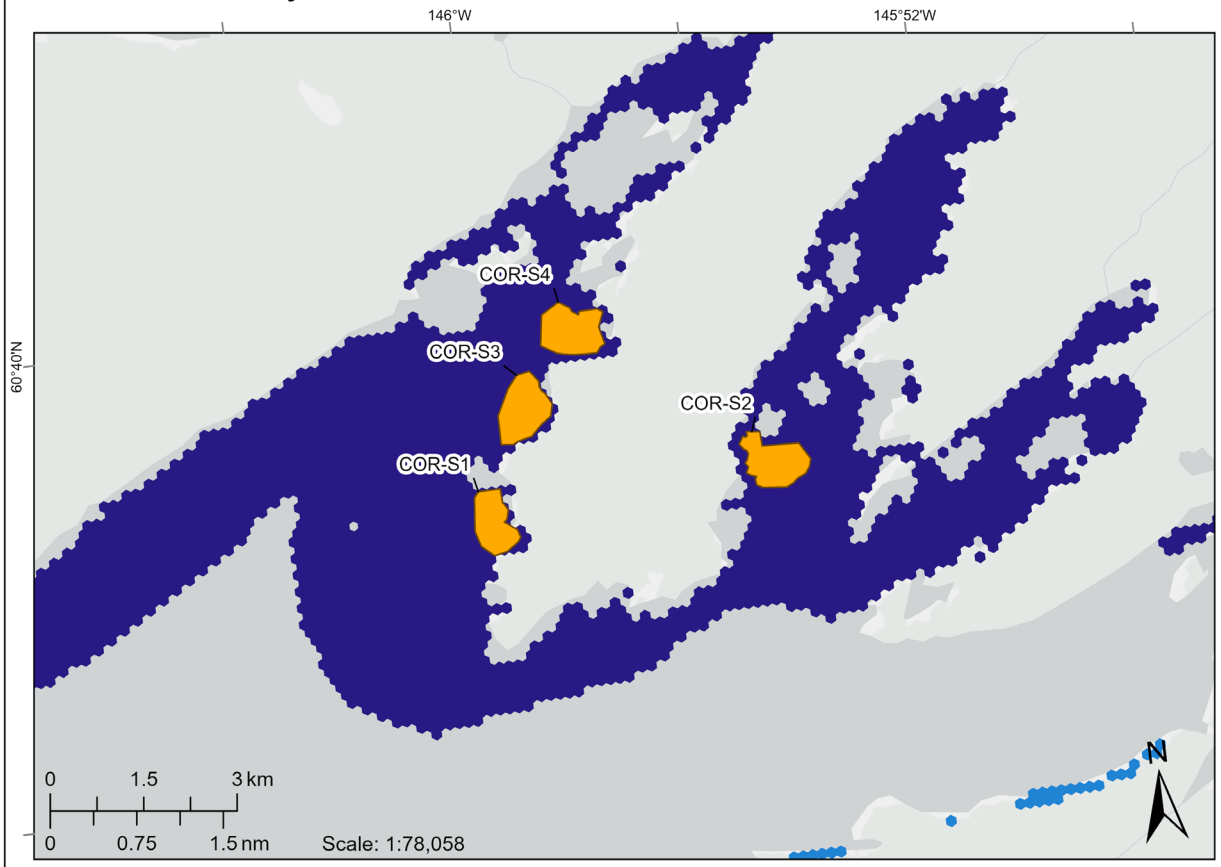

Cordova Study Area
146°W
145°52'W
60°40'N
COR-S4
COR-S3
COR-S2
COR-S1
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:78,058
N
Cordova
Cordova AOA Options
Natural Resources
Characterization
AOA Options
Key Harbor Seal Haulouts**
Anadromous Streams***
Shorezone Eelgrass
Pacific Herring Spawning Areas
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
Anadromous Streams: ADFG (2023)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

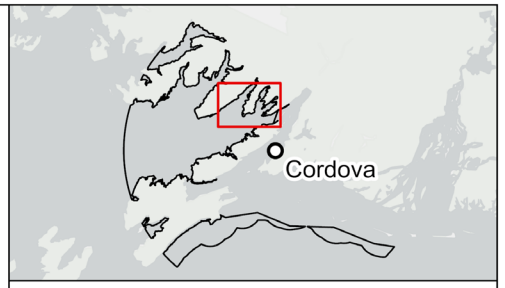

Cordova Study Area
146°W
145°52'W
60°40'N
COR-S4
COR-S3
COR-S2
COR-S1
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:78,058
N
Cordova
Cordova AOA Options
Industry, Navigation, and
Transportation Characterization
AOA Options
Aids to Navigation*
AOOS Sensor Stations
Offshore Seafood Processors
Permitted Vessels
Wrecks and Obstructions****
Alaska Marine Highway*
Ferry Routes*
Submarine Cables***
Alaska Area Plans - Anchorages
Submarine Cable Areas***
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)
Aids to Navigation: NOAA OCM (2022)
Alaska Area Plans: Alaska DNR (2020)
Alaska Marine Highway: Audubon Alaska (2016)
AOOS Sensor Stations: NOAA CO-OPS (2024)
Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020)
Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019)
Submarine Cables: NOAA OCM (2023)
Submarine Cable Areas: NOAA OCM (2023)
Wrecks and Obstructions: NOAA OCM (2023)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Cordova Study Area
146°W
145°52'W
60°40'N
COR-S4
COR-S3
COR-S2
COR-S1
N
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:78,058
Alaska Area Plans: Alaska DNR (2020)
Pacific Herring Spawning Areas: NOAA ORR (2023)
Cordova
Cordova AOA Options
Cultural Resources
Characterization
AOA Options
Alaska Area Plans - Community Harvest
Pacific Herring Spawning Areas
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Cordova Study Area
146°W
145°52'W
60°40'N
COR-S4
COR-S3
COR-S2
COR-S1
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:78,058
N
Cordova
Cordova AOA Options
Aquaculture and Fisheries
Characterization
AOA Options
Active Aquatic Farming
Operation Areas
Alaska Area Plans - Sport
Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources:
Esri, TomTom, Garmin, FAO, NOAA, USGS, (c)
OpenStreetMap contributors, and the GIS User
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Cordova Study Area





Cordova AOA Options Aquaculture and Fisheries Characterization

AOA Options

Fisheries Landings Relative Suitability

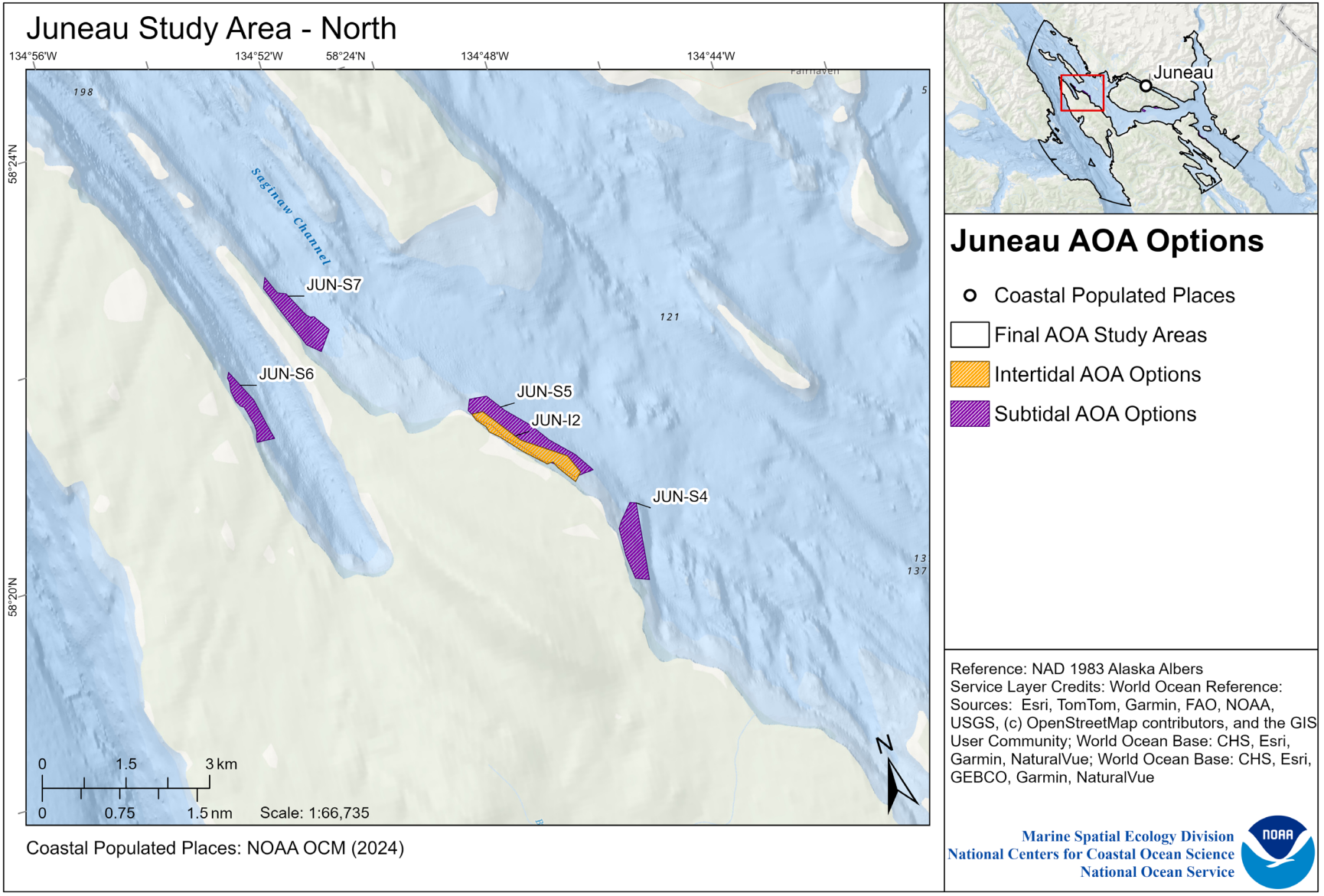
- Low
- Moderately Low
- Moderate
- Moderately High
- High

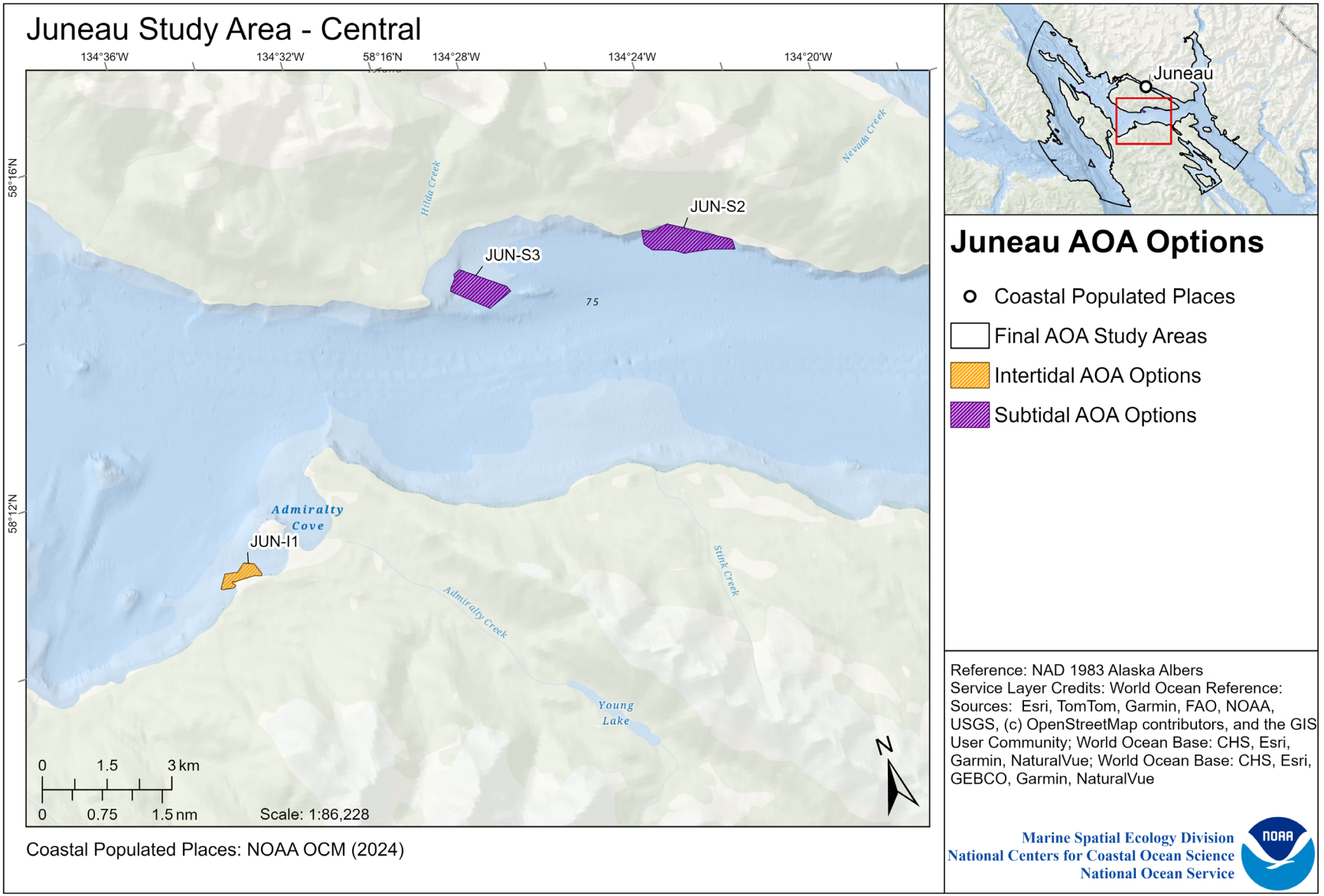
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

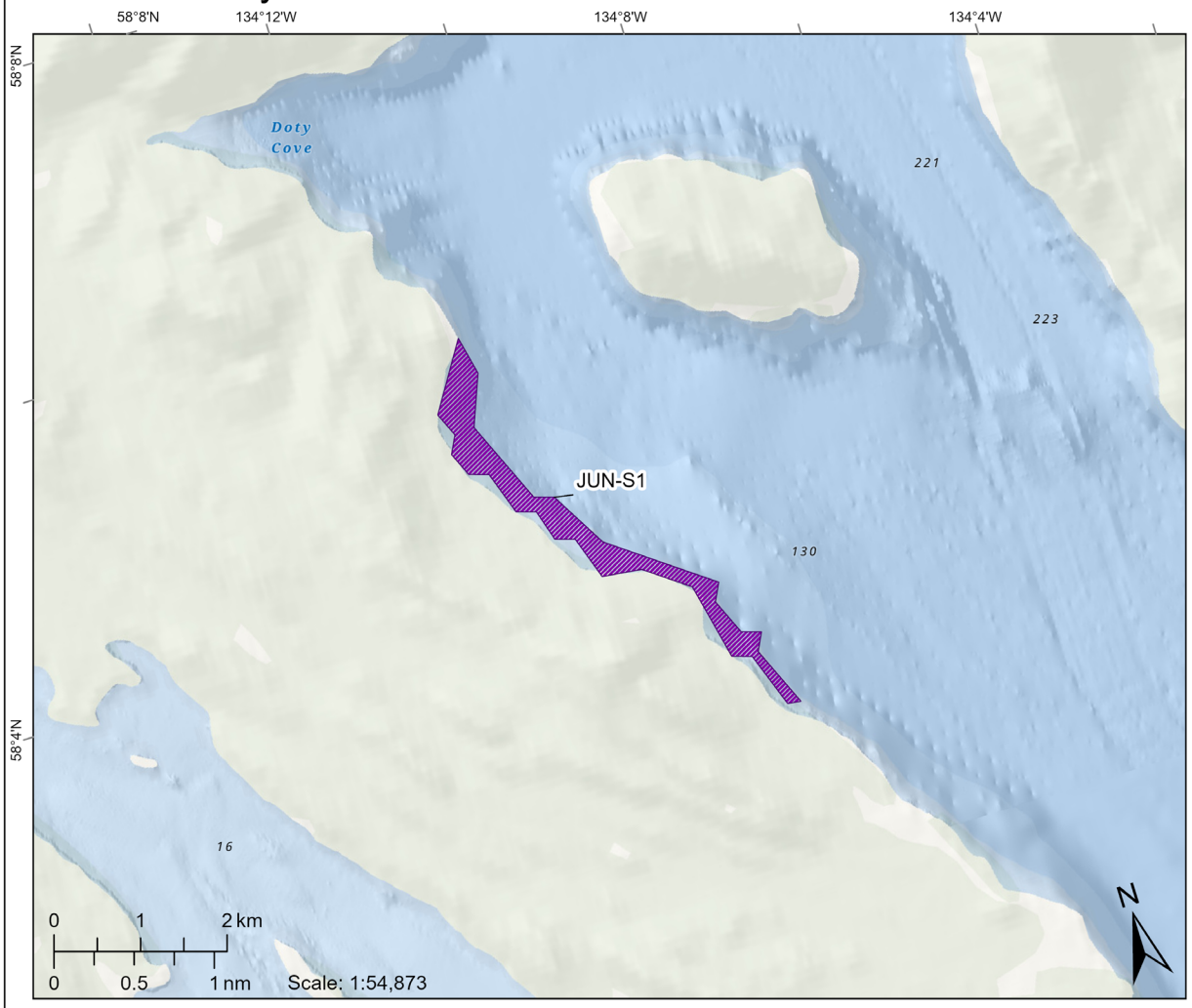
Juneau AOA Options Maps



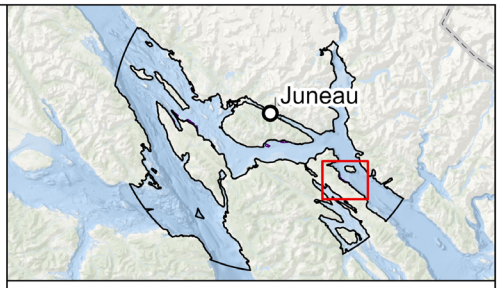


Coastal Populated Places: NOAA OCM (2024)

Juneau Study Area - South



Coastal Populated Places: NOAA OCM (2024)

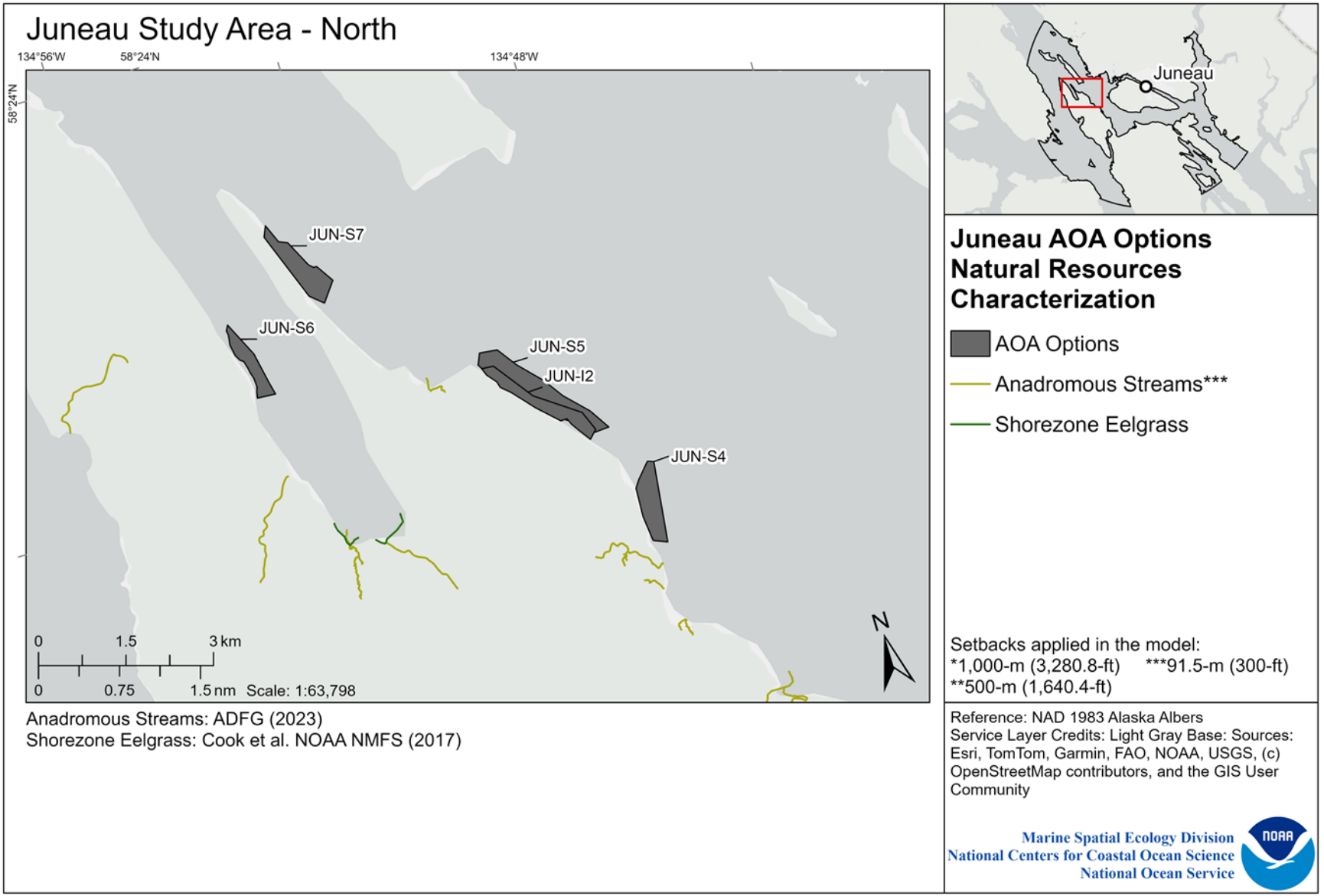


Juneau AOA Options

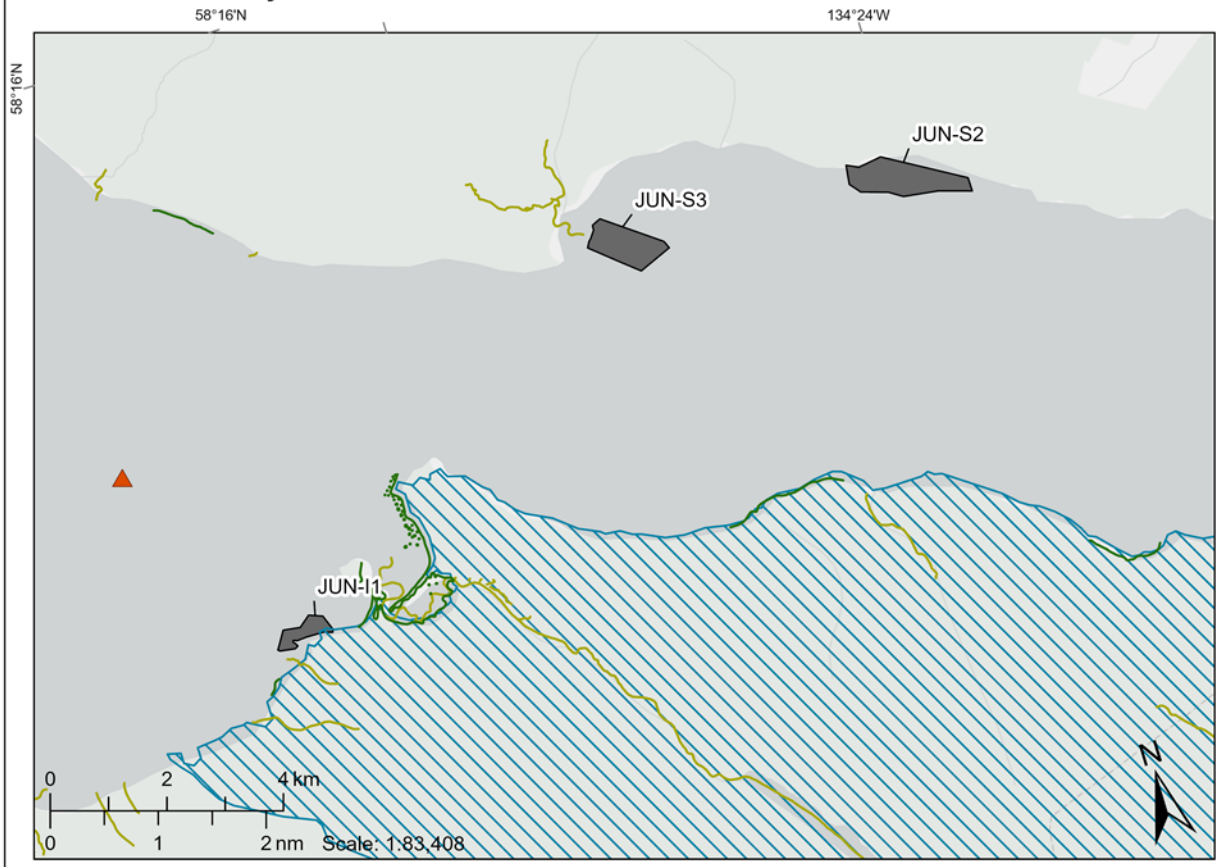
- Coastal Populated Places
- Final AOA Study Areas
- Intertidal AOA Options
- Subtidal AOA Options

Reference: NAD 1983 Alaska Albers
Service Layer Credits: World Ocean Reference: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community; World Ocean Base: CHS, Esri, Garmin, NaturalVue; World Ocean Base: CHS, Esri, GEBCO, Garmin, NaturalVue

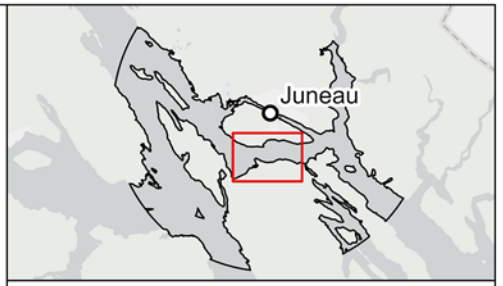
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Juneau Study Area - North
134°56'W
58°24'N
134°48'W
58°24'N
JUN-S7
JUN-S6
JUN-S5
JUN-I2
JUN-S4
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:63,798
N
Juneau
Juneau AOA Options
Natural Resources
Characterization
AOA Options
Anadromous Streams***
Shorezone Eelgrass
Setbacks applied in the model:
*1,000-m (3,280.8-ft)
***91.5-m (300-ft)
**500-m (1,640.4-ft)
Anadromous Streams: ADFG (2023)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

Juneau Study Area - Central



Alaska National Parks, Preserves, Monuments: Alaska DEC (2020)
Anadromous Streams: ADFG (2023)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)



Juneau AOA Options Natural Resources Characterization

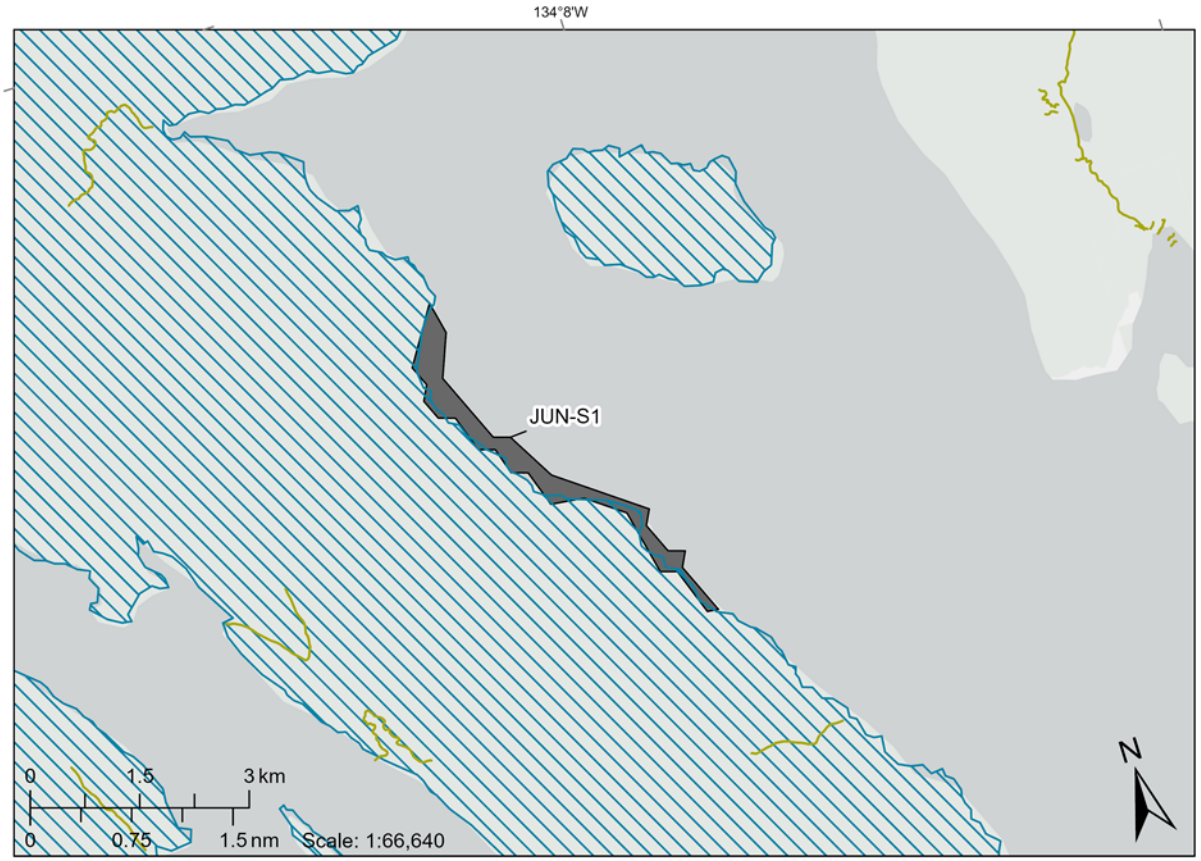
- AOA Options
- Key Harbor Seal Haulouts**
- Anadromous Streams***
- Shorezone Eelgrass
- Alaska National Parks, Preserves, and Monuments

Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)

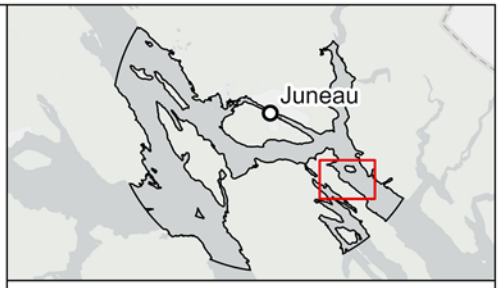
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Juneau Study Area - South



Alaska National Parks, Preserves, Monuments: Alaska DEC (2020)
Anadromous Streams: ADFG (2023)



Juneau AOA Options Natural Resources Characterization

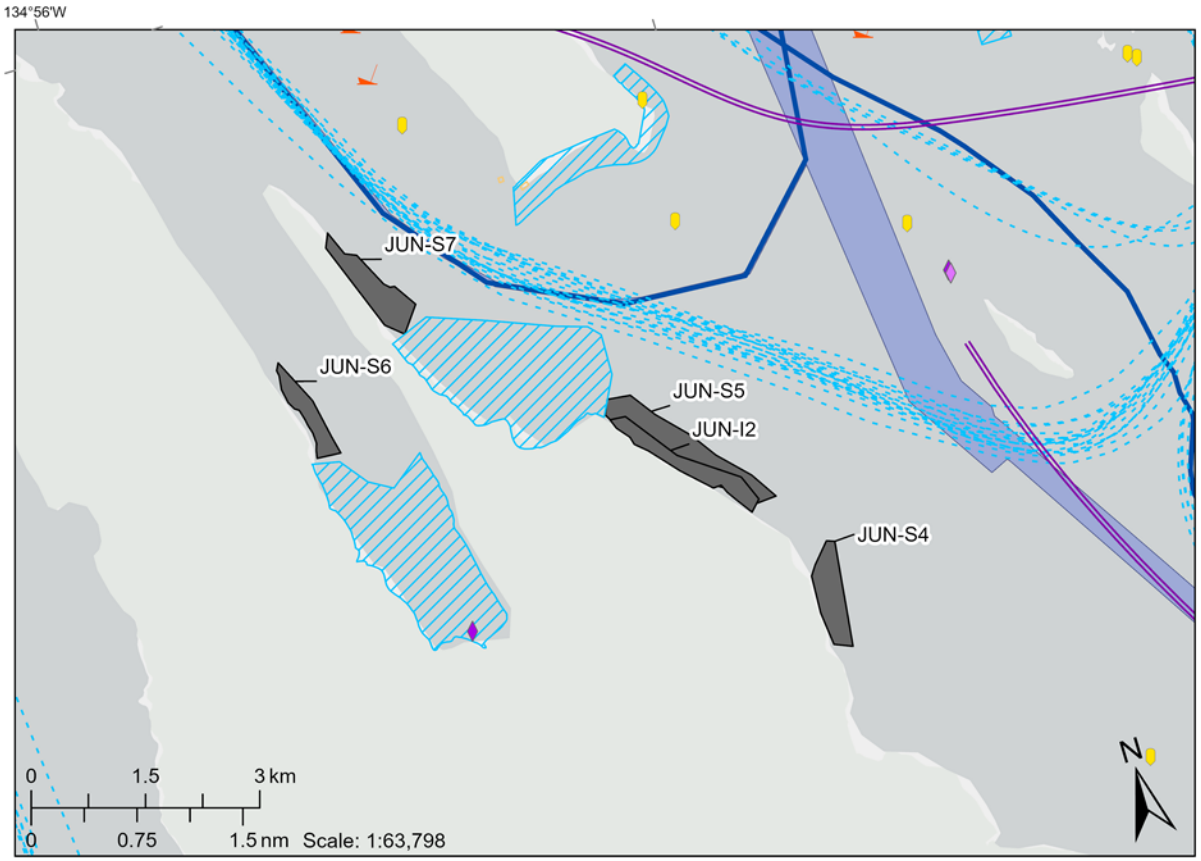
- AOA Options
- Anadromous Streams***
- Alaska National Parks, Preserves, and Monuments

