Environmental Resources Section

Public Notice

Alaska District
U.S. Army Corps of Engineers

Date 17 Jul 2019 Identification No.ER-19-08
Please refer to the identification number when replying.

The U.S. Army Corps of Engineers (Corps) has prepared an environmental assessment (EA) and draft Finding of No Significant Impact (FONSI) for the following project:

Harbor Maintenance
Aurora and Harris Harbors
Juneau, Alaska

This project includes (a) maintenance dredging of approximately 28,000 cubic yards of accumulated sediment from selected areas of Aurora and Harris Harbors, and disposed of that material in a designated disposal area within the inland waters of Gastineau Channel; (b) removal of a deteriorating steel-and-wood wave barrier along the top of the Aurora Harbor breakwater and replacement with a similar structure; and (c) Repositioning and/or replacement of displaced rock within a 150-foot section of the Harris Harbor breakwater.

The proposed project and potential environmental impacts are described in the enclosed EA and draft FONSI, which is available for public review and comment for **10** days from the date of this notice. It may also be viewed on the Alaska District's website at: www.poa.usace.army.mil. Click on the Reports and Studies button, look under Documents Available for Public Review, and then click on the Operations and Maintenance link.

To obtain a printed copy, please send a request via email to: Christopher.B.Floyd@usace.army.mil or send a request to the address below. The FONSI will be signed upon review of comments received and resolution of significant concerns. Please submit comments regarding the proposed action to the above email or to the following address:

U.S. Army Corps of Engineers, Alaska District
ATTN: CEPOA-PM-C-ER
P.O. Box 6898
Joint Base Elmendorf-Richardson, Alaska 99506-0898

For information on the proposed project, please contact Chris Floyd of the Environmental Resources Section at the above email or Corps postal address.

STATE OF ALASKA WATER QUALITY CERTIFICATION

Notice is hereby given that the Corps will be applying for State Water Quality certification from the Alaska Department of Environmental Conservation (ADEC). ADEC may certify there is a reasonable assurance this proposed action and any discharge that might result will comply with the Clean Water Act, Alaska Water Quality Standards, and other applicable State laws. ADEC's certification may authorize a mixing zone and/or a short-term variance under 18 AAC 70, Water Quality Standards, amended as of April 6, 2018. ADEC may also deny or waive certification. Any person desiring to comment on the project with respect to Water Quality Certification may submit written comments to the address below or to the email address dec-401cert@alaska.gov within 30 days of the date of this Public Notice. Mailed comments must be postmarked on or before the last day of the public comment period.

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WDAP/401 CERTIFICATION
555 CORDOVA STREET
ANCHORAGE, AK 99501-2617
PHONE: (907) 269-2711 | EMAIL: dec-401cert@alaska.gov

Sincerely,

Michael R. Salyer
Chief, Environmental Resources Section

US Army Corps of Engineers
Alaska District

Environmental Assessment and Finding of No Significant Impact

Harbor Maintenance
Harris and Aurora Harbors
Juneau, Alaska

July 2019

FINDING OF NO SIGNIFICANT IMPACT

Harbor Maintenance
Harris and Aurora Harbors
Juneau, Alaska

I. In accordance with the National Environmental Policy Act, I have reviewed and evaluated the documents concerning proposed maintenance activities at the Harris and Aurora small boat harbors in Juneau, Alaska:

a. A total of approximately 28,000 cubic yards of sediment will be dredged from selected areas of the two harbors, and disposed of in a designated disposal area within the inland waters of Gastineau Channel.

b. A deteriorating steel-and-wood wave barrier along the top of the Aurora Harbor breakwater will be removed and replaced with a similar structure.

c. Displaced rock within a 150-foot section of the Harris Harbor breakwater will be repositioned and/or replaced.

As part of my evaluation, I have considered:

a. Existing resources and the No Action Alternative.

b. Impacts to existing resources from the Preferred Alternative.

II. The possible consequences of these alternatives have been studied for physical, environmental, cultural, and social effects. My evaluation of significant factors has contributed to my finding:

a. No significant impacts to federally listed endangered or threatened species are anticipated.

b. No significant impacts are anticipated to natural resources, including fish and wildlife. The proposed work would have no adverse effect on historic properties or archaeological resources. There would be no appreciable degradation to the physical environment (e.g., water quality and air quality) as a result of the proposed activities.

c. The No Action Alternative was evaluated and determined to be unacceptable, as the U.S. Army Corps of Engineers is mandated to maintain the federal project at these harbors.

III. Based on the evaluation and disclosure of impacts contained within the Environmental Assessment, I find no significant impacts to the human environment are likely to occur as a result of the proposed action. Therefore, an Environmental Impact Statement will not be prepared prior to proceeding with the proposed maintenance activities at the Harris and Aurora small boat harbors in Juneau, Alaska.

______________________________ ____________________

Phillip J. Borders Date
Colonel, U.S. Army
Commanding

Table of Contents

Environmental Assessment

Harbor Maintenance
Aurora and Harris Harbors
Juneau, Alaska

1.0 Introduction and Purpose and Need

1.1. Introduction

The Alaska District U.S. Army Corps of Engineers (USACE) prepared this environmental assessment (EA) to describe the proposed maintenance dredging and repair activities at Harris and Aurora small boat harbors in Juneau, Alaska, and the placement of the dredged material in an open water disposal site, and to discuss the potential environmental effects of these activities.

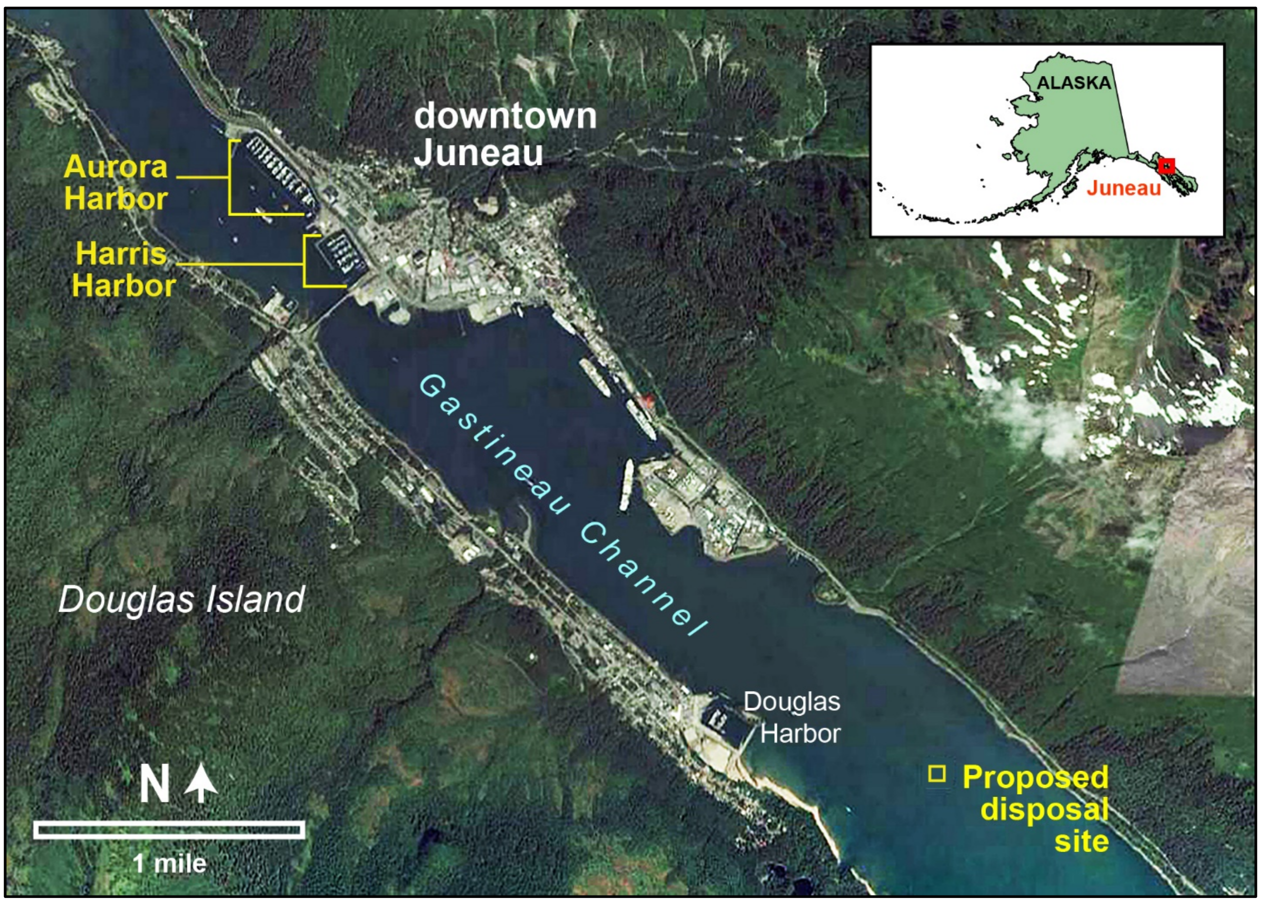

Figure 1. Location and vicinity of Harris and Aurora Harbors.

1.2 Federal Project Authorities and Histories

Harris Harbor. The Rivers and Harbors Act, 26 August 1937 (House Doc. 249, 75th Congress, 1st Session) as adopted, provided for a small boat basin 11.5 acres in area, just north of the Juneau-Douglas bridge, by construction of two rock mound breakwaters of 430 and 1,540 feet in length, and by dredging to a depth of -12 feet MLLW. Harbor construction was completed in 1939, with maintenance dredging occurring in 1950, 1962, and 1968. The north end of the main breakwater underwent repairs in 1973 (USACE 2015a).

Figure 2. Layout of Harris Harbor (adapted from USACE 2015a).

Aurora Harbor. The Rivers and Harbors Act, 3 July 1958 (House Doc. 286, 84th Congress, 2nd Session) as adopted, provided for a second basin adjacent to Harris Harbor, 19 acres in area dredged to depths of -12 feet MLLW and -14 feet MLLW, protected by a jetty 530 feet long and a breakwater 1,150 feet long. Design modifications increased the length of the jetty to 670 feet and the main breakwater to 1,500 feet. The breakwater is topped with a wave barrier constructed from steel H-pilings and wooden slats. The inclusion of the wave barrier in the breakwater design allowed construction of a breakwater with a smaller overall footprint; the top of the breakwater rock is awash at higher tides, and the wave barrier deflects wave energy during those periods. Work on the harbor began in August 1962, and was completed in February 1963. No maintenance dredging has been conducted at Aurora Harbor since its construction (USACE 2015b).

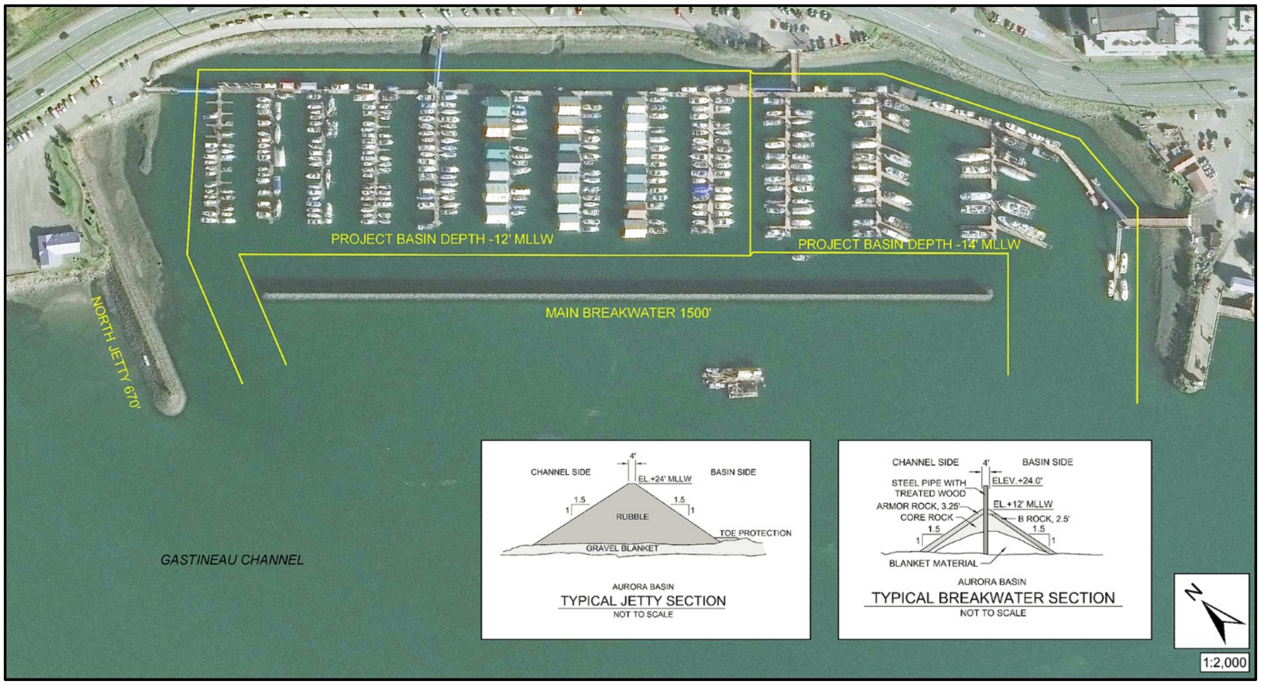

Figure 3. Layout of Aurora Harbor (adapted from USACE 2015b).

1.3 Purpose and Need

The basins and breakwaters at Harris and Aurora Harbors are in need of maintenance and refurbishment. Long-term shoaling has reduced the depths in certain areas of the basins to less than the design depths. An estimated maximum volume of 8,610 cubic yards (cy) will be dredged from Aurora Harbor, and 18,610 cy from Harris Harbor, for a total of about 28,000 cy. The Aurora Harbor wave barrier has deteriorated, and needs to be replaced. The exposed southeast end of the Harris Harbor rock breakwater no longer has adequate armor rock in place on the seaward side. The USACE plans to repair approximately 150 feet of the breakwater, moving displaced rock back into position and/or placing new rock.

2.0 Alternatives and Proposed Action

2.1 No-Action Alternative

The no-action alternative would result in no maintenance dredging of Harris and Aurora Harbors, and no need to dispose of dredged material. This alternative would avoid the potential environmental impacts and temporary restricted access to the harbor described in later sections. However, it would leave the Corps' obligation to maintain authorized project depths unfulfilled, and lead to diminished usefulness of the harbor. The no-action alternative would forgo repairs to the Aurora and Harris Harbor breakwaters, leading to further deterioration.

2.2 Dredging and Sediment Transport Alternatives

Any dredging action requires a dredging method, a place to put the dredged material, and the means of transporting the dredged material to the disposal/placement site. The basic choices of dredge type are mechanical (e.g., clamshell) versus hydraulic (suction), and transport via a barge or hopper dredge versus a pipeline.

2.2.1 Mechanical Dredge

A clamshell dredge deployed by a barge-mounted crane is often used for dredging, especially in areas around harbor floats and other infrastructure where maneuvering space is limited. Where the area to be dredged is in relatively shallow waters, a large, long-armed excavator can also be used. The dredged sediment is typically deposited onto a barge or scow and loses much of its entrained water as it is transferred to or held on the scow. The dredged material is partially dewatered before being placed at the disposal or stockpiling location. In comparison to other dredging methods, mechanical dredging can result in less lofting of sediment into the water column.

2.2.2 Hopper Dredge

A hopper dredge operates by use of suction "drag heads" that extend from the hull of the dredge down into the substrate to be dredged. Through suction, materials are brought up into the open hull of the dredge until the hopper is full and the material can then be moved to a dredged material placement site. The suction of material brings in significant volumes of water along with the sediment; the excess water is allowed to overflow the hopper and flow back into the waterbody. The overflow water can increase turbidity and cause water quality issues.

2.2.3 Pipeline Dredge

A pipeline dredge, like the hopper dredge, uses suction and a cutter head to bring up sediment from the bottom of the harbor. However, a pipeline dredge does not have a hopper to contain the material. Instead, the material is moved directly to the placement site. As with a hopper dredge, water is removed with the sediment. The excess water helps to keep the sediment "fluid" so that it can be pumped to the dredged material disposal facility. The pipeline dredge must have a placement or dewatering location within pumping range of the dredge.

2.3 Dredged Material Placement or Disposal Alternatives

The typical alternatives for the placement of dredged material include onshore placement or disposal; off-shore or near-shore placement as fill for construction or environmental-enhancement purposes; and offshore disposal.

2.3.1 Onshore Placement or Disposal

The dredged material, if shown to meet State of Alaska standards for "non-polluted" soil, may be used on-shore for fill, cover, or other purposes. This requires sufficient upland space to dewater and stockpile the dredged material, and also the identification of a party willing to take responsibility for the material and put it to a legitimate use. Under some conditions, contaminated dredged material may be useable for cover at a nearby landfill, but the policies of the State of Alaska Solid Waste Division must be met.

2.3.2 Off-Shore or Near-Shore Placement

The USACE and the U.S. Environmental Protection Agency (EPA) have policies encouraging the beneficial use of dredged material for construction or environmental enhancement. Such use requires the identification of a coinciding construction project, or a legitimate environmental restoration or enhancement project, that can receive the dredged material. Contaminated dredged material can be placed within specially designed confined disposal facilities (CDFs).

2.3.3 Off-Shore Disposal

Dredged material that meets certain criteria may be disposed of within inland waters of the U.S., if it can be demonstrated under Section 404(b)(1) of the Clean Water Act that there is no practicable upland alternative for placement or disposal of the material.

2.4 Preferred Alternatives

2.4.1 Dredging

To some extent the means of dredging will be selected and proposed by the contractor. However, because of the close confines of the small harbor, and the lack of a nearby ocean disposal site or space for an upland dewatering site into which hydraulically dredged sediment could be discharged, the USACE expects mechanical dredging with a barge-mounted excavator or clamshell dredge to be the only practicable dredging method.

Selected portions of Aurora and Harris harbors will be dredged to return those areas to the project design depths. An estimated maximum volume of 8,610 cubic yards (cy) will be dredged from Aurora Harbor, and 18,610 cy from Harris Harbor, for a total of about 28,000 cy.

2.4.2 Dredged Material Disposal

No upland use or disposal site for the dredged material could be identified, and no nearshore project requiring fill is available within the time-frame of the planned maintenance dredging.

Chemical testing of the sediment at Aurora and Harris harbors has shown that the material to be dredged only from certain areas of the harbors is suitable for open water marine disposal (section

Figure 4. Limits of planned dredging at Harris Harbor (adapted from USACE drawing).

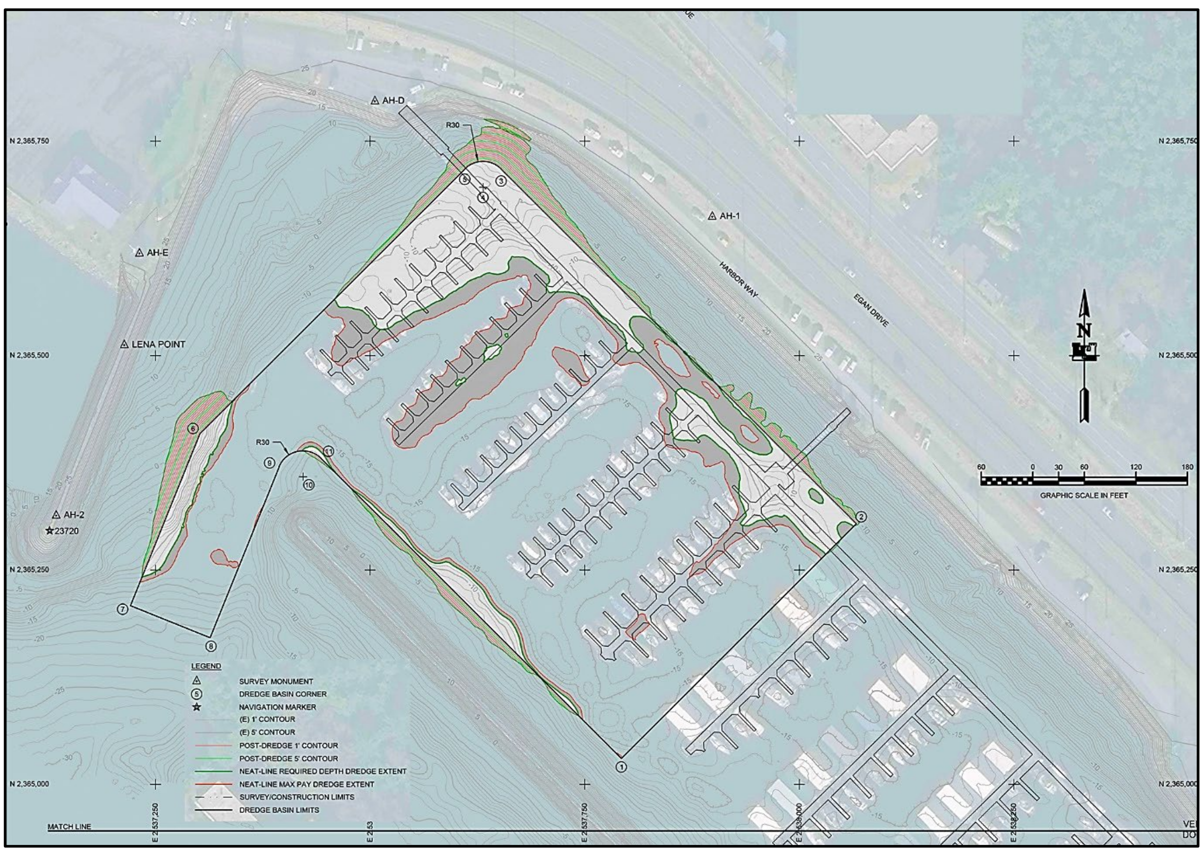

Figure 5. Limits of planned dredging at Aurora Harbor (adapted from USACE drawing).

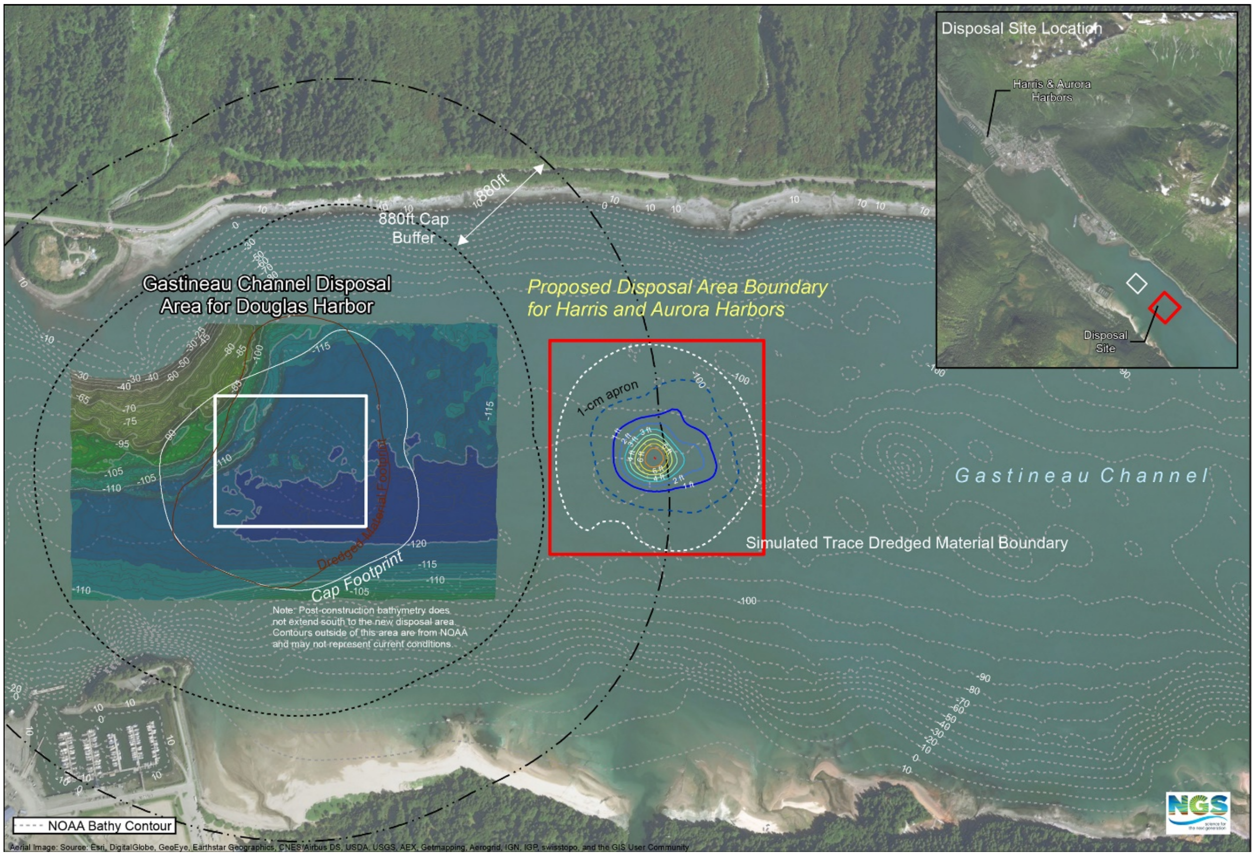

Figure 6. Location and extent of the proposed open water disposal site (from NewFields 2018a, 2018b).

2.6). The designated disposal site is in Gastineau Channel roughly 3 miles southeast of Harris Harbor, near a capped disposal site of dredged material from Douglas Harbor (figures 1 and 6). The proposed open water disposal site is a 1,500-foot square in waters about 130 feet deep (figure 6). Modeling (NewFields 2018a, 2018b) has shown that the plume of silty sand dredged material discharged from the disposal scow will stay within the disposal site boundary, under prescribed conditions of tidal stage, vessel position, and vessel velocity. Disposal scows with a capacity of 500 cy would require as many as 60 round trips to dispose of all the dredged material.

2.4.3 Repair of the Breakwater at Harris Harbor

The replacement of the Aurora Harbor wave barrier and repair of the Harris Harbor breakwater are simple upkeep and refurbishment activities, and underwent only a cursory evaluation of alternatives. The exposed southeast end of the rock breakwater no longer has adequate armor rock in place on the seaward side (figure 2). The USACE plans to repair approximately 150 feet of the breakwater, moving displaced rock back into position and/or placing new rock.

2.4.4 Replacement of the Wave Barrier at Aurora Harbor

The main breakwater at Aurora Harbor is topped with a 1,500-foot-long wave barrier, made of vertical steel H-pilings and horizontal wooden timbers (figure 3). This wave barrier has deteriorated, and will be replaced with a similar wave barrier. The existing pilings will either be pulled using a vibratory hammer, or cut off at the bottom of the existing armor stone layer. Existing armor rock and underlying intermediate rock will be removed and replaced as required to drive the new steel H-pilings. About 250 new pilings will be driven into the top of the breakwater, to a depth of approximately 24 feet below the crest of the breakwater, i.e., to an elevation of 12 feet below mean lower low water (MLLW). The new H-pilings will be 37-foot-long "W8x67" beams, a standard shape that is 8.28 inches wide by 9 inches deep, with a 0.57-inch-thick "web" and 0.935-inch-thick flanges. A vibratory hammer will be used preferentially to drive the new pilings into the top of the breakwater, but an impact hammer may be required.

2.5 Tentative Construction Schedule

- September 2019: USACE has awarded the contract, and provided the contractor with a Notice-to-Proceed.
- October/November 2019: Probable actual start date by the contractor on Aurora Harbor wave barrier repair and Harris Harbor armor rock repair.
- 30 April 2020: Pile-driving at Aurora Harbor completed.
- 30 June 2020: Breakwater repair projects at Aurora and Harris Harbors completed.
- 15 October to 31 December 2020: Maintenance dredging at Aurora Harbor.
- 15 October 2020 to 15 February 2021: Maintenance dredging at Harris Harbor (West 2019).

2.6 Sediment Quality Considerations.

Aurora and Harris Harbors were sampled in September 2016 using the dredging prism sampling procedures and criteria currently employed by Alaska District: the Dredged Material Evaluation and Disposal Procedures User Manual (DMMO 2018), prepared under the joint USACE Seattle District, USEPA, and State of Washington Dredged Material Management Program (DMMP). The two harbors were each divided into two Dredged Material Management Units (DMMUs) based on site history and volumes of materials to be dredged; an additional DMMU was added at the Aurora Harbor site to characterize a potential Large Boat Parking area (figure 7, USACE 2016b).

Chemical analyses of these 2016 sediment samples reported several chemicals detected at concentrations exceeding DMMP screening criteria in DMMUs:

- "Aurora 1"
- "Aurora Large Boat Parking"
- "Harris 2"

Sediment in DMMUs "Harris 2" and "Aurora Large Boat Parking" were found to contain tributyl tin and several fuel-related chemicals, common contaminants in older, seldom-dredged small boat harbors. On the other hand, the DMMU "Aurora 1" prism slightly exceeded DMMP screening criteria for only two organic chemicals: bis-(2-ethylhexyl)phthalate and diethyl phthalate. These phthalate compounds are common laboratory contaminants, and not chemicals typically expected as contaminants in a small boat harbor, but their detections in the 2016 samples could not be definitively attributed to laboratory error.

The two harbors were sampled again in July 2018 (USACE 2018) in an attempt to confirm the presence of the phthalate compounds reported in DMMU "Aurora 1". The bis-(2-ethylhexyl)-phthalate result was now below the screening criteria, and diethyl phthalate was not detected (Table 1).

Table 1. Phthalate Compound Results in DMMU "Aurora 1" Sediments

Compound	*DMMP Screening Level (mg/kg)*	2016 Result (mg/kg)	2018 Result (mg/kg)
Bis(2-ethylhexyl)phthalate	*1.3*	2.0	0.808
Diethyl Phthalate	*0.2*	0.25	non detected

Sediment samples were collected from twelve stations within and around the proposed Gastineau Channel disposal site in April 2018, by a contractor to the USACE (NewFields 2018a). Trace concentrations of bis-(2-ethylhexyl)phthalate and other phthalate compounds were reported in more than half of the disposal area sediment samples, although diethyl phthalate was generally not detected.

The USACE determines that the sediment from DMMU "Aurora 1" is suitable for open-water disposal at the designated disposal site. The maintenance dredging planned for Aurora and Harris Harbors under this project will be limited to the DMMUs "Aurora 1", "Aurora 2", and "Harris 1" (figures 4, 5, and 7). DMMUs "Aurora Large Boat Parking" and "Harris 2" will not be disturbed at this time.

2.7 Construction Considerations and Minimization of Environmental Impacts

2.7.1 Dredging Best Management Practices

Dredging will be conducted so as to minimize the amount of suspended sediment generated. Best management practices may include:

- Avoiding multiple bites while the bucket is on the seafloor.
- No stockpiling of dredged material on the seafloor.
- No leveling of the seafloor with the dredge bucket.
- Slowing the velocity (i.e., increasing the cycle time) of the ascending loaded clamshell bucket through the water column.

- Pausing the dredge bucket near the bottom while descending and near the water line while ascending.
- Placing filter material over the holding-scow scuppers to remove sediment from th4e return water.

2.7.2 Control of Dredged Material Discharge

The contractor conducting the dredged material disposal modeling (NewFields 2018b) recommends the following constraints be placed on disposal operations to reduce the potential spreading effect of tidal currents to place material inside the proposed boundary:

- During ebb or flood tide, the scow should approach the appropriate placement zone from the down-current side of the disposal site, releasing material within the designated 300 feet by 180 feet disposal zones.
- During low current or slack conditions, disposal closer to the site center within the appropriate placement zone will minimize the dredged material footprint.
- When feasible, the schedule for disposal activities should avoid peak tidal currents, placing material at slack tides or midway between Lower Low Water (LLW) and Higher High Water (HHW), especially during spring tide conditions.
    - Disposal should occur with barge speed over ground (SOG) of 0.0 to 1.0 knots. A slow velocity and short disposal duration will result in a smaller mound footprint.

2.7.3 Contaminant Discharge Prevention

The contractor will be required to prepare an Oil Spill Prevention and Control Plan. Reasonable precautions and controls would be used to prevent incidental and accidental discharge of petroleum products or other hazardous substances. Fuel storage and handling activities for equipment would be sited and conducted so there is no petroleum contamination of the ground, surface runoff or water bodies. Equipment would be inspected on a daily basis for leaks. If leaks are found the equipment would not be used and pulled from service until the leak is repaired. During construction, spill response equipment and supplies such as sorbent pads shall be available and used immediately to contain and cleanup oil, fuel, hydraulic fluid, antifreeze, or other pollutant spills. Any spill amount must be reported in accordance with Discharge Notification and Reporting Requirements (AS 46.03.755 and 18 AAC 75 Article 3).

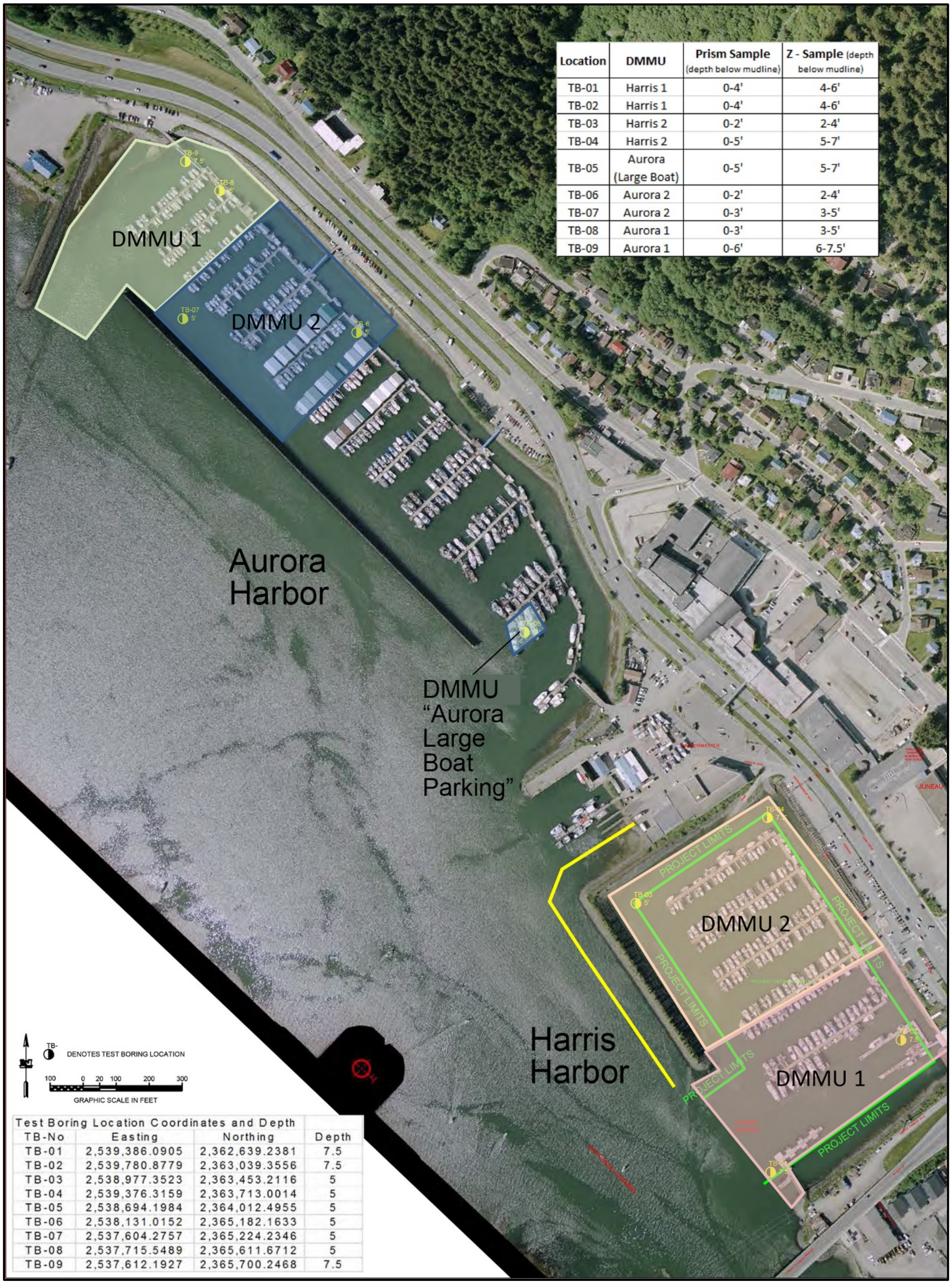

Figure 7. Locations of DMMUs at Aurora and Harris Harbors, and 2016 sampling points (USACE 2016b).

2.7.4 Timing of Construction Activities

The proposed schedule for the maintenance activities (Section 2.5) avoids the most vulnerable periods for fish in Gastineau Channel. Pile-driving at Aurora Harbor, and dredging at Aurora and Harris harbors, should almost entirely avoid the periods when juvenile salmon are released from the Macaulay Hatchery in Juneau (located about 1.5 miles northwest of Aurora Harbor), and when mature adult salmon are returning to the hatchery. This schedule also avoids the periods when sea mammals are likely to be most active near the harbors, in pursuit of salmon. Other maintenance activities, such as the completion of the new wave barrier at Aurora Harbor and manipulation of rock at the Harris Harbor breakwater, should have little or no effect on fish.