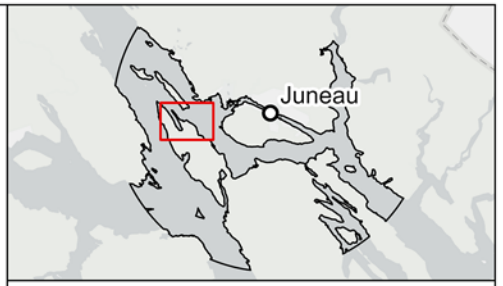
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Juneau Study Area - North





Juneau AOA Options Industry, Navigation, and Transportation Characterization

- AOA Options
- Aids to Navigation*
- AOOS Sensor Stations
- Sensors and Buoys*
- Wrecks and Obstructions****
- Alaska Marine Highway*
- Ferry Routes*
- Submarine Cables***
- Alaska Area Plans - Anchorages
- Land Permit Leases
- Submarine Cable Areas***

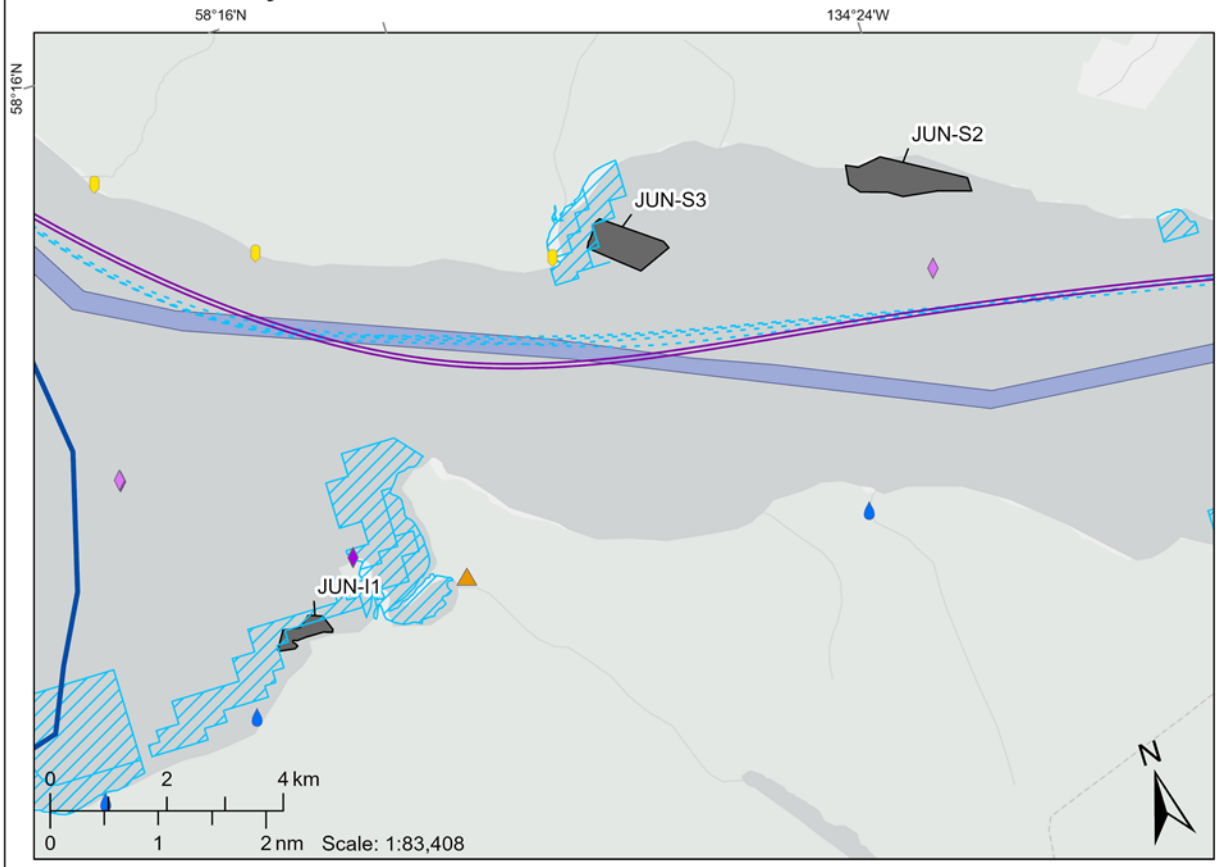
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)

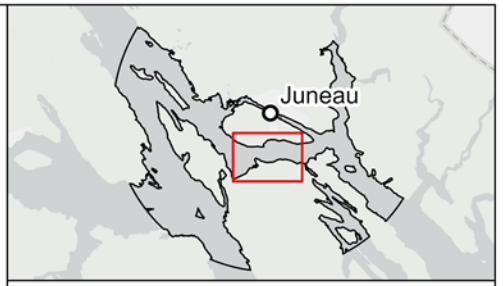
Aids to Navigation: NOAA OCM (2022)
Alaska Area Plans: Alaska DNR (2020)
Alaska Marine Highway: Audubon Alaska (2016)
AOOS Sensor Stations: NOAA CO-OPS (2024)
Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020)
Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022)
Sensors and Buoys: NOAA NDBC (2024)
Submarine Cables: NOAA OCM (2023)
Submarine Cable Areas: NOAA OCM (2023)
Wrecks and Obstructions: NOAA OCM (2023)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Juneau Study Area - Central





Juneau AOA Options Industry, Navigation, and Transportation Characterization

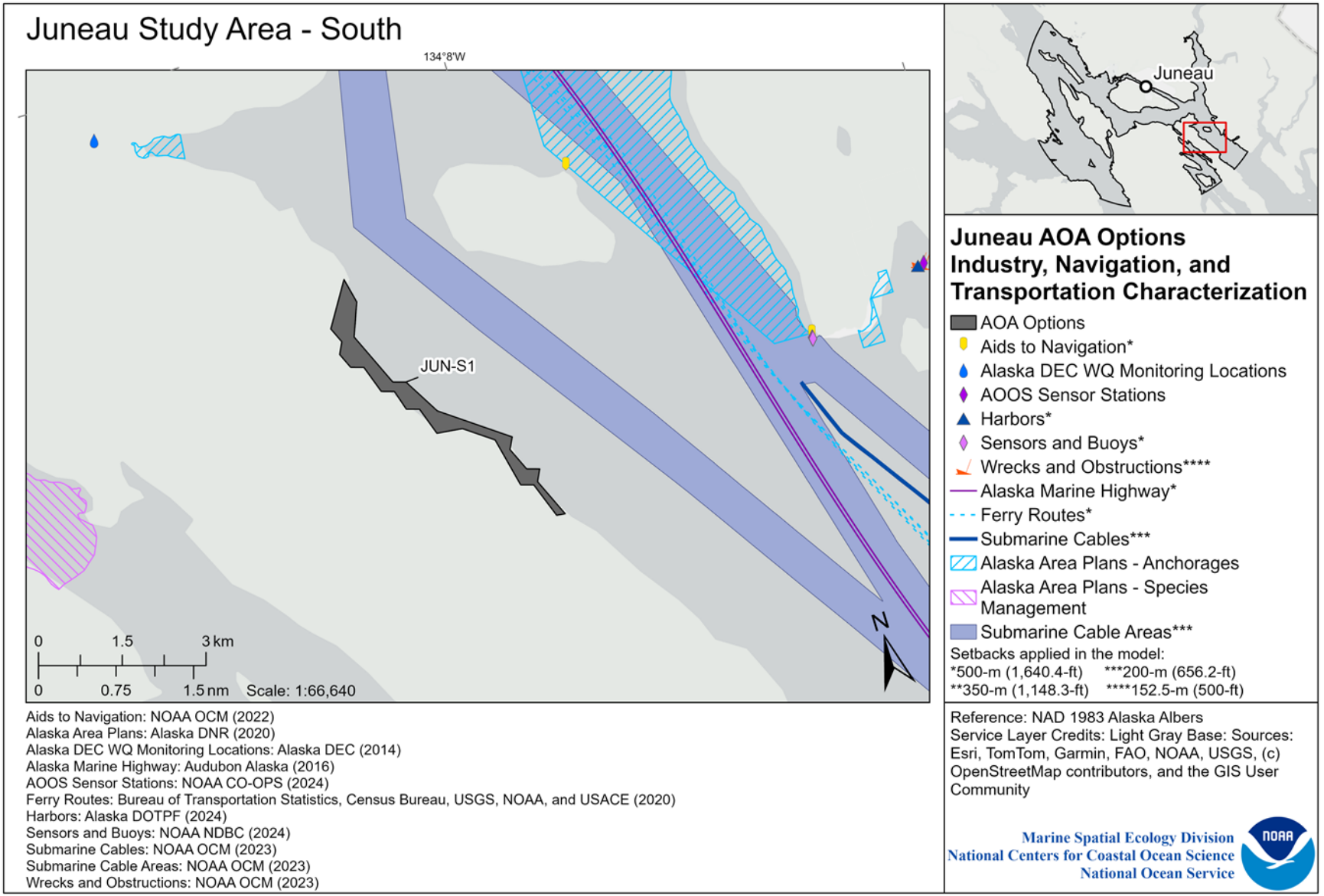
- AOA Options
- Aids to Navigation*
- Alaska DEC WQ Monitoring Locations
- AOOS Sensor Stations
- Sensors and Buoys*
- USFS Cabin Rentals
- Alaska Marine Highway*
- Ferry Routes*
- Submarine Cables***
- Alaska Area Plans - Anchorages
- Submarine Cable Areas***

Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)

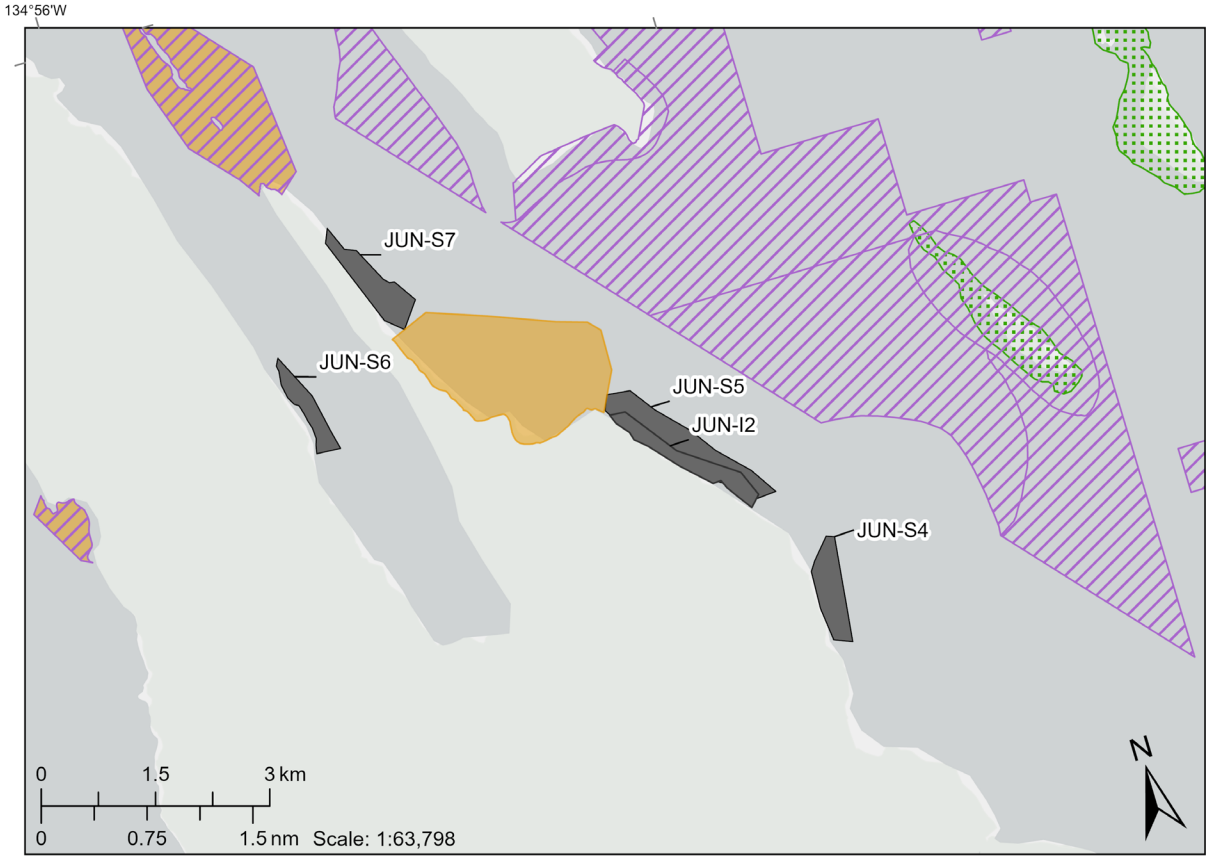
Aids to Navigation: NOAA OCM (2022)
Alaska Area Plans: Alaska DNR (2020)
Alaska DEC WQ Monitoring Locations: Alaska DEC (2014)
Alaska Marine Highway: Audubon Alaska (2016)
AOOS Sensor Stations: NOAA CO-OPS (2024)
Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020)
Sensors and Buoys: NOAA NDBC (2024)
Submarine Cables: NOAA OCM (2023)
Submarine Cable Areas: NOAA OCM (2023)
USFS Cabin Rentals: USFS (2017)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

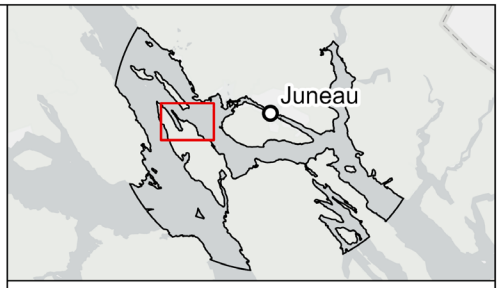
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Juneau Study Area - South
134°8'W
JUN-S1
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:66,640
N
Juneau
Juneau AOA Options
Industry, Navigation, and
Transportation Characterization
AOA Options
Aids to Navigation*
Alaska DEC WQ Monitoring Locations
AOOS Sensor Stations
Harbors*
Sensors and Buoys*
Wrecks and Obstructions****
Alaska Marine Highway*
Ferry Routes*
Submarine Cables***
Alaska Area Plans - Anchorages
Alaska Area Plans - Species Management
Submarine Cable Areas***
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)
Aids to Navigation: NOAA OCM (2022)
Alaska Area Plans: Alaska DNR (2020)
Alaska DEC WQ Monitoring Locations: Alaska DEC (2014)
Alaska Marine Highway: Audubon Alaska (2016)
AOOS Sensor Stations: NOAA CO-OPS (2024)
Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020)
Harbors: Alaska DOTPF (2024)
Sensors and Buoys: NOAA NDBC (2024)
Submarine Cables: NOAA OCM (2023)
Submarine Cable Areas: NOAA OCM (2023)
Wrecks and Obstructions: NOAA OCM (2023)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

Juneau Study Area - North



Alaska Area Plans: Alaska DNR (2020)
State Parks Boundary: Alaska DNR (2019)



Juneau AOA Options Cultural Resources Characterization

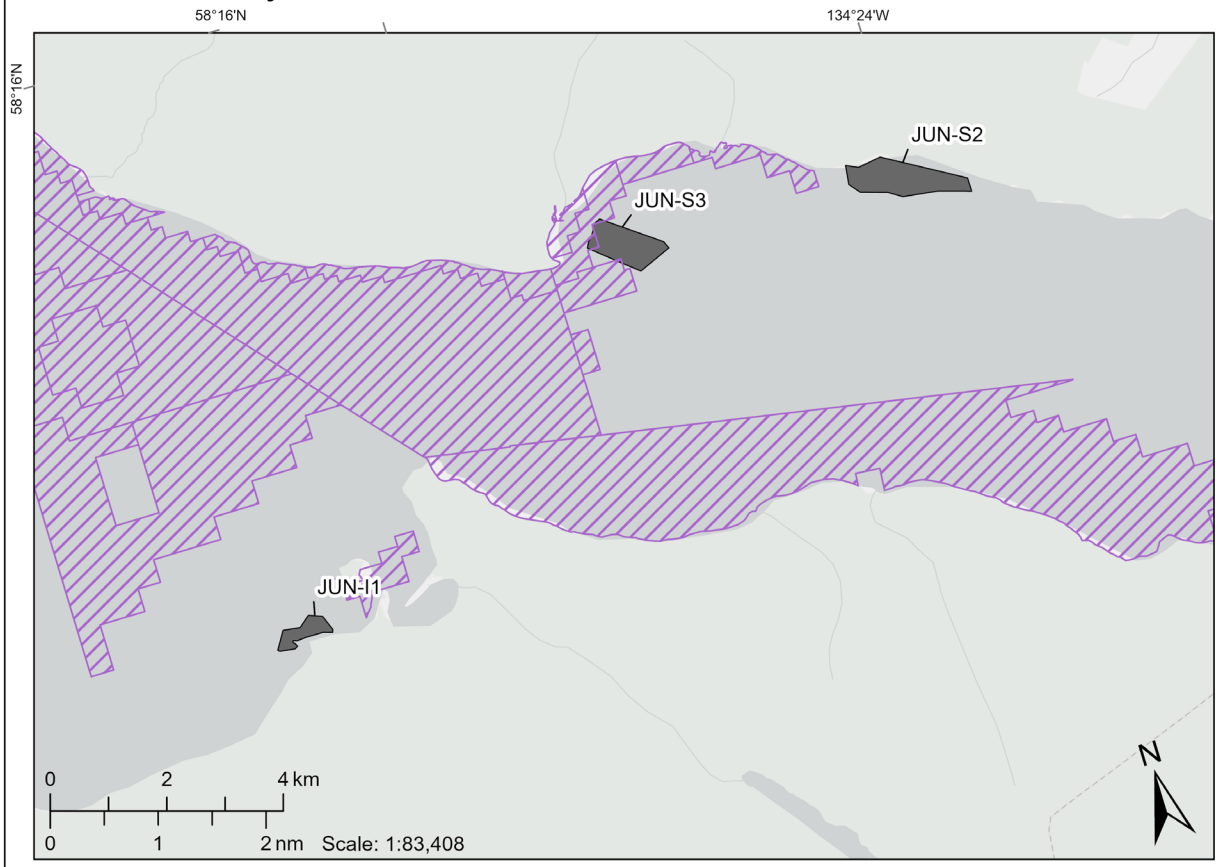
- AOA Options
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

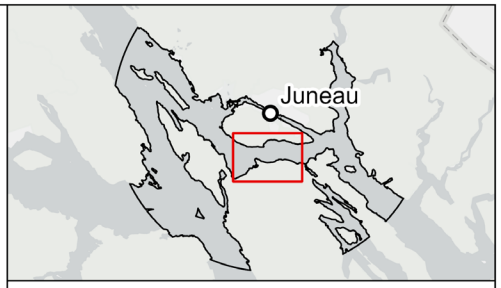
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Juneau Study Area - Central



Alaska Area Plans: Alaska DNR (2020)



Juneau AOA Options Cultural Resources Characterization

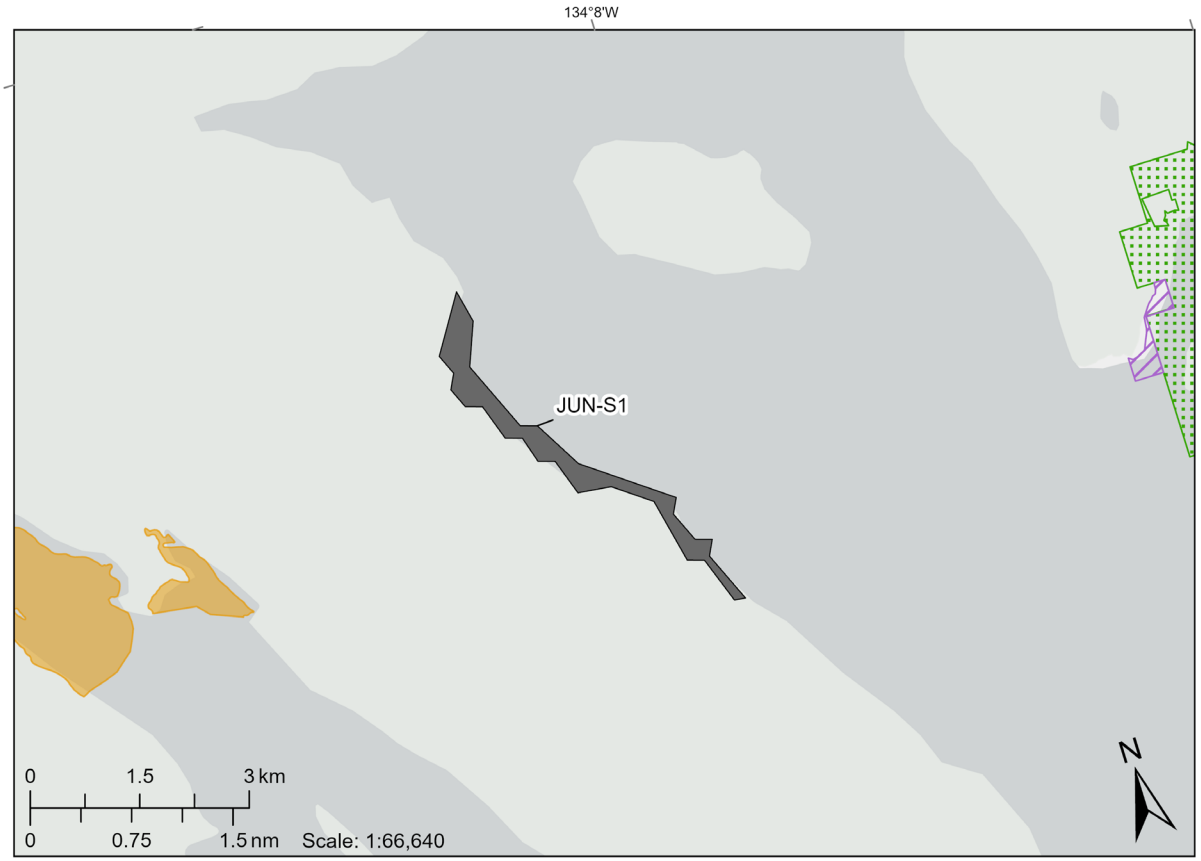
AOA Options

Alaska Area Plans - Community Harvest

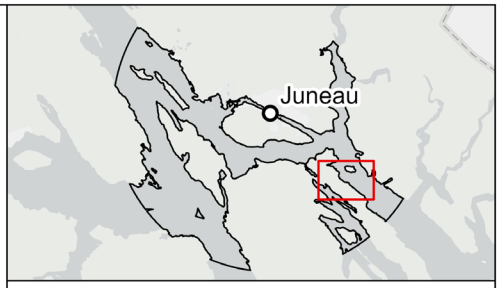
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Juneau Study Area - South



Alaska Area Plans: Alaska DNR (2020)
State Parks Boundary: Alaska DNR (2019)



Juneau AOA Options Cultural Resources Characterization

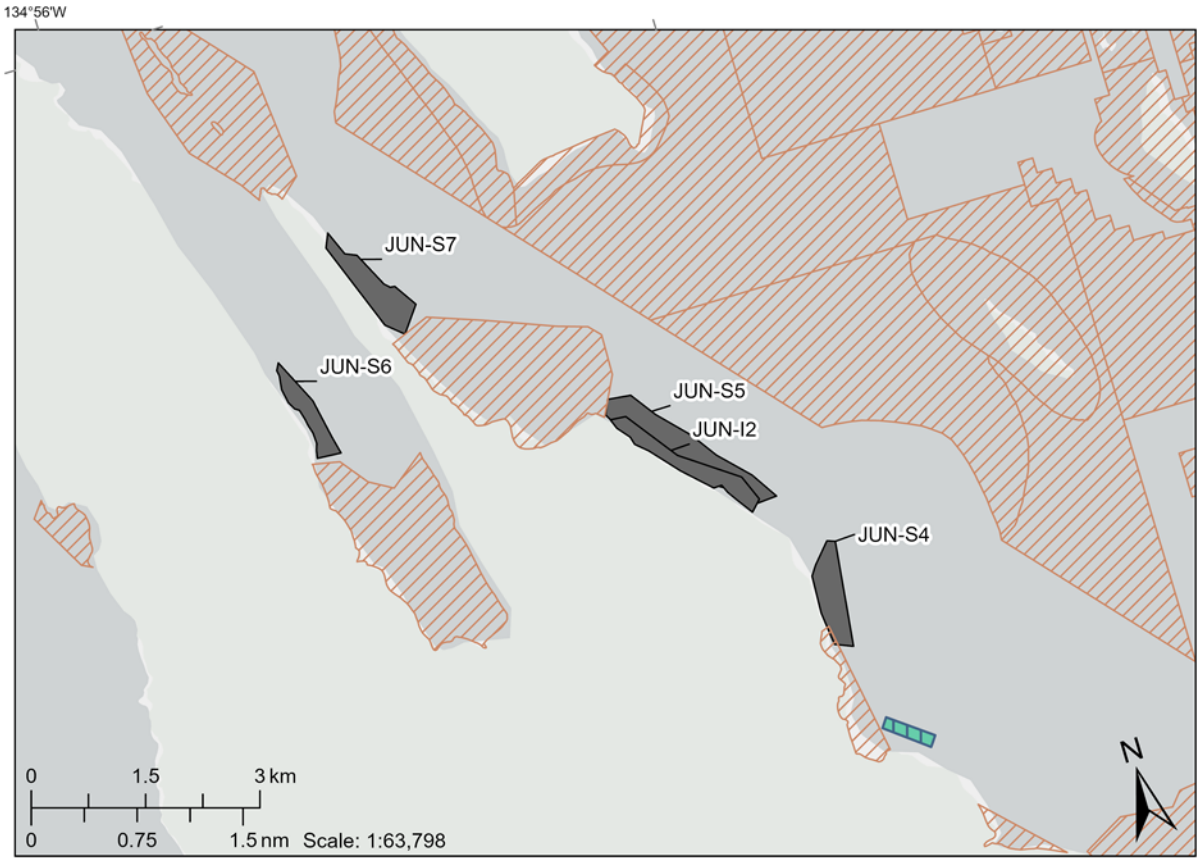
- AOA Options
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

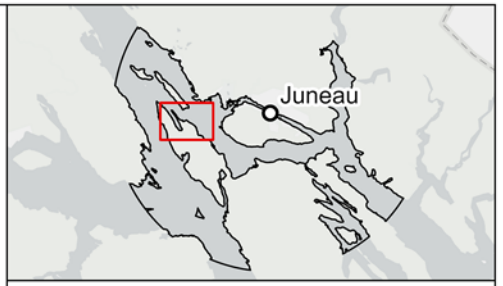
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
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National Ocean Service

Juneau Study Area - North



Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)



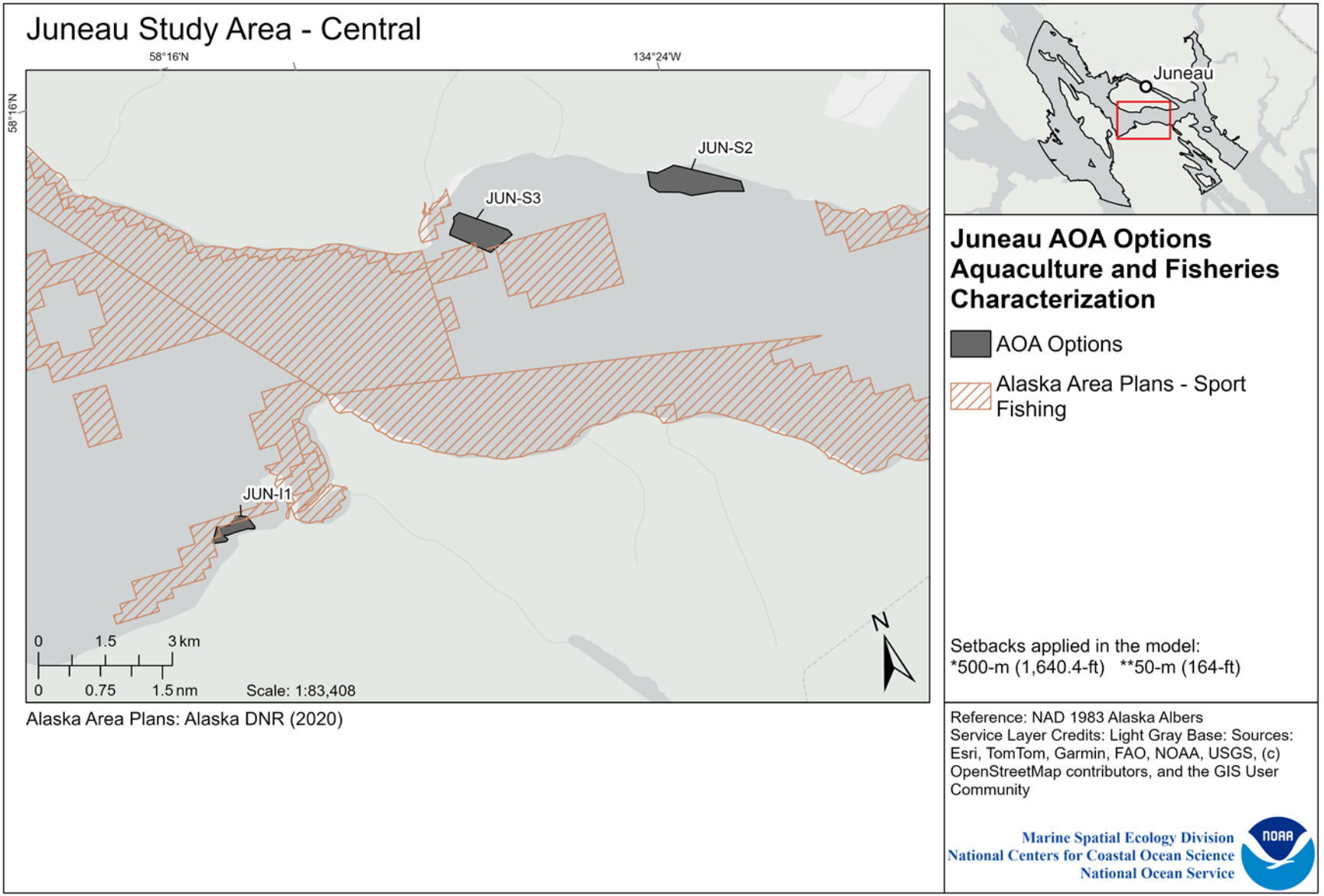
Juneau AOA Options Aquaculture and Fisheries Characterization

- AOA Options
- Active Aquatic Farming Operation Areas
- Alaska Area Plans - Sport Fishing
- Aquatic Farm Permit Leases**

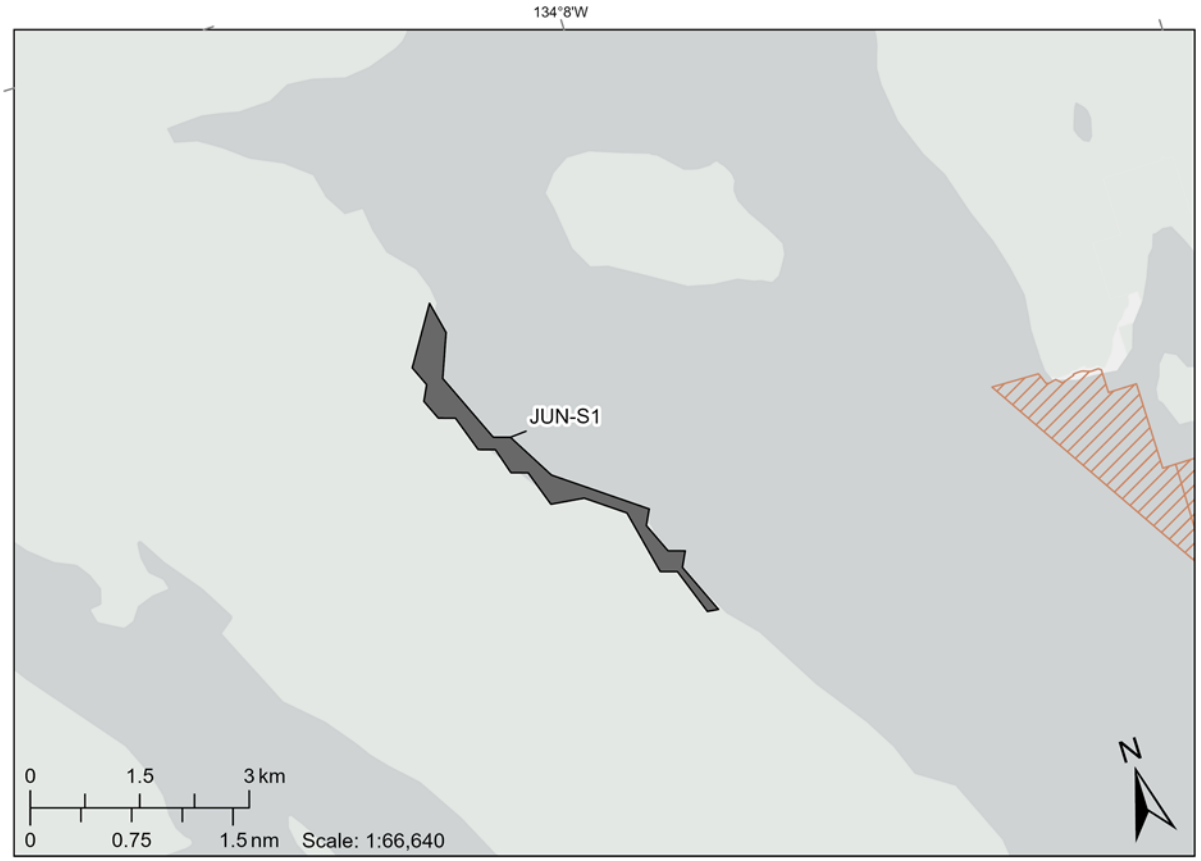
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

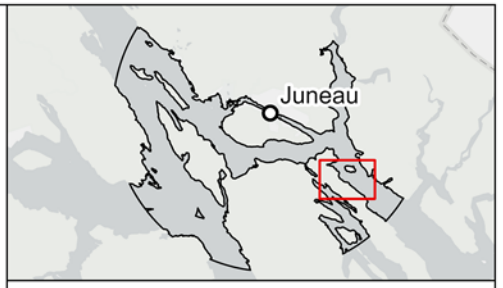
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Juneau Study Area - Central
58°16'N
134°24'W
58°16'N
JUN-S2
JUN-S3
JUN-I1
0
1.5
3 km
0
0.75
1.5 nm
Scale: 1:83,408
N
Juneau
Juneau AOA Options
Aquaculture and Fisheries
Characterization
AOA Options
Alaska Area Plans - Sport
Fishing
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Alaska Area Plans: Alaska DNR (2020)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources:
Esri, TomTom, Garmin, FAO, NOAA, USGS, (c)
OpenStreetMap contributors, and the GIS User
Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Juneau Study Area - South



Alaska Area Plans: Alaska DNR (2020)



Juneau AOA Options Aquaculture and Fisheries Characterization

AOA Options

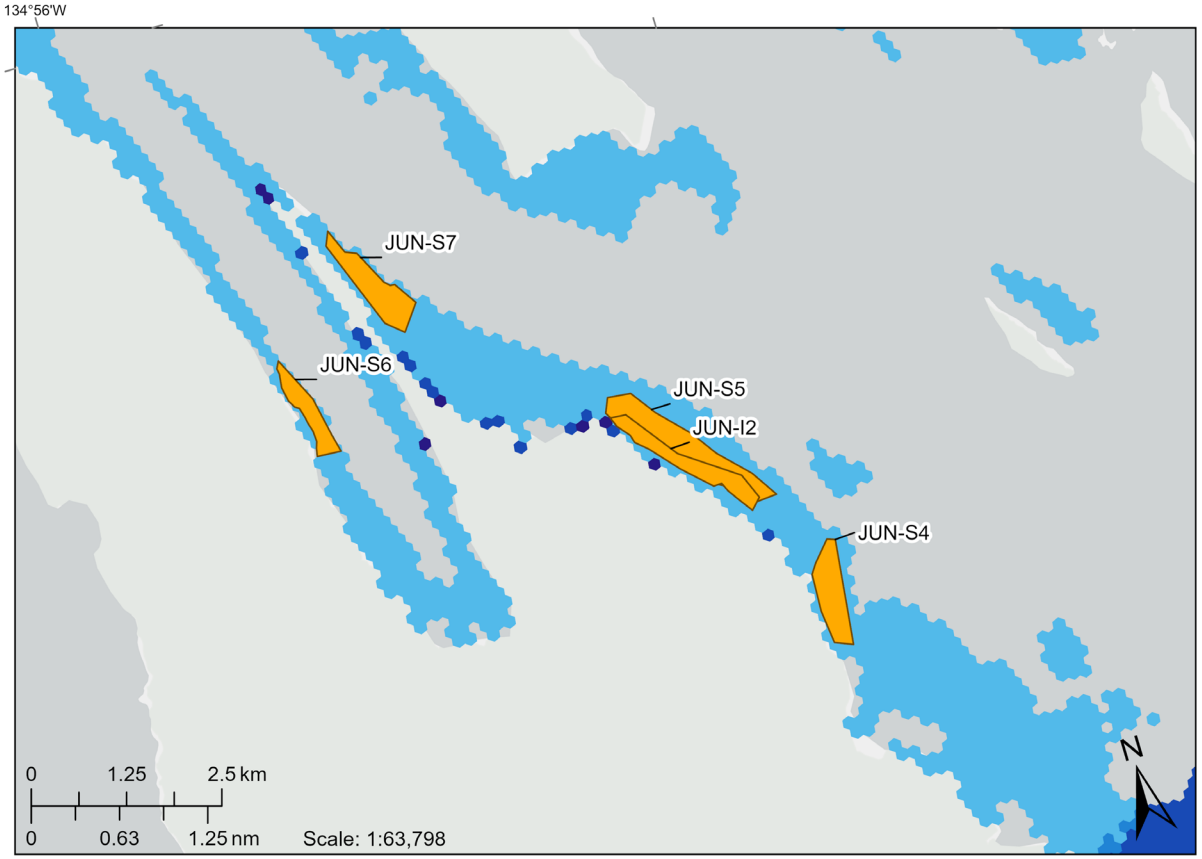
Alaska Area Plans - Sport Fishing

Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)

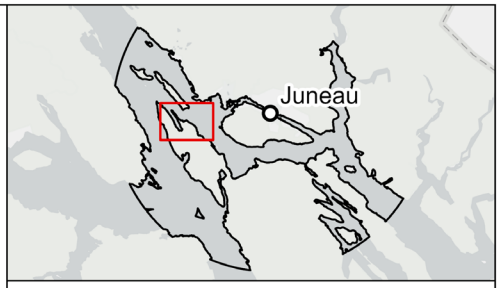
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Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Juneau Study Area - North



Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)



Juneau AOA Options Aquaculture and Fisheries Characterization

AOA Options

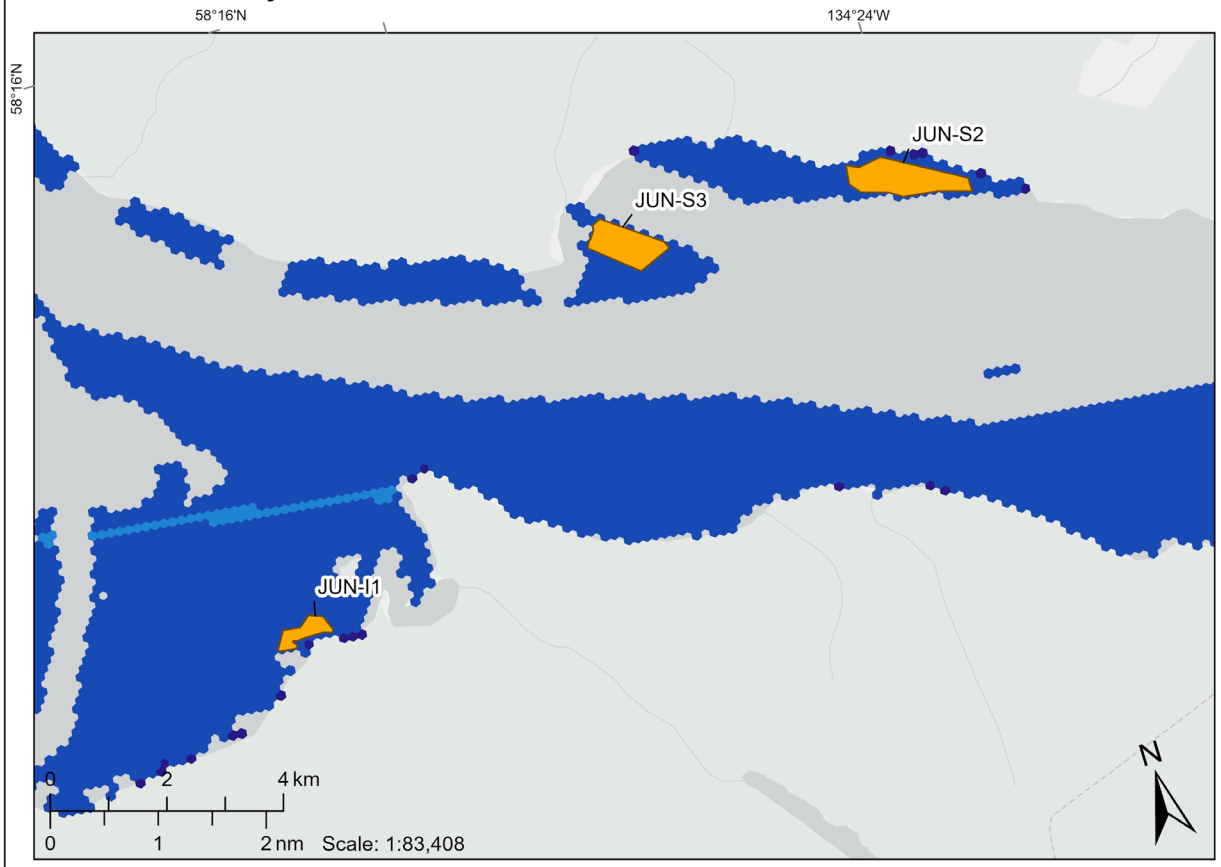
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

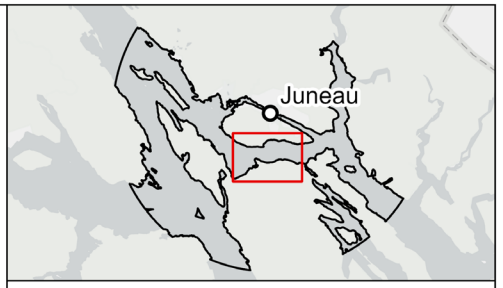
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Juneau Study Area - Central



Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)



Juneau AOA Options Aquaculture and Fisheries Characterization

AOA Options

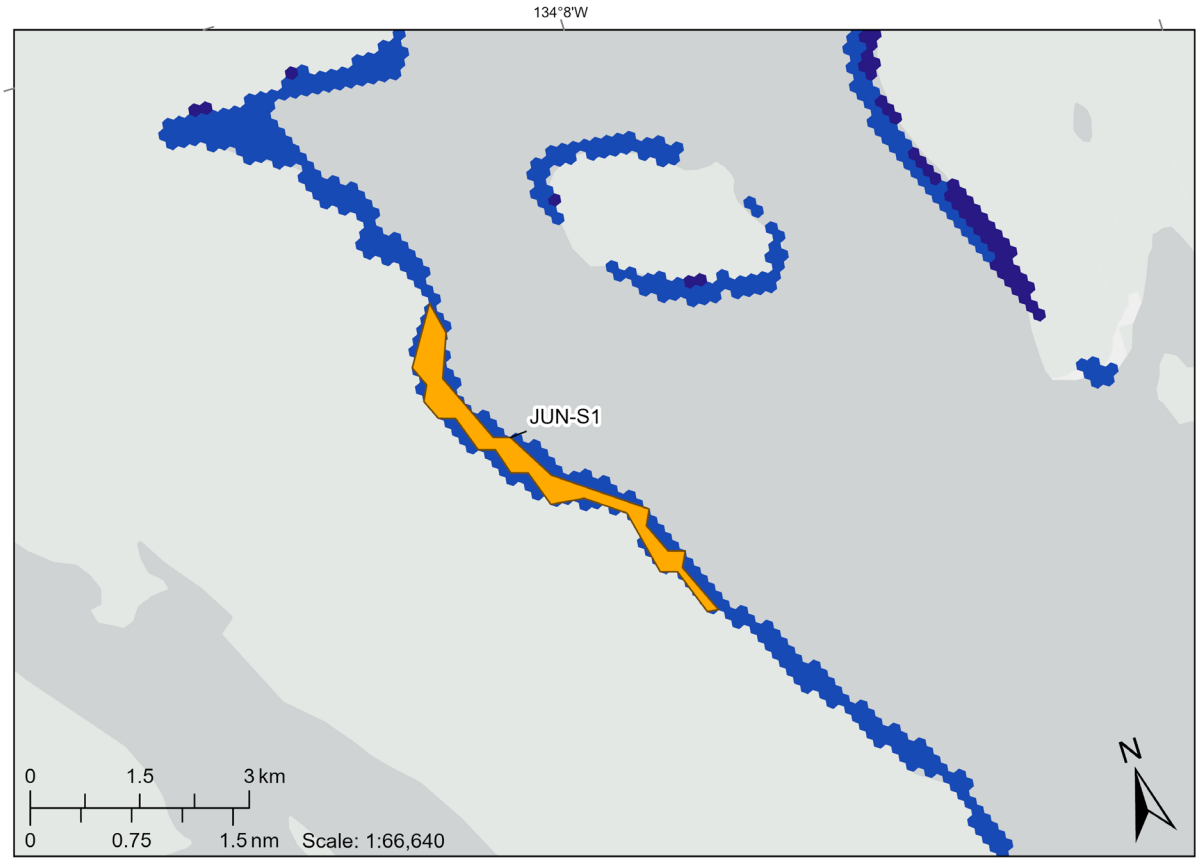
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

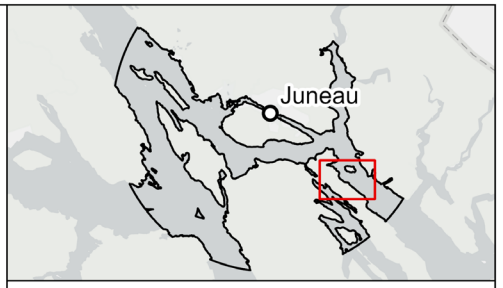
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Juneau Study Area - South



Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)



Juneau AOA Options Aquaculture and Fisheries Characterization

AOA Options

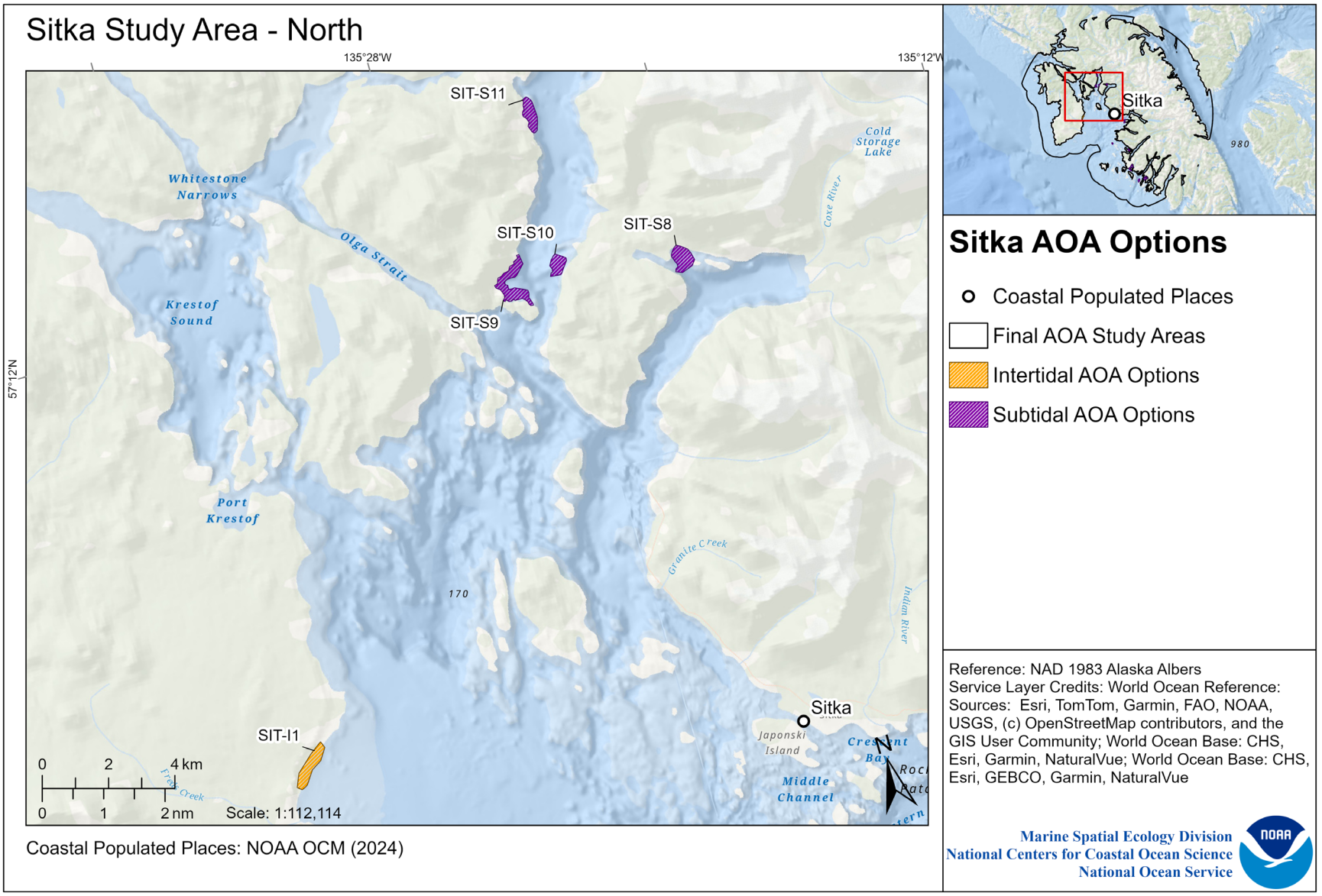
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

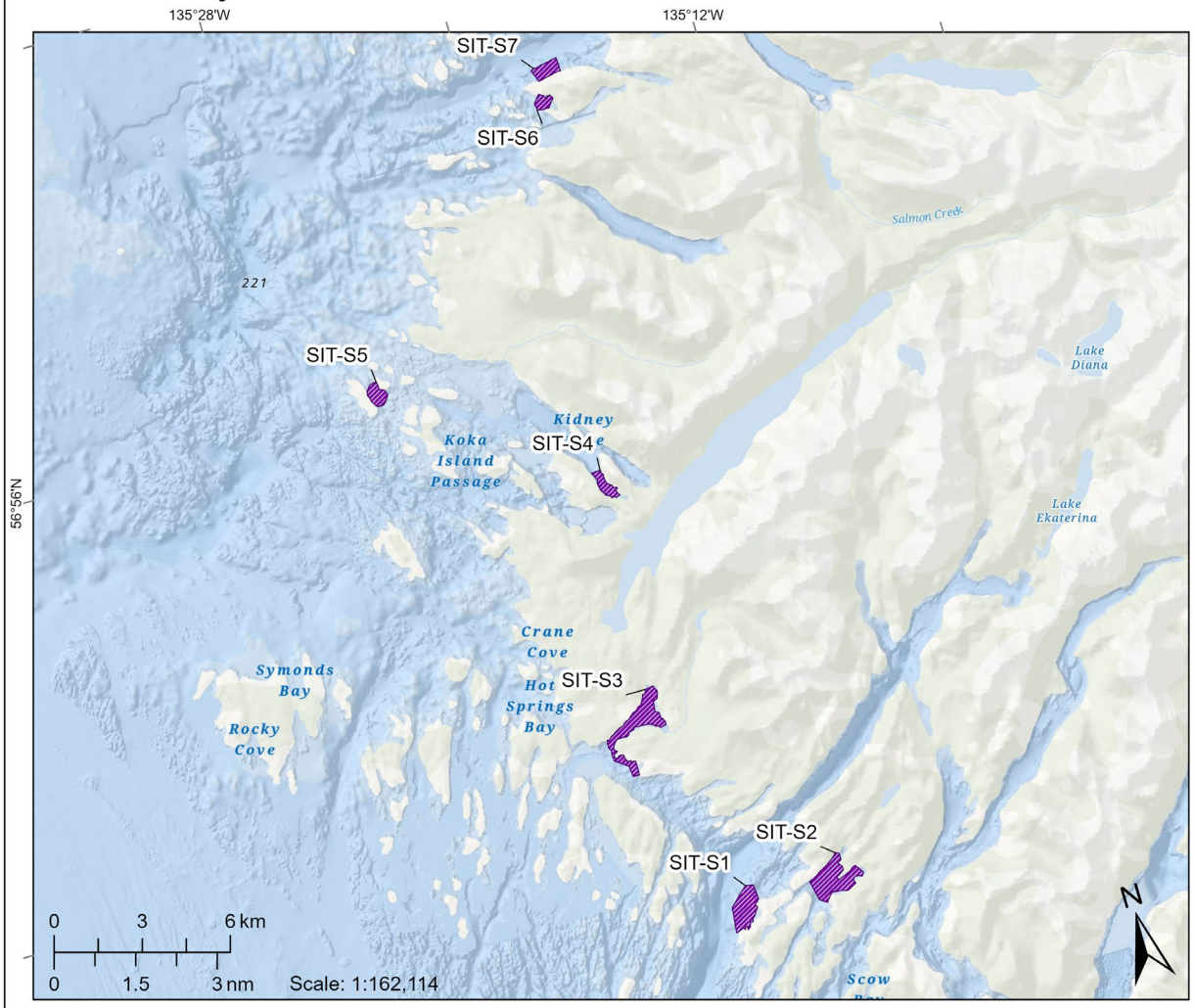
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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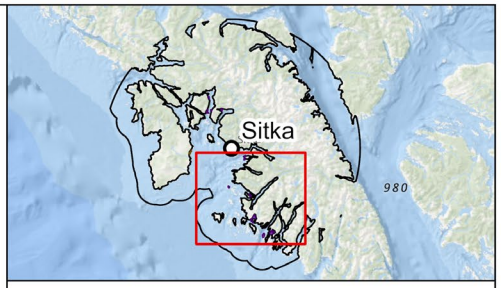
Sitka AOA Options Maps



Sitka Study Area - South



Coastal Populated Places: NOAA OCM (2024)



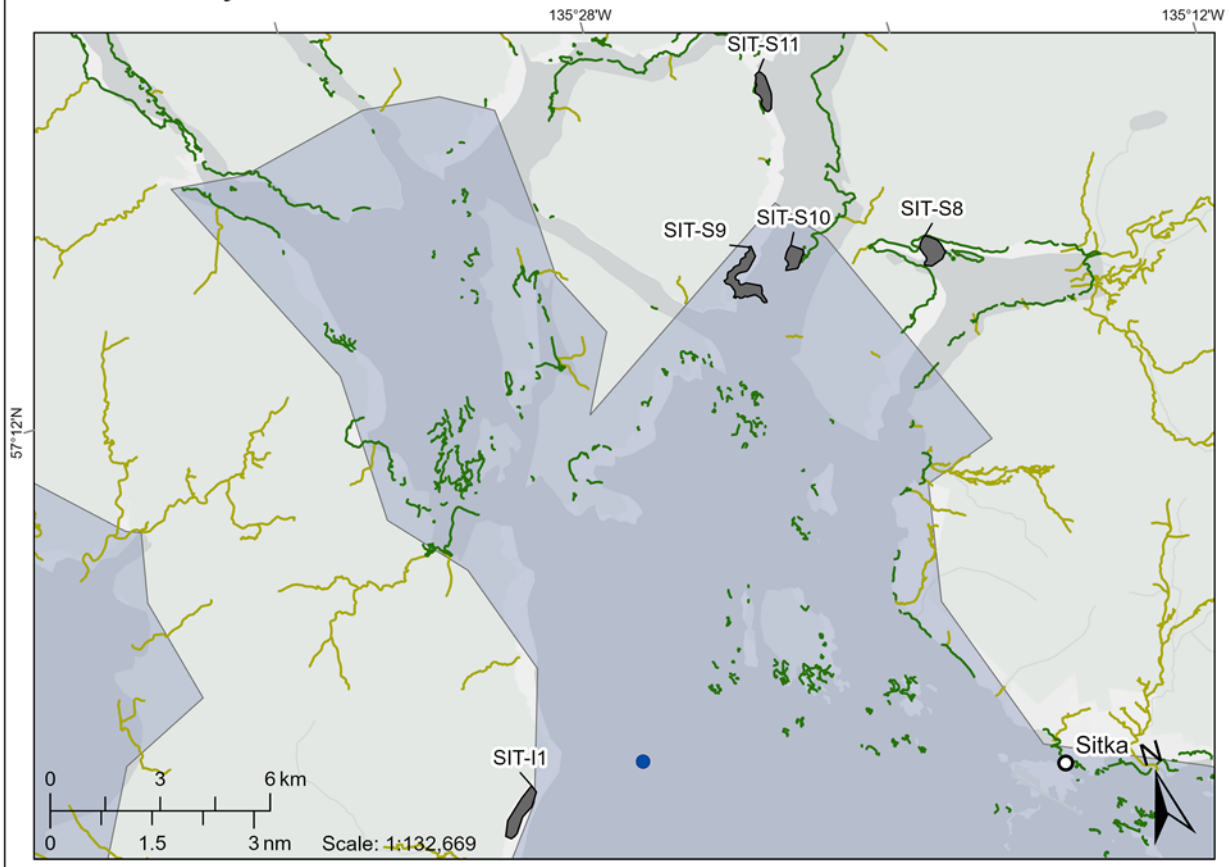
Sitka AOA Options

- Coastal Populated Places
- Final AOA Study Areas
- Intertidal AOA Options
- Subtidal AOA Options

Reference: NAD 1983 Alaska Albers
Service Layer Credits: World Ocean Reference: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community; World Ocean Base: CHS, Esri, Garmin, NaturalVue; World Ocean Base: CHS, Esri, GEBCO, Garmin, NaturalVue

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Sitka Study Area - North





Sitka AOA Options Natural Resources Characterization

- Coastal Populated Places
- AOA Options
- Deep-sea Coral and Sponge Observations*
- Anadromous Streams***
- Shorezone Eelgrass
- Gray Whale Feeding BIA

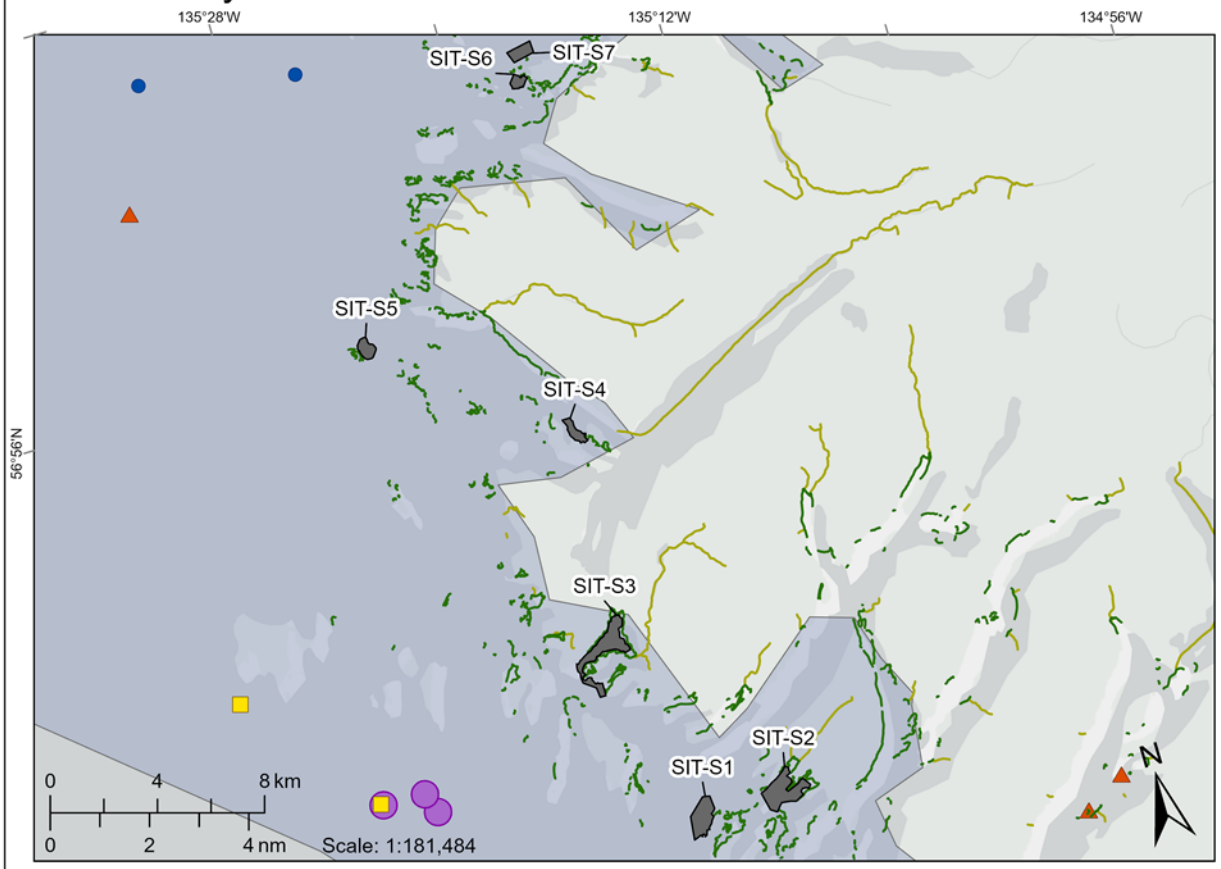
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)

Anadromous Streams: ADFG (2023)
Biologically Important Areas - Feeding: Wild et al. (2023)
Coastal Populated Places: NOAA OCM (2024)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Sitka Study Area - South





Sitka AOA Options Natural Resources Characterization

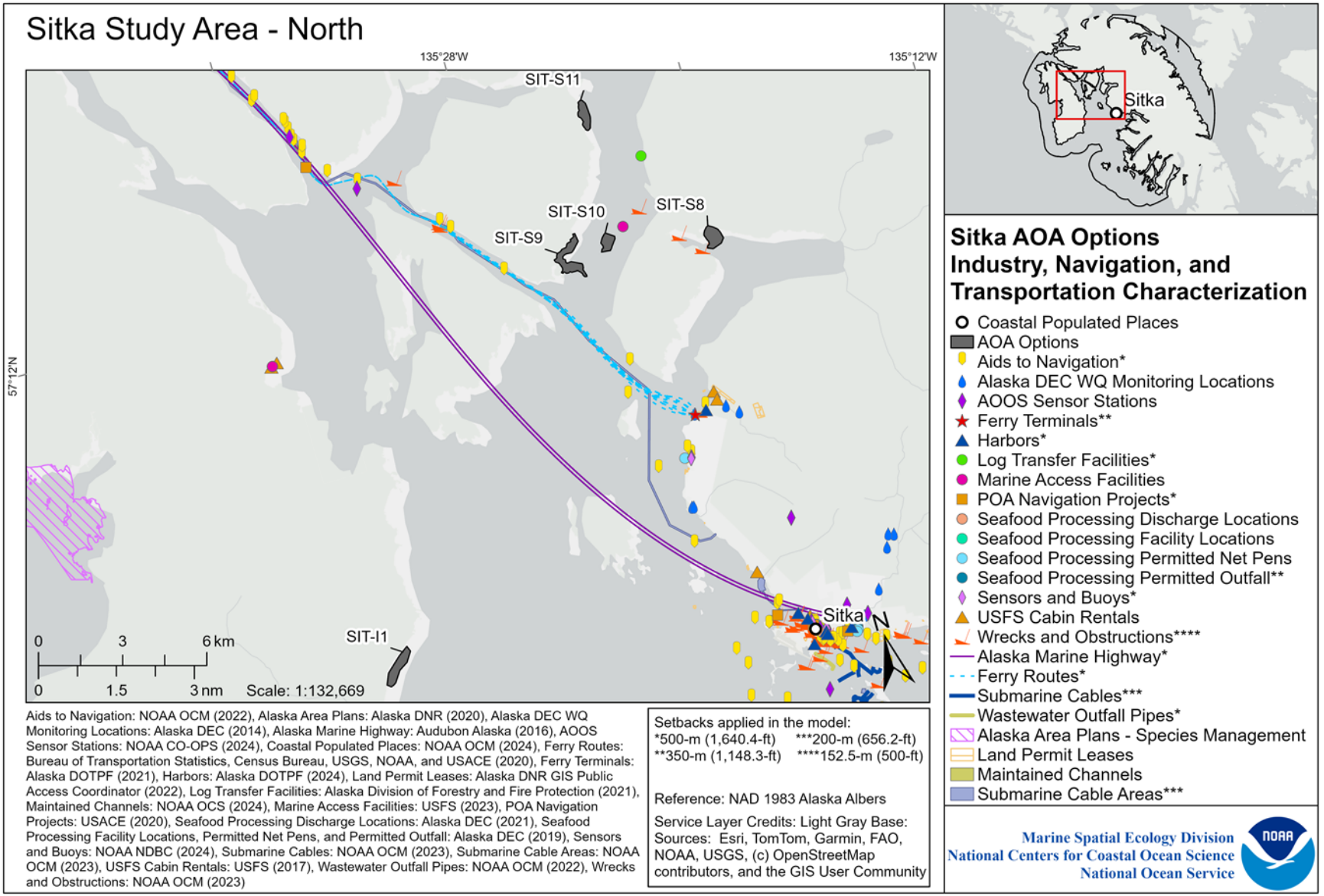
- AOA Options
- Deep-sea Coral and Sponge Observations*
- Key Harbor Seal Haulouts**
- Steller Sea Lion Major Haulouts and Rookeries**
- Anadromous Streams***
- Shorezone Eelgrass
- Gray Whale Feeding BIA
- Seabird Colonies