The October-to-February schedule for maintenance dredging is also timed to coincide with decreased boat operation within the harbors, and with City and Borough of Juneau (CBJ) plans to replace floats within Aurora Harbor. Use of the Gastineau Channel dredged material disposal site will end by 15 February at the request of the Alaska Department of Fish and Game (Messmer 2019), so as to minimize project impacts on the commercial tanner crab fishery that starts in mid-February.

3.0 Affected Environment

3.1 Community and People

Juneau is a city of 32,269 (2017 certified population) located 577 air miles southeast of Anchorage, Alaska, and 900 air miles northwest of Seattle, Washington. The city can be accessed only by air or water transportation. The city population is about 69% white, 12% Alaska Native or Native American, and 7% Asian (ADCRA 2019).

3.2 Project Setting and Current Land Use

Harris and Aurora Harbors are part of a larger, nearly contiguous strip of maritime infrastructure extending roughly three miles along the eastern shore of Gastineau Channel at Juneau (figure 1). The City and Borough of Juneau Department of Docks and Harbors operates and manages these and several other small boat harbors and small boat floats, as well as two cruise ship docks, six launch ramps, boat yards, and commercial loading facilities (CBJ 2019). Aurora Harbor is the largest harbor in Juneau, with capacity for 465 vessels, while Harris Harbor has moorage for 288 vessels. These harbors serve a combination of commercial fishing vessels, charter vessels, and private recreational vessels. About 100 commercial fishing boats hold year-around stalls in Harris and Aurora Harbors, representing roughly one-third of the Juneau commercial fishing fleet. About 160 people live permanently in vessels or float houses moored within Harris and Aurora Harbors. The harbors are nearly at capacity during the summer, and are used by hundreds of transient vessels in a typical year (CBJ 2017).

Commercial vessels fish for tanner crab in Gastineau Channel, including the proposed disposal site and the route between the disposal site and the Douglas Island Bridge (Messmer 2019).

3.3 Climate

Juneau has a typical southeast maritime climate of cool summers, mild winters, and heavy rain and fog throughout the year. Southeast Alaska lacks prolonged periods of freezing weather at coastal altitudes, but experiences long periods of cloudiness and precipitation (ADCRA 2019).

3.4 Topography, Soils, and Hydrology

Gastineau Channel separates Douglas Island and the Alaska mainland, and marks a deeply-buried fault. While 16 miles long, the channel is navigable by large vessels only via the southeast, for roughly 9.7 miles. A few miles northwest of Aurora Harbor, the channel is navigable only by small craft, and only at high tide. Infilling of Gastineau Channel with sediment from the Mendenhall Glacier, carried by the Mendenhall River, has created a vast delta wetland at the north end of the channel, which is now protected as Mendenhall Wetlands State Game Refuge. Continuing isostatic rebound of surface rock formations, following the retreat of the Mendenhall Glacier, is also contributing to the increasing shallowness of this portion of the channel (ADFG 2019b).

3.5 Tides, Currents, and Sediment Transport

Tides enter both ends of Gastineau Channel and meet roughly in the vicinity of Sunny Point. Since the tides are very closely equal in range and phase, tidal velocities in this area are almost zero. This contributes to growth of the Mendenhall River shoal as sediments are brought into the area by tributary streams and tidal currents. The tides display the diurnal inequality typical of the Pacific Ocean (USACE 1977).

- Tidal elevation data within Gastineau Channel at Juneau for the period 2012-2016 were:
- Mean higher high water (MHHW): 16.30 feet
- Mean high water (MHW): 15.34 feet
- Mean low water (MLW): 1.60 feet
- Mean lower low water (MLLW): 0.00 feet (NOAA 2019).

3.6 Water Quality

Water quality within Gastineau Channel at Juneau is monitored closely, largely due to the heavy traffic of cruise ships. Effluent from cruise ships is tested for parameters such as fecal coliform, total suspended solids, chlorine, and metals (CPVEC 2019). Gastineau Channel is not an “impaired water” under Section 305(b) of the Clean Water Act (CWA), although several streams discharging into the channel, such as Vanderbilt Creek and Lemon Creek, are listed as impaired by turbidity and sediment (ADEC 2019).

3.7 Air Quality

Gastineau Channel and Juneau enjoy generally good air quality, with the primary sources of air pollutants being ocean vessels such as cruise ships and ferries, along with individual fuel oil or wood stoves, and vehicles such as cars, aircraft, and boats. A portion of the greater Juneau area, the Mendenhall Valley, was designated by the U.S Environmental Protection Agency (USEPA) in 1991 as a moderate Clean Air Act (CAA) nonattainment area for the National Ambient Air Quality Standard (NAAQS) for particulate matter. This designation was based on violations of the 24-hour particulate standard that occurred throughout the 1980s. The EPA fully approved Alaska's moderate particulate nonattainment area plan as a State Implementation Plan (SIP) revision for the Mendenhall Valley particulate nonattainment area in 1994. There have been no measured violations of the PM_{10} standard since 1994. EPA has approved a Limited Maintenance Plan (LMP) for the Mendenhall Valley area of Juneau that provides contingency plans if Juneau experiences a particulate problem in the future. Juneau is designated as in attainment for airborne particulates (ADEC 2019b).

The cruise ships that dock at downtown Juneau every year are a conspicuous source of air emissions, one that has drawn complaints from the public. A study is planned for 2019 to determine which areas of downtown Juneau are most affected, and assess whether the scale of impacts in terms of frequency, duration, and severity has the potential to significantly affect public health or violate CAA standards (ADEC 2019c).

3.8 Airborne Noise

Along the Juneau waterfront, noise levels presumably fluctuate with the seasons, with nearby boat traffic, vehicles, aircraft, construction equipment, and generators as the most significant sources of human generated noise. The four-lane Egan Drive runs immediately inland of both harbors, and carries heavy traffic between downtown Juneau and the Mendenhall Valley and airport areas to the north. No recent ambient noise studies are known to have been performed in the project area.

3.9 Biological Resources

3.9.1 Habitat

The Alaska Department of Fish and Game (ADFG) conducted a dive survey in December 2009, in the general vicinity of the proposed Douglas Harbor disposal site (ADFG 2010), which is adjacent to the proposed Harris and Aurora Harbors disposal site (figure 6). The purpose was to characterize the benthic habitat in that area of Gastineau Channel. The seafloor was composed of silt, and was largely featureless, with no attached vegetation or rock formations, and little sign of biological activity. The divers noted three male tanner crabs, a small group of striped shrimp, and a few juvenile flatfish, snails, and hermit crabs. The dive survey report concluded that the habitat type and depth of the surveyed area is not well suited for species targeted by sport and commercial fisheries, and that the area's proximity to Gastineau Channel vessel traffic routes make it an unlikely place to place crab or shrimp pots (ADFG 2010).

The benthic habitats of the Harris and Aurora harbor basins have not been evaluated recently. Older, shoaling small boat harbors are typically subject to frequent disturbance and suspended sediment from prop-wash. Floating docks are attractive cover for juvenile fish, and improperly disposed-of fish waste can support crab and seastars. Sea mammals such as sea otters, seals, and sea lions may gather in and around the boat harbors during periods when commercial and sport fishermen bring in their catches, but are unlikely to remain absent a source of food.

3.9.2 Endangered and Threatened Species

Based on discussions with the NMFS (Gann 2018) and online information provided by the National Marine Fisheries Service (NMFS), the species listed in Table 2 are identified as species listed under the Endangered Species Act (ESA) that may be present in the project area. Both of these species are under the jurisdiction of the NMFS. No ESA-listed species under the jurisdiction of the U.S. Fish and Wildlife (USFWS) are identified in the project area.

Table 2. ESA-listed species

Species	Listed Population	ESA Status
Steller sea lion, *Eumetopias jubatus*	Western DPS occurring east of 144°W long	Endangered
Humpback whale, *Megaptera novaeangliae*	Mexico DPS	Threatened

DPS: Distinct Population Segment

Steller Sea Lion. The Steller sea lion was listed as a threatened species under the ESA in November 1990. In 1997, NMFS reclassified Steller sea lions into two distinct population segments (DPSs) based on genetic studies and other information (62 FR 24345); Steller sea lions from breeding colonies located to the west of 144°W longitude (roughly aligned with Cape Suckling, on the Gulf of Alaska coast between Cordova and Yakutat), are assigned to the western DPS (WDPS), and the remainder to the eastern DPS (EDPS). Initially, the WDPS was relisted as endangered, and the EDPS as threatened under the ESA, but in 2013 the EDPS was removed from the list of threatened species.

However, tagging studies show that there is regular movement of WDPS individuals across the 144°W boundary. The majority of the cross-boundary movements are temporary, with individuals returning to their natal DPS for breeding, but some females from the WDPS have likely emigrated permanently and have given birth to pups at EDPS rookeries. WDPS Steller sea lions are common from Cape Suckling through Yakutat and northern southeast Alaska, potentially including the waters of Gastineau Channel (NMFS 2013).

Gastineau Channel is within the EDPS territory; NMFS-designated critical habitat for WDPS Steller sea lions exists within the de-listed EDPS range, but not within Gastineau Channel. No established haulouts or rookeries are present within Gastineau Channel, although several haulouts exist nearby on Lynn Canal and Taku Inlet. A WDPS Steller sea lion in Gastineau Channel would most likely be foraging during salmon runs.

Humpback whale. Humpback whales were originally listed as endangered with the passage of the ESA in 1973. The NMFS currently recognizes three DPSs of humpback whale occurring in Alaska waters (NMFS 2016a):

1. Western North Pacific DPS (ESA endangered);
2. Mexico DPS (ESA threatened); and
3. Hawaii DPS (not listed under the ESA).

Whales from these three DPSs overlap to some extent in feeding grounds off Alaska. An individual humpback whale encountered in southeast Alaska waters has an 89% percent probability from being from the unlisted Hawaii DPS, a 10.5% percent chance of being from the threatened Mexico DPS, and only a 0.5% percent chance of being from the endangered Western North Pacific DPS (Table 3). No CH is designated in Alaskan waters for humpback whales.

Table 3. Humpback Whale DPS Distribution in Alaskan Waters

Summer Feeding Areas	**Hawaii DPS (not listed)**	**Mexico DPS (threatened)**	**Western North Pacific DPS (endangered)**
Aleutian Islands, Bering, Chukchi, and Beaufort Seas	86.5%	11.3%	4.4%
Gulf of Alaska	89.0%	10.5%	0.5%
Southeast Alaska	94.0%	6.0%	0.0%

The humpback whale is seasonally migratory, mating and calving in tropical and subtropical waters in winter, but spending summers feeding in temperate and subpolar seas. In Alaskan waters, humpbacks concentrate in southeast Alaska, Prince William Sound, lower Cook Inlet, and along the Aleutian Islands in summer. About 6,000 humpback whales gather in southeast Alaska each summer. Most humpbacks leave Alaskan waters in early autumn, although a few individuals overwinter in southeast Alaska (ADFG 2018). A humpback whale found in Gastineau Channel would be foraging, perhaps taking advantage of salmon or herring runs.

3.9.3 Marine Mammal Protection Act

Marine mammals in the area not listed under the ESA but protected by the Marine Mammal Protection Act (MMPA) include:

- Steller sea lion (Eastern DPS)
- Humpback whale (Hawaii DPS)
- Harbor seal
- Harbor porpoise
- Killer whale
- Northern sea otter (Southeast Alaska DPS)

3.9.4 Bald and Golden Eagle Protection Act

The bald eagles commonly seen along the Southeast Alaska coast are protected under the Bald and Golden Eagle Protection Act, as well as the Migratory Bird Treaty Act (see below). In addition to prohibiting direct takes such as killing eagles or destroying nests, this act also regulates human activity or construction that may interfere with eagle's normal breeding, feeding, or sheltering habits (USFWS 2011).

3.9.5 Migratory Bird Treaty Act

With the exception of State-managed ptarmigan and grouse species, all native birds in Alaska (including active nests, eggs, and nestlings) are protected under the Federal Migratory Bird Treaty Act (MBTA; USFWS 2009).

3.9.6 Essential Fish Habitat and Anadromous Streams

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act established the essential fish habitat (EFH) provision to identify and protect important habitats of Federally-managed marine and anadromous fish species. Federal agencies that fund, permit, or undertake activities that may adversely affect EFH are required to consult with National Marine Fisheries Service (NMFS) regarding the potential effects of their actions on EFH, and respond in writing to NMFS recommendations. An EFH Assessment was prepared for this project, and submitted to the NMFS along with this EA; most of the information in the EFH Assessment is directly reproduced in this EA, so the EHF Assessment has not been appended to this EA.

Based on EFH maps and descriptions in the Pacific salmon fishery management plan (FMP; NPFMC 2018a), the Bering Sea/Aleutian Islands Groundfish FMP (NPFMC 2018b), and information provided by the NMFS Alaska EFH Mapper web application, the marine waters of Gastineau Channel contain EFH for the five Pacific salmon species and eight groundfish species at the life-stages summarized in table 4.

Table 4. Marine Essential Fish Habitat in the Project Areas

Species	Life-Stage	Seasons
Pink salmon	Juvenile, mature	Spring, summer, fall
Chum salmon	Juvenile, mature.	Spring, summer, fall
Sockeye salmon	Juvenile, immature, mature	Spring, summer, fall
Coho salmon	Juvenile, mature.	Spring, summer, fall
Chinook salmon	Juvenile, immature, mature	Spring, summer, fall
Arrowtooth flounder	Larvae	Summer
Dover sole	Egg, larve	Summer
Flathead sole	Egg	Summer
Northern rock sole	Larvae	Summer
Pacific cod	Larvae	Summer
Pacific ocean perch	Larvae	Summer
Rex sole	Egg	Summer
Sablefish	Larvae	Summer
Southern rock sole	Larvae	Summer
Walleye pollock	Egg, larvae	Summer
Yellowfin sole	Egg	Summer

EFH for all Pacific salmon species includes freshwater habitat, and extends to all streams, lakes, wetlands, and other water bodies currently or historically assessable to salmon. These waters and their salmon fisheries are managed by the State of Alaska. The location of many freshwater water bodies used by salmon are contained in documents organized and maintained by the Alaska Department of Fish and Game (ADFG). Alaska Statute 16.05.870 requires ADFG to specify the various streams that are important for spawning, rearing, or migration of anadromous fishes. This is accomplished through the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* and the *Atlas to the Catalog of Waters Important for Spawning, Returning or Migration of Anadromous Fishes*. (NPFMC 2018a).

The steep confines of southeast Gastineau Channel allows limited freshwater habitat for salmon. The Anadromous Waters Catalog (AWC) identifies about ten salmon streams discharging into

Gastineau Channel between Salmon Creek and the southeast entrance of Gastineau Channel. These streams tend to be very short due to the steep coastal topography; the AWC reports only chum and pink salmon spawning in a small number of southeast Gastineau Channel streams (ADFG 2019).

The majority of salmon present within Gastineau Channel are produced by the Macaulay Salmon Hatchery, located in Juneau about 1.5 miles northwest of Aurora Harbor, and operated by Douglas Island Pink and Chum, Inc. (DIPAC). The hatchery incubates Chinook, coho, and chum salmon eggs, and releases salmon fry and smolt from the hatchery itself and from several other release sites along Gastineau Channel. Eggs are harvested from returning salmon to sustain the program (DIPAC 2018). Fry and smolt release generally occurs mid-May to early June, with mature adult salmon returning to the release sites from late June to early October (Brock Meredith, DIPAC operations manager, personal communication).

3.10 Special Aquatic Sites

Special aquatic sites, identified as part of the Clean Water Act, are waters of the U.S. possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region. The following ecosystems are considered to be special aquatic sites:

- Wetlands
- Coral reefs
- Sanctuaries and refuges
- Mudflats
- Vegetated shallows
- Riffle and pool complexes

None of these categories are known to exist in the areas affected by the planned activities. The Clean Water Act defines vegetated shallows as “permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as turtle grass and eelgrass in estuarine or marine systems as well as a number of freshwater species in rivers and lakes” (40 CFR 230.43). The Gastineau Channel disposal site is known to not support rooted vegetation (section 3.8.1)

3.11 Cultural and Historic Resources

Section 106 of the National Historic Preservation Act (NHPA) of 1966 and its implementing regulations require all Federal agencies to identify historic properties within an undertaking’s area of potential effect (APE). The only historic properties that would be affected by the planned maintenance activities are the Harris and Aurora Harbor breakwater structures themselves, cataloged in the Alaska Historic Resource Survey (AHRS) as JUN-1291 and JUN-1292, respectively. There are no known underwater cultural resources, such as shipwrecks, within the APE of either project site (Eldridge 2019a, Eldridge 2019b).

4.0 Environmental Consequences

4.1 No-Action Alternative

The no-action alternative would avoid the direct and indirect environmental impacts described below, but would not accomplish the objective of returning the harbors to their authorized design depths, or the breakwaters to their operational condition.

4.2 Action Alternatives

As described in Chapter 2, the USACE has identified mechanical dredging of harbor sediments and disposal of the dredged material at a selected in-water disposal site as the most effective and environmentally acceptable alternatives for the proposed maintenance dredging. The repair of the breakwaters would proceed as described previously.

4.2.1 Effects on Community and People

The intent of the proposed maintenance dredging is to benefit economic activity by ensuring local vessels have safe, effective access to the harbor. The presence of the dredging barges and scows within the confines of the harbors may cause obstruction of the harbor channels and restricted access to moorage. Limitations on harbor access and inconvenience to harbor users will be minimized by close coordination with the harbormaster and other stakeholders, and will be scheduled to the least disruptive time periods to the extent possible. All activities are scheduled for the winter months, and the Aurora Harbor dredging is scheduled to coincide with the removal of that harbor's float system by the CBJ.

The USACE determines that there will be no significant impacts to economic or subsistence activities in the limited area affected by the planned maintenance activities.

4.2.2 Effects on Land Use

The proposed alternatives will not change the use of the harbor or any surrounding lands except for the short-term limitations on harbor access during dredging, as described above. Operations at the in-water disposal site are scheduled to end on 15 February 2021, to avoid potential interference with the Gastineau Channel commercial tanner crab fishery that starts in mid-February (Messmer 2019).

The USACE determines that there will be no significant impacts to land use.

4.2.3 Climate

The USACE determines that the planned maintenance activities will have no discernable effect on climate, but will improve the climate resilience of these federal projects.