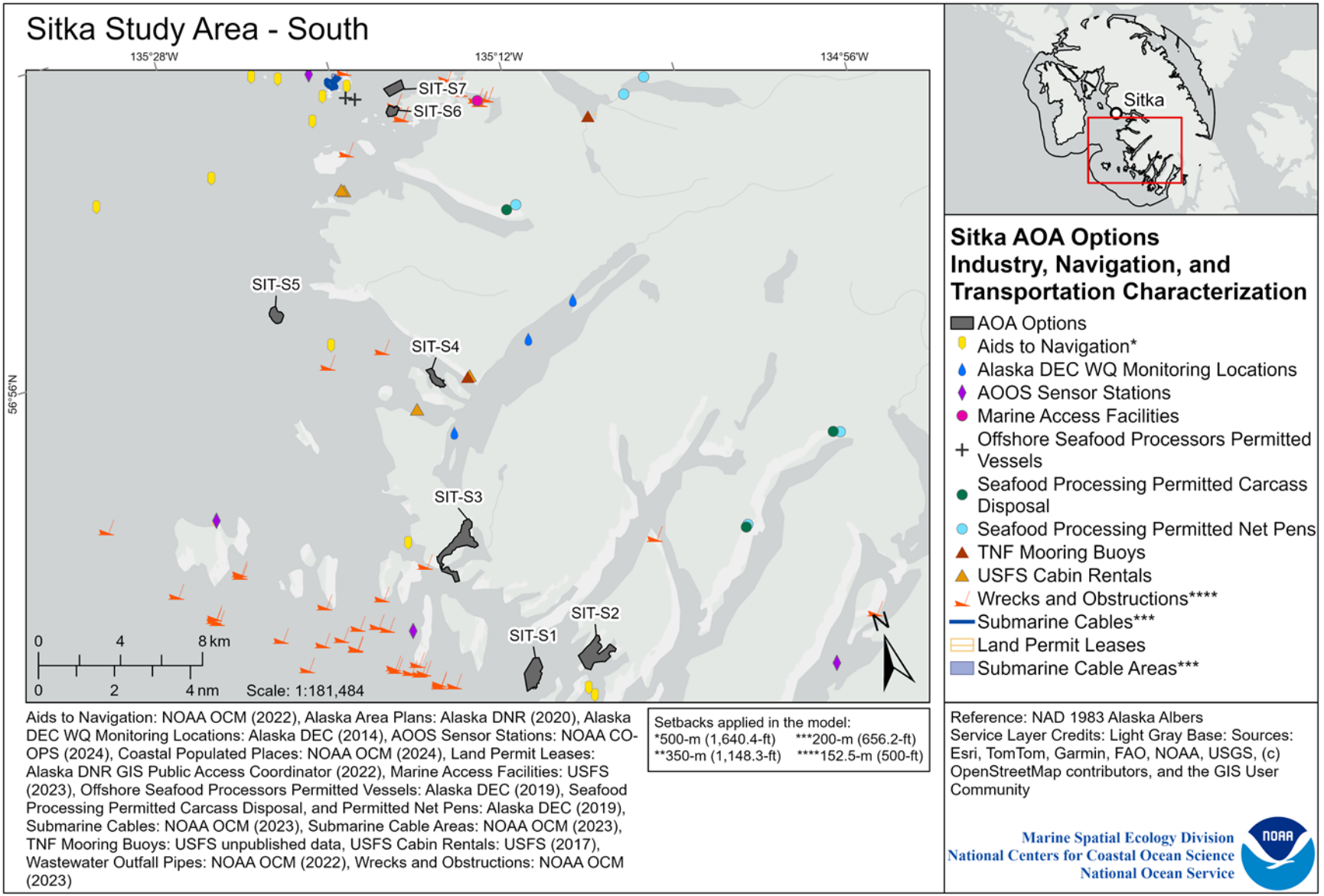
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)

Anadromous Streams: ADFG (2023)
Biologically Important Areas - Feeding: Wild et al. (2023)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Seabird Colonies: Seabird Information Network - North Pacific Seabird Data Portal (2024)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Stellar Sea Lion Major Haulouts and Rookeries: NOAA NMFS PRD AKR (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Sitka Study Area - North
135°28'W
135°12'W
57°12'N
SIT-S11
SIT-S10
SIT-S8
SIT-S9
SIT-I1
Sitka
0 3 6 km
0 1.5 3 nm
Scale: 1:132,669
Sitka
Sitka AOA Options
Industry, Navigation, and
Transportation Characterization
Coastal Populated Places
AOA Options
Aids to Navigation*
Alaska DEC WQ Monitoring Locations
AOOS Sensor Stations
Ferry Terminals**
Harbors*
Log Transfer Facilities*
Marine Access Facilities
POA Navigation Projects*
Seafood Processing Discharge Locations
Seafood Processing Facility Locations
Seafood Processing Permitted Net Pens
Seafood Processing Permitted Outfall**
Sensors and Buoys*
USFS Cabin Rentals
Wrecks and Obstructions****
Alaska Marine Highway*
Ferry Routes*
Submarine Cables***
Wastewater Outfall Pipes*
Alaska Area Plans - Species Management
Land Permit Leases
Maintained Channels
Submarine Cable Areas***
Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021), Maintained Channels: NOAA OCS (2024), Marine Access Facilities: USFS (2023), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Net Pens, and Permitted Outfall: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), USFS Cabin Rentals: USFS (2017), Wastewater Outfall Pipes: NOAA OCM (2022), Wrecks and Obstructions: NOAA OCM (2023)
Setbacks applied in the model:
*500-m (1,640.4-ft)
**350-m (1,148.3-ft)
***200-m (656.2-ft)
****152.5-m (500-ft)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA



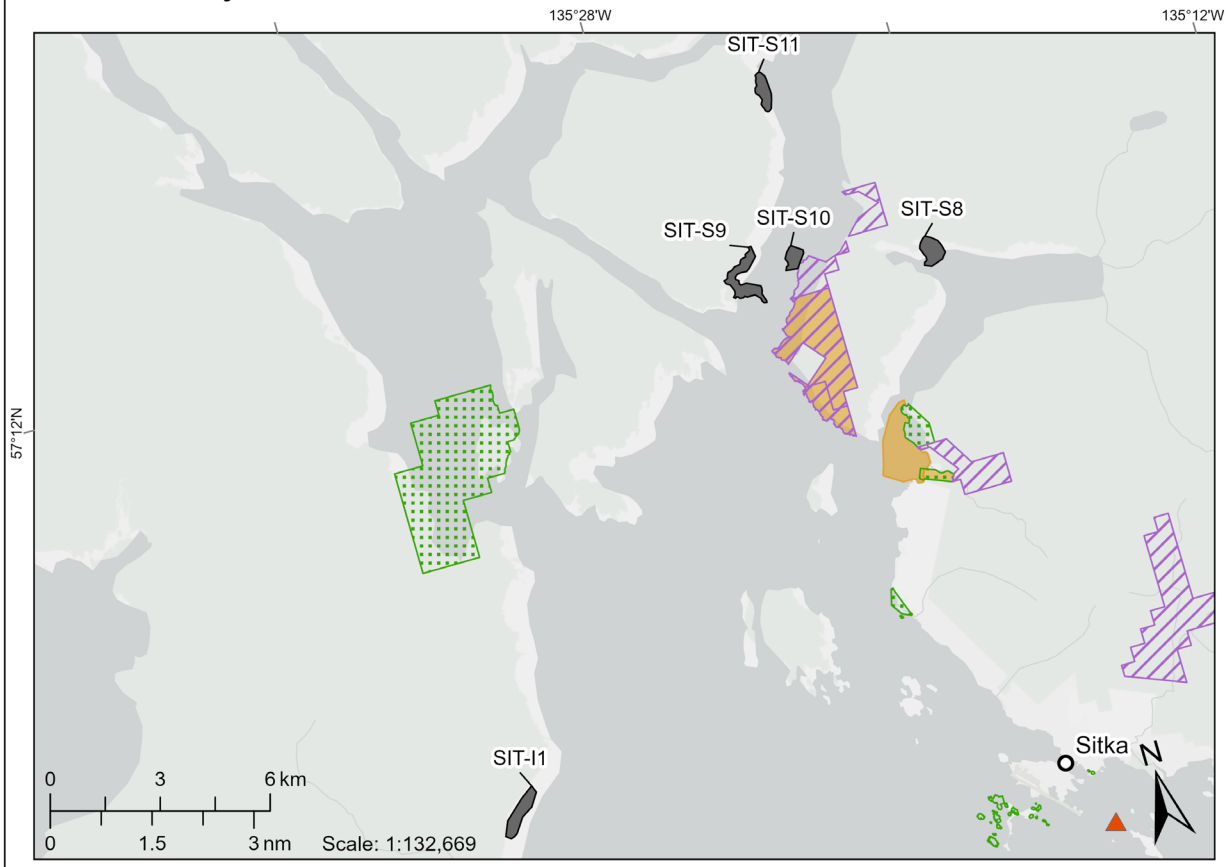
Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Marine Access Facilities: USFS (2023), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), Seafood Processing Permitted Carcass Disposal, and Permitted Net Pens: Alaska DEC (2019), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), TNF Mooring Buoys: USFS unpublished data, USFS Cabin Rentals: USFS (2017), Wastewater Outfall Pipes: NOAA OCM (2022), Wrecks and Obstructions: NOAA OCM (2023)

Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Sitka Study Area - North





Sitka AOA Options Cultural Resources Characterization

- Coastal Populated Places
- AOA Options
- Historic Lighthouses*
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- State Parks Boundary**

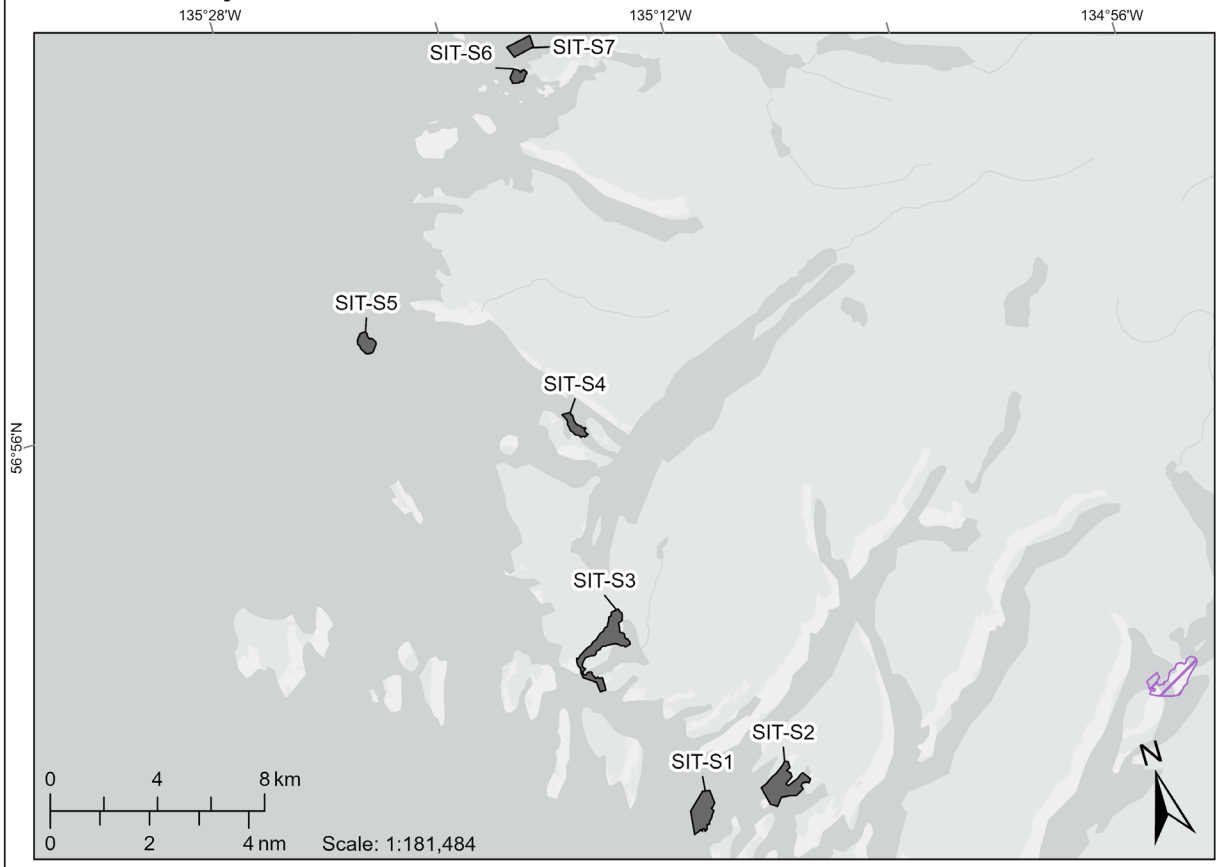
Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
Historic Lighthouses: NOAA OCM (2018)
State Parks Boundary: Alaska DNR (2019)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Sitka Study Area - South



Alaska Area Plans: Alaska DNR (2020)



Sitka AOA Options Cultural Resources Characterization

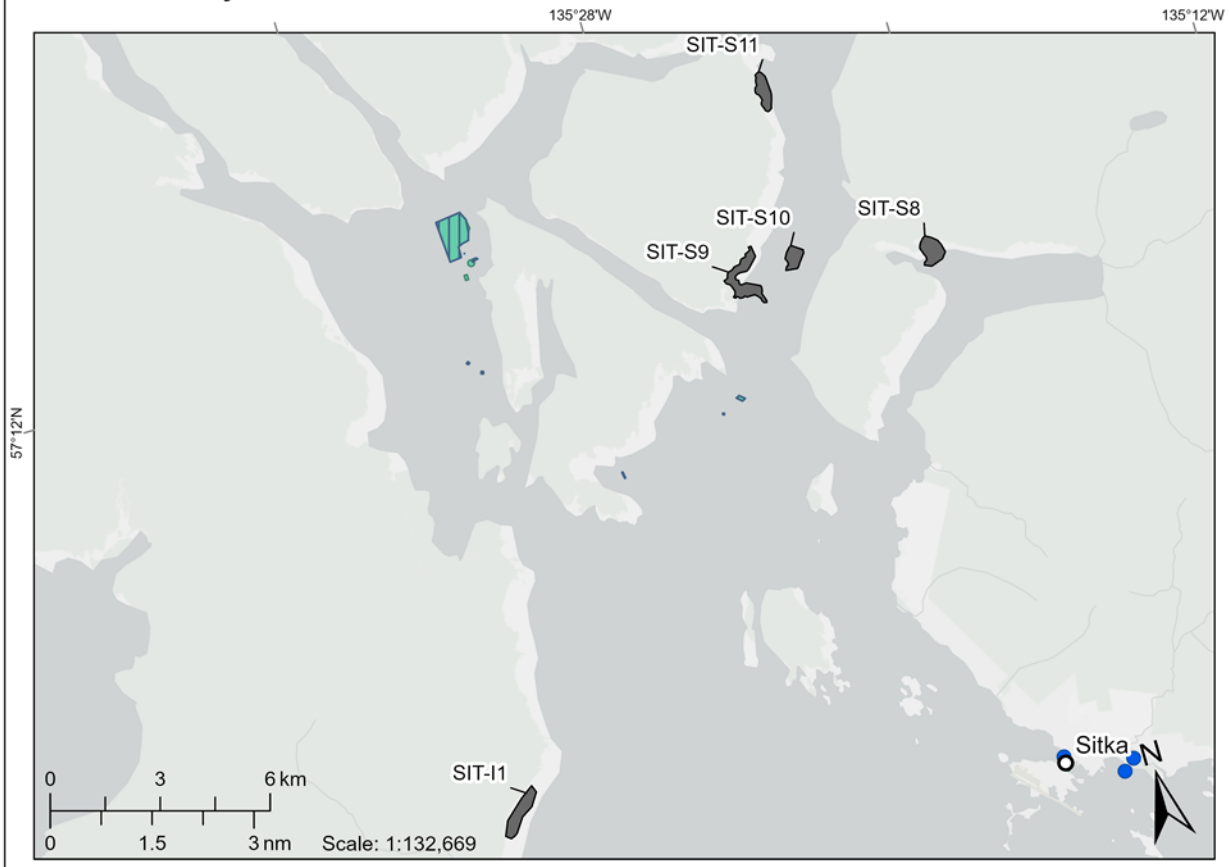
AOA Options

Alaska Area Plans - Community Harvest

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Sitka Study Area - North



Active Aquatic Farming Operation Areas: ADFG (2019)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)



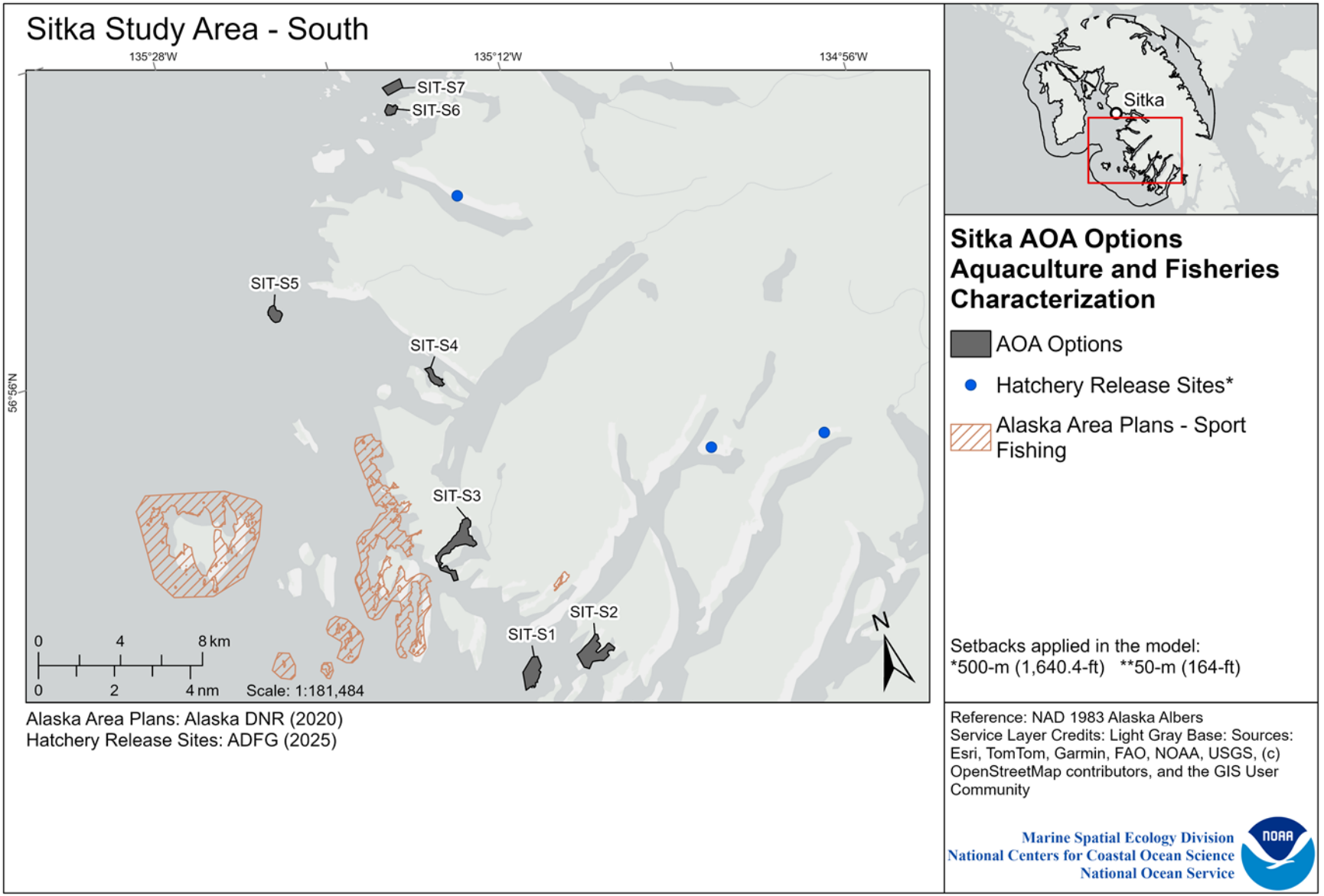
Sitka AOA Options Aquaculture and Fisheries Characterization

- Coastal Populated Places
- Hatchery Release Sites*
- Active Aquatic Farming Operation Areas
- Aquatic Farm Permit Leases**

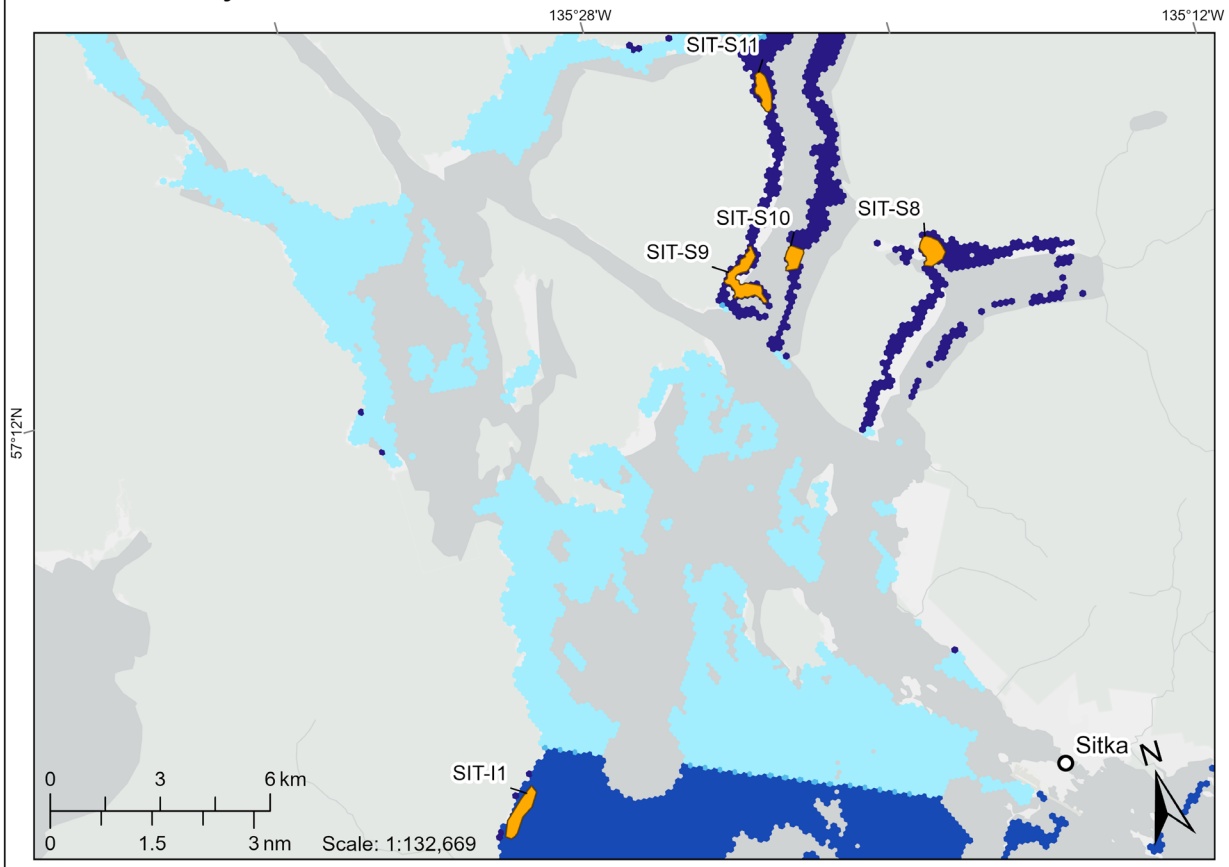
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service


Sitka Study Area - South
135°28'W
135°12'W
134°56'W
56°56'N
SIT-S7
SIT-S6
SIT-S5
SIT-S4
SIT-S3
SIT-S2
SIT-S1
0
4
8 km
0
2
4 nm
Scale: 1:181,484
N
Sitka
Sitka AOA Options Aquaculture and Fisheries Characterization
AOA Options
Hatchery Release Sites*
Alaska Area Plans - Sport Fishing
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Alaska Area Plans: Alaska DNR (2020)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Sitka Study Area - North



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)



Sitka AOA Options Aquaculture and Fisheries Characterization

- Coastal Populated Places
- AOA Options

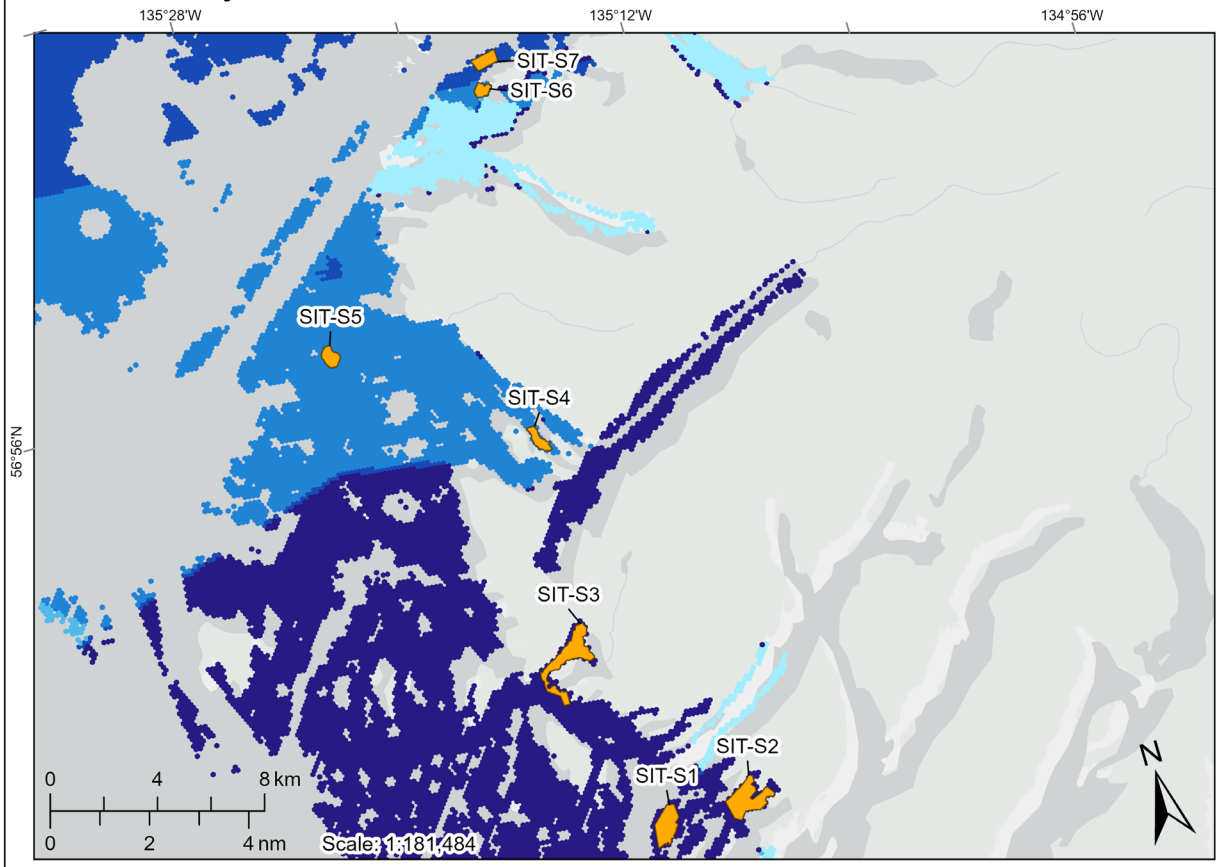
Fisheries Landings Relative Suitability

- Low
- Moderaately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Centers for Coastal Ocean Science
National Ocean Service

Sitka Study Area - South





Sitka AOA Options Aquaculture and Fisheries Characterization

AOA Options

Fisheries Landings Relative Suitability

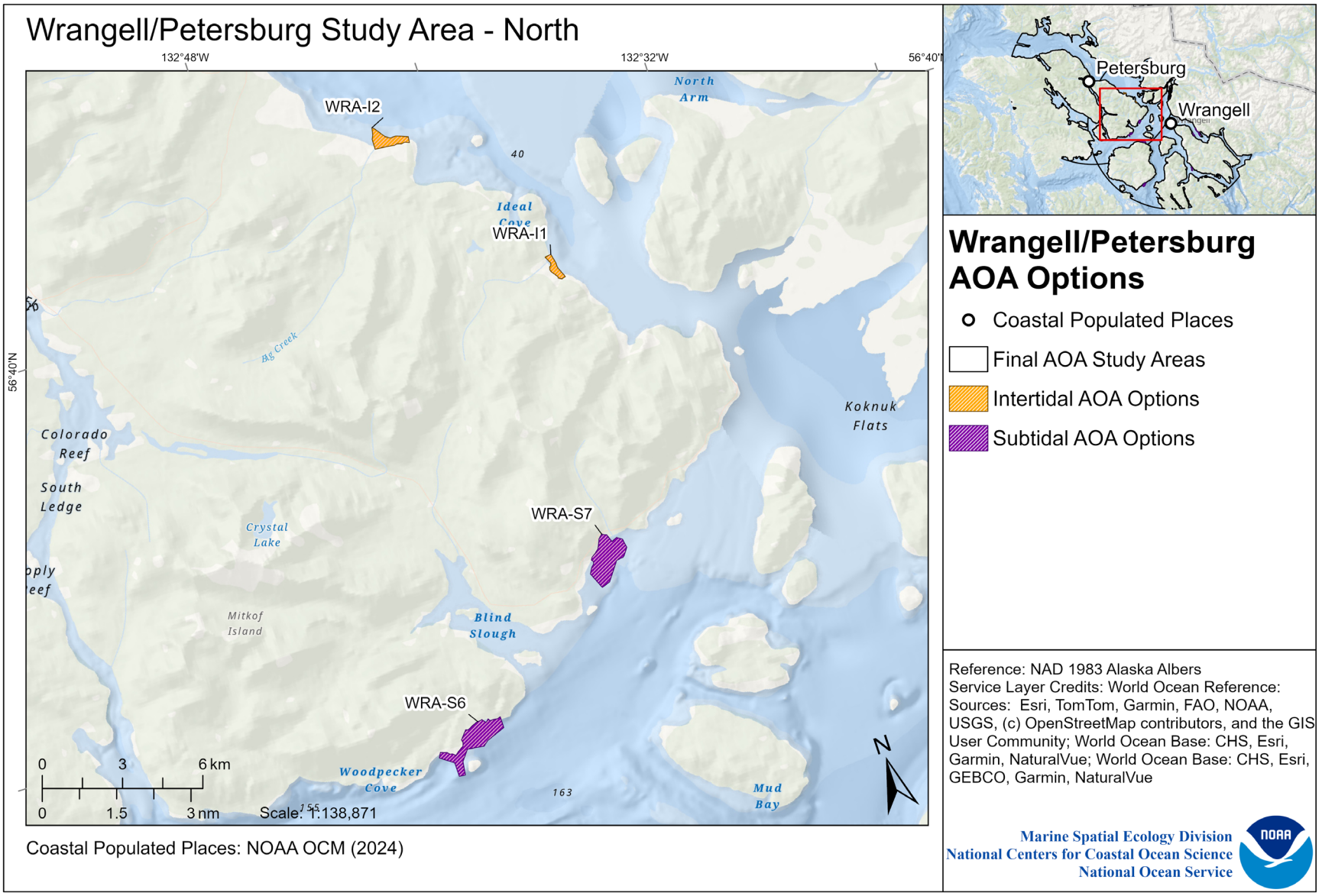
- Low
- Moderaately Low
- Moderate
- Moderately High
- High

Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

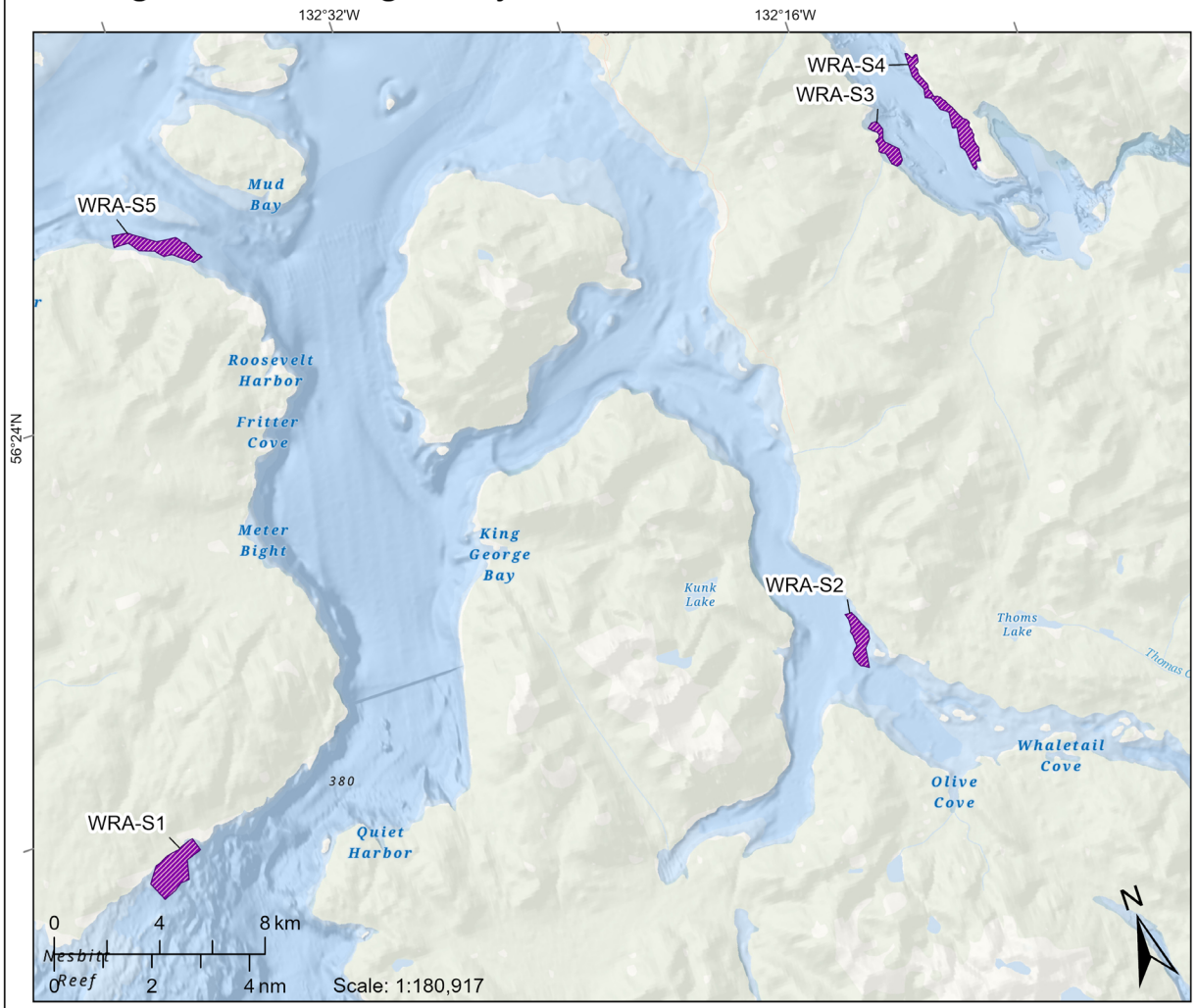
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Wrangell/Petersburg AOA Options Maps

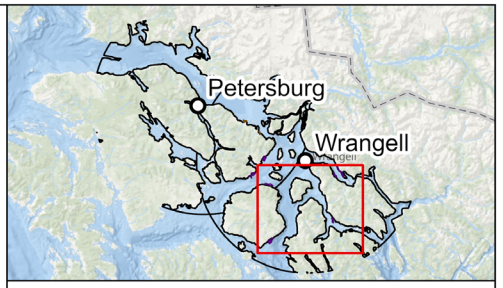


Coastal Populated Places: NOAA OCM (2024)

Wrangell/Petersburg Study Area - South



Coastal Populated Places: NOAA OCM (2024)

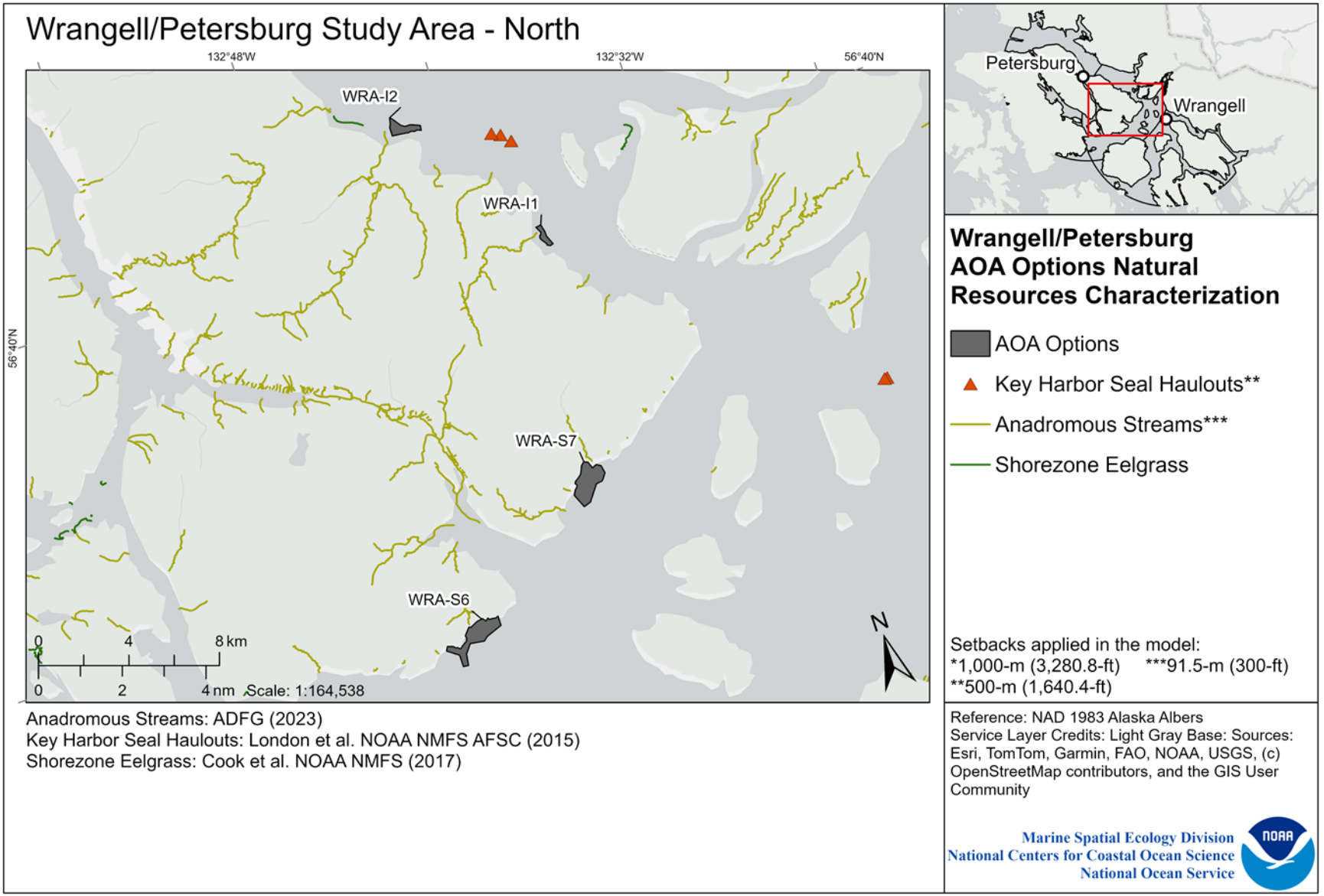


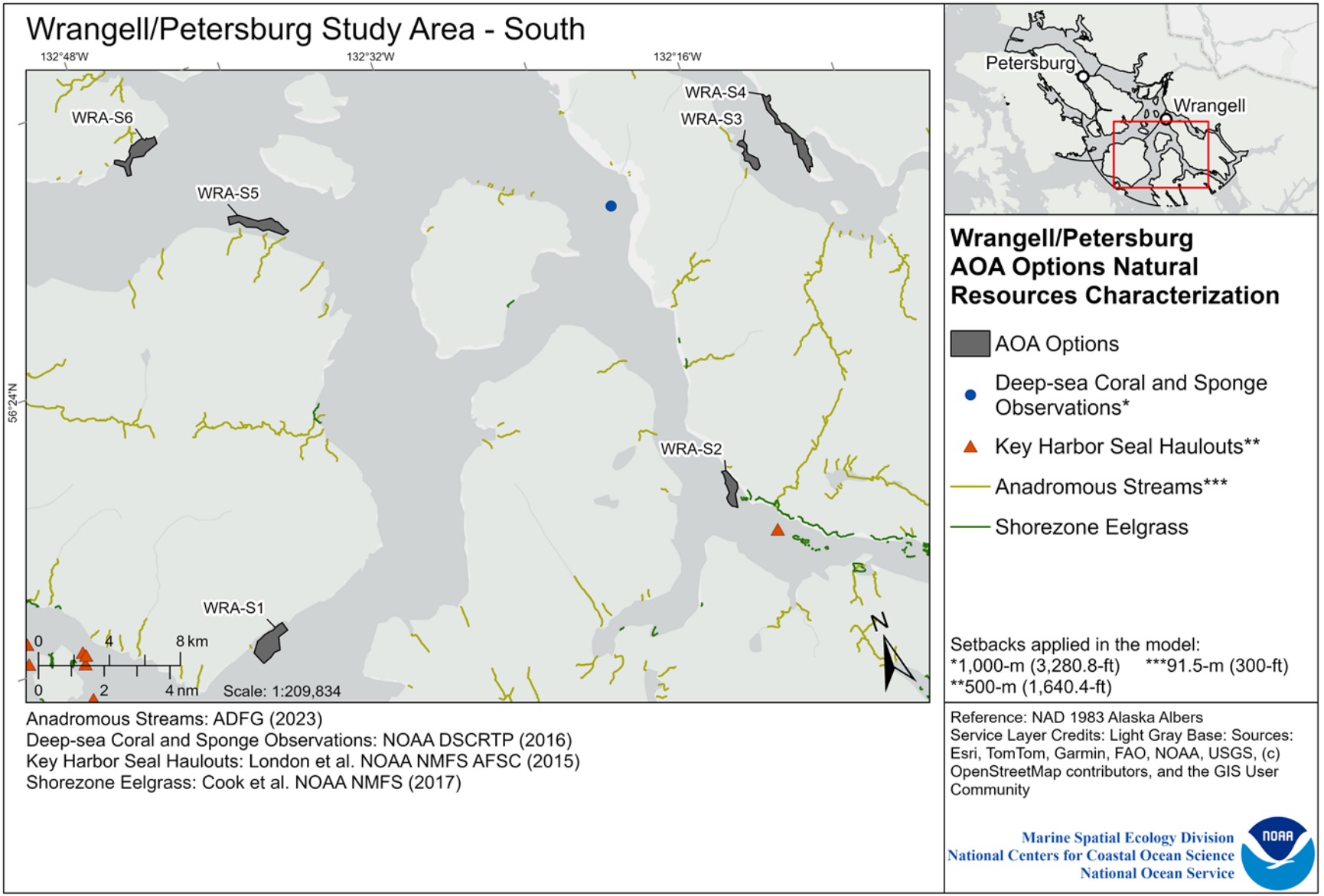
Wrangell/Petersburg AOA Options

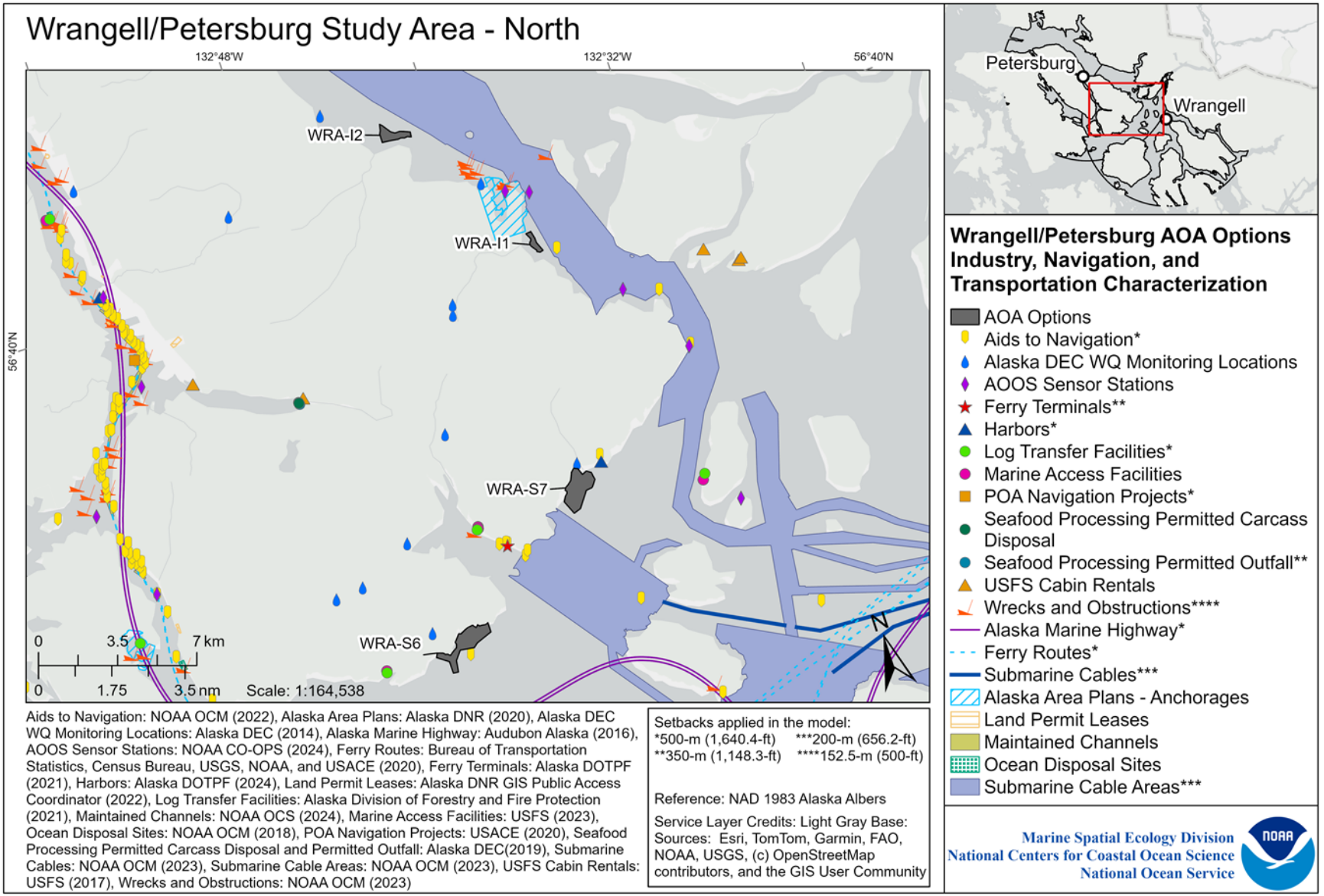
- Coastal Populated Places
- Final AOA Study Areas
- Intertidal AOA Options
- Subtidal AOA Options

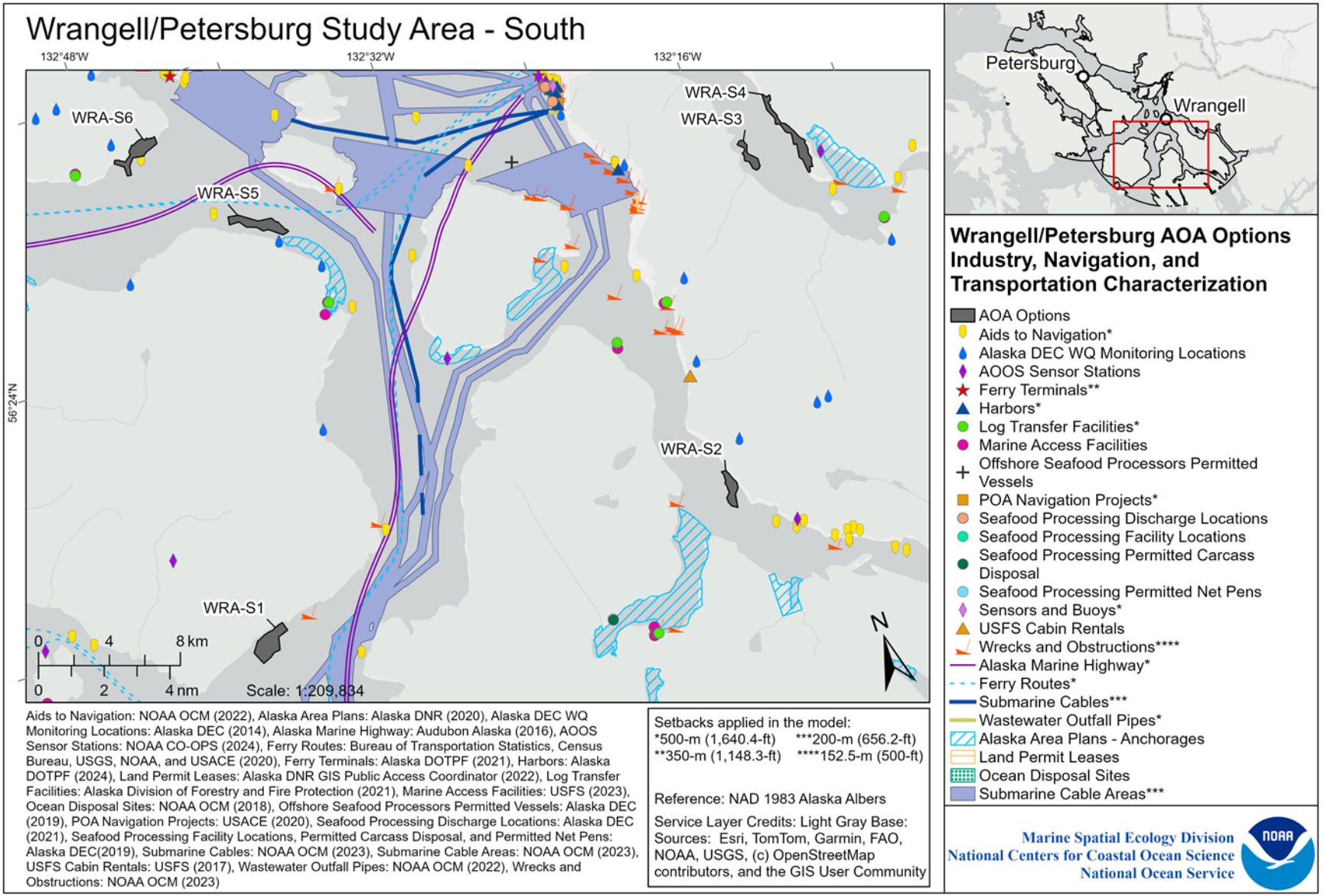
Reference: NAD 1983 Alaska Albers
Service Layer Credits: World Ocean Reference: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community; World Ocean Base: CHS, Esri, Garmin, NaturalVue; World Ocean Base: Esri, GEBCO, Garmin, NaturalVue

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National Centers for Coastal Ocean Science
National Ocean Service

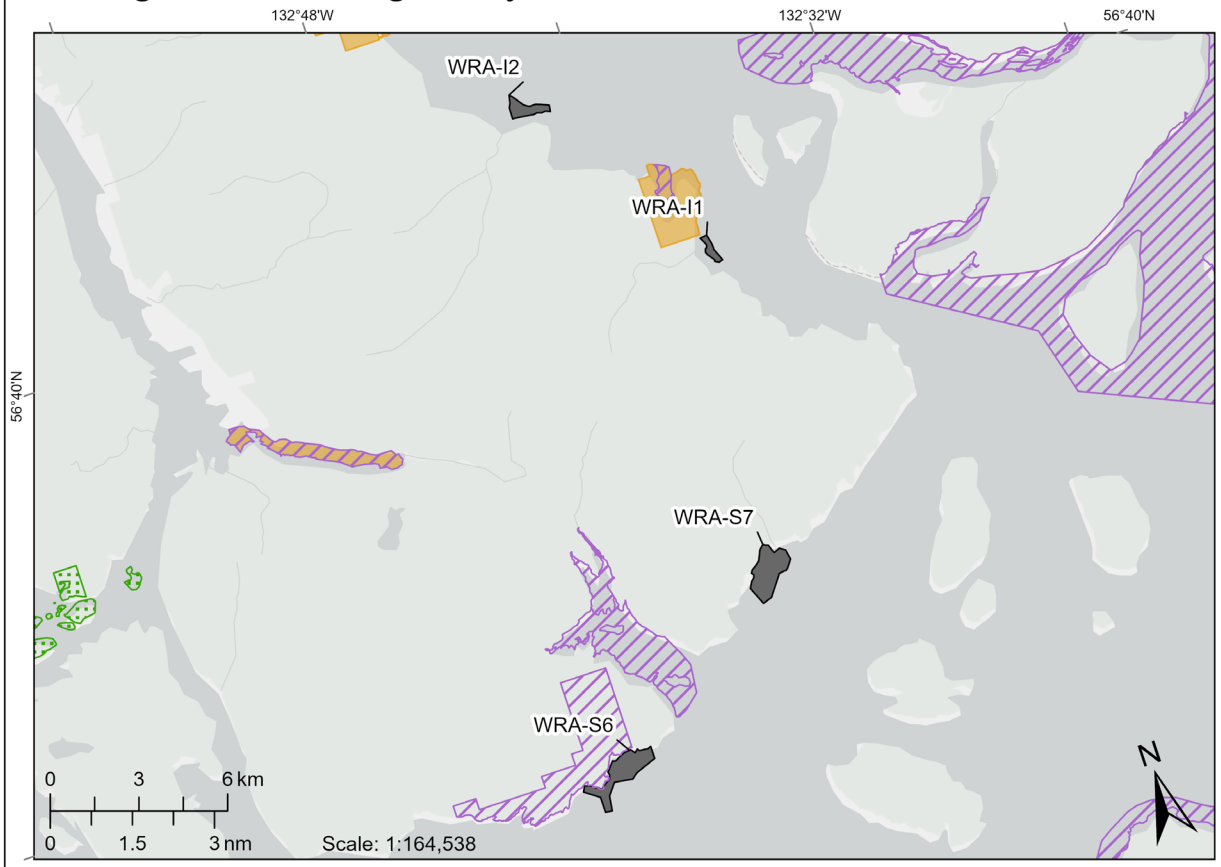

Wrangell/Petersburg Study Area - North
132°48'W
132°32'W
56°40'N
56°40'N
WRA-I2
WRA-I1
WRA-S7
WRA-S6
0
4
8 km
0
2
4 nm
Scale: 1:164,538
N
Petersburg
Wrangell
Wrangell/Petersburg
AOA Options Natural
Resources Characterization
AOA Options
Key Harbor Seal Haulouts**
Anadromous Streams***
Shorezone Eelgrass
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
Anadromous Streams: ADFG (2023)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Wrangell/Petersburg Study Area - South
132°48'W
132°32'W
132°16'W
56°24'N
WRA-S6
WRA-S5
WRA-S4
WRA-S3
WRA-S2
WRA-S1
0
4
8 km
0
2
4 nm
Scale: 1:209,834
Petersburg
Wrangell
Wrangell/Petersburg
AOA Options Natural
Resources Characterization
AOA Options
Deep-sea Coral and Sponge Observations*
Key Harbor Seal Haulouts**
Anadromous Streams***
Shorezone Eelgrass
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
Anadromous Streams: ADFG (2023)
Deep-sea Coral and Sponge Observations: NOAA DSCRTP (2016)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

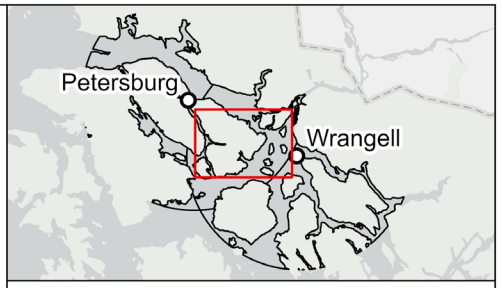

Wrangell/Petersburg Study Area - North
132°48'W
132°32'W
56°40'N
56°40'N
WRA-I2
WRA-I1
WRA-S7
WRA-S6
0
3.5
7 km
0
1.75
3.5 nm
Scale: 1:164,538
N
Petersburg
Wrangell
Wrangell/Petersburg AOA Options
Industry, Navigation, and
Transportation Characterization
AOA Options
Aids to Navigation*
Alaska DEC WQ Monitoring Locations
AOOS Sensor Stations
Ferry Terminals**
Harbors*
Log Transfer Facilities*
Marine Access Facilities
POA Navigation Projects*
Seafood Processing Permitted Carcass Disposal
Seafood Processing Permitted Outfall**
USFS Cabin Rentals
Wrecks and Obstructions****
Alaska Marine Highway*
Ferry Routes*
Submarine Cables***
Alaska Area Plans - Anchorages
Land Permit Leases
Maintained Channels
Ocean Disposal Sites
Submarine Cable Areas***
Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021), Maintained Channels: NOAA OCS (2024), Marine Access Facilities: USFS (2023), Ocean Disposal Sites: NOAA OCM (2018), POA Navigation Projects: USACE (2020), Seafood Processing Permitted Carcass Disposal and Permitted Outfall: Alaska DEC(2019), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), USFS Cabin Rentals: USFS (2017), Wrecks and Obstructions: NOAA OCM (2023)
Setbacks applied in the model:
*500-m (1,640.4-ft)
***200-m (656.2-ft)
**350-m (1,148.3-ft)
****152.5-m (500-ft)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Wrangell/Petersburg Study Area - South
132°48'W
132°32'W
132°16'W
56°24'N
WRA-S6
WRA-S5
WRA-S4
WRA-S3
WRA-S2
WRA-S1
0 4 8 km
0 2 4 nm
Scale: 1:209,834
N
Petersburg
Wrangell
Wrangell/Petersburg AOA Options
Industry, Navigation, and
Transportation Characterization
AOA Options
Aids to Navigation*
Alaska DEC WQ Monitoring Locations
AOOS Sensor Stations
Ferry Terminals**
Harbors*
Log Transfer Facilities*
Marine Access Facilities
Offshore Seafood Processors Permitted Vessels
POA Navigation Projects*
Seafood Processing Discharge Locations
Seafood Processing Facility Locations
Seafood Processing Permitted Carcass Disposal
Seafood Processing Permitted Net Pens
Sensors and Buoys*
USFS Cabin Rentals
Wrecks and Obstructions****
Alaska Marine Highway*
Ferry Routes*
Submarine Cables***
Wastewater Outfall Pipes*
Alaska Area Plans - Anchorages
Land Permit Leases
Ocean Disposal Sites
Submarine Cable Areas***
Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), AOOS Sensor Stations: NOAA CO-OPS (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021), Marine Access Facilities: USFS (2023), Ocean Disposal Sites: NOAA OCM (2018), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Carcass Disposal, and Permitted Net Pens: Alaska DEC(2019), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), USFS Cabin Rentals: USFS (2017), Wastewater Outfall Pipes: NOAA OCM (2022), Wrecks and Obstructions: NOAA OCM (2023)
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Ocean Service
NOAA

Wrangell/Petersburg Study Area - North



Alaska Area Plans: Alaska DNR (2020)
State Parks Boundary: Alaska DNR (2019)



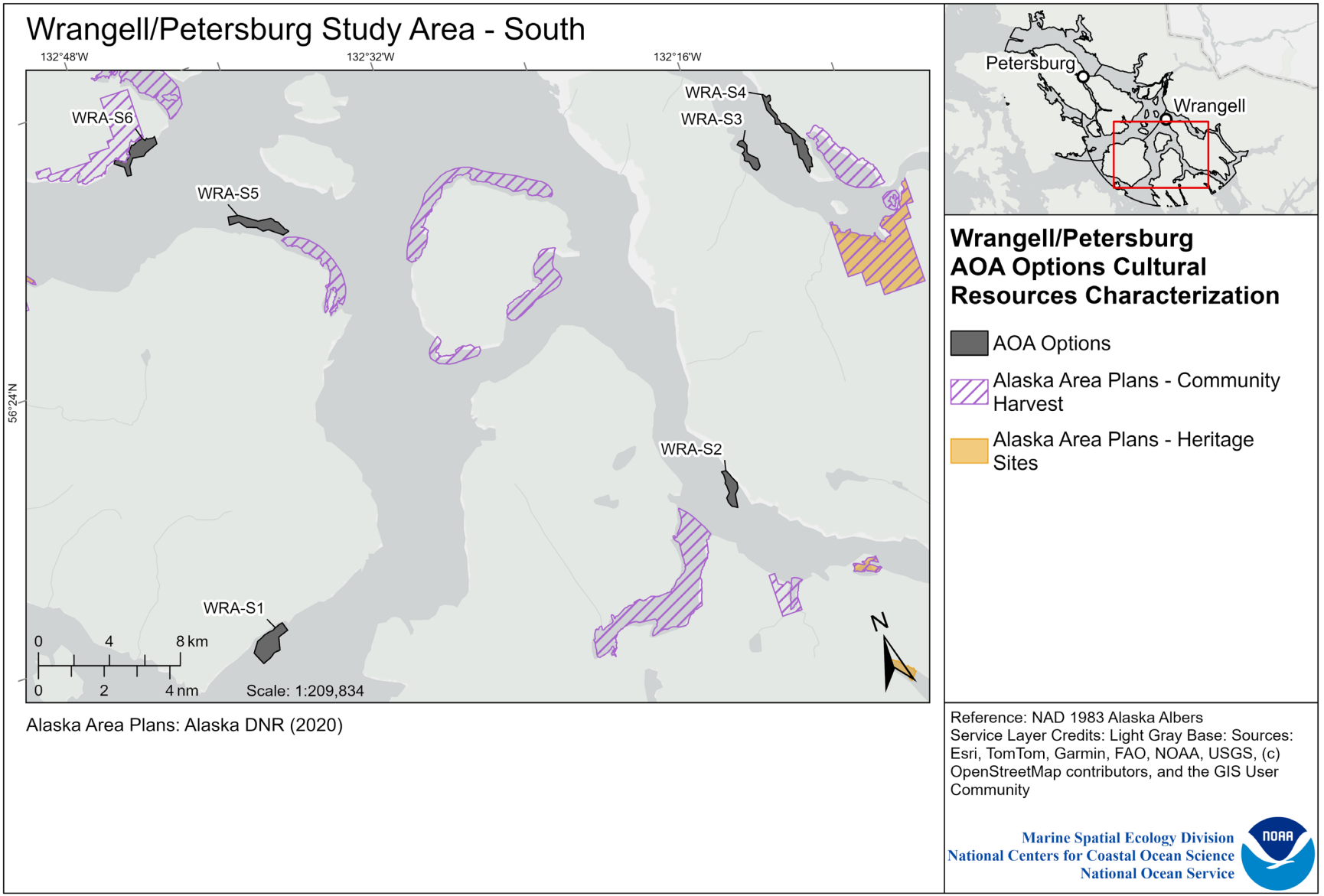
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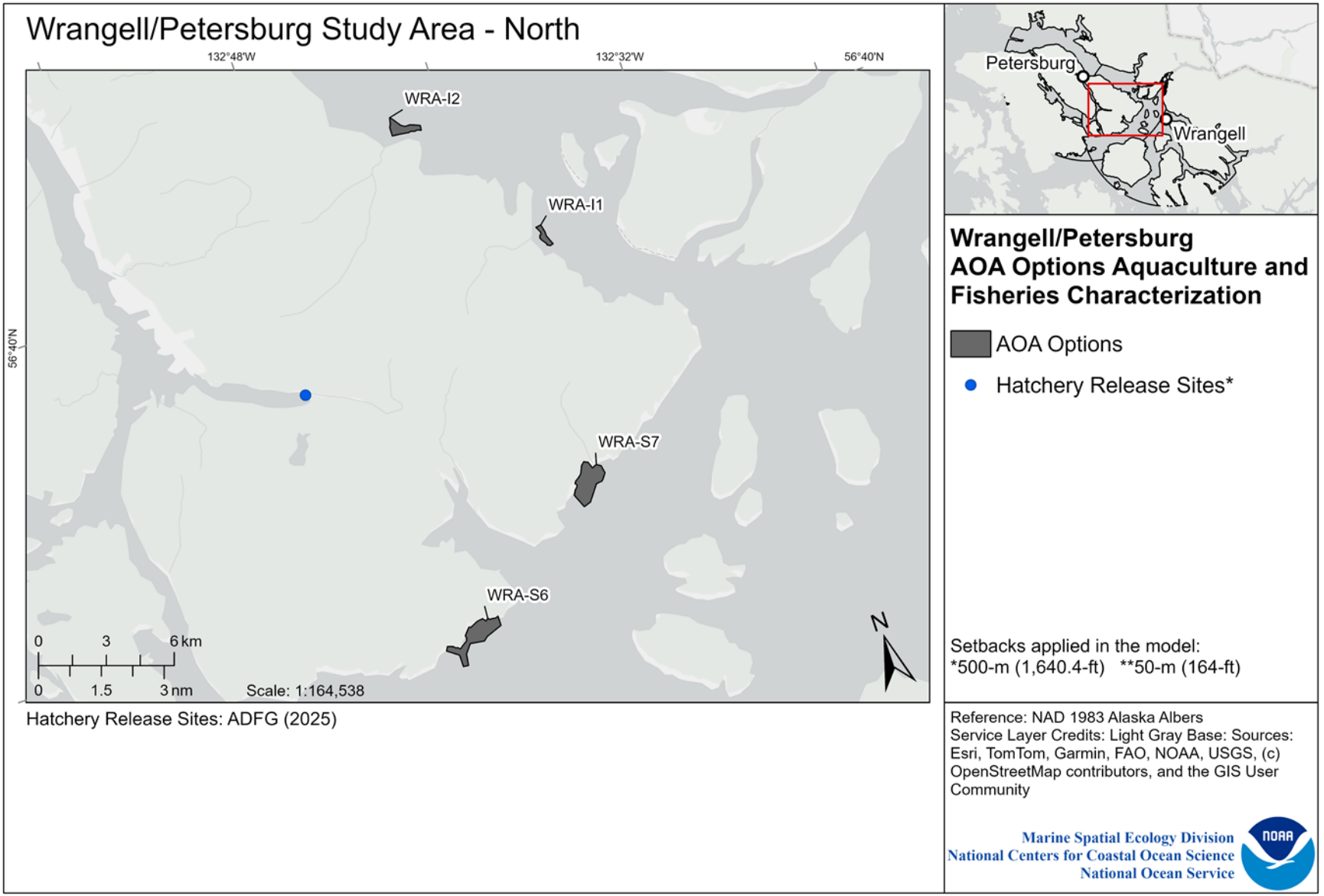
- AOA Options
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites
- State Parks Boundary**