4.2.4 Effects on Topography, Soils, and Hydrology

The dredging action will remove shoaled sediment from the bottom of the harbors, returning them to their design contours in the areas dredged; it will have no effect on upland topography or hydrology. Disposal of the dredged material will create a mound of sediment roughly 1,500 feet in diameter on the disposal site sea floor, with a central depth of about 6 feet tapering to trace thickness at the edges (figure 6). This mound is likely to flatten out and dissipate over time. The dredged material is expected to be similar in composition to the benthic sediment at the disposal site.

The USACE determines that there will be no significant impacts to topography, soils, or hydrology.

4.2.5 Effects on Tides, Currents, and Sediment Transport

The removal of sediment from the harbor will return a portion of the harbor contours to their original design; this may have a small effect on water movement through the harbor versus pre-dredging conditions. The disposal site is in roughly 130 feet of water, and the low mound created there by the discharge of dredged material will have no discernable effect on the movement of water within Gastineau Channel.

The USACE determines that there will be no significant impacts to topography, soils, or hydrology.

4.2.6 Effects on Water Quality

Both the dredging and dredged material disposal actions have the potential to increase turbidity at the dredging location and at the disposal site. A certain amount of temporarily increased turbidity is inevitable as the dredged material moves through the water column. However, the overall quantity of dredged material is relatively small, and only material suitable for in-water disposal will be disturbed (Section 2.6). Section 2.7 details measures that will be followed to minimize the spread of disturbed sediment, and to minimize the risk of the release of fuel or other contaminants during the maintenance activities. Concurrent with the public review of this EA, the USACE will apply for a CWA Section 401 Certification of Reasonable Assurance from the State of Alaska Division of Water.

The USACE determines that the planned activities will not cause significant adverse impacts on water quality.

4.2.7 Effects on Air Quality

The operation of construction equipment and vessels during the planned maintenance activities would, in the short term, add incrementally to the air pollutant emissions ordinarily generated by vessels and machinery along the Juneau waterfront. The tugboats, dredging equipment, and construction machinery likely to be used during project would be primarily diesel-powered, and comparable to existing mobile emission sources at Juneau. Direct, short term project-related impacts to air quality in the greater Juneau area would be highly variable and transitory, where noticeable at all. The planned activities will not create any new stationary source of air emissions.

The USACE determines that the planned activities will not cause significant adverse impacts on air quality.

4.2.8 Effects on Airborne Noise

The operation of equipment and vessels during the planned activities would, in the short term, add incrementally to the noise ordinarily generated by vessels and machinery at Harris and Aurora Harbors. Most project-related noise would be low-frequency, low-amplitude sound generated by diesel machinery and the movement of rock and other materials. The installation of new pilings for the wave barrier would be a source of higher-frequency, high-energy sound during its construction, and is likely to generate the most conspicuous noise of the project.

Sound is usually measured in decibels (dB) on a relative scale. Airborne noise weighted for human hearing is measured on an "A-weighted scale", with units of dBA. The A-weighted decibel scale begins at zero, which represents the faintest sound level that humans with normal hearing can detect. Decibels are measured on a logarithmic scale, so each 10 dB increase doubles the sound; therefore a noise level of 50 dBA is twice as loud to the listener as a noise of 40 dBA. Table 5 compares typical dBA sound levels for a range of noise situations (WSDOT 2019).

People working and living at Aurora Harbor could be significantly affected by airborne noise generated from the pile-driving necessary to replace the breakwater wave barrier. Additionally Juneau-Douglas High School is located within 180 yards of the nearest point on the breakwater; a hotel (the Breakwater Inn) within 222 yards; and a residential area on Glacier Avenue within 260 yards. Work areas exist to the north and south of Aurora Harbor within 130 yards. Using a standard noise-attenuation formula (WSDOT 2019), the noise from a pile-driver generating 110 dBA (measured at 50 feet away) would be expected to diminish over distance in the following manner:

- 50 feet…………………..…110 dBA
- 130 yards (390 feet)……….88 dBA
- 220 yards (660 feet)……….82 dBA
- 260 yards (2,550 feet)……..80 dBA

Table 5. Comparison of dBA sound levels (WSDOT 2019).

Representative Sounds	dBA	Human Reaction
Rocket launching pad	180	Irreversible hearing loss
Carrier deck jet operation Air raid siren	140	Painfully loud
Thunderclap	130	Painfully loud
Jet takeoff (200 ft) Auto horn (3 ft)	120	Maximum vocal effort to communicate
Pile driver Rock concert	110	Extremely loud
Garbage truck Firecrackers	100	Very loud
Heavy truck (50 ft) City traffic	90	Very annoying Hearing damage over time
Alarm clock (2 ft) Hair dryer	80	Annoying
Noisy restaurant Business office	70	Conversation difficult
Air conditioning unit Conversational speech	60	Intrusive
Light auto traffic (100 ft)	50	Quiet
Library Soft whisper (15 ft)	30	Very quiet
--	10	Barely audible

Airborne noise of an intensity of 80 to 88 dBA would be perceived as “annoying” to “very annoying” (table 4), and would be unacceptable in a school or residential setting for a sustained period of time. Anyone residing on a vessel within Aurora Harbor itself (section 3.2) would be subjected to noise of greater intensity. This calculation does not take into account that the elevation of the top of the Aurora Harbor breakwater, at 10 feet above MLLW (figure 5), is about 15 feet below the elevation of the land at the edge of the harbor. This difference in elevation may help limit the transmission of airborne noise beyond the harbor limits, but would not help people residing within the harbor, who may need to be relocated for the duration of the pile-driving.

The potential effects of airborne noise caused by the planned activities, and possible mitigatory measures, require further and more comprehensive analysis.

4.2.9 Effects on Habitat

The harbor basins and the proposed in-water disposal site represent marginal, low-complexity benthic habitat that will be temporarily disrupted by the planned dredging and disposal activities, but not significantly degraded in the long term. Crab and other slow-moving invertebrates within the harbor dredging areas may be killed and/or entrained by the dredge, and buried under dredged material at the disposal site. Bottom-dwelling fish may be able to escape from both the dredge and the discharge of dredged material. The benthic conditions within the harbor basins and disposal site at the end of the project will be reasonably similar to the initial conditions, and those areas will be recolonized by a similar community of organisms.

The USACE determines that the planned activities will not have a significant long term impact on habitat.

4.2.10 Effects on Endangered and Threatened Species

As the proposed project may affect the ESA-listed species discussed above in similar ways, the evaluation of potential effects is organized here by type of effect, rather than individual species. The project may have short-term potential effects associated with construction, as well as long-term effects caused directly or indirectly by the finished project. Neither Steller sea lions nor humpback whales are known to congregate at or preferentially use habitat in the project area. Any project effects are likely to be on individual animals that are incidentally in the vicinity of maintenance activities or project-related vessel traffic.

Generally speaking, marine mammals face common threats from human activities:

- Vessel strikes
- Noise and disturbance
- Direct impacts from human fishing (e.g., entanglement in fishing gear)
- Indirect impacts from human fishing (e.g., competition for food resources)
- Contaminants and pollutants
- Habitat degradation caused by human activities
- Hunting and illegal killings

The major maintenance activities at Juneau will consist of:

- Dredging sediment from the existing boat harbors
- Disposing of the dredged material at the designated disposal site
- Driving new pilings into the top of the Aurora Harbor breakwater
- Placing new rock at the Harris Harbor breakwater

The main potential threats to marine mammals from these activities include:

- Noise and disturbance
- Vessel strikes
- Release of pollutants into the water column

Noise and Disturbance

The NMFS has developed comprehensive guidance on sound levels likely to cause injury to marine mammals through onset of permanent and temporary threshold shifts (PTS and TTS;

Level A harassment; 81 FR 51693). Under the PTS/TTS Technical Guidance (NMFS 2016c), the NMFS uses the following thresholds for underwater sounds that cause injury, referred to as Level A harassment under section 3(18)(A)(i) of the MMPA. These acoustic thresholds are presented using dual metrics of cumulative sound exposure level (LE) and peak sound level (PK) for impulsive sounds and LE for non-impulsive sounds:

Table 6. Marine Mammal Hearing Groups and Level A Acoustic Thresholds

Hearing Group	Relevant Species	Generalized Hearing Range	PTS Onset Acoustic Thresholds	
			Impulsive	Non-Impulsive
Low-Frequency Cetaceans (LF)	**Humpback whale** NP right whale NWP gray whale Blue whale Fin whale	0.007 to 35 kHz	$L_{pk,flat}$: 219 dB $L_{E,LF,24h}$: 183 dB	$L_{E,LF,24h}$: 199 dB
Mid-Frequency Cetaceans (MF)	Sperm whale Beluga whale	0.15 to 160 kHz	$L_{pk,flat}$: 230 dB $L_{E,MF,24h}$: 185 dB	$L_{E,MF,24h}$: 198 dB
High-Frequency Cetaceans (HF)	Porpoises	0.275 to 160 kHz	$L_{pk,flat}$: 202 dB $L_{E,HF,24h}$: 155 dB	$L_{E,MF,24h}$: 173 dB
Phocid Pinnipeds (PW)	Ringed seal Bearded seal Harbor seal Spotted seal	0.05 to 86 kHz	$L_{pk,flat}$: 218 dB $L_{E,PW,24h}$: 185 dB	$L_{E,PW,24h}$: 201 dB
Otariid Pinnipeds (OW)	**Steller sea lion**	0.06 to 39 kHz	$L_{pk,flat}$: 232 dB $L_{E,OW,24h}$: 203 dB	$L_{E,OW,24h}$: 219 dB

PTS: Permanent Threshold Shift: a permanent reduction in the ability to hear.
kHz: kilohertz (sound frequency)
dB: Decibels, unweighted (sound intensity)
L_{pk}: Peak sound level; "flat" = unweighted within the generalized hearing range.
L_E: Cumulative sound level; "24h" = 24-hour cumulative period.
LF, MF, HF, PW, OW: defined in "Hearing Group" column
(Adapted from NMFS 2016c)

The NMFS is in the process of developing guidance for behavioral disruption (Level B harassment). However, until such guidance is available, NMFS uses the following conservative thresholds of underwater sound pressure levels (measured in micropascals, or µPa), expressed in root mean square (rms), from broadband sounds that cause behavioral disturbance, and referred to as Level B harassment under section 3(18)(A)(ii) of the MMPA.

- impulsive sound: 160 dB re 1 μPa_{rms}
- continuous sound: 120 dB re 1μPa_{rms}

For air-transmitted sound, the NMFS has developed the following Level B thresholds:

- 100 dB re 20μPa_{rms} for non-harbor seal pinnipeds
- 90 dB re 20μPa_{rms} for harbor seals

The major sources of noise and disturbance expected during construction of this project are:

- Extraction and driving of steel H-piles
- Dredging;
- Placement of rock material; and,
- Project-related vessels (tugboats, barges, and scows);

Extraction and driving of new steel pilings in the Aurora Harbor breakwater has the potential to generate percussive high-amplitude sound both in the water and in the air. The generation of underwater noise will be greatly limited if extraction and driving of pilings is done when the top of the breakwater is exposed, and the pilings are not in contact with the water column. Air-transmitted noise generated during vibratory extraction and driving of the H-piles has been calculated by the Corps to reach the 90 dB air-transmitted noise disturbance threshold at a distance of approximately 150 meters.

Dredging typically generates underwater noise that are typically low-intensity (i.e., sound pressure levels of less than 190 dB re 1 µPa at 1 m) and non-impulsive, with frequencies below 1,000 kHz, and do not pose a significant risk of injury or mortality to aquatic organisms (McQueen, *et al,* 2018). The low frequency sounds produced by dredging are similar to that produced by commercial ship traffic, and overlap the hearing frequency ranges of most marine animals, potentially posing a risk of temporary threshold shifts, auditory masking, and behavior response in marine mammals. However, a review by the study of available field observations found that whales and seals generally had no adverse reactions or avoidance behavior near active dredging operations. Bowhead whales sometimes exhibited avoidance or altered feeding behavior in experiments that broadcast simulated dredging sounds underwater (Richardson, *et al*, 1990). A one-year field study evaluating avoidance behavior in harbor porpoises revealed that there may be short-term avoidance of areas near dredging activity; however, these effects were short-term and porpoises return to the areas after the dredging activity was completed (Diederichs, *et al*, 2010). In other observational studies, seals did not exhibit avoidance or altered behavior near dredging activities (Gilmartin 2003). In the absence of specific information on Steller sea lion or humpback whale disturbance behaviors, or on the type of dredge to be used at Aurora and Harris Harbors, a conservative sound profile documented during the operation of a large bucket dredge in Cook Inlet has been used by the NMFS to calculate a 120 dB isopleth at a distance of 300 meters from the project dredging (Gann 2019b).

Placement of rock material to repair breakwaters produces low-intensity underwater sound; armor stone is typically maneuvered carefully into place rather than allowed to drop, to avoid damaging the armor stone or displacing the core material underneath.

The rock material may be placed by excavators or other heavy equipment working from barges or from shore. The intensity of air-transmitted noise from on-land construction equipment is most often expressed in decibels weighted for the human-hearing frequency range ("A-weighted” decibels, or dBA), whereas water-transmitted noise intensity is generally expressed in unweighted decibels (dB). The A-weighting convention was developed for human health and safety, and emphasizes the frequencies between 1 kHz and 6.3 kHz to simulate the relative response of human hearing. Table 4 shows typical averaged maximum (L_{max}) or time-weighted (L_{eq}) noise intensity levels generated by shore-based heavy construction equipment, expressed as dBA measured at a distances of 50 feet or 10 meters (33 feet; USDOT 2006; DEFRA 2005).

Table 7. Typical Air-Transmitted Noise Levels of Land Construction Equipment

Equipment	Averaged measured L_{max} @ 50 ft (dBA)[a]	Measured L_{eq} @ 33 ft (dBA)[b]
Bulldozer	82	81-86
Dump Truck	76	79-87
Excavator	81	69-89
Front End Loader	79	68-82

a. USDOT 2006; b. DEFRA 2005.

Studies of the frequency ranges of construction machinery noise tend to measure sound pressure levels in a general range of 0.063 to 8 kHz (Roberts 2009; DEFRA 2005), but this may again represent an emphasis on human hearing, and not the full range of frequencies generated by the equipment.

Air-transmitted noise levels generated by tugboat diesel engines are comparable to those of large construction equipment, generally 70-100 dBA within 50 feet of the engine (Navy 1987; USACE 2011; Dyer & Lundgard 1983).

The transmission of land-generated air-transmitted noise into an adjacent waterbody is not well studied. The transfer of sound energy from air into water via sound waves striking the air/water interface at a shallow angle is generally understood to be poor (Zhang 2002); noise generated on land at an elevation not far above the surface of an adjacent water body will be to a significant degree reflected off of the water’s surface, and not transmitted into the water.

Sound energy can also be transmitted from ground-based sources into water via vibration. Vibration from non-impact construction machinery transmitted through the ground is typically very low frequency, in the 10-30 Hz (0.01-0.03 kHz) range (Roberts 2009).

Tugboats may generate significant underwater noise, especially when maneuvering or holding a barge in position against a dock or the shore. During a 2001 acoustic survey of Cook Inlet (Blackwell and Greene 2002), the highest level underwater broad-frequency noise recorded (149 decibels (dB) re 1µPa, at a distance of 102 meters) was generated by a tugboat docking a gravel barge. The same tug/barge combination generated a maximum level of 125 dB re 1µPa, at a distance of 190 meters, when in transit. The underwater noise level generated by a tugboat can vary greatly with the size/horsepower of the tugboat engine and whether noise-reducing features, such as propeller cowlings, are present. Diesel-powered tugs typically generate underwater noise at relatively low frequencies, roughly in the 0.02 to 1 kHz range (USACE 1998).

At 0.02 to 1 kHz, the typical frequency range of underwater noise generated by a tugboat engine (USACE 1998) places it at the lower end of the generalized hearing range of low frequency (LF) cetaceans, and below or at the very lower limit of the hearing range of other marine mammals (Table 3). The noise generated by the tugboat engine is assumed to be non-impulsive/continuous; no source of impulsive noise from the tug and barge is anticipated other than brief, incidental sounds from docking or landing. The 125 dB re 1µPa, at a distance of 190 meters, of a tug and barge in transit (Blackwell and Greene 2002) falls well below the Level A harassment (injury) acoustic thresholds for non-impulsive noise shown in Table 3, but slightly exceeds the 120 dB re $1\mu Pa_{rms}$ default conservative threshold for a Level B disturbance from continuous noise. There is the potential for LF cetaceans within a few hundred meters of proposed action-related vessels in transit to experience a Level B disturbance (behavioral disruption) due to underwater noise; other marine mammals would likely be insufficiently sensitive to the low-frequency engine noise to experience a disturbance.

Air-transmitted noise levels generated by tugboat diesel engines are comparable to those of large construction equipment, generally 70 to 100 A-weighted decibels (dBA) within 50 feet of the engine (Navy 1987; USACE 2011; Dyer and Lundgard 1983). Thornton (1975) measured in-air barge noise at levels between 88 and 93 dBA in the aft deck of two barges. These levels fall below the level B disturbance threshold for pinnipeds (excluding harbor seals).

Vessel Strikes

The probability of vessel strikes on marine mammals depends on the frequency, speed, and route of the marine vessels, as well as distribution of marine mammals in the area. An analysis of ship strikes in Alaskan waters (Neilson et al, 2012) found that whale mortalities are more likely when large vessels travel at speeds greater than 12 knots. Another study (Vanderlaan and Taggart 2007) used observations to develop a model of the probability of lethal injury based upon vessel speed, projecting that the chance of lethal injury to a whale struck by a vessel is approximately 80 percent at vessel speeds over 15 knots, but approximately 20 percent at 8.6 knots. The relatively low speed of a typical ocean-going barge and tug (typically no more than 9 knots), together with a barge's blunt prow and shallow draft, make it far less likely to strike and inflict injury upon a marine mammal than larger, faster ocean-going vessels such as cruise ships and cargo ships. The limited maneuverability and long stopping-distance of a barge and tug would make it difficult for the vessels to avoid an observed marine mammal, and in many circumstances unsafe for them to attempt to do so. Conversely, however, the vessels' low speed and consistent course would enable marine mammals to avoid the path of the barge and tug well before there was a danger of collision.

Vessel operations supporting the planned maintenance activities will consist of a barge to serve as a dredging platform, barges or scows to transport dredged material to the disposal site, one or more barges to deliver equipment and supplies (including new rock for the Harris Harbor breakwater), and the tugboats required to maneuver the barges and scows. As described above, these slow-moving, shallow-draft vessels will present a low strike risk for marine mammals. Small craft may also be used during the project, especially for post-maintenance surveys.