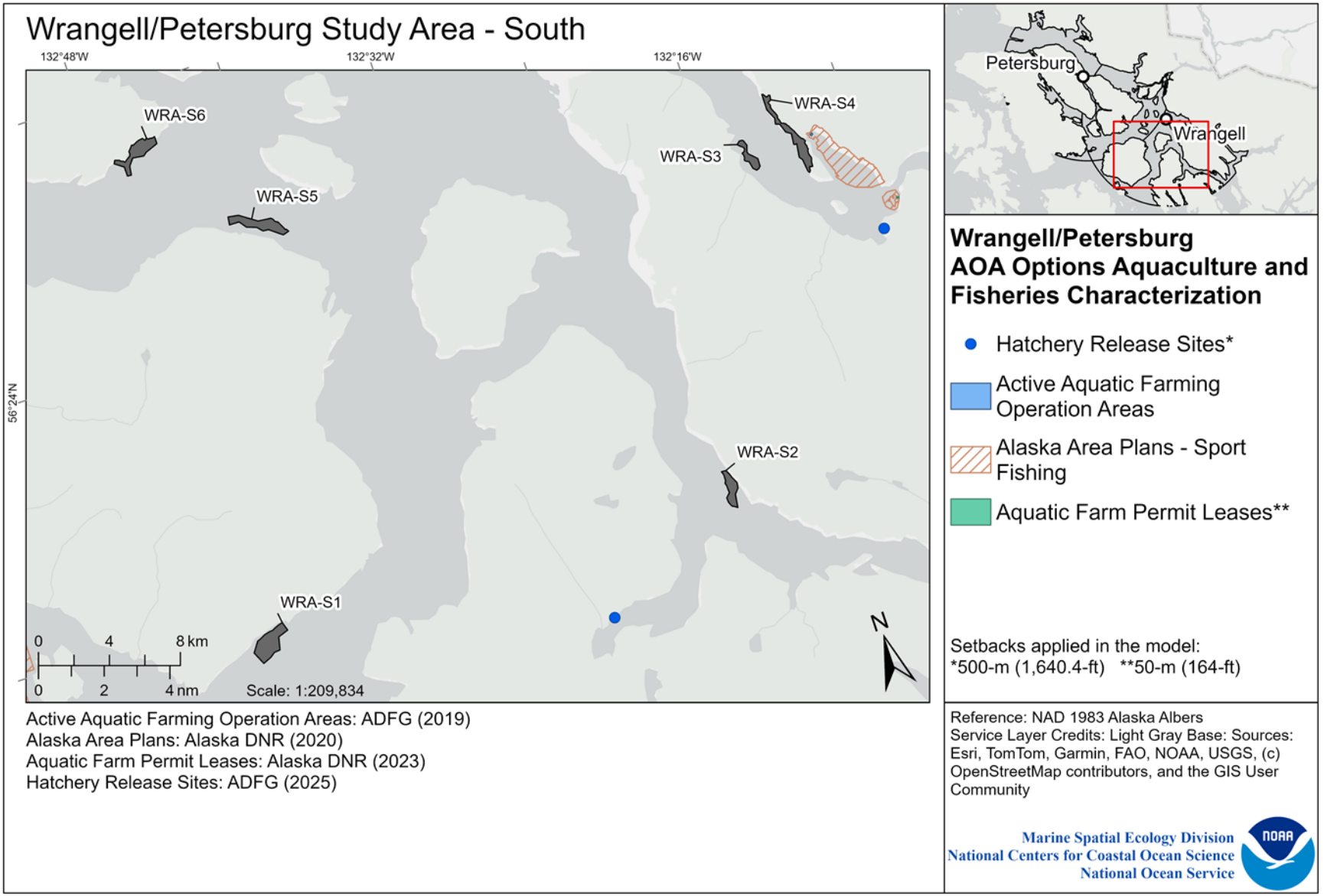
Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

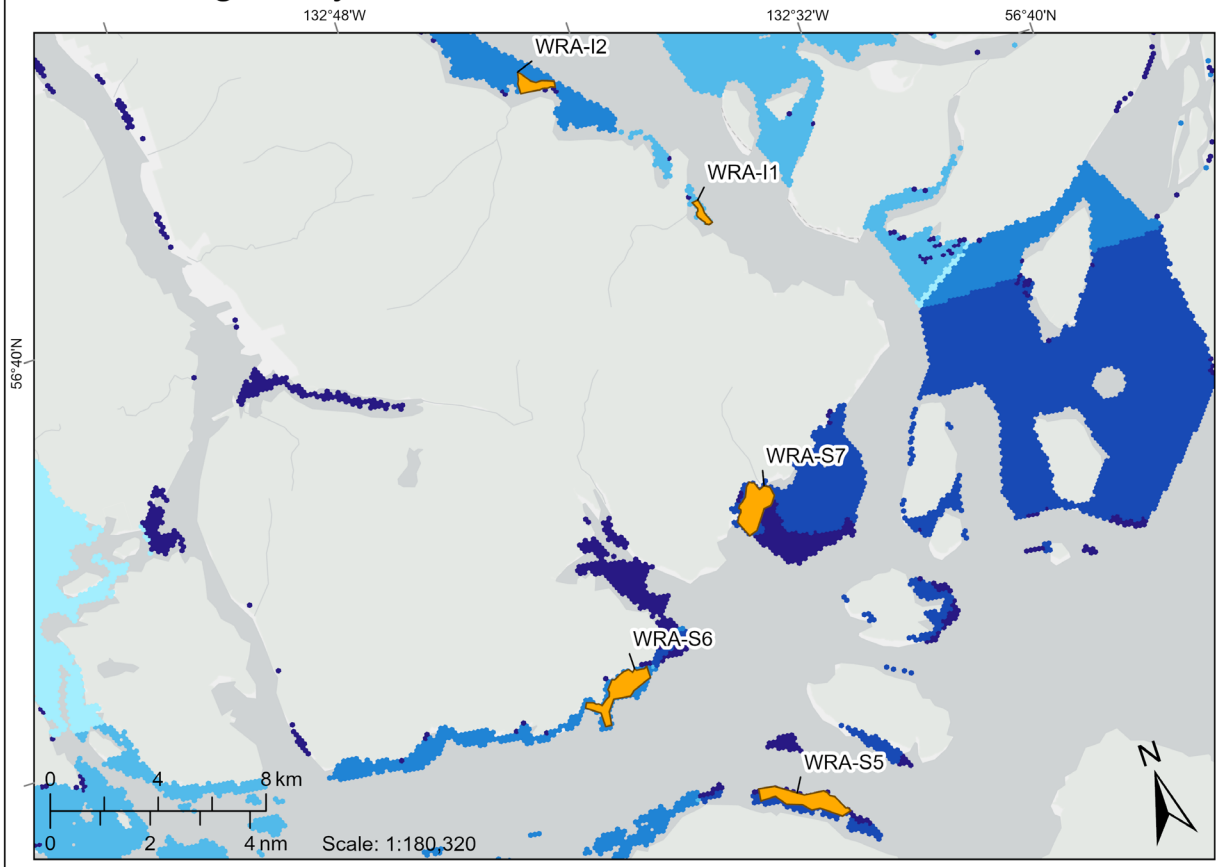
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Wrangell/Petersburg Study Area - South
132°48'W
132°32'W
132°16'W
56°24'N
WRA-S6
WRA-S5
WRA-S4
WRA-S3
WRA-S2
WRA-S1
0
4
8 km
0
2
4 nm
Scale: 1:209,834
N
Petersburg
Wrangell
Wrangell/Petersburg
AOA Options Cultural
Resources Characterization
AOA Options
Alaska Area Plans - Community Harvest
Alaska Area Plans - Heritage Sites
Alaska Area Plans: Alaska DNR (2020)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Wrangell/Petersburg Study Area - North
132°48'W
132°32'W
56°40'N
WRA-I2
WRA-I1
WRA-S7
WRA-S6
0 3 6 km
0 1.5 3 nm
Scale: 1:164,538
N
Petersburg
Wrangell
Wrangell/Petersburg
AOA Options Aquaculture and
Fisheries Characterization
AOA Options
Hatchery Release Sites*
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Wrangell/Petersburg Study Area - South
132°48'W
132°32'W
132°16'W
56°24'N
WRA-S6
WRA-S5
WRA-S4
WRA-S3
WRA-S2
WRA-S1
0 4 8 km
0 2 4 nm
Scale: 1:209,834
N
Petersburg
Wrangell
Wrangell/Petersburg
AOA Options Aquaculture and
Fisheries Characterization
Hatchery Release Sites*
Active Aquatic Farming
Operation Areas
Alaska Area Plans - Sport
Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
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National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Petersburg Study Area



Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)



Wrangell/Petersburg AOA Options Aquaculture and Fisheries Characterization

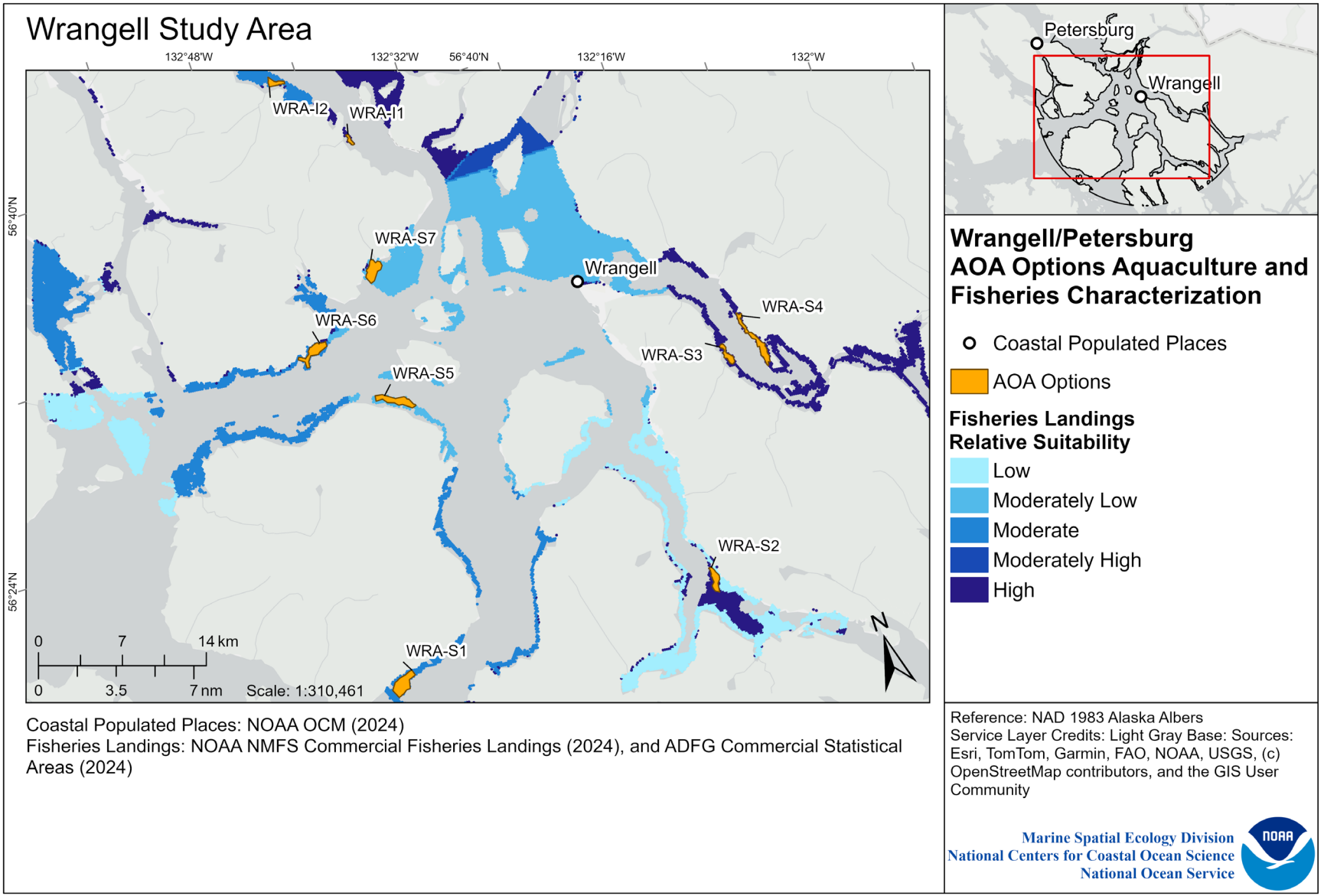
AOA Options

Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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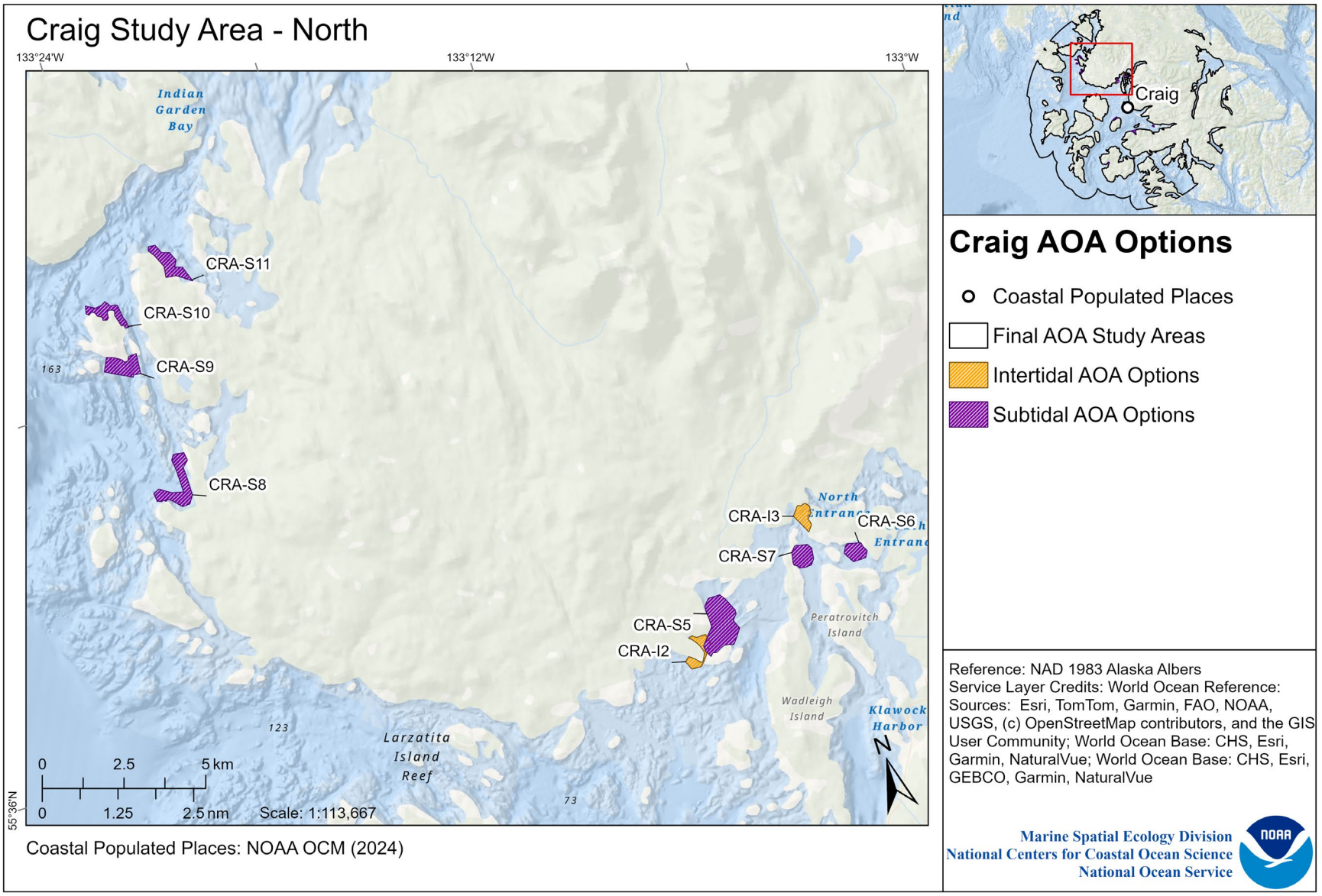


Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

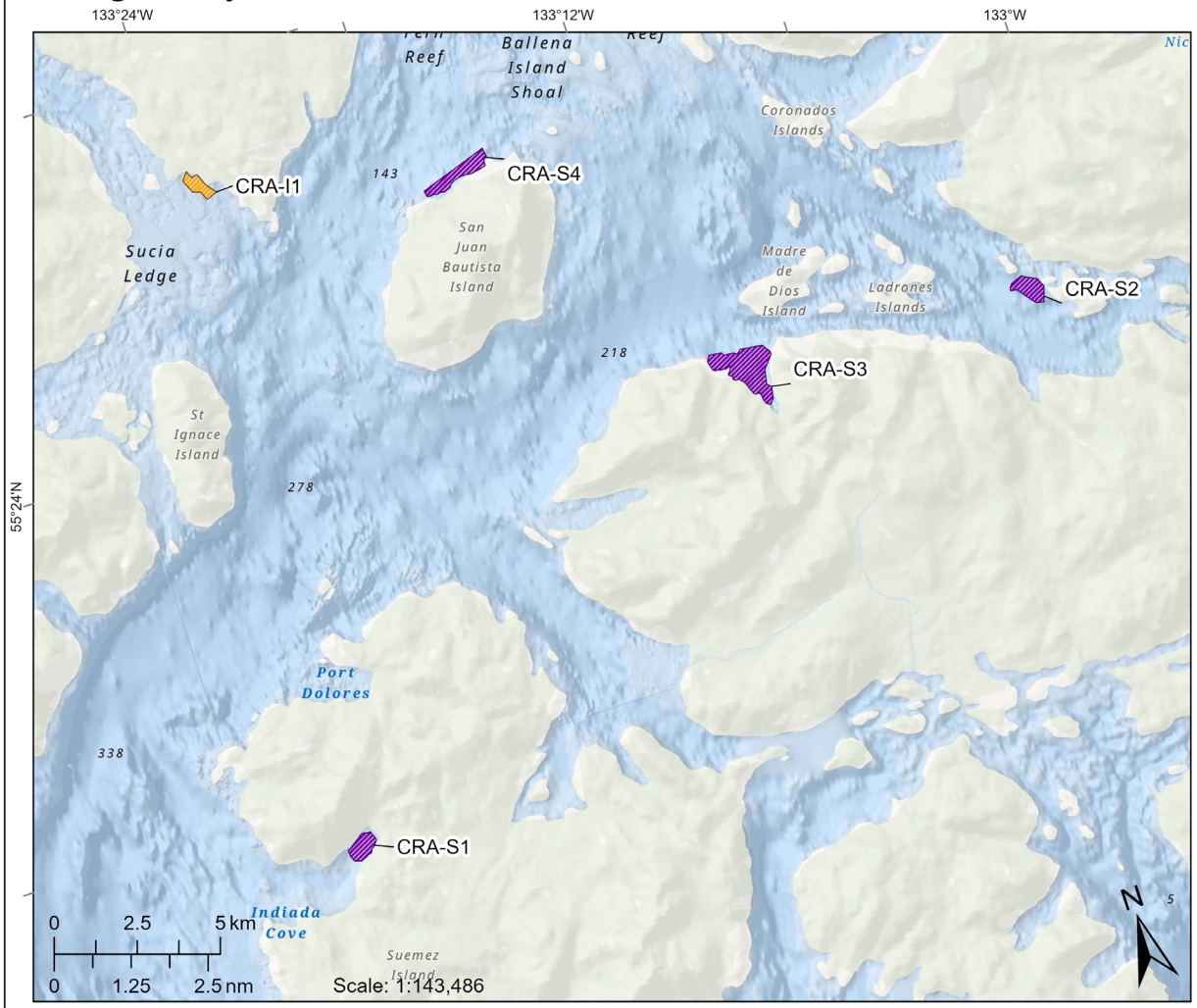
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Craig AOA Options Maps

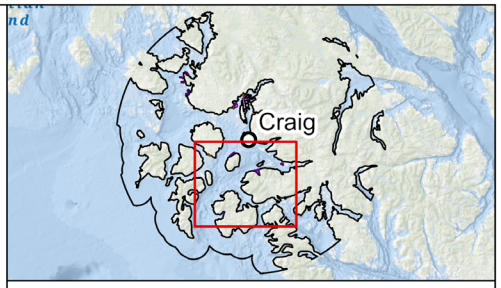


Coastal Populated Places: NOAA OCM (2024)

Craig Study Area - South



Coastal Populated Places: NOAA OCM (2024)

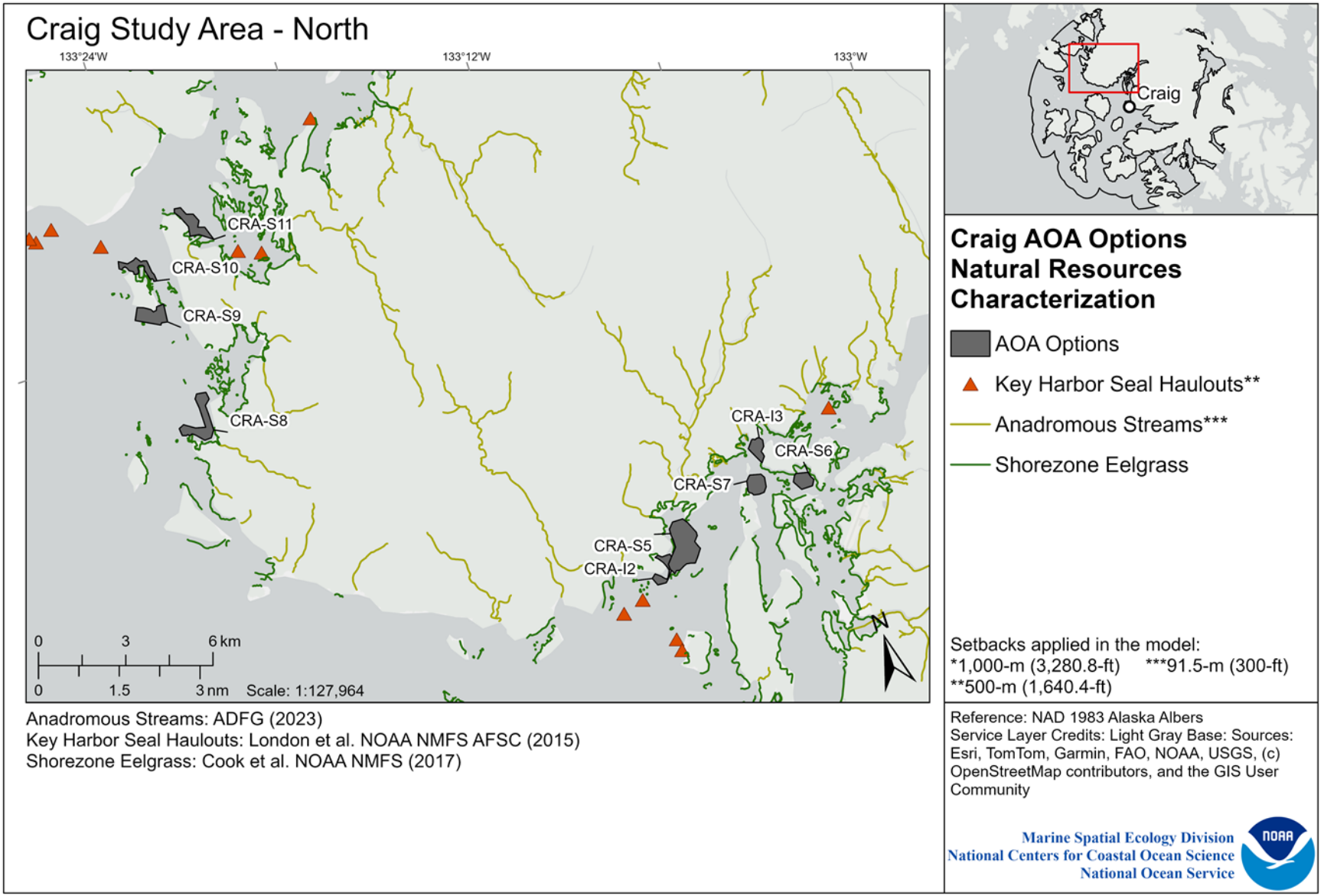


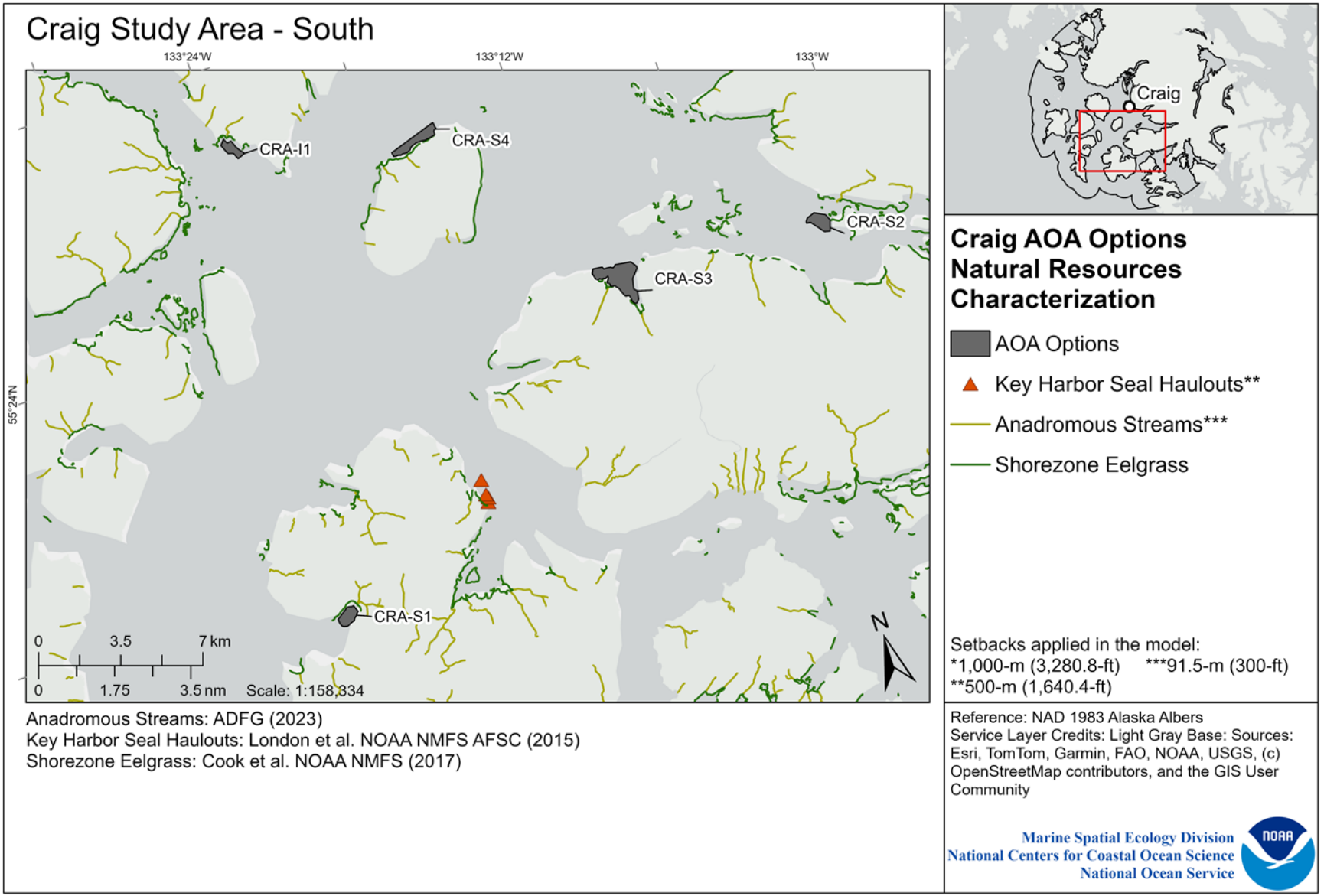
Craig AOA Options

- Coastal Populated Places
- Final AOA Study Areas
- Intertidal AOA Options
- Subtidal AOA Options

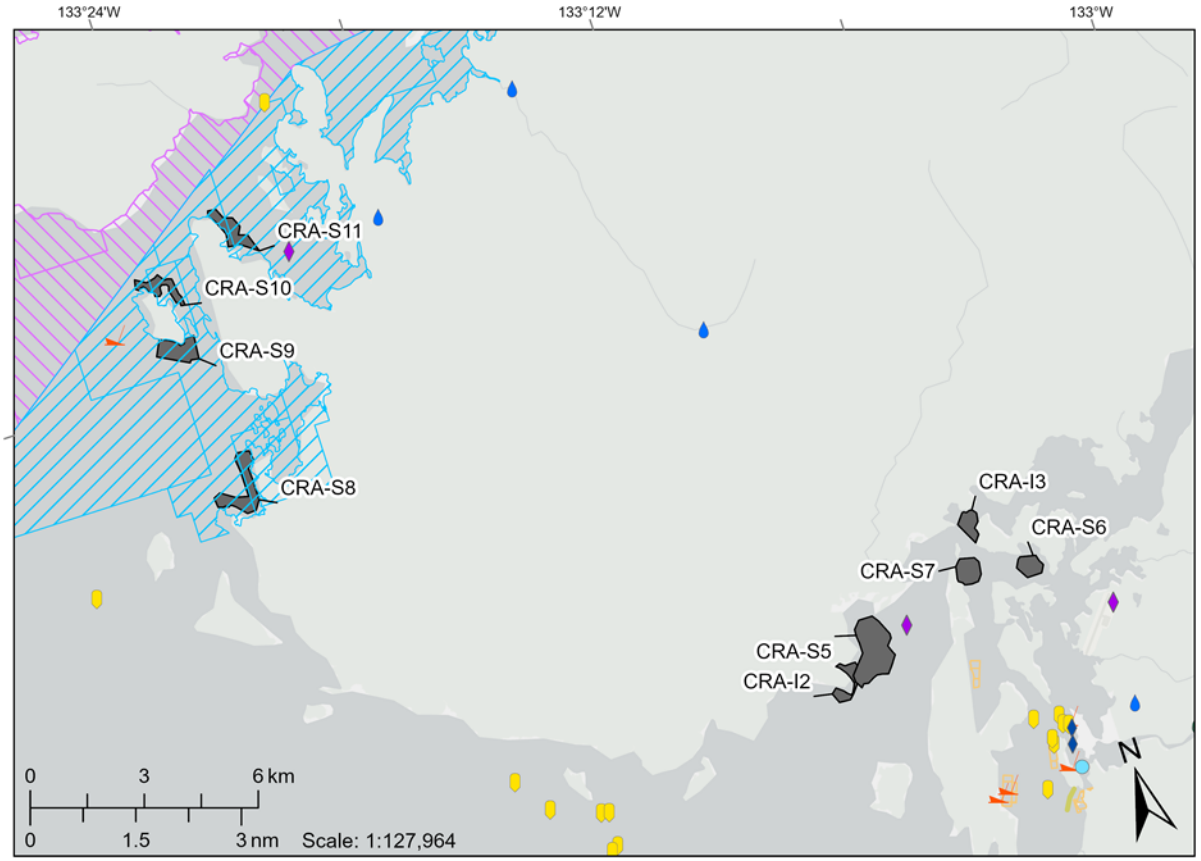
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Service Layer Credits: World Ocean Reference: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community; World Ocean Base: CHS, Esri, Garmin, NaturalVue; World Ocean Base: CHS, Esri, GEBCO, Garmin, NaturalVue

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Craig Study Area - North
133°24'W
133°12'W
133°W
CRA-S11
CRA-S10
CRA-S9
CRA-S8
CRA-I3
CRA-S6
CRA-S7
CRA-S5
CRA-I2
0
3
6 km
0
1.5
3 nm
Scale: 1:127,964
N
Craig
Craig AOA Options
Natural Resources
Characterization
AOA Options
Key Harbor Seal Haulouts**
Anadromous Streams***
Shorezone Eelgrass
Setbacks applied in the model:
*1,000-m (3,280.8-ft)
***91.5-m (300-ft)
**500-m (1,640.4-ft)
Anadromous Streams: ADFG (2023)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Craig Study Area - South
133°24'W
133°12'W
133°W
55°24'N
CRA-I1
CRA-S4
CRA-S2
CRA-S3
CRA-S1
0
3.5
7 km
0
1.75
3.5 nm
Scale: 1:158,834
N
Craig
Craig AOA Options
Natural Resources
Characterization
AOA Options
Key Harbor Seal Haulouts**
Anadromous Streams***
Shorezone Eelgrass
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
Anadromous Streams: ADFG (2023)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Craig Study Area - North