Release of Pollutants

The increased vessel activity during the planned maintenance represents an increased risk of accidental leaks and improper discharges of fuel or other pollutants. Such releases may come from tugboats and survey vessels. Onshore discharges from shore-based construction equipment could potentially also contaminate marine waters.

Collection and analysis of sediment samples from Aurora and Harris harbors has shown the material to be dredged from those harbors is suitable for open water marine disposal (USACE 2018, USACE 2016); the planned maintenance dredging and disposal will not release harmful concentrations of contaminants into the environment. The dredging, disposal, and maneuvering of tugboats will cause a temporary increase in suspended sediment at the harbors and the disposal site. The increased turbidity would not directly harm marine mammals, but could potentially disrupt the migration and other movements on fish and other prey species. As described below, the dredging activities will be timed to minimize impacts on migrating fish. The sediment released during disposal is expected to stay within a 1,500-foot square centered on a relatively deep section of Gastineau Channel (figure 6). Gastineau Channel is over 4,000 feet across at that point, so fish occupying more shallow and productive waters closer to the shoreline should not be affected by elevated levels of suspended solids.

Proposed Avoidance and Minimization Measures for ESA Species

1. The Corps has planned the project activities, to the extent practicable, to occur during the late fall, winter, and early spring, when seasonal fish activity in Gastineau Channel is at a minimum. This period should also correspond to lower marine mammal presence in Gastineau Channel.

2. Pile Extraction and Driving (Aurora Harbor breakwater).

> a. Both pile extraction and driving will be done in-the-dry.
>
> b. A 150-meter shut-down radius will be observed for air-transmitted noise during pile extraction and driving (figure 8).
>
> c. A protected species observer (PSO), able to accurately identify and distinguish species of Alaska marine mammals, will be present at all times before and during pile-driving activities.

i. Prior to in-water construction activities, an exclusion (i.e., shut-down) zone will be established. For this project, the exclusion zone includes all marine waters within 150 meters (figure 8) of the sound source.

ii. Pile-driving will not be conducted when weather conditions or darkness restrict clear, visible observation of all waters within and surrounding the exclusion zone.

iii. The PSO will be positioned such that the entire exclusion zone is visible.

iv. The PSO will have the following to aid in determining the location of observed listed species, to take action if listed species enter the exclusion zone, and to record these events:

- Binoculars
- Range finder
- GPS
- Two-way radio communication with construction foreman/superintendent
- A log book of all activities which will be made available to the Corps and NMFS upon request

v. The PSO will have no other primary duty than to watch for and report on events related to marine mammals.

vi. The PSO will scan the exclusion zone for the presence of marine mammals for 30 minutes before any pile-driving or removal activities take place.

- If any listed species are present within the exclusion zone, pile-driving and removal activities will not begin until the animal(s) has left the exclusion zone or no listed species have been observed in the exclusion zone for 15 min (for pinnipeds) or 30 min (for cetaceans).
- Throughout all pile-driving activity, the PSOs will continuously scan the exclusion zone to ensure that listed species do not enter it.
- If any listed species enter, or appear likely to enter, the exclusion zone during pile-driving or removal activities, all pile-driving activity will cease immediately. Pile-driving activities may resume when the animal(s) has been observed leaving the area on its own accord. If the animal(s) is not observed leaving the area, pile-driving activity may begin 15 min (for pinnipeds) or 30 min (for cetaceans) after the animal is last observed in the area.

vii. Once the zone has been cleared, ramp-up procedures will be applied prior to beginning pile-driving activities each day and/or when pile-driving hammers have been idle for more than 30 min: a. For impact pile-driving, contractors will be required to provide an initial set of three strikes from the hammer at 40 percent energy, followed by a 30-sec waiting period. This procedure will be repeated two additional times.

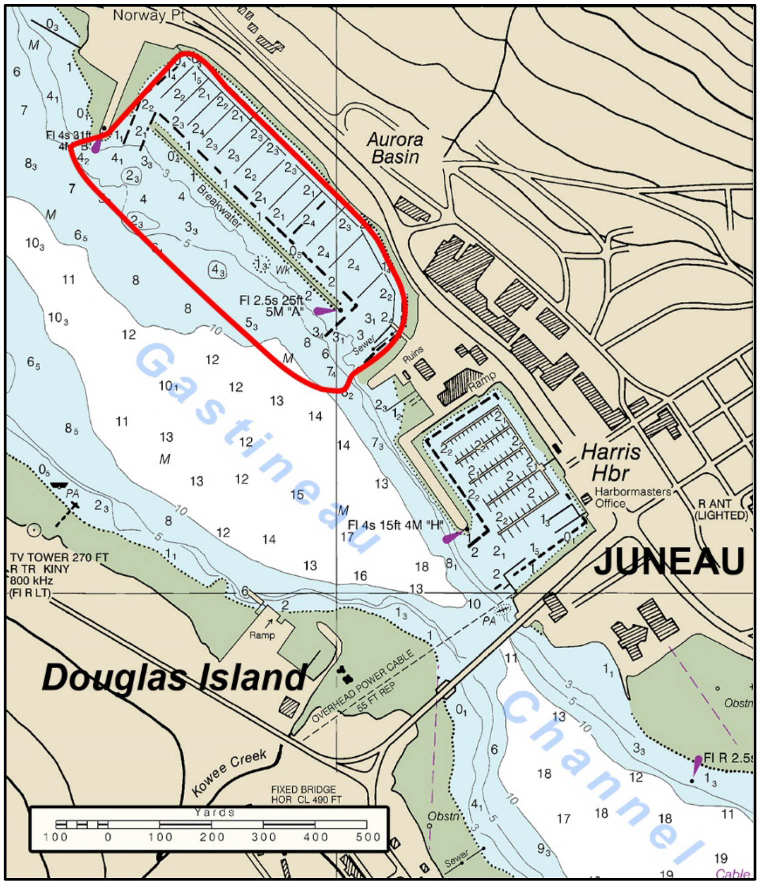

Figure 8. Representative 150-meter over-water radius from Aurora Harbor breakwater (in red), for air-transmitted noise.

<u>3. Maintenance Dredging (Aurora and Harris Harbors).</u>

a. IF DREDGING IS PERFORMED WITH A CLAMSHELL DREDGE, a 300-meter shut-down radius will be observed for underwater noise during dredging with a crane-operated clamshell/bucket dredge (figure 9).

b. PSO requirements and protocols as detailed in Section 3.4.2.c above will be observed.

Figure 9. 300-meter shut-down radii for underwater noise during dredging (from NMFS – Gann 2019b).

c. IF THE DREDGING IS PERFORMED WITH AN EXCAVATOR, the dredging crew will pause operation of the dredge if a marine mammal is spotted within 50 meters of the dredge bucket, and not resume dredging until the mammal has been observed again outside of this range, or until 15 minutes have elapsed since the mammal was last sighted. This monitoring will be performed by the standard crew of the dredge during the course of their duties, as the dredge crew will have the best view of any marine mammals approaching the dredge.

4. Vessel Operations.

a. To reduce the risk of collisions with protected species, project vessels will be limited to a speed of 8 knots, or the slowest speed above 8 knots consistent with safe navigation.

b. Vessel operators will not to approach within 100 yards of a marine mammal, to the extent practicable and given navigational and safety constraints.

5. The contractor will prepare an Environmental Protection Plan, to include an Oil Spill Prevention and Control Plan describing steps to avoid and mitigate releases of hazardous substances.

The Corps determines that the planned activities may affect, but are not likely to adversely affect the following ESA-listed species, or their designated critical habitat:

- Steller sea lion (Western DPS occurring east of 144°W long)
- Humpback whale (Mexico DPS)

The Corps has requested concurrence from the NMFS on this determination, in a letter dated 21 June 2019 (USACE 2019); the NMFS concurred in a letter dated 11 July 2019 (NMFS 2019).

4.2.11 Effects on Marine Mammals

The anticipated effects on marine mammals not listed under the ESA, e.g., Steller sea lion (Eastern DPS), humpback whale (Hawaii DPS), harbor seal, harbor porpoise, killer whale, and northern sea otter (Southeast Alaska DPS) are expected to be the same as described above for the ESA-listed marine mammals. The same avoidance and minimization measures as described in Section 4.2.10 would apply for marine mammals in general.

The Corps determines that the planned activities will not result in a taking under the MMPA.

4.2.12 Effects on Eagles and Migratory Birds

The area surrounding Aurora and Harris Harbors is mostly urbanized, with very little potential eagle nesting habitat within the recommended 660-foot buffer distance (USFWS 2011). Any eagles frequenting the area will be highly acclimated to human noise and activity. The USACE determines that the project will not result in a taking under the Bald and Golden Eagle Protection Act.

No other bird nesting habitat that could be disturbed by project activities is known to exist in or near the project area, and the probable November-April project timing would mostly avoid the nesting periods for southeast Alaska bird species (generally, mid-April to mid-July) identified by the USFWS (USFWS 2009). The USACE determines that the project will not result in a taking under the MBTA.

4.2.13 Effects on Essential Fish Habitat and Anadromous Streams

The potential effects on EFH are discussed in the appended EFH Assessment (Appendix B).

The Corps determines that the planned maintenance activities will not adversely affect essential fish habitat.

4.2.14 Effects on Cultural and Historic Resources

The USACE determined that the planned activities will result in no adverse effects to historic properties (Eldridge 2019a, Eldridge 2019b). The Alaska State Historic Preservation Officer has concurred with these determinations (SHPO 2019a, SHPO 2019b).

4.2.15 Effects on Coastal Zone Management

Alaska withdrew from the voluntary National Coastal Zone Management Program (http://coastalmanagement.noaa.gov/programs/czm.html) on July 1, 2011. Within the State of Alaska, the Federal consistency requirements under the Coastal Zone Management Act do not apply to Federal agencies, those seeking forms of Federal authorization, and state and local government entities applying for Federal assistance.

4.2.16 Effects on Environmental Justice and Protection of Children

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations was issued in 1994. The purpose of the order is to avoid disproportionate adverse environmental, economic, social, or health effects from Federal activities on minority and low-income populations. The proposed maintenance activities must be performed at the small boat harbors, so little discretion in the siting of the activities is possible. The area surrounding the harbors is primarily industrial and commercial. The USACE anticipates no disproportionate adverse effects on minority or low-income populations.

On April 21, 1997, Executive Order 13045, Protection of Children from Environmental Health and Safety Risks, was issued to identify and assess environmental health and safety risks that may disproportionately affect children. The proposed action will affect the community as a whole, and there will be no environmental health or safety risks associated with the action that will disproportionately affect children. The potential for intrusive noise at Juneau-Douglas High School during pile-driving at Aurora Harbor, while not a health or safety risk, will be evaluated further.

4.2.13 Cumulative Effects

Federal law (40 CFR 651.16) requires that NEPA documents assess cumulative effects, which are the impact on the environment resulting from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions.

By their nature, the planned maintenance activities are intended to return the Federal project to its designed configuration. The dredging of Aurora Harbor will be coordinated with the replacement of floats at Aurora Harbor to minimize disruption of activities at the harbor. No direct or indirect cumulative effects are anticipated.

5.0 Regulatory Compliance and Agency Coordination

5.1 Compliance with Laws and Regulations

This EA and unsigned Finding of No Significant Impact (FONSI) were prepared using information gathered during several iterations of this project, and the most recent correspondence with state and Federal resource agencies. Per the NEPA process and USACE regulations and guidance, the EA and unsigned FONSI are subject to a public review period. If requested, a public meeting may be held to discuss project alternatives and solicit public views and opinions.

The proposed dredged material disposal site in Gastineau Channel is within U.S. inland waters. The in-water disposal of dredged material at this site will be a discharge to waters of the U.S. under Section 404 of the Clean Water Act. The USACE does not issue Section 404 permits for its own actions; however, a Section 404(b)(1) evaluation has been prepared by the USACE and appended to this EA (Appendix A).

The USACE has engaged in informal consultation under the ESA with the NMFS; no species listed under the ESA under USFWS jurisdiction are present in the project area. The avoidance and minimization measures proposed in this EA for ESA and MMPA species were developed during informal consultation with the NMFS (Gann 2019b). The USACE has submitted a revised ESA determination letter to the NMFS documenting USACE adoption of these avoidance and minimization measures (USACE 2019); the NMFS concurred with the USACE determination of "may affect but not adversely affect" ESA-listed Steller sea lions and humpback whales in a letter dated 11 July 2019 (NMFS 2019).

The USACE has prepared an EFH Assessment under the Magnuson-Stevens Fisheries Conservation and Management Act (Appendix B), which it will submit to the NMFS Habitat Division for review along with this EA.

Maintenance dredging projects that return established navigation projects to their design parameters and use upland or established in-water disposal sites are generally regarded by the Corps, in the absence of unusual impacts or circumstances, to not be subject to the Fish and Wildlife Coordination Act (FWCA).

Alaska withdrew from the voluntary National Coastal Zone Management Program (http://coastalmanagement.noaa.gov/programs/czm.html) on July 1, 2011. Within the State of Alaska, the Federal consistency requirements under the Coastal Zone Management Act do not apply to Federal agencies, those seeking forms of Federal authorization, and state and local government entities applying for Federal assistance.

A checklist of project compliance with relevant Federal, state, and local statutes and regulations is shown in Table 8.

Table 8. Environmental Compliance Checklist

FEDERAL	Compliance
Archeological & Historical Preservation Act of 1974*	FC
Clean Air Act	FC
Clean Water Act*	PC
Coastal Zone Management Act of 1972	NA
Endangered Species Act of 1973*	FC
Estuary Protection Act	FC
Federal Water Project Recreation Act	FC
Fish and Wildlife Coordination Act	NA
National Environmental Policy Act *	PC
Land and Water Conservation Fund Act	FC
Marine Protection, Research & Sanctuaries Act of 1972	NA
National Historic Preservation Act of 1972*	FC
River and Harbors Act of 1899	FC
Magnuson-Stevens Fishery Conservation & Management Act *	PC
Marine Mammal Protection Act	FC
Bald Eagle Protection Act	FC
Watershed Protection and Flood Preservation Act	FC
Wild & Scenic Rivers Act	NA
Executive Order 11593, Protection of Cultural Environment	FC
Executive Order 11988, Flood Plain Management	FC
Executive Order 11990, Protection of Wetlands	FC
Executive Order 12898, Environmental Justice	FC
Executive Order 13045, Protection of Children	FC
STATE AND LOCAL	
State Water Quality Certification *	PC
Alaska Coastal Management Program *	NA

PC = Partial compliance, FC = Full compliance
*Full compliance will be attained upon completion of the Public Review process and/or completion of coordination with the responsible agency.

6.0 Conclusion

The completed environmental assessment supports the conclusion that the proposed maintenance dredging does not constitute a major Federal action significantly affecting the quality of the human and natural environment. An environmental impact statement (EIS) is therefore not necessary for the annual maintenance dredging, and the prepared Finding of No Significant Impact (FONSI) may be signed.

7.0 Document Preparation

This environmental assessment was prepared by Chris Floyd and Kelly Eldridge of the Environmental Resources Section, Alaska District, U.S Army Corps of Engineers. The Corps of Engineers Project Manager is Donna West.

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APPENDIX A

404(b)(1) Evaluation

EVALUATION UNDER
SECTION 404(b)(1) CLEAN WATER ACT 40 CFR PART 230

Harbor Maintenance
Harris and Aurora Harbors
Juneau, Alaska

I. Project Description

- Selected portions of Aurora and Harris harbors will be dredged to return those areas to the project design depths. An estimated maximum volume of 8,610 cubic yards (cy) will be dredged from Aurora Harbor, and 18,610 cy from Harris Harbor, for a total of about 28,000 cy.

- The exposed southeast end of the Harris Harbor rubblemound breakwater no longer has adequate armor rock in place on the seaward side. The USACE plans to repair approximately 150 feet of the breakwater, moving displaced rock back into position and/or placing new rock.

- A 1,500-foot-long wave barrier atop the Aurora Harbor breakwater will be removed and replaced. The existing pilings will either be pulled using a vibratory hammer, or cut off at the bottom of the existing armor stone layer. Existing armor rock and underlying intermediate rock will be removed and replaced as required to drive the new steel H-pilings. About 250 new pilings will be driven into the top of the breakwater, to a depth of approximately 24 feet below the crest of the breakwater, i.e., to an elevation of 12 feet below mean lower low water (MLLW).

A. Authorities

- Harris Harbor: The Rivers and Harbors Act, 26 August 1937 (House Doc. 249, 75th Congress, 1st Session) as adopted, provided for a small boat basin 11.5 acres in area, just north of the Juneau-Douglas bridge, by construction of two rock mound breakwaters of 430 and 1,540 feet in length, and by dredging to a depth of -12 feet MLLW. Harbor construction was completed in 1939, with maintenance dredging occurring in 1950, 1962, and 1968. The north end of the main breakwater underwent repairs in 1973 (USACE 2015a).

- Aurora Harbor: The Rivers and Harbors Act, 3 July 1958 (House Doc. 286, 84th Congress, 2nd Session) as adopted, provided for a second basin adjacent to Harris Harbor, 19 acres in area dredged to depths of -12 feet MLLW and -14 feet MLLW, protected by a jetty 530 feet long and a breakwater 1,150 feet long.

Design modifications increased the length of the jetty to 670 feet and the main breakwater to 1,500 feet.

B. General Description of Dredged or Fill Material

The dredged material to be disposed of will be fine sand and silt, similar in composition to the sea floor material at the disposal site.

The repositioning of rock on the established Harris Harbor breakwater, and the replacement of the Aurora Harbor breakwater wave barrier, are not considered to be discharges under Section 404, and will not be considered further in this evaluation

C. Descriptions of the Proposed Discharge Sites

The Alaska Department of Fish and Game (ADFG) conducted a dive survey in December 2009 in the general vicinity of the proposed disposal site. The seafloor was found to be composed of silt, and was largely featureless, with no attached vegetation or rock formations, and little sign of biological activity. The disposal site is a 1,500-foot square in waters about 130 feet deep, roughly 3 miles southeast of Harris Harbor, and near an existing capped disposal site of dredged material from Douglas Harbor.

D. Descriptions of Discharge Methods

The two harbors will most likely be dredged using a crane-mounted clamshell dredge, or an excavator, operating from a floating platform such as a barge. The dredged material will be loaded onto a scow, and transported to the proposed disposal site in Gastineau Channel.

II. Factual Determinations

A. Physical Substrate Determinations

Modeling of the dredged material disposal suggests that it will create a mound of sediment roughly 1,500 feet in diameter on the disposal site sea floor, with a central depth of about 6 feet tapering to trace thickness at the edges. This mound is likely to flatten out and dissipate over time. The dredged material is expected to be similar in composition to the benthic sediment at the disposal site, perhaps

B. Water Circulation, Fluctuations, and Salinity Determinations

The removal of sediment from the harbor will return a portion of the harbor contours to their original design; this may have a small effect on water movement through the harbor versus pre-dredging conditions. The disposal site is in roughly 130 feet of water, and the low mound created there by the discharge of dredged material will have no discernable effect on the movement of water within Gastineau Channel.

C. Suspended Particulate/Turbidity Determinations

Both the dredging and dredged material disposal actions have the potential to increase turbidity at the dredging location and at the disposal site. A certain amount of temporarily increased turbidity is inevitable as the dredged material moves through the water column. However, the overall quantity of dredged material is relatively small, and only material suitable for in-water disposal will be disturbed.

Dredging will be conducted so as to minimize the amount of suspended sediment generated. Best management practices may include:

- Avoiding multiple bites while the bucket is on the seafloor.
- No stockpiling of dredged material on the seafloor.
- No leveling of the seafloor with the dredge bucket.
- Slowing the velocity (i.e., increasing the cycle time) of the ascending loaded clamshell bucket through the water column.
- Pausing the dredge bucket near the bottom while descending and near the water line while ascending.
- Placing filter material over the holding-scow scuppers to remove sediment from th4e return water.

The contractor conducting the dredged material disposal modeling recommends the following constraints be placed on disposal operations to reduce the potential spreading effect of tidal currents to place material inside the proposed boundary:

- During ebb or flood tide, the scow should approach the appropriate placement zone from the down-current side of the disposal site, releasing material within the designated 300 feet by 180 feet disposal zones.
- During low current or slack conditions, disposal closer to the site center within the appropriate placement zone will minimize the dredged material footprint.
- When feasible, the schedule for disposal activities should avoid peak tidal currents, placing material at slack tides or midway between Lower Low Water (LLW) and Higher High Water (HHW), especially during spring tide conditions.
- Disposal should occur with barge speed over ground (SOG) of 0.0 to 1.0 knots. A slow velocity and short disposal duration will result in a smaller mound footprint.

D. Contaminant Determinations

As discussed in the EA, the sediment at Aurora and Harris Harbors has been sampled and analyzed for chemical contamination several times. Portions of the harbors are known to contain sediment that is unsuitable for unconfined in-water disposal. The maintenance dredging planned under this project will be limited to the DMMUs “Aurora 1” and

"Harris 2", which have been demonstrated to not contain significant levels of contaminants.

E. Aquatic Ecosystems and Organism Determinations

The harbor basins and the proposed in-water disposal site represent marginal, low-complexity benthic habitat that will be temporarily disrupted by the planned dredging and disposal activities, but not significantly degraded in the long term. Crab and other slow-moving invertebrates within the harbor dredging areas may be killed and/or entrained by the dredge, and buried under dredged material at the disposal site. Bottom-dwelling fish may be able to escape from both the dredge and the discharge of dredged material. The benthic conditions within the harbor basins and disposal site at the end of the project will be reasonably similar to the initial conditions, and those areas will be recolonized by a similar community of organisms.

F. Proposed Discharge Site Determinations

Disposal of the dredged material will create a mound of sediment roughly 1,500 feet in diameter on the disposal site sea floor, with a central depth of about 6 feet tapering to trace thickness at the edges. This mound is likely to flatten out and dissipate over time. The dredged material is expected to be similar in composition to the benthic sediment at the disposal site.

G. Determination of Cumulative and Secondary Effects on the Aquatic Ecosystem

No cumulative or secondary effects are anticipated.

III. Findings of Compliance or Non-Compliance with the Restrictions on Discharge

A. Adaptation of the Section 404 (b)(1) Guidelines to this Evaluation

The proposed project complies with the requirements set forth in the Environmental Protection Agency's Guidelines for Specification of Disposal Sites for Dredged or Fill Material.

B. Evaluation of Availability of Practicable Alternatives to the Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem

No upland use or disposal site for the dredged material could be identified, and no nearshore project requiring fill is available within the necessary time-frame of the planned maintenance dredging. Upland areas suitable and available for stockpiling dredged material are of very limited availability in the mountainous Juneau area. State of Alaska solid waste regulations restrict the placement of dredged material and similar bulk materials at landfills with limited road access. Placement of the project dredged material at the proposed minimally-productive deep water disposal site is considered by the USACE to have the least adverse environmental impact of the available practicable alternatives.

C. Compliance with Applicable State Water Quality Standards
The proposed project will not lead to exceedances of applicable State of Alaska water quality standards.

D. Compliance with Applicable Toxic Effluent Standards or Prohibition under Section 307 of the Clean Water Act
No toxic effluents that would affect water quality parameters are associated with the proposed project. Therefore, the project complies with toxic effluent standards of Section 307 of the Clean Water Act.

E. Compliance with Endangered Species Act of 1973
The USACE has been in informal consultation with the National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act (ESA). The USACE has determined that the proposed project may affect, but not adversely affect, the following ESA-listed species or their critical habitat:

- Steller sea lion, *Eumetopias jubatus* (Western DPS occurring east of 144°W longitude)
- Humpback whale, *Megaptera novaeangliae* (Mexico DPS)

The NMFS concurred with the USACE determination in a letter dated 11 July 2019.

F. Evaluation of Extent of Degradation of the Waters of the United States
There are no municipal or private water supplies in the area that could be negatively affected by the proposed project. Commercial interests would benefit from port improvements. There would be no significant adverse impacts to plankton, fish, shellfish, wildlife, and/or special aquatic sites.

APPENDIX B

Essential Fish Habitat Assessment

ESSENTIAL FISH HABITAT ASSESSMENT

MAINTENANCE DREDGING AND REPAIRS
AURORA AND HARRIS HARBORS
JUNEAU, ALASKA

Prepared by:
U.S. ARMY ENGINEER DISTRICT, ALASKA
ENVIRONMENTAL RESOURCES SECTION

July 2019

ESSENTIAL FISH HABITAT ASSESSMENT
Maintenance Dredging and Repairs
Aurora and Harris Harbors
Juneau, Alaska

1. Introduction

1.1 Preface

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act established the essential fish habitat (EFH) provision to identify and protect important habitats of Federally-managed marine and anadromous fish species. Federal agencies that fund, permit, or undertake activities that may adversely affect EFH are required to consult with National Marine Fisheries Service (NMFS) regarding the potential effects of their actions on EFH, and respond in writing to NMFS recommendations.

EFH is defined as those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity. “Waters” include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate. ”Substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities.

1.2 Project Purpose and Description

The purpose of the planned maintenance activities is to return the federal projects at Aurora and Harris small boat harbors in Juneau, Alaska (figure 1), as close as practicable to their original design state.

The planned maintenance activities include:

1. Maintenance dredging within Aurora and Harris harbors;
2. Disposal of the dredged material at an open water disposal site within Gastineau Channel;
3. Replacement of a wave barrier along the top of the Aurora Harbor breakwater;
4. Repair of the Harris Harbor breakwater.

1.2.1 Maintenance Dredging

Harris Harbor was completed in 1939, and last underwent maintenance dredging in 1968. Aurora Harbor was built in 1963, and has not received maintenance dredging since that time. Selected portions of Aurora and Harris harbors will be dredged to return those portions to the project design depths, as shown in figures 2 and 3. An estimated maximum volume of 8,610 cubic yards (cy) will be dredged from Aurora Harbor, and 18,610 cy from Harris Harbor, for a total of about

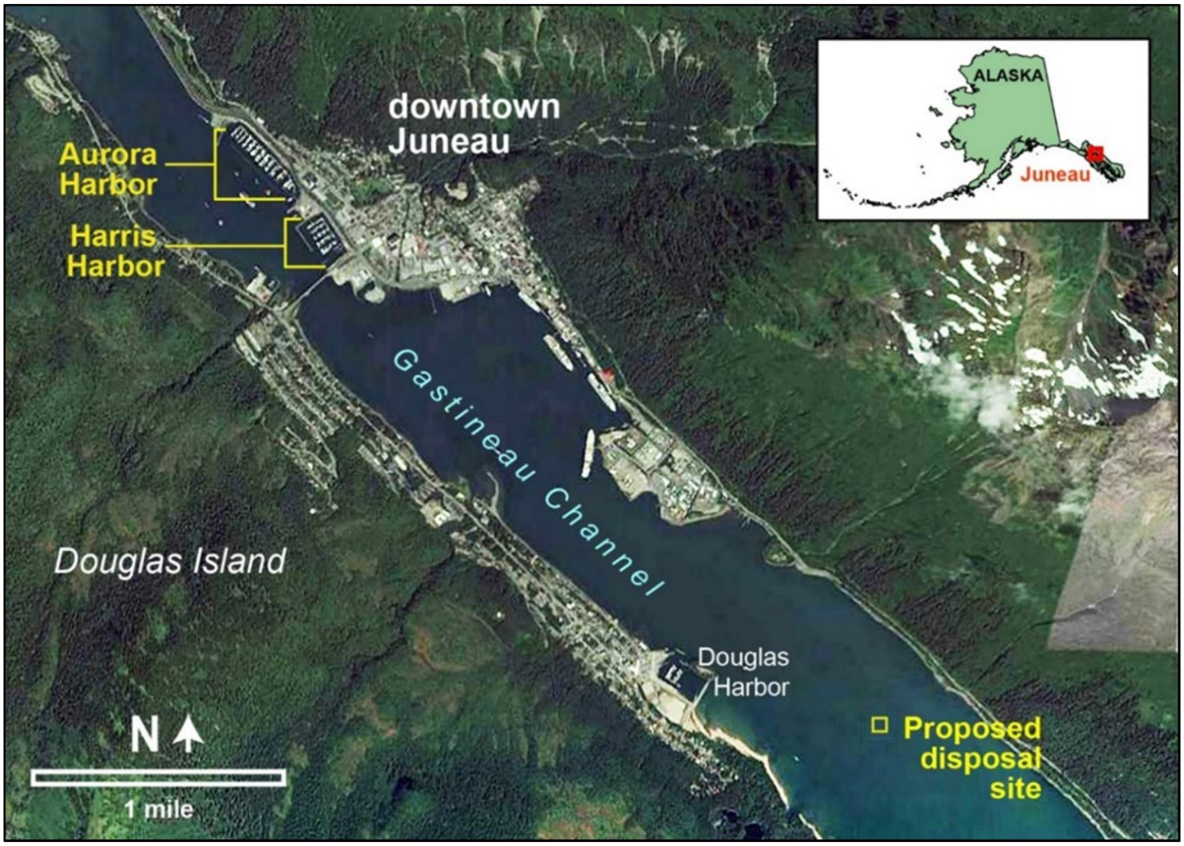

Figure 1. Project location and vicinity.

28,000 cy. The dredging will most likely be done mechanically, with a clamshell dredge operated from a barge-mounted crane, or with a long-boom excavator.

1.2.2 Dredged Material Disposal

Several rounds of chemical testing of the sediment at Aurora and Harris harbors has shown that the material to be dredged is suitable for open water marine disposal. The designated disposal site is in Gastineau Channel roughly 3 miles southeast of Harris Harbor, near a capped disposal site of dredged material from Douglas Harbor (figures 1 and 4). The proposed open water disposal site is a 1,500-foot square in waters about 130 feet deep (figure 4). Modeling (NewFields 2018a, 2018b) has shown that the plume of silty sand dredged material discharged from the disposal scow will stay within the disposal site boundary, under prescribed conditions of tidal stage, vessel position, and vessel velocity. Disposal scows with a capacity of 500 cy would require as many as 60 round trips to dispose of all the dredged material.

1.2.3 Replacement of the Wave Barrier at Aurora Harbor

The main breakwater at Aurora Harbor is topped with a 1,500-foot-long wave barrier, made of vertical steel H-pilings and horizontal wooden timbers (figure 2). This wave barrier has deteriorated, and will be replaced with a new, similar wave barrier. The existing pilings will either be pulled using a vibratory hammer, or cut off at the bottom of the existing armor stone layer. Existing armor rock and underlying intermediate rock will be removed and replaced as required to drive the new steel H-pilings. About 250 new pilings will be driven into the top of the breakwater, to a depth of approximately 24 feet below the crest of the breakwater, i.e., to an elevation of 12 feet below mean lower low water (MLLW). The new H-pilings will be 37-foot-long "W8x67" beams, a standard shape that is 8.28 inches wide by 9 inches deep, with a 0.57-inch-thick "web" and 0.935-inch-thick flanges. A vibratory hammer will be used preferentially to drive the new pilings into the top of the breakwater, but an impact hammer may be required.

The top of the Aurora Harbor breakwater is awash at higher tides. Pile extraction and driving will be performed only when the top of the breakwater is exposed, which will substantially limit the propagation of underwater noise.

1.2.4 Repair of the Breakwater at Harris Harbor

The exposed southeast end of the rock breakwater no longer has adequate armor rock in place on the seaward side (figure 3). The Corps plans to repair approximately 150 feet of the breakwater, moving displaced rock back into position and/or placing new rock.

1.3 Tentative Construction Schedule

- September 2019: Corps has awarded the contract, and provided the contractor with a Notice-to-Proceed.
- October/November 2019: Probable actual start date by the contractor on Aurora Harbor wave barrier repair and Harris Harbor armor rock repair.
- 30 April 2020: Pile-driving at Aurora Harbor completed.
- 30 June 2020: Breakwater repair projects at Aurora and Harris Harbors completed.
- 15 October to 31 December 2020: Maintenance dredging at Aurora Harbor.
- 15 October 2020 to 15 February 2021: Maintenance dredging at Harris Harbor (West 2019).

2. Project Area Description

The proposed activities are confined to Gastineau Channel, a narrow marine strait separating Douglas Island from the Alaska mainland; it runs about 14 miles from its southeast entrance at Stephens Passage to the beginning of the Mendenhall Bar. The Channel is steadily becoming shallower, due to sediment infill from the Mendenhall River, and glacial rebound. The communities of Juneau and Douglas sit on either side of Gastineau Channel, and significant commercial and residential development lines the shores for about five miles (figure 1).

2.1 Aurora and Harris Harbors

Aurora and Harris harbors are artificial basins constructed out from the Gastineau Channel shoreline, and receive no direct discharge from freshwater streams (figures 1, 2, and 3). The sandy silty sediment lining the harbor bottoms is similar to Gastineau Channel benthic sediment in general, although the harbor sediments have accumulated some chemical contaminants from long-term use. The excess sediment targeted for removal through maintenance dredging is not uniformly distributed across the harbors, but concentrated along the edges of the harbor basin and under the float system, as decades of propeller wash from vessels maneuvering within the harbor have redistributed the fine material.

The DIPAC Macaulay Salmon Hatchery is on Gastineau Channel roughly 1.5 miles northwest of Aurora Harbor. The hatchery raises chum, coho, and chinook salmon fry and smolt, as well as catchable and sub-catchable sized rainbow trout, in support of regional sport and commercial fisheries. The fish raised at this hatchery are released at several locations in Gastineau Channel, Lynn Canal, and elsewhere in southeast Alaska (DIPAC 2018). Salmon fry and smolt are released from the Macaulay Hatchery itself from mid-May to early June; adult salmon return to the hatchery from late June to early October (Brock Meredith, personal communication).

2.2 Gastineau Channel Disposal Site

The proposed open water disposal site is a 1,500-foot square in waters about 130 feet deep, roughly 3 miles south of Harris Harbor (figures 1 and 4). The proposed disposal site is near the capped disposal site of material dredged from Douglas Harbor, although an 880-foot separation will be maintained between the two disposal sites to avoid disturbing the sand cap of the Douglas Harbor disposal site (Newfields 2018).

The Alaska Department of Fish and Game (ADFG) conducted a dive survey in December 2009, in the general vicinity of the proposed Douglas Harbor disposal site (ADFG 2010). The purpose was to characterize the benthic habitat in that area of Gastineau Channel. The seafloor was composed of silt, and largely featureless, with no attached vegetation or rock formations, and little sign of biological activity. The divers noted three male tanner crabs, a small group of striped shrimp, and a few juvenile flatfish, snails, and hermit crabs. The dive survey report concluded that the habitat type and depth of the surveyed area is not well suited for species targeted by sport and commercial fisheries, and that the area's proximity to Gastineau Channel vessel traffic routes make it an unlikely place to place crab or shrimp pots (ADFG 2010).

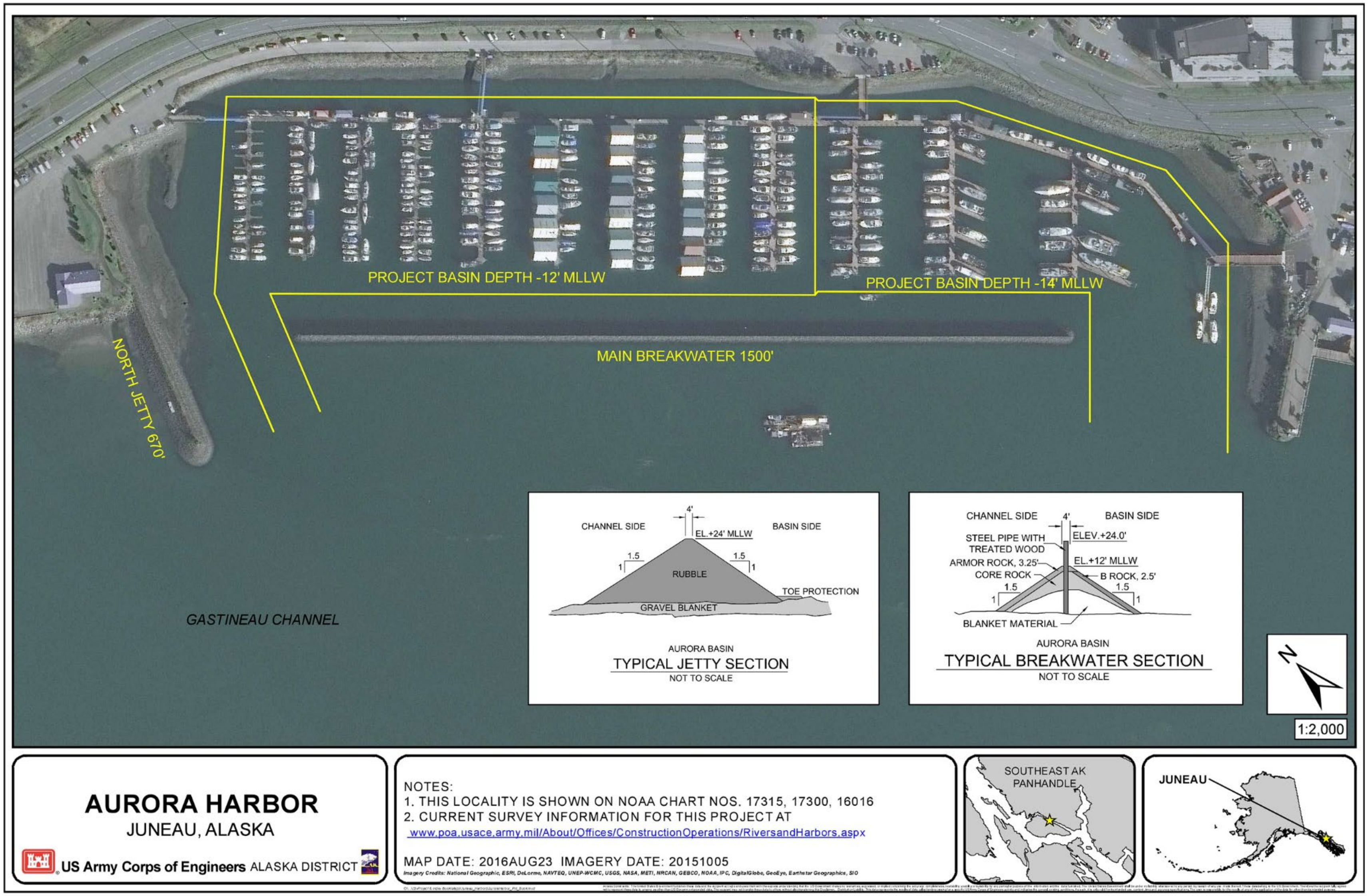

Figure 2. Aurora Harbor layout (from USACE 2017).