Craig AOA Options Industry, Navigation, and Transportation Characterization

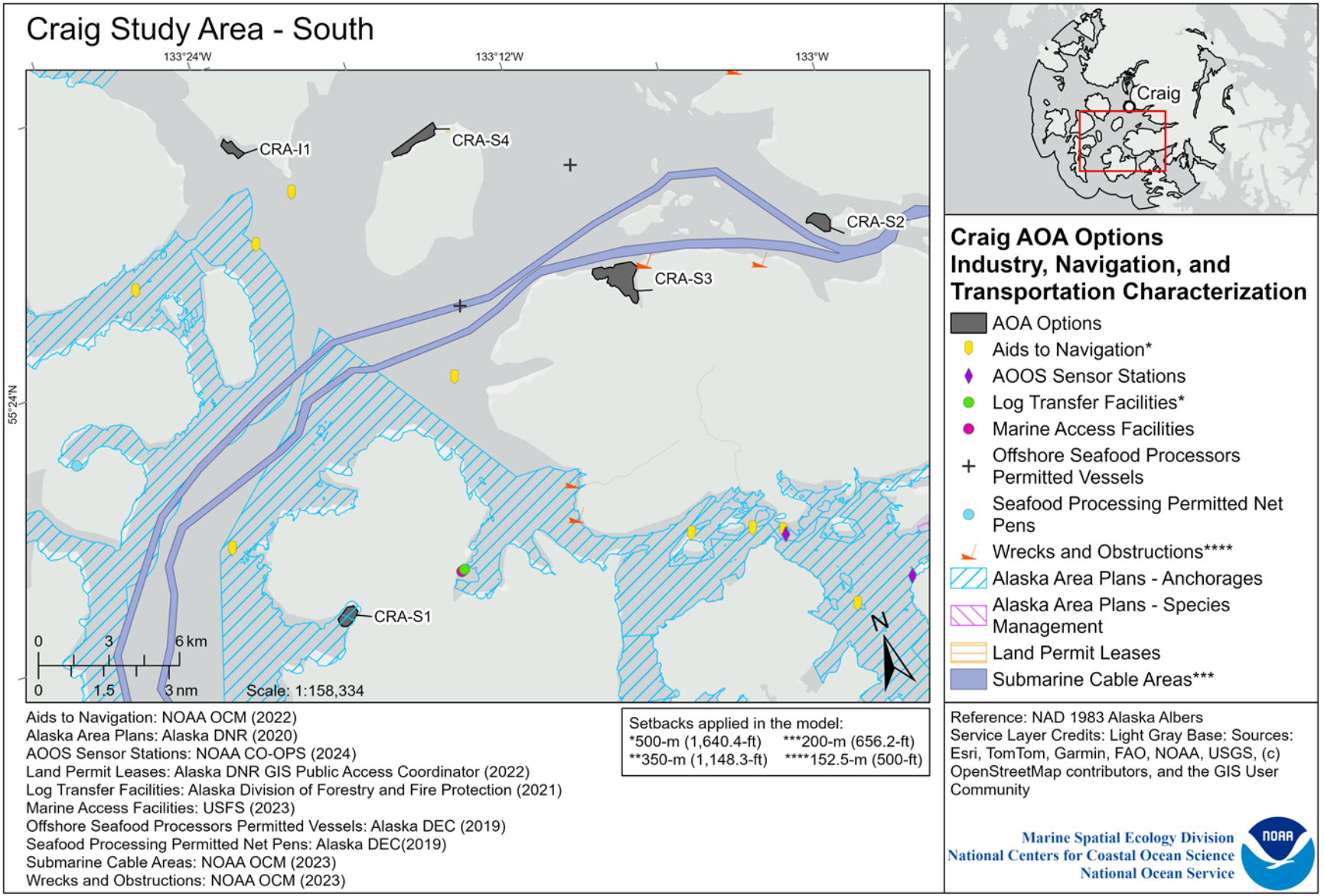
- AOA Options
- Aids to Navigation*
- Alaska DEC WQ Monitoring Locations
- AOOS Sensor Stations
- Harbors*
- Seafood Processing Permitted Carcass Disposal
- Seafood Processing Permitted Net Pens
- Seafood Processing Permitted Outfall**
- Wrecks and Obstructions****
- Wastewater Outfall Pipes*
- Alaska Area Plans - Anchorages
- Alaska Area Plans - Species Management
- Land Permit Leases

Aids to Navigation: NOAA OCM (2022)
Alaska Area Plans: Alaska DNR (2020)
Alaska DEC WQ Monitoring Locations: Alaska DEC (2014)
AOOS Sensor Stations: NOAA CO-OPS (2024)
Harbors: Alaska DOTPF (2024)
Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022)
Seafood Processing Permitted Carcass Disposal, Net Pens, and Outfalls: Alaska DEC (2019)
Wastewater Outfall Pipes: NOAA OCM (2022)
Wrecks and Obstructions: NOAA OCM (2023)

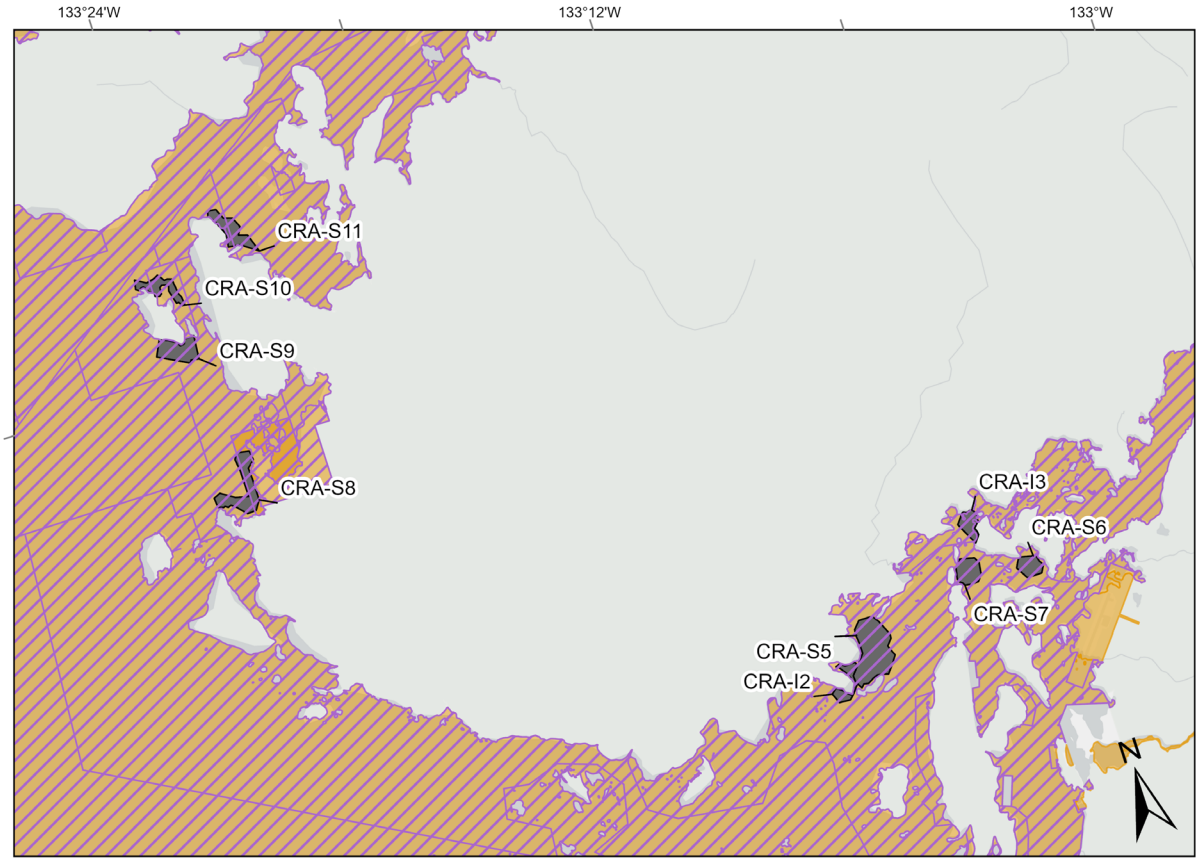
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service


Craig Study Area - South
133°24'W
133°12'W
133°W
55°24'N
CRA-I1
CRA-S4
CRA-S2
CRA-S3
CRA-S1
0
3
6 km
0
1.5
3 nm
Scale: 1:158,334
N
Craig
Craig AOA Options
Industry, Navigation, and
Transportation Characterization
AOA Options
Aids to Navigation*
AOOS Sensor Stations
Log Transfer Facilities*
Marine Access Facilities
Offshore Seafood Processors
Permitted Vessels
Seafood Processing Permitted Net
Pens
Wrecks and Obstructions****
Alaska Area Plans - Anchorages
Alaska Area Plans - Species
Management
Land Permit Leases
Submarine Cable Areas***
Aids to Navigation: NOAA OCM (2022)
Alaska Area Plans: Alaska DNR (2020)
AOOS Sensor Stations: NOAA CO-OPS (2024)
Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022)
Log Transfer Facilities: Alaska Division of Forestry and Fire Protection (2021)
Marine Access Facilities: USFS (2023)
Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019)
Seafood Processing Permitted Net Pens: Alaska DEC(2019)
Submarine Cable Areas: NOAA OCM (2023)
Wrecks and Obstructions: NOAA OCM (2023)
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Craig Study Area - North



0 2.5 5 km

0 1.25 2.5 nm

Scale: 1:127,964

Alaska Area Plans: Alaska DNR (2020)



Craig AOA Options Cultural Resources Characterization

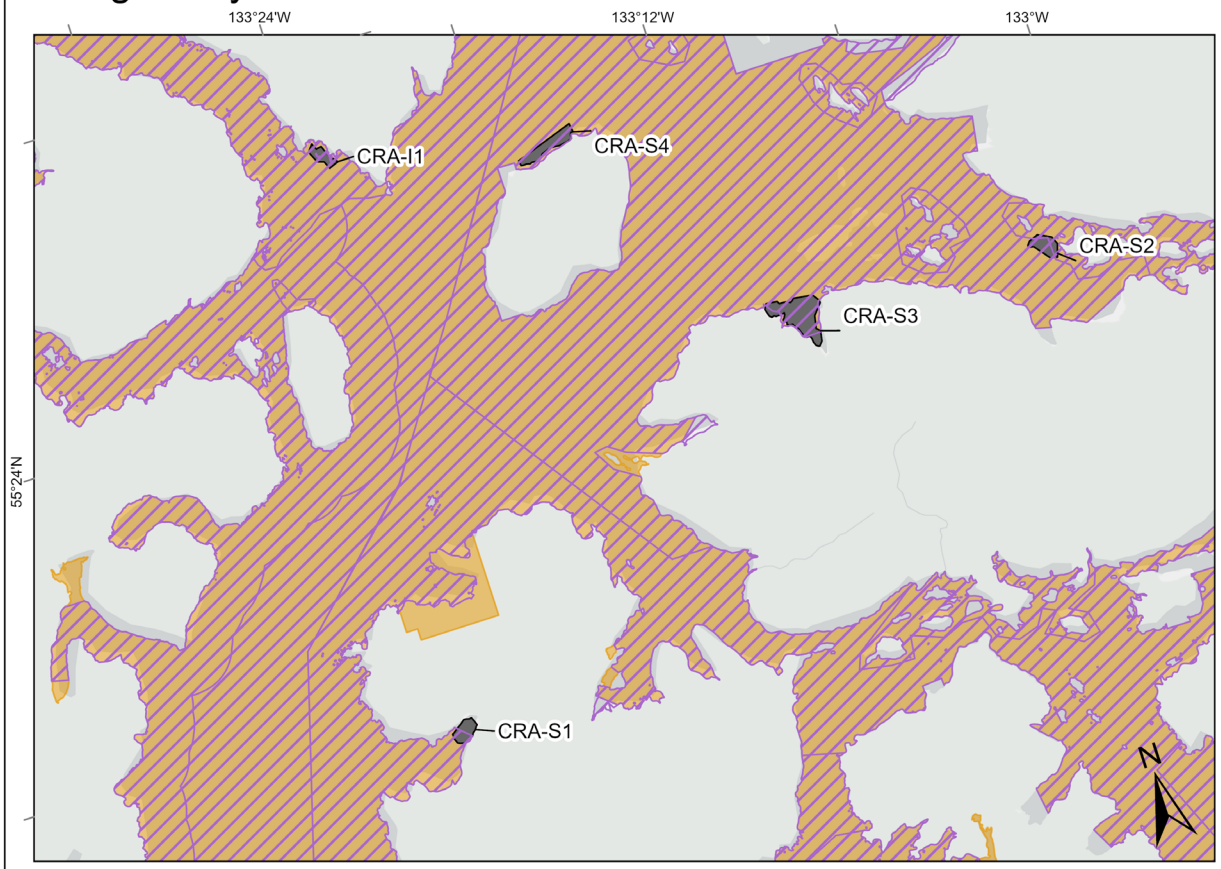
- AOA Options
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites

Reference: NAD 1983 Alaska Albers

Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Craig Study Area - South

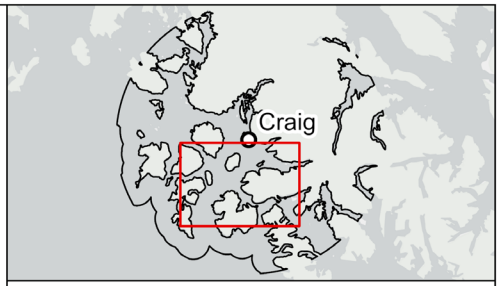


0 3.5 7 km

0 1.75 3.5 nm

Scale: 1:168,334

Alaska Area Plans: Alaska DNR (2020)



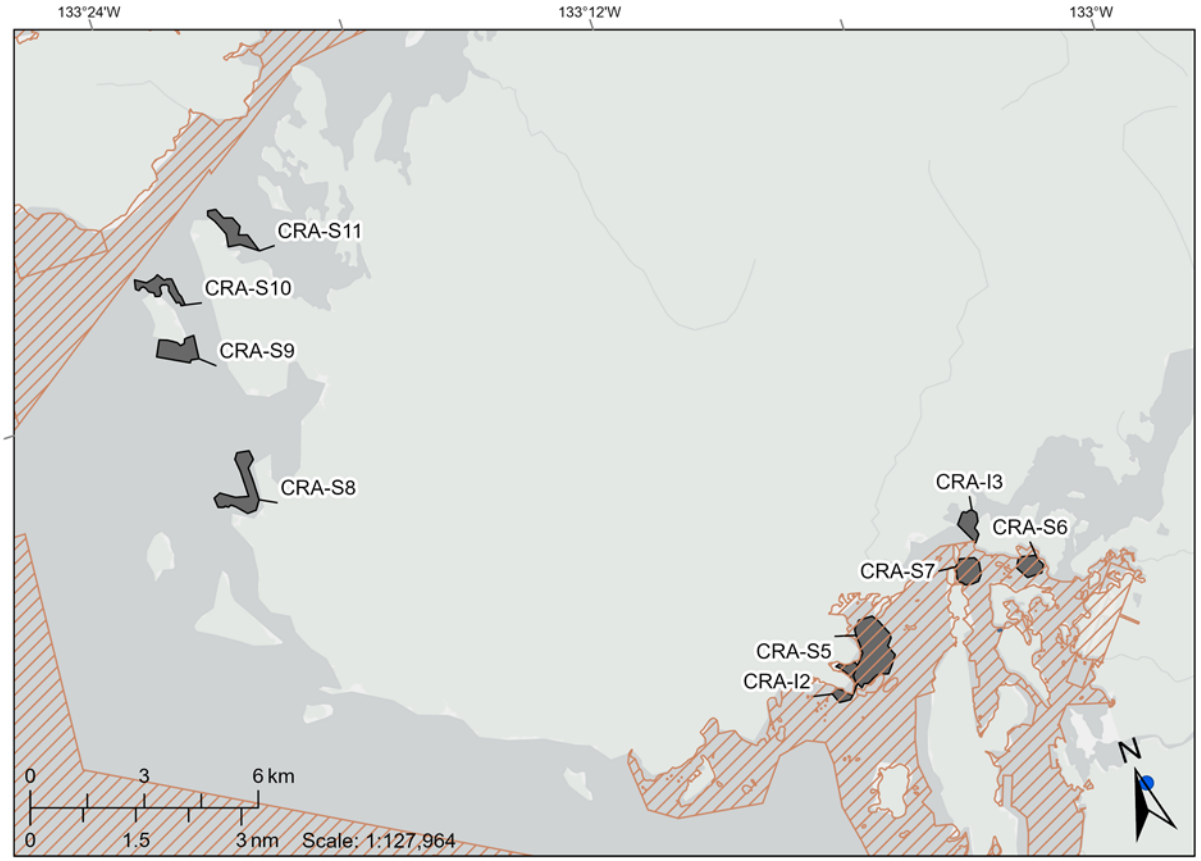
Craig AOA Options Cultural Resources Characterization

- AOA Options
- Alaska Area Plans - Community Harvest
- Alaska Area Plans - Heritage Sites

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Craig Study Area - North



Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Hatchery Release Sites: ADFG (2025)



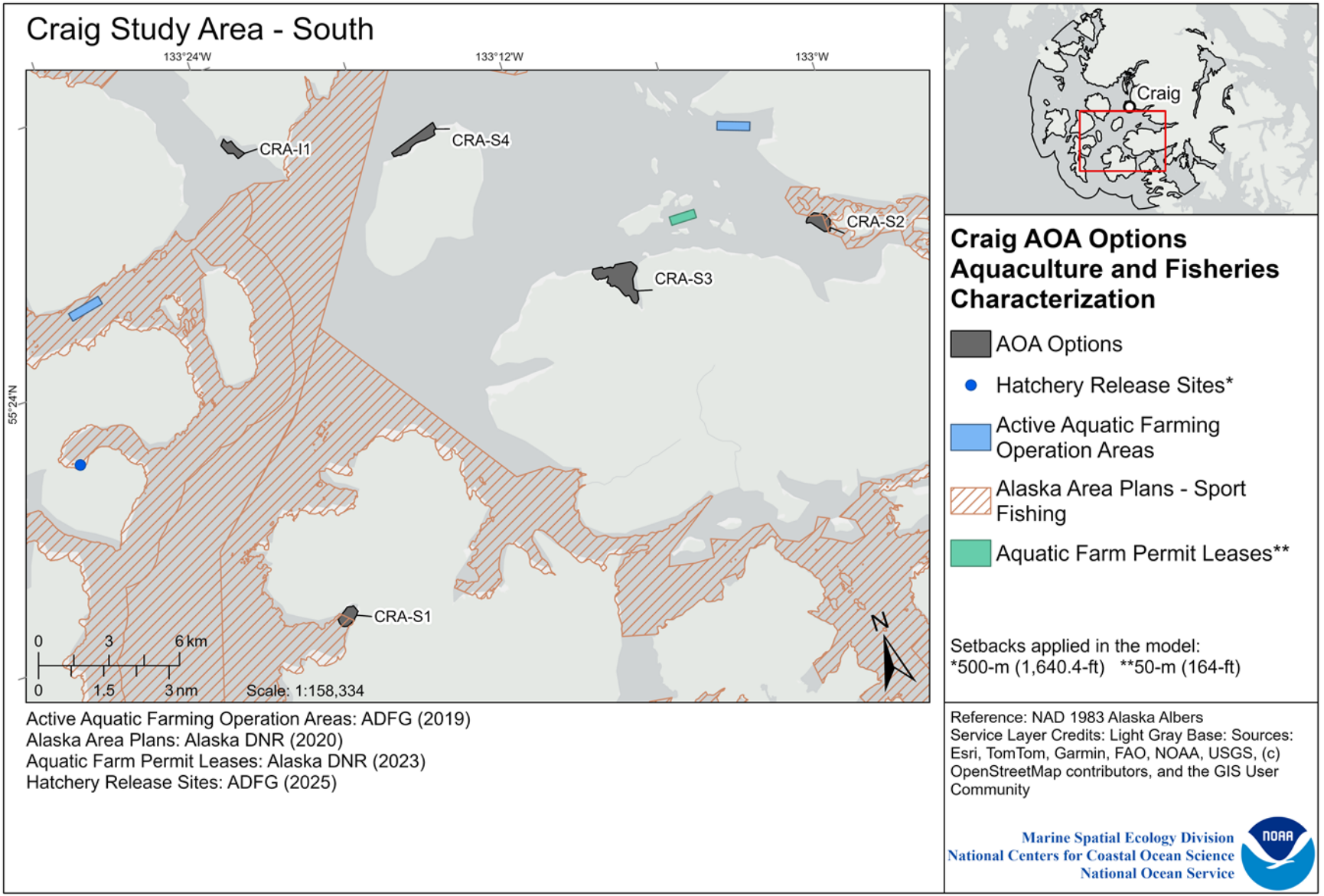
Craig AOA Options Aquaculture and Fisheries Characterization

- AOA Options
- Hatchery Release Sites*
- Active Aquatic Farming Operation Areas
- Alaska Area Plans - Sport Fishing
- Aquatic Farm Permit Leases**

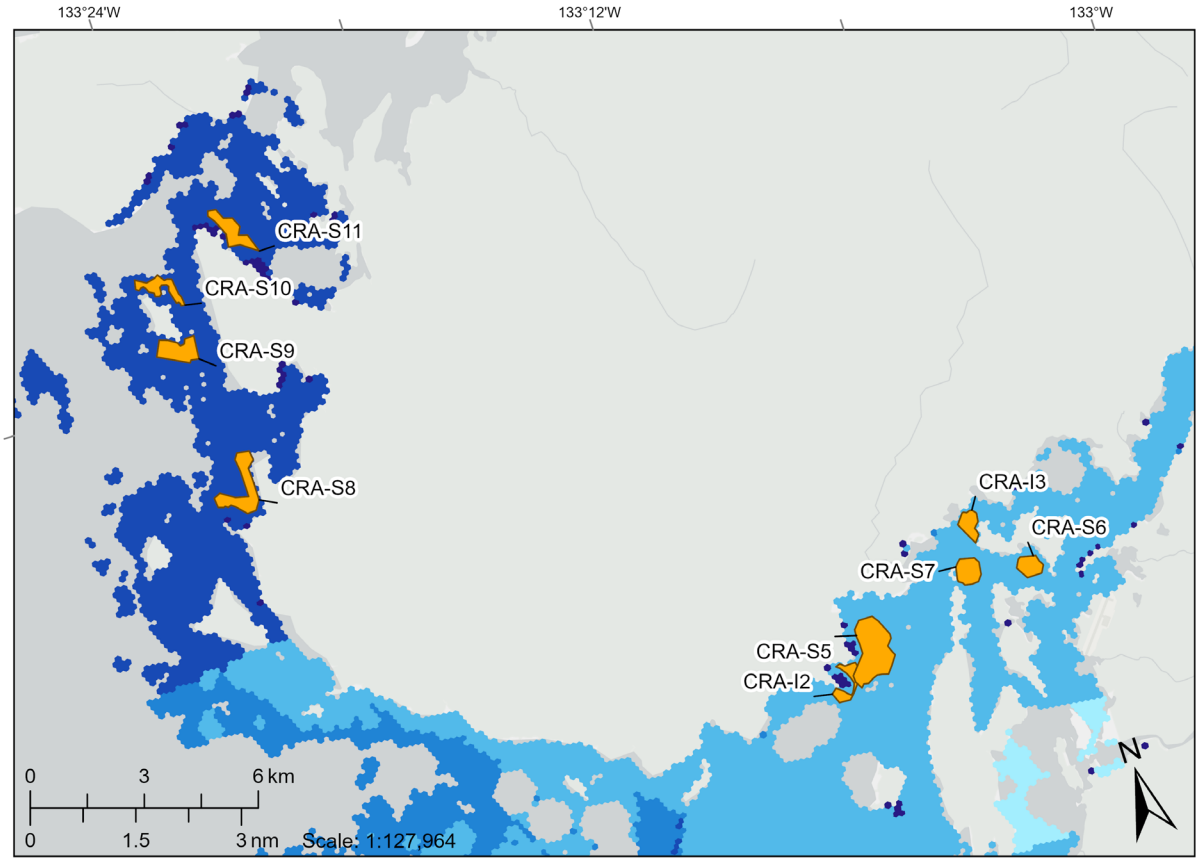
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Craig Study Area - South
133°24'W
133°12'W
133°W
55°24'N
CRA-I1
CRA-S4
CRA-S2
CRA-S3
CRA-S1
0
3
6 km
0
1.5
3 nm
Scale: 1:158,334
N
Craig
Craig AOA Options
Aquaculture and Fisheries
Characterization
AOA Options
Hatchery Release Sites*
Active Aquatic Farming
Operation Areas
Alaska Area Plans - Sport
Fishing
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Alaska Area Plans: Alaska DNR (2020)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources:
Esri, TomTom, Garmin, FAO, NOAA, USGS, (c)
OpenStreetMap contributors, and the GIS User
Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Craig Study Area - North



Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)



Craig AOA Options Aquaculture and Fisheries Characterization

AOA Options

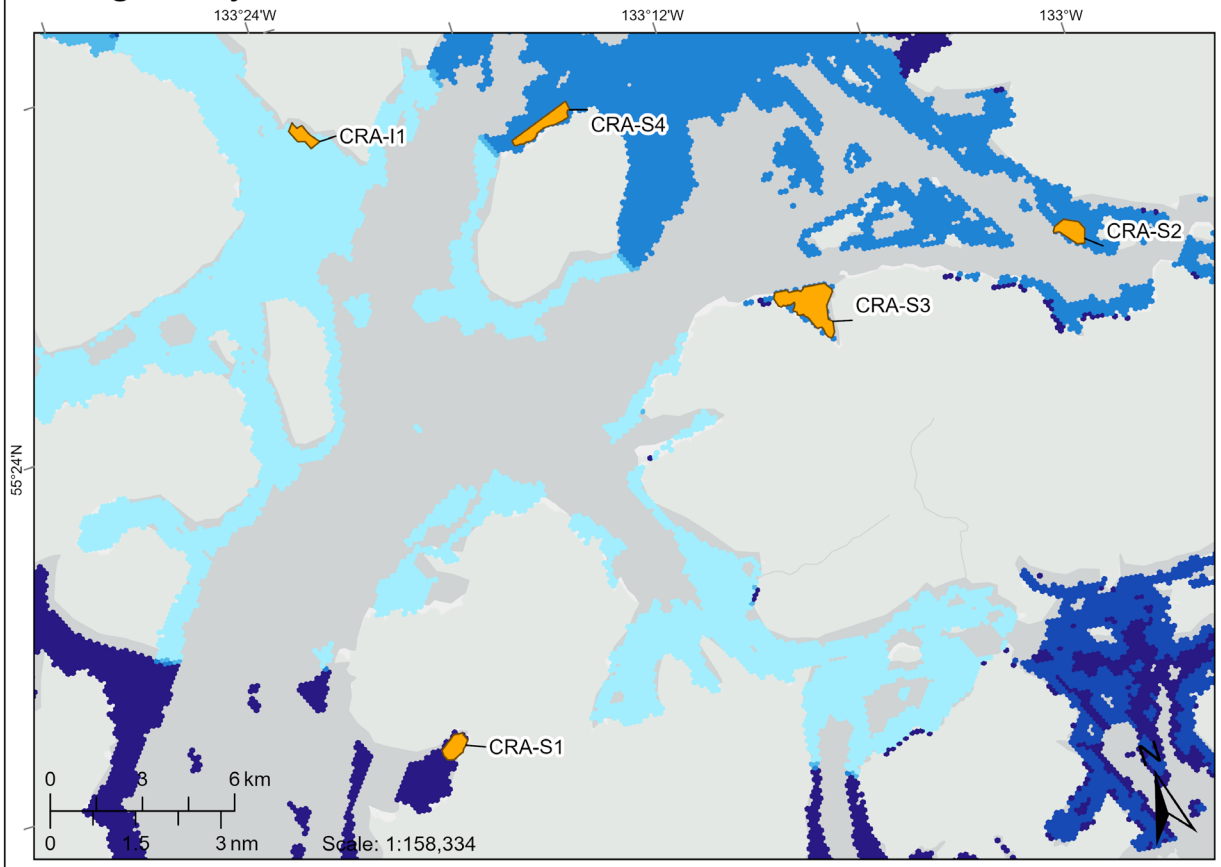
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

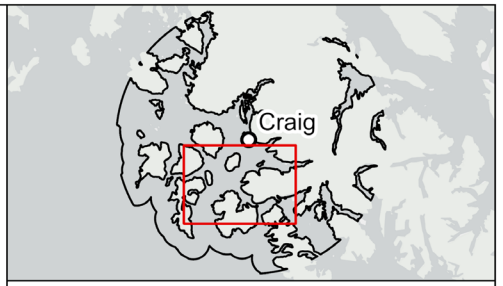
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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National Ocean Service

Craig Study Area - South



Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)



Craig AOA Options Aquaculture and Fisheries Characterization

AOA Options

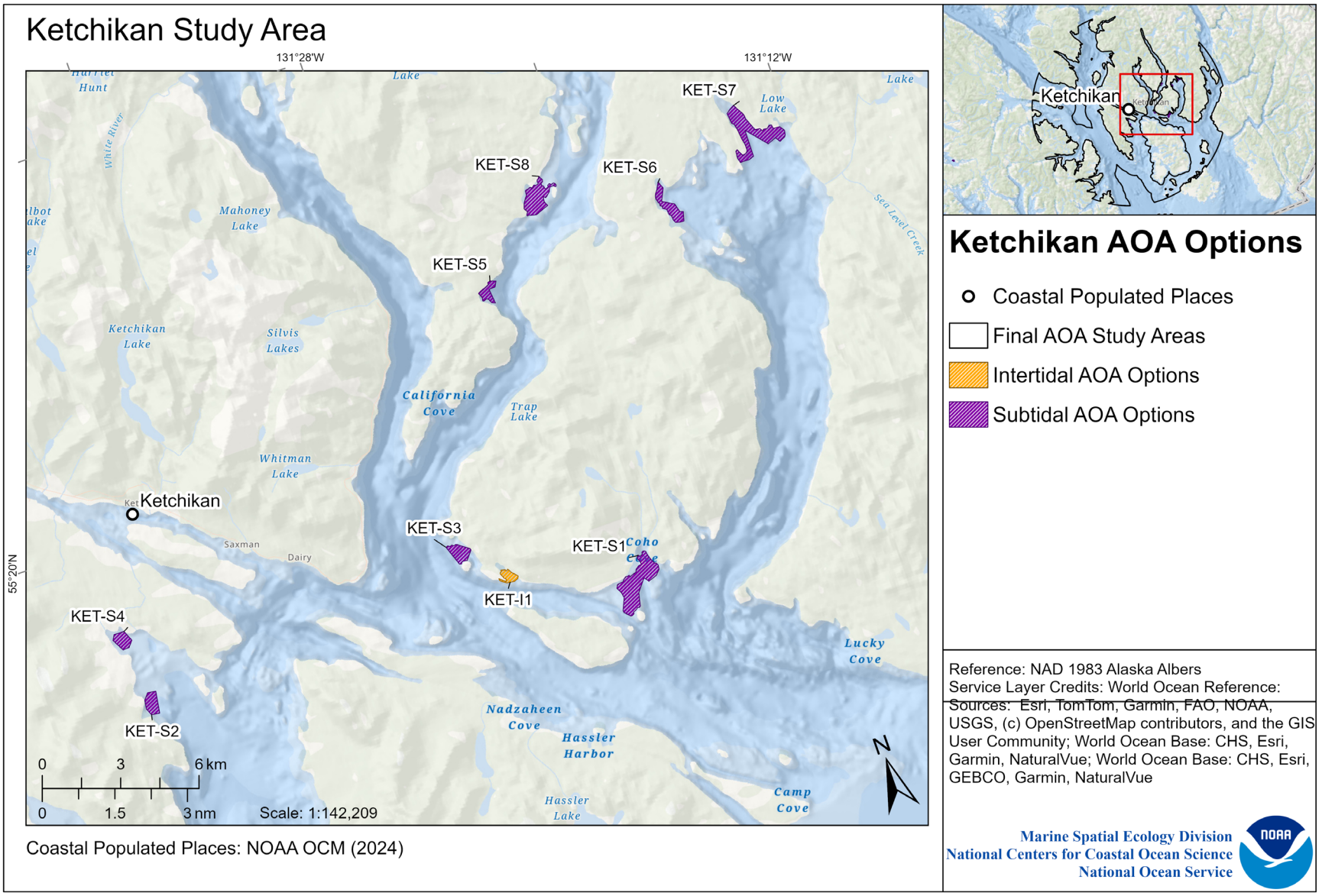
Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