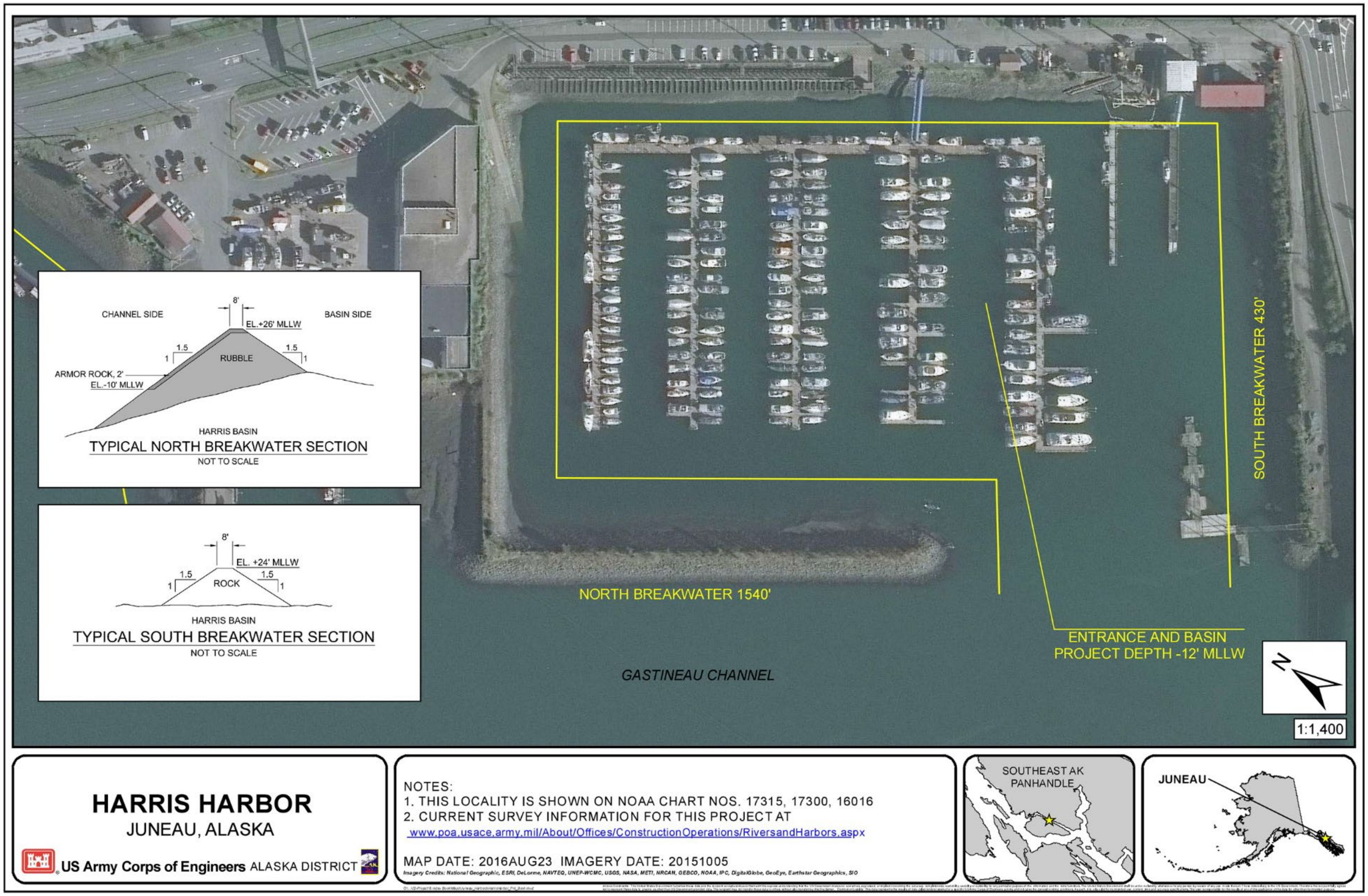

Figure 3. Harris Harbor layout (from USACE 2017).

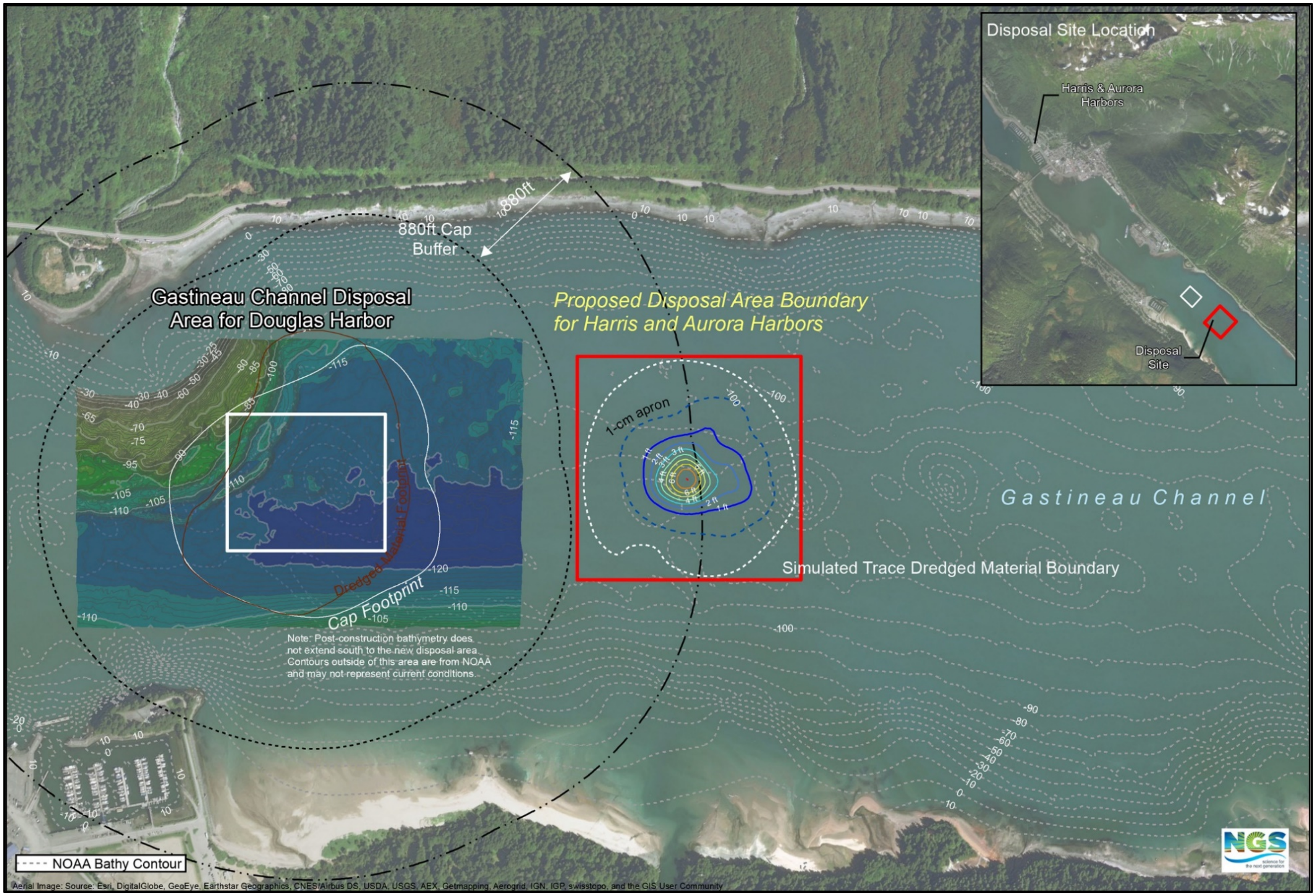

Figure 4. Location and extent of the proposed open water disposal site (from NewFields 2018).

2.3 Sediment Quality Considerations

Aurora and Harris harbors were sampled in September 2016 using the dredging prism sampling procedures and criteria then employed by Alaska District: the Dredged Material Evaluation and Disposal Procedures User Manual (DMMO 2016), prepared under the joint USACE Seattle District, USEPA, and State of Washington Dredged Material Management Program (DMMP). The two harbors were divided into dredged material management units (DMMUs) based on site history and volumes of materials to be dredged:

- "Aurora 1"
- "Aurora 2"
- "Aurora Large Boat Parking"
- "Harris 1"
- "Harris 2"

Sediment in DMMUs "Harris 2" and "Aurora Large Boat Parking" were found to contain tributyl tin and several fuel-related chemicals, common contaminants in older, seldom-dredged small boat harbors. On the other hand, the DMMU "Aurora 1" prism slightly exceeded DMMP screening criteria for only two organic chemicals: bis-(2-ethylhexyl)phthalate and diethyl phthalate. These phthalate compounds are common laboratory contaminants, and not chemicals typically expected as contaminants in a small boat harbor, but their detections in the 2016 samples could not be definitively attributed to laboratory error.

The two harbors were sampled again in July 2018 (USACE 2018) in an attempt to confirm the presence of the phthalate compounds reported in DMMU "Aurora 1". The bis-(2-ethylhexyl)-phthalate result was now below the screening criteria, and diethyl phthalate was not detected.

Sediment samples were collected from twelve stations within and around the proposed Gastineau Channel disposal site in April 2018, by a contractor to the USACE (NewFields 2018a). Trace concentrations of bis-(2-ethylhexyl)phthalate and other phthalate compounds were reported in more than half of the disposal area sediment samples, although diethyl phthalate was generally not detected.

The USACE determines that the sediment from DMMU "Aurora 1" is suitable for open-water disposal at the designated disposal site. The maintenance dredging planned for Aurora and Harris Harbors under this project will be limited to the DMMUs "Aurora 1", "Aurora 2", and "Harris 1". DMMUs "Aurora Large Boat Parking" and "Harris 2" will not be disturbed at this time.

3. Essential Fish Habitat in the Project Area

The marine waters within Gastineau Channel include EFH for Pacific salmon and Gulf of Alaska (GOA) groundfish. Full descriptions of EFH, life-stages, and habitat requirements for these species are available in their respective fishery management plans (FMPs; NPFMC 2018a, NPFMC 2018b).

3.1 Pacific Salmon EFH

Based on EFH maps and descriptions in the Pacific salmon FMP (NPFMC 2018a), and information provided by the NMFS Alaska EFH Mapper web application, the marine waters of Gastineau Channel contain EFH for the five Pacific salmon species at the following life-stages:

- Pink salmon – juvenile and mature.
- Chum salmon – juvenile, immature, and mature.
- Sockeye salmon – juvenile, immature, and mature.
- Coho salmon – juvenile and mature.
- Chinook salmon – juvenile, immature, and mature.

3.1.1 Pink Salmon (*Oncorhynchus gorbuscha*)

Pink salmon are distinguished from other Pacific salmon by having a fixed 2-year life span, being the smallest of the Pacific salmon as adults, and the fact that the young migrate to sea soon after emerging from the spawning beds. Newly emerged pink salmon fry show a preference for saline water over fresh water, and schools of pink salmon fry may move quickly from the natal stream area or remain to feed along shorelines up to several weeks. Early marine schools of pink salmon fry, often in tens or hundreds of thousands of fish, tend to follow shorelines and, during the first weeks at sea, spend much of their time in shallow water of only a few centimeters deep. In many areas, pink salmon and chum salmon fry of similar age and size co-mingle in both large and small schools during early sea life (NPFMC 2018a).

- Marine EFH for juvenile pink salmon is defined as the general distribution area for this life stage, located in marine waters off the coast of Alaska from the mean higher tide line to the 200-nautical mile limit of the U.S. Exclusive Economic Zone, (EEZ), including the Gulf of Alaska (GOA), Eastern Bering Sea (EBS), Chukchi Sea, and Arctic Ocean. Juvenile pink salmon distribute within coastal waters along the entire shelf (0 to 200 m) from mid-summer until December; then migrate to pelagic waters (upper 50m) of the slope (200 to 3,000 m).

- Marine EFH for immature and maturing adult pink salmon is defined as the general distribution area for this life stage, located in marine waters off the coast of Alaska to depths of 200 m and range from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean. Mature adult pink salmon are present from fall through the mid-summer in pelagic waters (upper 50m) of the slope (0-200m) before returning to spawn in intertidal areas and coastal streams.

3.1.2 Chum Salmon (*Oncorhynchus keta*)

After emerging from the streambed, schooling juvenile chum salmon fry migrate downstream, mostly at night, to the estuaries where they tend to feed in the intertidal grass flats and along the shore. Chums can utilize these intertidal wetlands for several months before actively migrating out of bays and into channels on the way to the outside waters. Pink salmon on the other hand tend to move more directly to more open water areas. Chum salmon utilize a wide variety of food items, including mostly invertebrates (including insects), and gelatinous species. Offshore movement of larger juveniles occurs mostly in July to September (NPFMC 2018a).

Adult chum salmon reside in the ocean for about 1 to 6 years. Throughout their range, 3-, 4-, and 5-year olds are common, but 4-, 5-, and 6-year-old chum salmon dominate the northern stocks. Chum salmon eat a variety of foods during their ocean life, e.g., amphipods, euphausiids, pteropods, copepods, fish, and squid larvae (NPFMC 2018a).

- Estuarine EFH for juvenile chum salmon is defined as the general distribution area for this life stage, located in estuarine areas, as identified by the salinity transition zone (ecotone) and the mean higher tide line, within nearshore waters from late April through June.

- Marine EFH for juvenile chum salmon is defined as the general distribution area for this life stage, located in marine waters off the coast of Alaska to approximately 50 m in depth from the mean higher tide line to the 200-nm limit of the EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean.

- EFH for immature and maturing adult chum salmon is defined as the general distribution area for this life stage, located in marine waters off the coast of Alaska to depths of 200 m and ranging from the mean higher tide line to the 200-nm limit of the EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean (NPFMC 2018a).

3.1.3 Sockeye Salmon (*Oncorhynchus nerka*)

After emergence from their natal river systems in spring or early summer, juvenile sockeye enter the marine environment where they reside for 1 to 4 years, usually 2 or 3 years, before returning to spawn. Depending on the stock, they may reside in the estuarine or nearshore environment before moving into oceanic waters. They are typically distributed in offshore waters by autumn following outmigration. During the initial marine period, yearling sockeye forage actively on a variety of organisms, apparently preferring copepods and insects, but also eating amphipods, euphausiids, and fish larvae when available. After entering the open sea during their first summer, juvenile sockeye salmon remain in a band relatively close to the coast (NPFMC 2018a).

- Estuarine EFH for juvenile sockeye salmon is defined as the general distribution area for this life stage, located in estuarine areas, as identified by the salinity transition zone (ecotone) and the mean higher tide line, within nearshore waters. Under-yearling, yearling, and older smolts occupy estuaries from March through early August.

- Marine EFH for juvenile sockeye salmon is defined as the general distribution area for this life stage, located in marine waters off the coast of Alaska to depths of 50 m and range from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean from mid-summer until December of their first year at sea (NPFMC 2018a).

- Marine EFH for immature and maturing adult sockeye salmon is defined as the general distribution area for this life stage, located in marine waters off the coast of Alaska to depths of 200 m and range from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean.

3.1.4 Coho Salmon (*Oncorhynchus kisutch*)

After leaving fresh water, juvenile coho (also commonly called silver salmon) in Alaska spend up to 4 months in coastal waters before migrating offshore and dispersing throughout the North Pacific Ocean and Bering Sea. Marine invertebrates are the primary food when coho first enter salt water, and fish prey increase in importance as the coho grow. Most immature and maturing coho occupy upper pelagic areas in the central GOA and BS during the 12 to 14 months after leaving coastal areas. Some maturing coho also use coastal and inshore waters at this life stage, but those are likely to be smaller at maturity. The bioenergetics of growth is best in epipelagic offshore habitat where forage is abundant and sea surface temperature is between 12 and 15°C. Coho rarely use areas where sea surface temperature exceeds 15°C. Most coho remain at sea for about 16 months before returning to coastal areas and entering fresh water to spawn, although some precocious males will return to spawn after about 6 months at sea (NPFMC 2018a).

- Estuarine EFH for juvenile coho salmon is the general distribution area for this life stage, located in estuarine areas, as identified by the salinity transition zone (ecotone) and the mean higher tide line, within nearshore waters. Juvenile coho salmon require year-round rearing habitat and also migration habitat from April to November to provide access to and from the estuary.

- Marine EFH for juvenile coho salmon is the general distribution area for this life stage, located in marine waters off the coast of Alaska from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean.Marine juvenile coho salmon inhabit these marine waters from June to September.

- EFH for immature and maturing adult coho salmon is the general distribution area for this life stage, located in marine waters off the coast of Alaska to 200 m in depth and range from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean. Marine mature coho salmon inhabit pelagic marine waters in the late summer, by which time the mature fish migrate out of marine waters (NPFMC 2018a).