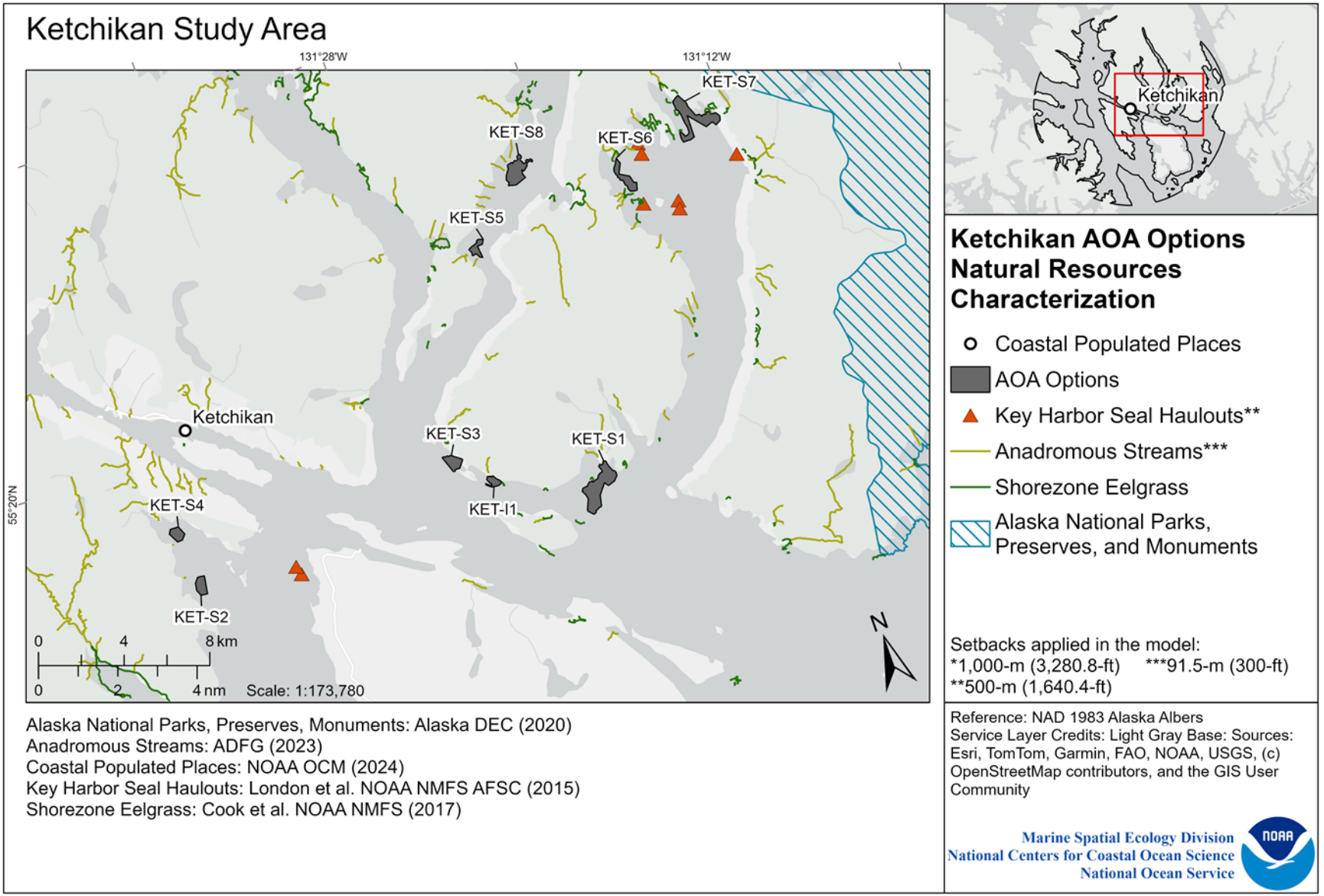
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

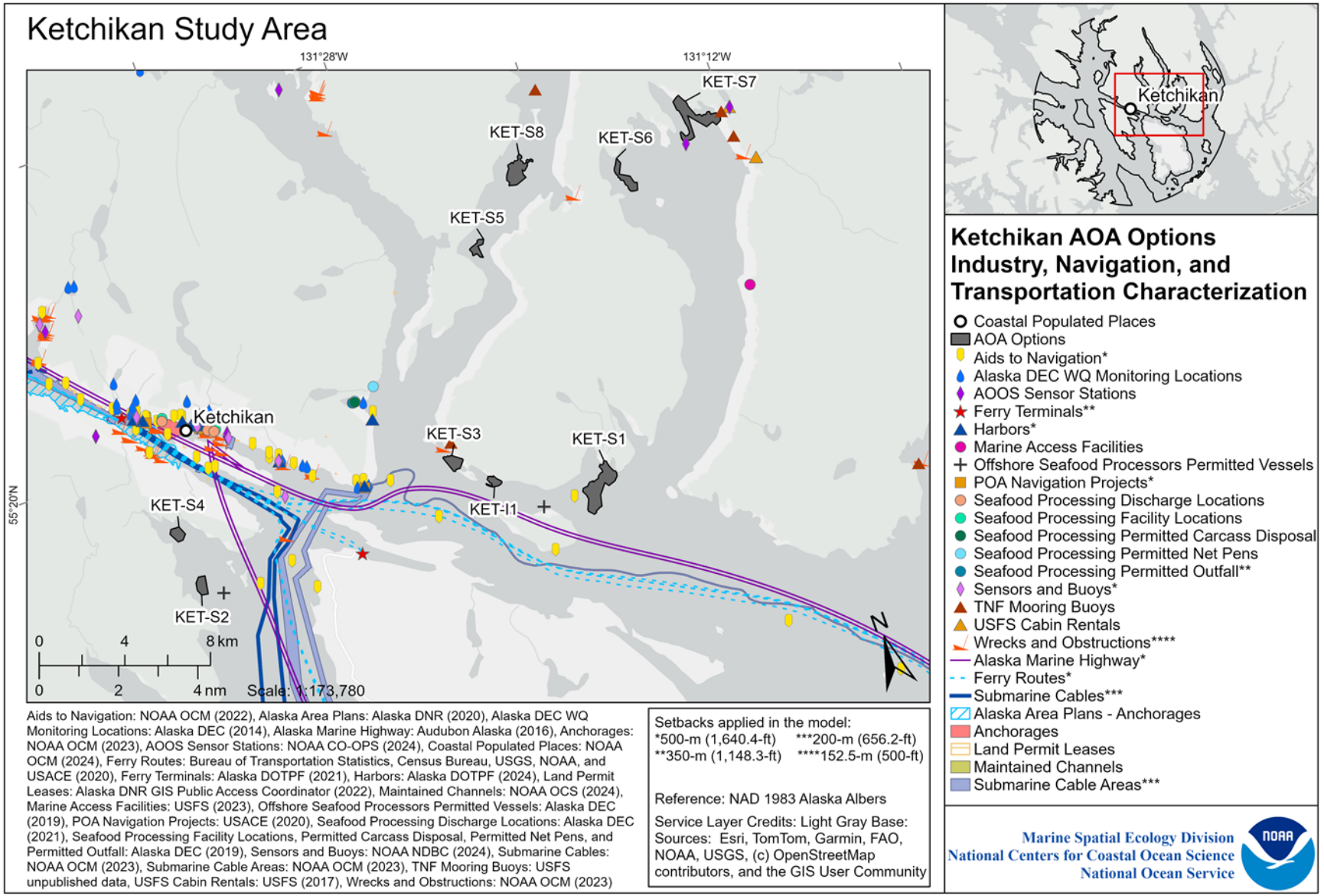
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service

Ketchikan AOA Options Maps

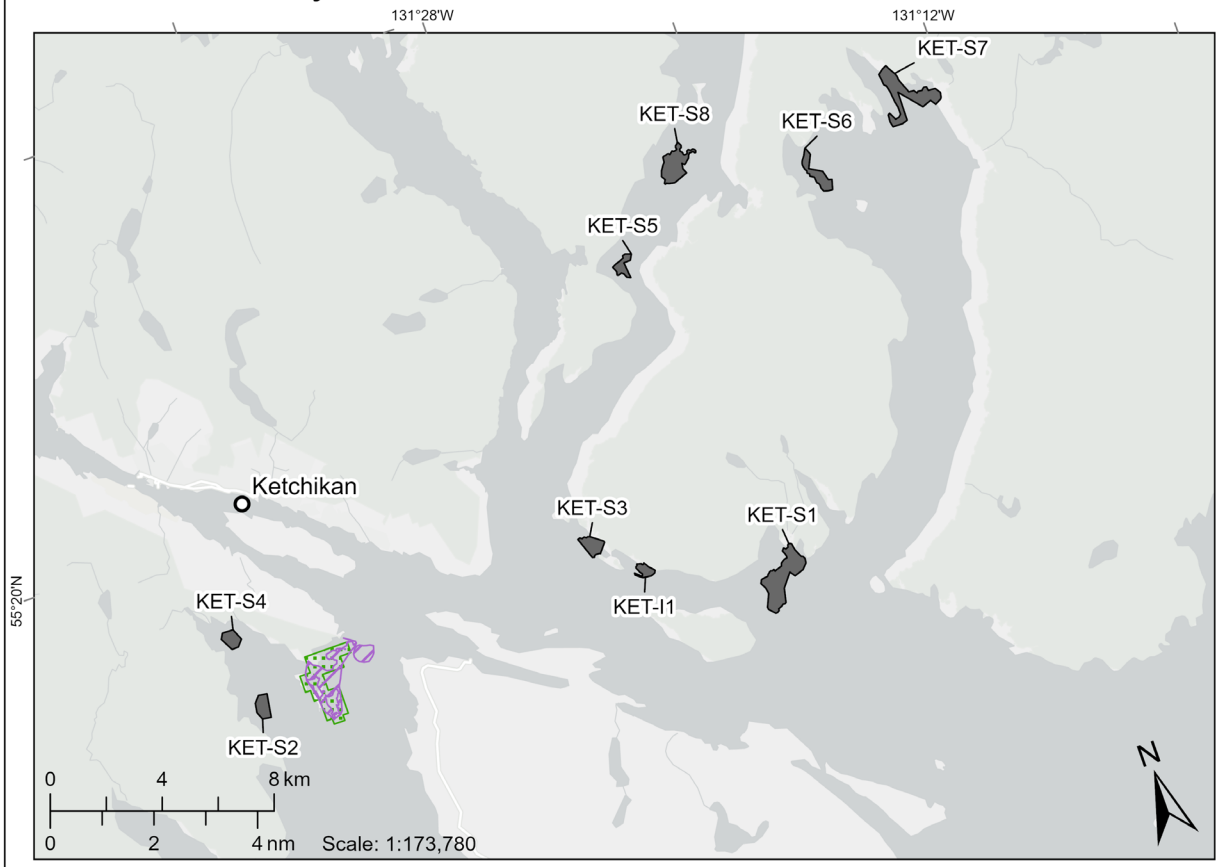


Coastal Populated Places: NOAA OCM (2024)


Ketchikan Study Area
131°28'W
131°12'W
55°20'N
KET-S7
KET-S8
KET-S6
KET-S5
Ketchikan
KET-S3
KET-S1
KET-I1
KET-S4
KET-S2
0
4
8 km
0
2
4 nm
Scale: 1:173,780
N
Ketchikan
Ketchikan AOA Options
Natural Resources
Characterization
Coastal Populated Places
AOA Options
Key Harbor Seal Haulouts**
Anadromous Streams***
Shorezone Eelgrass
Alaska National Parks,
Preserves, and Monuments
Setbacks applied in the model:
*1,000-m (3,280.8-ft) ***91.5-m (300-ft)
**500-m (1,640.4-ft)
Alaska National Parks, Preserves, Monuments: Alaska DEC (2020)
Anadromous Streams: ADFG (2023)
Coastal Populated Places: NOAA OCM (2024)
Key Harbor Seal Haulouts: London et al. NOAA NMFS AFSC (2015)
Shorezone Eelgrass: Cook et al. NOAA NMFS (2017)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA


Ketchikan Study Area
131°28'W
131°12'W
55°20'N
KET-S7
KET-S8
KET-S6
KET-S5
Ketchikan
KET-S3
KET-S1
KET-S4
KET-I1
KET-S2
0
4
8 km
0
2
4 nm
Scale: 1:173,780
N
Ketchikan
Ketchikan AOA Options
Industry, Navigation, and
Transportation Characterization
Coastal Populated Places
AOA Options
Aids to Navigation*
Alaska DEC WQ Monitoring Locations
AOOS Sensor Stations
Ferry Terminals**
Harbors*
Marine Access Facilities
Offshore Seafood Processors Permitted Vessels
POA Navigation Projects*
Seafood Processing Discharge Locations
Seafood Processing Facility Locations
Seafood Processing Permitted Carcass Disposal
Seafood Processing Permitted Net Pens
Seafood Processing Permitted Outfall**
Sensors and Buoys*
TNF Mooring Buoys
USFS Cabin Rentals
Wrecks and Obstructions****
Alaska Marine Highway*
Ferry Routes*
Submarine Cables***
Alaska Area Plans - Anchorages
Anchorages
Land Permit Leases
Maintained Channels
Submarine Cable Areas***
Aids to Navigation: NOAA OCM (2022), Alaska Area Plans: Alaska DNR (2020), Alaska DEC WQ Monitoring Locations: Alaska DEC (2014), Alaska Marine Highway: Audubon Alaska (2016), Anchorages: NOAA OCM (2023), AOOS Sensor Stations: NOAA CO-OPS (2024), Coastal Populated Places: NOAA OCM (2024), Ferry Routes: Bureau of Transportation Statistics, Census Bureau, USGS, NOAA, and USACE (2020), Ferry Terminals: Alaska DOTPF (2021), Harbors: Alaska DOTPF (2024), Land Permit Leases: Alaska DNR GIS Public Access Coordinator (2022), Maintained Channels: NOAA OCS (2024), Marine Access Facilities: USFS (2023), Offshore Seafood Processors Permitted Vessels: Alaska DEC (2019), POA Navigation Projects: USACE (2020), Seafood Processing Discharge Locations: Alaska DEC (2021), Seafood Processing Facility Locations, Permitted Carcass Disposal, Permitted Net Pens, and Permitted Outfall: Alaska DEC (2019), Sensors and Buoys: NOAA NDBC (2024), Submarine Cables: NOAA OCM (2023), Submarine Cable Areas: NOAA OCM (2023), TNF Mooring Buoys: USFS unpublished data, USFS Cabin Rentals: USFS (2017), Wrecks and Obstructions: NOAA OCM (2023)
Setbacks applied in the model:
*500-m (1,640.4-ft) ***200-m (656.2-ft)
**350-m (1,148.3-ft) ****152.5-m (500-ft)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Ketchikan Study Area





Ketchikan AOA Options Cultural Resources Characterization

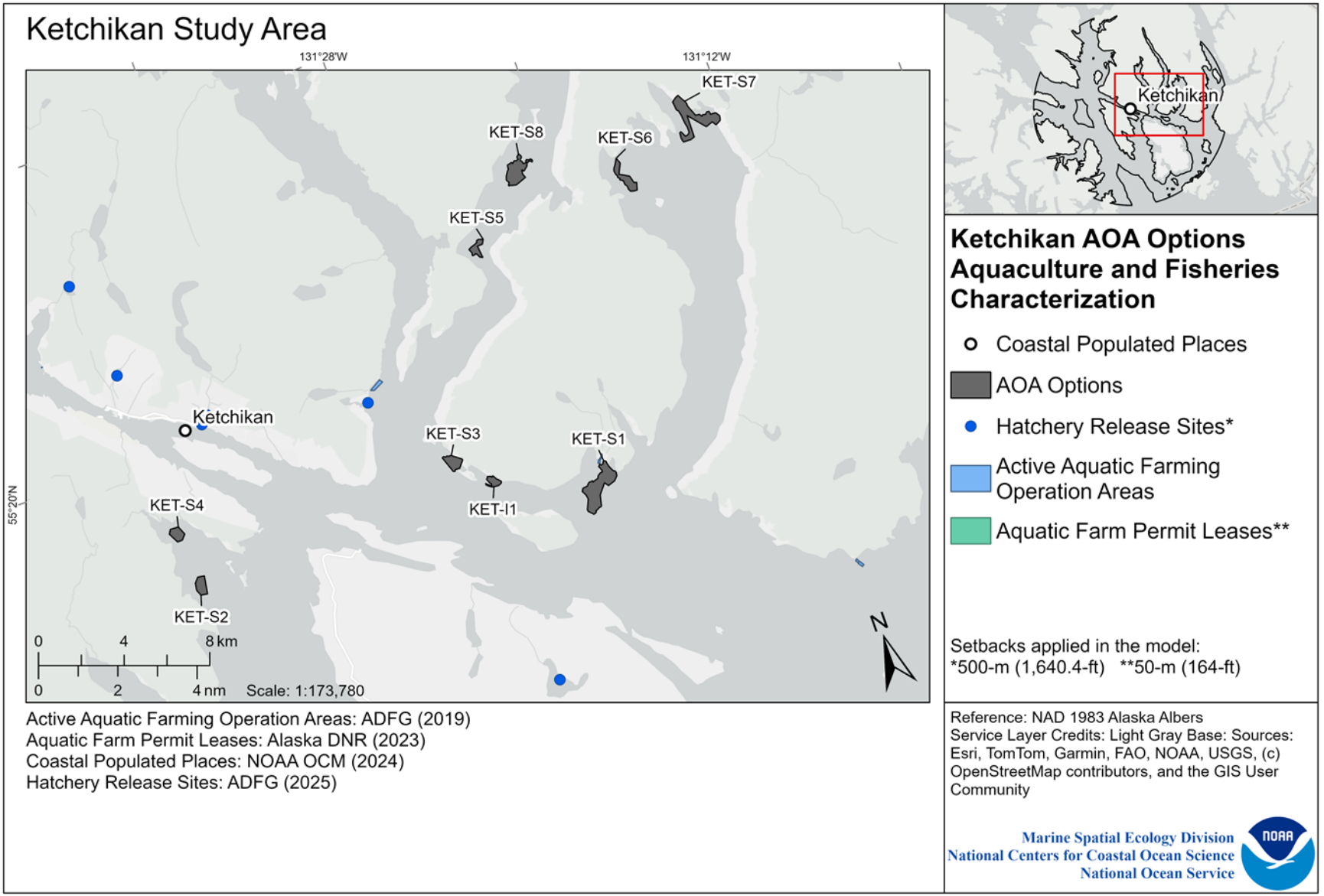
- Coastal Populated Places
- AOA Options
- Alaska Area Plans - Community Harvest
- State Parks Boundary**

Setbacks applied in the model:
*500-m (1,640.4-ft)
**100-m (328.1-ft)

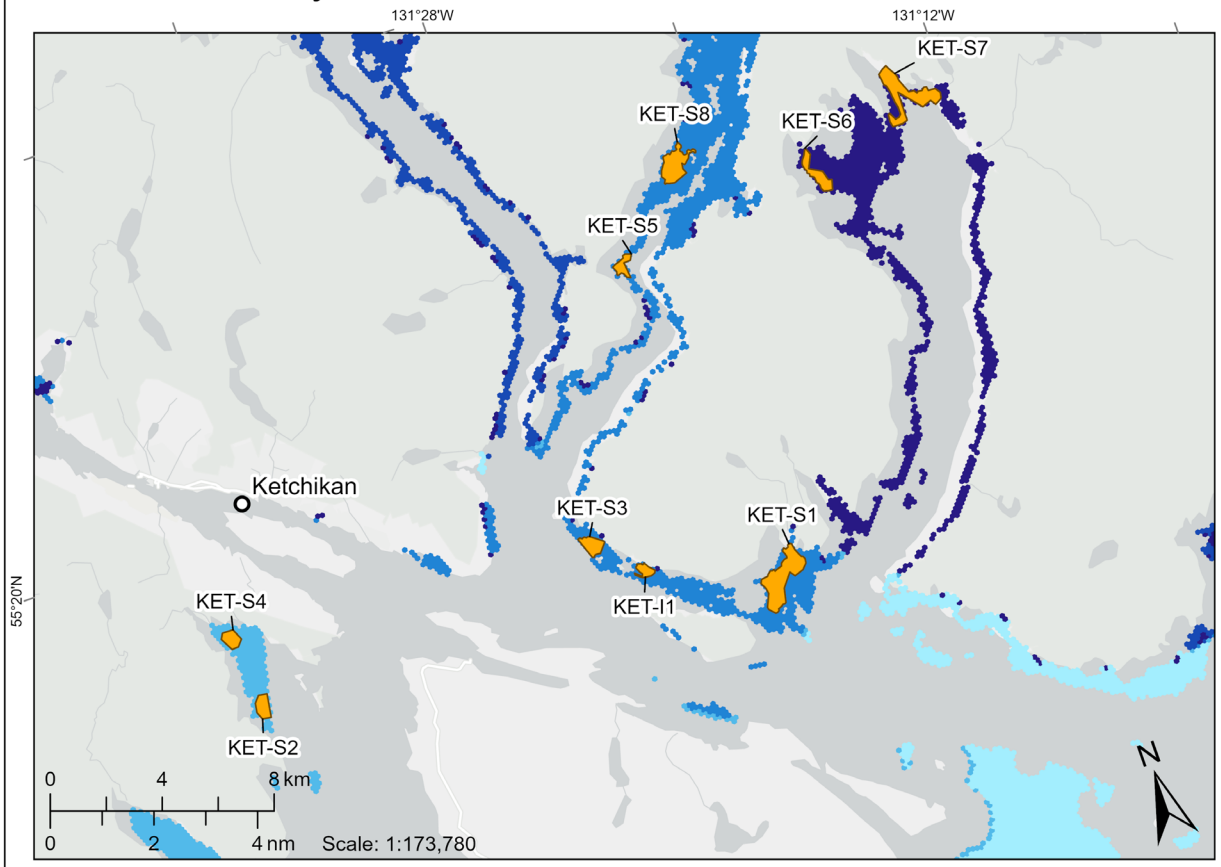
Alaska Area Plans: Alaska DNR (2020)
Coastal Populated Places: NOAA OCM (2024)
State Parks Boundary: Alaska DNR (2019)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Ketchikan Study Area
131°28'W
131°12'W
55°20'N
KET-S7
KET-S8
KET-S6
KET-S5
Ketchikan
KET-S3
KET-S1
KET-I1
KET-S4
KET-S2
0
4
8 km
0
2
4 nm
Scale: 1:173,780
N
Ketchikan
Ketchikan AOA Options
Aquaculture and Fisheries
Characterization
Coastal Populated Places
AOA Options
Hatchery Release Sites*
Active Aquatic Farming
Operation Areas
Aquatic Farm Permit Leases**
Setbacks applied in the model:
*500-m (1,640.4-ft) **50-m (164-ft)
Active Aquatic Farming Operation Areas: ADFG (2019)
Aquatic Farm Permit Leases: Alaska DNR (2023)
Coastal Populated Places: NOAA OCM (2024)
Hatchery Release Sites: ADFG (2025)
Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community
Marine Spatial Ecology Division
National Centers for Coastal Ocean Science
National Ocean Service
NOAA

Ketchikan Study Area





Ketchikan AOA Options Aquaculture and Fisheries Characterization

- Coastal Populated Places
- AOA Options

Fisheries Landings Relative Suitability

- Low
- Moderately Low
- Moderate
- Moderately High
- High

Coastal Populated Places: NOAA OCM (2024)
Fisheries Landings: NOAA NMFS Commercial Fisheries Landings (2024), and ADFG Commercial Statistical Areas (2024)

Reference: NAD 1983 Alaska Albers
Service Layer Credits: Light Gray Base: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community

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Appendix D

Selected reference tables

Table D – 1. Minimum travel distance within 50 km of an Aquaculture Opportunity Area option to features within the Alaska Seaweed Source Inventory dataset, separated by species. Distances below are displayed in meters (m).....2
Table D – 2. Draft and Final AOA option IDs. “NA” denotes that Draft AOA options were not selected as Final AOA options.....5

Table D – 1. Minimum travel distance within 50 km of an Aquaculture Opportunity Area option to features within the Alaska Seaweed Source Inventory dataset, separated by species. Distances below are displayed in meters (m).

Option ID	Sieve Kelp *Agarum clathratum*	Ribbon Kelp *Alaria marginata*	Three-ribbed Kelp *Cymathaere triplicata*	Dragon Kelp *Eualaria fistulosa*	Giant Kelp *Macrocystis pyrifera*	Bull Kelp *Nerocystis leutkeana*	Alaska Red-Ribbon Kelp *Palmaria palmata*	Split Kelp *Saccharina groenlandica*	Sugar Kelp *Saccharina latissima*
KOD-I1	-	-	-	-	-	-	-	-	-
KOD-I2	-	-	-	-	-	-	-	-	-
KOD-S1	-	-	-	-	-	-	-	-	-
KOD-S2	-	-	-	-	-	-	-	-	-
KOD-S3	-	-	-	-	-	-	-	-	-
KOD-S4	-	-	-	-	-	-	-	-	-
KOD-S5	-	-	-	-	-	-	-	-	-
KOD-S6	-	-	-	-	-	-	-	-	-
KOD-S7	-	-	38.71	-	-	-	-	-	-
KOD-S8	-	16.83	15.47	20.22	-	19.71	-	-	19.71
KOD-S9	-	11.89	10.31	15.28	-	15.28	-	-	15.28
KOD-S10	-	8.01	6.4	11.4	-	11.4	-	-	11.4
KOD-S11	-	4.33	1.86	3.59	-	2.27	-	-	2.27
KOD-S12	-	13.78	5.85	12.48	-	9.35	-	-	9.35
KOD-S13	-	15.19	7.26	13.89	-	10.77	-	-	10.77
SEW-S1	-	-	-	-	-	-	-	-	-
SEW-S2	-	-	-	-	-	-	-	-	-
VAL-S1	-	-	-	-	-	-	-	-	-
VAL-S2	-	-	-	-	-	-	-	-	-
VAL-S3	-	-	-	-	-	-	-	-	-
COR-S1	8.71	-	-	9.29	-	8.71	19.76	8.71	9.94
COR-S2	9.04	-	-	11.38	-	2.9	14.06	9.04	4.25
COR-S3	10.68	-	-	11.26	-	10.68	21.73	10.68	11.91
COR-S4	12.63	-	-	13.21	-	12.63	23.68	12.63	13.86
JUN-I1	-	-	19.82	-	-	14.91	-	40.49	16.73

Option ID	Sieve Kelp *Agarum clathratum*	Ribbon Kelp *Alaria marginata*	Three-ribbed Kelp *Cymathaere triplicata*	Dragon Kelp *Eualaria fistulosa*	Giant Kelp *Macrocystis pyrifera*	Bull Kelp *Nerocystis leutkeana*	Alaska Red-Ribbon Kelp *Palmaria palmata*	Split Kelp *Saccharina groenlandica*	Sugar Kelp *Saccharina latissima*
JUN-I2	-	-	1.65	-	-	7.93	-	17.8	5.01
JUN-S1	-	-	7.22	-	-	49.12	-	-	49.3
JUN-S2	-	-	28	-	-	23.07	-	47.02	23.25
JUN-S3	-	-	22.81	-	-	17.88	-	41.82	18.06
JUN-S4	-	-	1.3	-	-	6.08	-	20.09	7.07
JUN-S5	-	-	1.49	-	-	7.7	-	17.43	4.72
JUN-S6	-	-	2.74	-	-	13.95	-	21.97	4.75
JUN-S7	-	-	1.12	-	-	9.58	-	17.78	1.74
SIT-I1	-	-	-	-	9.52	-	-	-	-
SIT-S1	-	-	-	-	39.71	-	-	-	-
SIT-S2	-	-	-	-	41.94	-	-	-	-
SIT-S3	-	-	-	-	32.26	-	-	-	-
SIT-S4	-	-	-	-	22.93	-	-	-	-
SIT-S5	-	-	-	-	15.7	-	-	-	-
SIT-S6	-	-	-	-	8.12	-	-	-	-
SIT-S7	-	-	-	-	7.4	-	-	-	-
SIT-S8	-	-	-	-	11.24	-	-	-	-
SIT-S9	-	-	-	-	10.8	-	-	-	-
SIT-S10	-	-	-	-	11.73	-	-	-	-
SIT-S11	-	-	-	-	16.7	-	-	-	-
WRA-I1	-	-	35.22	-	-	-	-	-	-
WRA-I2	-	-	25.01	-	-	-	-	-	-
WRA-S1	-	-	-	-	-	-	-	-	-
WRA-S2	-	-	-	-	-	-	-	-	-
WRA-S3	-	-	-	-	-	-	-	-	-
WRA-S4	-	-	-	-	-	-	-	-	-
WRA-S5	-	-	-	-	-	-	-	-	-

Option ID	Sieve Kelp *Agarum clathratum*	Ribbon Kelp *Alaria marginata*	Three-ribbed Kelp *Cymathaere triplicata*	Dragon Kelp *Eualaria fistulosa*	Giant Kelp *Macrocystis pyrifera*	Bull Kelp *Nerocystis leutkeana*	Alaska Red-Ribbon Kelp *Palmaria palmata*	Split Kelp *Saccharina groenlandica*	Sugar Kelp *Saccharina latissima*
WRA-S6	-	-	-	-	-	-	-	-	-
WRA-S7	-	-	-	-	-	-	-	-	-
CRA-I1	-	-	0	-	-	0	-	-	0
CRA-I2	-	-	9.61	-	-	13.67	-	-	22.04
CRA-I3	-	-	14.24	-	-	20.11	-	-	28.09
CRA-S1	-	-	24.12	-	-	24.12	-	-	24.12
CRA-S2	-	-	17.32	-	-	27.91	-	-	27.91
CRA-S3	-	-	12.15	-	-	18.46	-	-	18.46
CRA-S4	-	-	5.55	-	-	6.67	-	-	6.67
CRA-S5	-	-	10	-	-	14.48	-	-	22.67
CRA-S6	-	-	13.79	-	-	20.69	-	-	28.67
CRA-S7	-	-	12.94	-	-	18.89	-	-	26.86
CRA-S8	-	-	20.54	-	-	13.04	-	-	20.54
CRA-S9	-	-	24.87	-	-	17.46	-	-	24.87
CRA-S10	-	-	26.64	-	-	19.19	-	-	26.64
CRA-S11	-	-	29.88	-	-	22.39	-	-	29.88
KET-I1	-	-	7.22	-	-	49.12	-	-	49.3
KET-S1	-	-	-	-	-	-	-	-	-
KET-S2	-	-	-	-	-	-	-	-	-
KET-S3	-	-	-	-	-	-	-	-	-
KET-S4	-	-	-	-	-	-	-	-	-
KET-S5	-	-	-	-	-	-	-	-	-
KET-S6	-	-	-	-	-	-	-	-	-
KET-S7	-	-	-	-	-	-	-	-	-
KET-S8	-	-	-	-	-	-	-	-	-

Table D – 2. Draft and Final AOA option IDs. “NA” denotes that Draft AOA options were not selected as Final AOA options.

Draft AOA Option ID	Final AOA Option ID
KOD-I1	NA
KOD-I2	NA
KOD-I3	KOD-I1
KOD-I4	KOD-I2
KOD-I5	NA
KOD-S1	KOD-S9
KOD-S2	KOD-S10
KOD-S3	KOD-S8
KOD-S4	KOD-S12
KOD-S5	KOD-S11
KOD-S6	KOD-S1
KOD-S7	KOD-S2
KOD-S8	KOD-S3
KOD-S9	KOD-S6
KOD-S10	KOD-S4
KOD-S11	KOD-S5
KOD-S12	KOD-S7
KOD-S13	KOD-S13
SEW-S1	SEW-S1
SEW-S2	SEW-S2
VAL-S1	NA
VAL-S2	VAL-S1
VAL-S3	VAL-S2
VAL-S4	VAL-S3
COR-S1	COR-S1
COR-S2	COR-S3
COR-S3	COR-S2
COR-S4	COR-S4
COR-S5	NA
COR-S6	NA
JUN-I1	JUN-I2
JUN-I2	JUN-I1
JUN-I3	NA
JUN-I4	NA
JUN-S1	JUN-S6
JUN-S2	JUN-S7
JUN-S3	NA
JUN-S4	JUN-S4
JUN-S4	JUN-S5
JUN-S5	JUN-S3
JUN-S6	JUN-S2
JUN-S7	JUN-S1
SIT-I1	SIT-I1
SIT-I2	NA
SIT-I3	NA
SIT-S1	SIT-S1
SIT-S2	NA
SIT-S3	SIT-S3
SIT-S4	SIT-S2
SIT-S5	SIT-S5
SIT-S6	SIT-S4
SIT-S7	NA
SIT-S8	SIT-S6
SIT-S9	SIT-S9
SIT-S10	SIT-S10
SIT-S11	SIT-S8
SIT-S12	SIT-S11
SIT-S13	SIT-S7

Draft AOA Option ID	Final AOA Option ID
WRA-I1	WRA-I2
WRA-I2	WRA-I1
WRA-I3	NA
WRA-S1	WRA-S1
WRA-S2	NA
WRA-S3	WRA-S5
WRA-S4	WRA-S6
WRA-S5	WRA-S7
WRA-S6	WRA-S2
WRA-S7	WRA-S3
WRA-S8	WRA-S4
CRA-I1	CRA-I1
CRA-I2	CRA-I2
CRA-I3	CRA-I3
CRA-S1	CRA-S1
CRA-S2	CRA-S3
CRA-S3	CRA-S4
CRA-S4	CRA-S8
CRA-S5	CRA-S9
CRA-S6	CRA-S10
CRA-S7	CRA-S11
CRA-S8	CRA-S2
CRA-S9	CRA-S5
CRA-S10	CRA-S6
CRA-S11	CRA-S7
KET-I1	NA
KET-I2	KET-I1
KET-I3	NA
KET-S1	KET-S2
KET-S2	KET-S4
KET-S3	KET-S1

Draft AOA Option ID	Final AOA Option ID
KET-S4	KET-S3
KET-S5	NA
KET-S6	NA
KET-S7	NA
KET-S8	NA
KET-S9	KET-S5
KET-S10	KET-S8
KET-S11	KET-S6
KET-S12	KET-S7



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