3.1.5 Chinook Salmon (*Oncorhynchus tshawytscha*)

Chinook salmon, also commonly called king salmon, display diverse and complex life history patterns, and use a wide range of spawning habitat. They are separated generally into two races: stream- and ocean-type fish. Stream-type fish have long freshwater residence as juveniles (1 to 2 years), migrate rapidly to oceanic habitats, enter freshwater as immature or "bright" fish, and spawn far upriver in late summer or early fall. Ocean-type fish have short, highly variable freshwater residency (lasting up to a year), extensive estuarine residency, a more coastal-oriented ocean distribution, and spawn within a few weeks of freshwater entry in the lower portions of the watershed. In Alaska, the stream-type life history predominates although ocean-type life histories have been documented in a few Alaska watersheds. Chinook salmon also have a distinctly different distribution in ocean habitats than do other species of Pacific salmon. While other species of salmon generally are surface oriented, utilizing primarily the upper 20 m, Chinook salmon tend to be at greater depths and are often associated with bottom topography (NPFMC 2018a).

Residency in freshwater and size and timing of seawater migration are highly variable amongst juvenile Chinook salmon. Ocean-type fish can migrate seaward immediately after yolk absorption. The majority of ocean-type fish migrate at 30 to 90 days after emergence, but some fish move seaward as fingerlings in the late summer of their first year, while others overwinter and migrate as yearling fish. Stream-type fish, in contrast, generally spend at least 1 year in freshwater, migrating as 1- or 2-year-old fish. After entering saltwater, Chinook juveniles disperse to oceanic feeding areas; the seaward migration of smolts is timed so that the smolts arrive in the estuary when food is plentiful. Ocean-type fish have more extended estuarine residency, tend to be more coastal oriented, and do not generally migrate as far as stream-type fish. Food in estuarine areas include epibenthic organisms, insects, and zooplankton (NPFMC 2018a).

- Estuarine EFH for juvenile Chinook salmon is defined as the general distribution area for this life stage, located in estuarine areas, as identified by the salinity transition zone (ecotone) and the mean higher tide line, within nearshore waters. Chinook salmon smolts and post-smolt juveniles may be present in these estuarine habitats from April through September.

- Marine EFH for juvenile Chinook salmon is defined as the general distribution area for this life stage, located in marine waters off the coast of Alaska from the mean higher tide line to the 200-nm limit of the EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean. Juvenile marine Chinook salmon are at this life stage from April until annulus formation in January or February during their first winter at sea (NPFMC 2018a).

- EFH for immature and maturing adult Chinook salmon is defined as the general distribution area for this life stage, located in marine waters off the coast of Alaska and ranging from the mean higher tide line to the 200-nm limit of the U.S. EEZ, including the GOA, EBS, Chukchi Sea, and Arctic Ocean. Marine mature Chinook salmon inhabit pelagic marine waters from January to September, by which time the mature fish migrate out of marine waters.

EFH for all Pacific salmon species includes freshwater habitat, and extends to all streams, lakes, wetlands, and other water bodies currently or historically assessable to salmon. These waters and their salmon fisheries are managed by the State of Alaska. The location of many freshwater water bodies used by salmon are contained in documents organized and maintained by the Alaska Department of Fish and Game (ADFG). Alaska Statute 16.05.870 requires ADFG to specify the various streams that are important for spawning, rearing, or migration of anadromous fishes. This is accomplished through the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* and the *Atlas to the Catalog of Waters Important for Spawning, Returning or Migration of Anadromous Fishes*. (NPFMC 2018a).

The steep confines of southeast Gastineau Channel allows limited freshwater habitat for salmon. The Anadromous Waters Catalog (AWC) identifies about ten salmon streams discharging into Gastineau Channel between Salmon Creek and the southeast entrance of Gastineau Channel. These streams tend to be very short due to the topography; the AWC reports only chum and pink salmon spawning in a small number of southeast Gastineau Channel streams (ADFG 2019).

The majority of salmon present within Gastineau Channel are produced by the Macaulay Salmon Hatchery, located in Juneau about 1.5 miles northwest of Aurora Harbor, and operated by Douglas Island Pink and Chum, Inc. (DIPAC). The hatchery incubates Chinook, coho, and chum salmon eggs, and releases salmon fry and smolt from the hatchery itself and from several other release sites along Gastineau Channel. Eggs are harvested from returning salmon to sustain the program (DIPAC 2018). Fry and smolt release generally occurs mid-May to early June, with mature adult salmon returning to the release sites from late June to early October (Brock Meredith, DIPAC operations manager, personal communication).

3.2 Bering Sea Groundfish EFH

Based on EFH maps and descriptions in the Bering Sea/Aleutian Islands Groundfish FMP (NPFMC 2018b), the nearshore marine waters near Nome contain EFH for eight species, summarized in Table 2.

Table 2. Gulf of Alaska Groundfish with EFH near Nome.

Species	Life-Stage	Seasons
Arrowtooth flounder	Larvae	Summer
Dover sole	Egg, larve	Summer
Flathead sole	Egg	Summer
Northern rock sole	Larvae	Summer
Pacific cod	Larvae	Summer
Pacific ocean perch	Larvae	Summer
Rex sole	Egg	Summer
Sablefish	Larvae	Summer
Southern rock sole	Larvae	Summer
Walleye pollock	Egg, larvae	Summer
Yellowfin sole	Egg	Summer

3.2.1 Arrowtooth flounder (*Atheresthes stomias*)

Arrowtooth flounder larvae are planktonic for at least 2 to 3 months until metamorphosis occurs. Adult spawning occurs November to March.

- EFH for larval arrowtooth flounder is defined as the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

3.2.2 Dover sole (*Microstomus pacificus*)

Dover sole are planktonic eggs and larvae for up to 2 years until metamorphosis occurs; juvenile distribution is unknown. Adult spawning occurs January to August.

- EFH for Dover sole eggs is defined as the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

- EFH for larval Dover sole is defined as the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA.

3.2.3 Flathead sole (*Hippoglossoides elassodon*)

Adult flathead sole spawn January to April; eggs are pelagic.

- EFH for flathead sole eggs is the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and slope (200 to 3,000 m) throughout the GOA

3.2.4 Northern rock sole (*Lepidopsetta polyxystra*)

Adult northern rock sole larvae are pelagic for 2-3 months until metamorphosis. Adults deposit demersal eggs December to April.

- EFH for larval northern rock sole is defined as the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and upper slope (200 to 1,000 m) throughout the GOA.

3.2.5 Pacific cod (*Gadus macrocephalus*)

Larvae are epipelagic, occurring primarily in the upper 45 m of the water column shortly after hatching, moving downward in the water column as they grow.

- EFH for larval Pacific cod is defined as the general distribution area for this life stage, located in pelagic waters along the inner (0 to 50 m) and middle (50 to 100 m) shelf throughout the GOA.

3.2.6 Pacific ocean perch (*Sebastes alutus*)

Little information is known about Pacific ocean perch larvae. Earlier information suggested that after parturition, larvae rise quickly to near surface, where they become part of the plankton. More recent data from British Columbia indicates that larvae may remain at depths of 175 m for some period of time (perhaps 2 months), after which they slowly migrate upward in the water column. This species is viviparous, with larval release by females occurring in spring.

- EFH for larval Pacific ocean perch is the general distribution area for this life stage, located in the middle to lower portion of the water column along the inner shelf (0 to 50 m), middle shelf (50 to 100 m), outer shelf (100 to 200 m), and upper slope (200 to 500 m) throughout the GOA. Additionally, Pacific ocean perch larvae have been found as far as 180 km offshore over depths in excess of 1,000 m.

3.2.7 Rex sole (*Glyptocephalus zachirus*)

Rex sole eggs are planktonic, and released in October to July.

- EFH for rex sole eggs is defined as the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and upper slope (200 to 500 m) throughout the GOA in the spring.

3.2.8 Sablefish (*Anoplopoma fimbria*)

Sablefish larvae are planktonic. The eggs are apparently released near the bottom where they incubate. After hatching and yolk adsorption, the larvae rise to the surface. The larvae are oceanic through the spring to late summer.

- EFH for larval sablefish is defined as the general distribution area for this life stage. Larvae are located in epipelagic waters along the middle shelf (50 to 100 m), outer shelf (100 to 200 m), and slope (200 to 3,000 m) throughout the GOA.

3.2.9 Southern rock sole (*Lepidopsetta bilineata*)

Southern rock sole larvae are planktonic for at least 2 to 3 months until metamorphosis occurs. Spawning by adults occurs June to August.

- EFH for larval southern rock sole is defined as the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and upper slope (200 to 1,000 m) throughout the GOA.

3.2.10 Walleye pollock (*Theragra calcogramma*)

Walleye pollock eggs develop throughout the pelagic water column; in the GOA, egg development takes approximately 2 weeks during February to April at ambient temperature (5 °C). Larvae are distributed in the upper 40 m of the water column in March through July.

- EFH for walleye pollock eggs is defined as the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m), upper slope (200 to 500 m), and intermediate slope (500 to 1,000 m) throughout the GOA.
- EFH for larval walleye pollock is defined as the general distribution area for this life stage, located in epipelagic waters along the entire shelf (0 to 200 m), upper slope (200 to 500 m), and intermediate slope (500 to 1,000 m) throughout the GOA.

3.2.11 Yellowfin sole (*Limanda aspera*)

Yellowfin sole eggs are pelagic; spawning by adults occurs May to August.

- EFH for yellowfin sole eggs is defined as the general distribution area for this life stage, located in pelagic waters along the entire shelf (0 to 200 m) and upper (200 to 500 m) slope throughout the GOA.

3.4 Habitat Areas of Particular Concern (HAPCs)

Habitat areas of particular concern (HAPCs) are specific sites within EFH that are of particular ecological importance to the long-term sustainability of managed species, are of a rare type, or are especially susceptible to degradation or development. HAPCs are meant to provide for greater focus of conservation and management efforts and may require additional protection from adverse effects. The NPFMC may designate specific sites as HAPCs and may develop management measures to protect habitat features within HAPCs.

There are no HAPCs designated within or near the project area.

4. Effects on EFH

The major activities potentially affecting EFH will consist of (1) dredging of the harbors, (2) disposal of dredged material, and (3) pile-driving at the Aurora Harbor breakwater.

4.1 Dredging

Dredging activities can adversely affect benthic and water column habitats; the potential environmental effects of dredging on managed species and their habitats include:

- the direct removal and/or burial of organisms;
- increased turbidity and siltation, including light attenuation from turbidity;
- contaminant release and uptake, including nutrients, metals, and organics;
- the release of oxygen-consuming substances (e.g., chemicals and bacteria);
- entrainment;
- noise disturbances; and
- alterations to hydrodynamic regimes and physical habitat (Limpinsel et al. 2017).

Many managed species forage on infaunal and bottom-dwelling organisms. Dredging may adversely affect these prey species by directly removing or burying them. Although macrobenthic communities may recover total abundance and biomass within a few month or years, their taxonomic composition and species diversity may remain different from pre-dredging for more than three to five years. Recovery of microbenthic communities in colder, high latitude environments may require even more time.

Dredging can elevate levels of suspended sediment and organic matter in the water column. The associated turbidity plumes of suspended particulates may reduce light penetration and lower the rate of photosynthesis for subaquatic vegetation. Fish may sustain gill injury and suffer reduced feeding ability if exposed to high suspended sediment levels for extended periods of time. Dredging can also re-suspend and release nutrients and toxic substances that may then become more biologically available to aquatic organisms, or cause short-term oxygen depletion.

The noise generated by pumps, cranes, and the mechanical action of the dredge has the ability to alter the behavior of fish and other aquatic organisms. The noise levels and frequencies produced from dredging depend on the type of dredging equipment being used, the depth and thermal variations in the surrounding water, and the topography and composition of the surrounding sea floor. It has been hypothesized that dredging-induced sound may block or delay the migration of anadromous fishes, interrupt or impair communication, or impact foraging behavior, and dredging is known to elicit an avoidance response by marine fishes. However, very little is known about effects of low-level anthropogenic sounds on fish (Limpinsel et al. 2017).

Dredging also has the potential for modifying current patterns and water circulation via alterations to substrate morphology. These alterations can cause changes in the direction or velocity of water flow, water circulation, or dimensions of the waterbody traditionally used by fish for food, shelter, or reproductive purposes (Limpinsel et al. 2017, Kelly and Ames 2018).

The dredging at Aurora and Harris will be confined to the harbor basins. The effects from dredging such as suspended sediment and sound will also be largely confined to the basins. The proposed winter-spring timing of the dredging (Section 1.3) also avoids the periods when juvenile or adult salmon are most likely to be concentrating their movements past the harbors to and from the Macaulay Hatchery.

4.2 Dredged material disposal

Dredged material disposal can have disruptive effects similar to that of dredging, particularly through altering existing habitat by changing water depth or substrate, smothering benthic organisms, increasing turbidity, and releasing contaminants (Limpinsel et al. 2017).

Sediment released into the water column at the disposal site has the potential to impact larval and juvenile fish. However, the proposed winter-spring timing of the dredging and disposal avoids the periods when planktonic groundfish eggs and larvae are actively developing. Juvenile fish, especially salmon, are more likely to inhabit more complex habitat along the shore of Gastineau Channel than the center of the channel where the disposal site is located.

As described in Section 2.2., a dive survey in the general vicinity of the proposed Douglas Harbor disposal site found the seafloor to be composed of silt, and to have no attached vegetation or exposed rock, and little sign of biological activity (ADFG 2010). The material to be disposed of will be fine sand and silt, similar in composition to the sea floor material at the disposal site. Figure 4 illustrates the dimensions of the mound of dredged material expected to accumulate within the disposal area, based on modeling (NewFields 2018).

4.3 Pile driving

Pile driving can generate intense underwater sound pressure waves that may adversely affect EFH. Fish may leave an area for more suitable spawning grounds or may avoid a natural migration path because of noise disturbances, and can be injured and killed by more intense pressure waves. Short-term exposure to peak sound pressure levels (SPLs) above 180 to 190 dB is believed to cause physical harm to fish, while SPLs around 155 dB may be sufficient to stun small fish (Limpinsel et al. 2017). Adverse behavioral effects are expected above a root mean square (RMS) value of 150 dB (CALTRANS 2015).

The type and intensity of the sounds produced during pile driving depend on a variety of factors, including the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water, and the type and size of the pile-driving hammer:

- Sound pressure levels are positively correlated with the size of the pile, as more energy is required to drive larger piles.
- Firmer substrates require more energy to drive piles and produce more intense sound pressures.
- Sound attenuates more rapidly with distance from the source in shallow water than it does in deep water.

- Studies have shown that fish display an avoidance response to the sound from vibratory hammers, and do not habituate to such sound, whereas fish may become habituated to impact hammer sounds after an initial startle response, and may remain within range of potentially harmful sound (Limpinsel et al. 2017).

The planned driving of piles into the top of the Aurora Harbor breakwater is an atypical pile-driving scenario, and one for which it is difficult to predict the sound pressure levels that may be generated. For that reason, piling extraction and driving will be performed only when the top of the breakwater is exposed, and the pilings are not in contact with the water column. This will significantly curtail the propagation of underwater noise.

4.4 Long-term effects

No long term effects on EFH are anticipated. The dredging of Aurora and Harris harbors will return them partially to their original design depths. The completed deposition of dredged material at the disposal site will not cause noticeable long term effects to EFH, or to that area's usefulness as habitat in general.

5. Proposed avoidance and minimization measures

5.1 Timing

The primary measure proposed to protect EFH is the timing of the construction activities. Table 5 shows how the proposed schedule for the maintenance activities (Section 1.3) avoids the most vulnerable periods for salmon and groundfish EFH in Gastineau Channel. Pile-driving at Aurora Harbor, and dredging at Aurora and Harris harbors, should almost entirely avoid the periods when juvenile salmon are released from the Macaulay Hatchery, and when mature adult salmon are returning to the hatchery. Other maintenance activities, such as the completion of the new wave barrier at Aurora Harbor and manipulation of rock at the Harris Harbor breakwater, should have little or no effect on fish.

5.2 Dredging Best Management Practices

Dredging will be conducted so as to minimize the amount of suspended sediment generated. Best management practices may include:

- Avoiding multiple bites while the bucket is on the seafloor.
- No stockpiling of dredged material on the seafloor.
- No leveling of the seafloor with the dredge bucket.
- Slowing the velocity (i.e., increasing the cycle time) of the ascending loaded clamshell bucket through the water column.
- Pausing the dredge bucket near the bottom while descending and near the water line while ascending.

- Placing filter material over the holding-scow scuppers to remove sediment from th4e return water.

5.3 Control of Dredged Material Discharge

The contractor conducting the dredged material disposal modeling (NewFields 2018b) recommends the following constraints be placed on disposal operations to reduce the potential spreading effect of tidal currents to place material inside the proposed boundary:

- During ebb or flood tide, the scow should approach the appropriate placement zone from the down-current side of the disposal site, releasing material within the designated 300 feet by 180 feet disposal zones.
- During low current or slack conditions, disposal closer to the site center within the appropriate placement zone will minimize the dredged material footprint.
- When feasible, the schedule for disposal activities should avoid peak tidal currents, placing material at slack tides or midway between Lower Low Water (LLW) and Higher High Water (HHW), especially during spring tide conditions.
- Disposal should occur with barge speed over ground (SOG) of 0.0 to 1.0 knots. A slow velocity and short disposal duration will result in a smaller mound footprint.

5.4 Contaminant Discharge Prevention.

The contractor will be required to prepare an Oil Spill Prevention and Control Plan. Reasonable precautions and controls would be used to prevent incidental and accidental discharge of petroleum products or other hazardous substances. Fuel storage and handling activities for equipment would be sited and conducted so there is no petroleum contamination of the ground, surface runoff or water bodies. Equipment would be inspected on a daily basis for leaks. If leaks are found the equipment would not be used and pulled from service until the leak is repaired. During construction, spill response equipment and supplies such as sorbent pads shall be available and used immediately to contain and cleanup oil, fuel, hydraulic fluid, antifreeze, or other pollutant spills. Any spill amount must be reported in accordance with Discharge Notification and Reporting Requirements (AS 46.03.755 and 18 AAC 75 Article 3).

6. Determination of Effect on EFH.

The Corps determines that the planned maintenance activities, implementing the proposed avoidance and minimization measures, <u>will not adversely affect essential fish habitat</u>.

Table 5. Timing of maintenance events relative to EFH seasonal events

Event	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Oct/Nov 2019 - 30 Apr 2020 Aurora Harbor wave barrier pile-driving												
Oct/Nov 2019 - 30 June 2020 Aurora & Harris Harbors, other breakwater repairs												
15 Oct 2020 - 15 Feb 2021 Aurora & Harris Harbors maintenance dredging and disposal												
Hatchery release of salmon fry & smolt												
Hatchery return of adult salmon												
GOA groundfish egg & larvae “summer” EFH within Gastineau Channel												

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