Appendix B:

Essential Fish Habitat Assessment

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Essential Fish Habitat Assessment

City and Borough of Sitka
Sitka Seaplane Base Project
Sitka Channel, Sitka, Alaska

November 2020

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AWC	Anadromous Waters Catalog
BMP	best management practices
CBS	City and Borough of Sitka
dB	decibels
EFH	Essential Fish Habitat
FAA	Federal Aviation Administration
FMP	Fisheries Management Plan
ft	feet
GOA	Gulf of Alaska
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
µPa	micropascal
NOAA	National Oceanic and Atmospheric Administration
NMFS	National Marine Fisheries Service
NPFMC	National Pacific Fisheries Management Council
SEL	sound exposure level
SPB	Seaplane Base
USACE	U.S. Army Corps of Engineers

1 INTRODUCTION

The City and Borough of Sitka (CBS) is proposing to construct a new seaplane base (SPB) in Sitka Channel on the northern shore of Japonski Island in Sitka, Alaska. The new SPB will replace the existing SPB (Federal Airline Administration [FAA] identifier A29) currently located on the eastern shore of Sitka Channel, near Eliason Harbor and downtown Sitka. The new SPB will address existing capacity, safety, and condition deficiencies for critical seaplane operations, and allow seaplanes to more safely transit Sitka Channel. Construction, which includes the installation of piles to support a floating ramp dock, floating transient dock, landing gangway, wave attenuators, and a shore-access transfer span and trestle, is anticipated to begin in January 2023 and be completed in June 2025.

Currently, the SPB A29 off Katlian Street is at the end of its useful life and has a number of shortcomings, including limited docking capacity. A29 has only eight spaces, four of which cannot be accessed during low tide. The facility also lacks on-site fueling infrastructure, is expensive to maintain, has wildlife conflicts with a nearby seafood processing plant, and requires pilots to navigate a busy channel with ship traffic. The new SPB will improve the safety of seaplane operation in the channel, along with reducing traffic and congestion in Sitka Channel. The proposed SPB will provide, among other improvements, 14 permanent slips, space for 5 transient planes, on-site fuel storage, a drive down ramp, a seaplane haul-out ramp, and upland seaplane and car parking.

This assessment of Essential Fish Habitat (EFH) for the Sitka Seaplane Base project is being provided in compliance with The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267). EFH is defined by the Magnuson-Stevens Act as those “waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity”.

The 1996 amendment established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan (FMP). Section 305(b)(2) of the Magnuson-Stevens Act requires Federal action agencies to consult with National Oceanic and Atmospheric Association (NOAA)’s National Marine Fisheries Service (NMFS) on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH. The proposed SPB on Japonski Island is located within an area designated as EFH and the below assessment satisfies EFH consultation requirements.

2 PROJECT PURPOSE

The purpose of this project is to construct a new SPB on Japonski Island in Sitka Channel and address capacity, safety, operational, and condition deficiencies at the existing Sitka SPB. This project is needed to support critical seaplane operations and transportation in Southeast Alaska, to resolve existing seaplane and boat conflicts, and to replace the existing base which is 65 years old and in poor condition.

The CBS identified the need for a new SPB in 2002, and the planning process progressed as conditions at the facility continued to degrade. In 2002, CBS completed a Sitka Seaplane Base Master Plan to assess the need for a new SPB and layout a proposed facility and location (HDR Alaska, Inc. 2002). In 2012, CBS completed a Siting Analysis to reevaluate SPB sites and confirmed Japonski Island as the recommended location (DOWL KHM 2012). In 2016, CBS conducted another Siting Analysis which confirmed aviation stakeholder interest, resolved FAA funding concerns, and provided an economic impact study (DOWL 2016). The CBS has now received funding for planning and environmental review for the new SPB (CBS 2019).

3 PROPOSED ACTION

3.1 PROJECT LOCATION

The new SPB will be located on the north shore of Japonski Island, along the eastern side of Sitka Channel, approximately 1.5 miles north of downtown Sitka, in Southeast Alaska; Township 55S, Range 63E, Sections 34 and 35, Copper River Meridian; United States Geologic Survey (USGS) Quad Map Sitka A-latitude 57.0575 and longitude -135.7382 (Figure 1-2) (Earthpoint 2020). Sitka Channel is a high traffic passage and the main way to access Sitka by water, a commonly used method of transportation in Southeast Alaska.

The proposed project will be located within the Channel Rock Breakwaters in the Sitka Channel on the northeast side of Japonski Island. The Channel Rock Breakwaters were built perpendicular to the Sitka Channel, a little more than half a mile northwest of Thomsen Harbor, in order to provide protection for the harbor and other facilities and structures located throughout the channel. The distance from Channel Rock Breakwaters to the James O'Connell Bridge is about 6,500 feet (ft), and Sitka Channel is about 150 ft wide and about 22 ft deep at the narrowest (NOAA 2020). The mean tide range is 7.7 ft, the diurnal tide range is 9.94 ft, and the extreme range is 18.98 ft (NOAA 2020a). The Sitka Channel connects to the larger Sitka Sound, an active fishery and transportation corridor.

Figure 1. New Sitka SPB Location

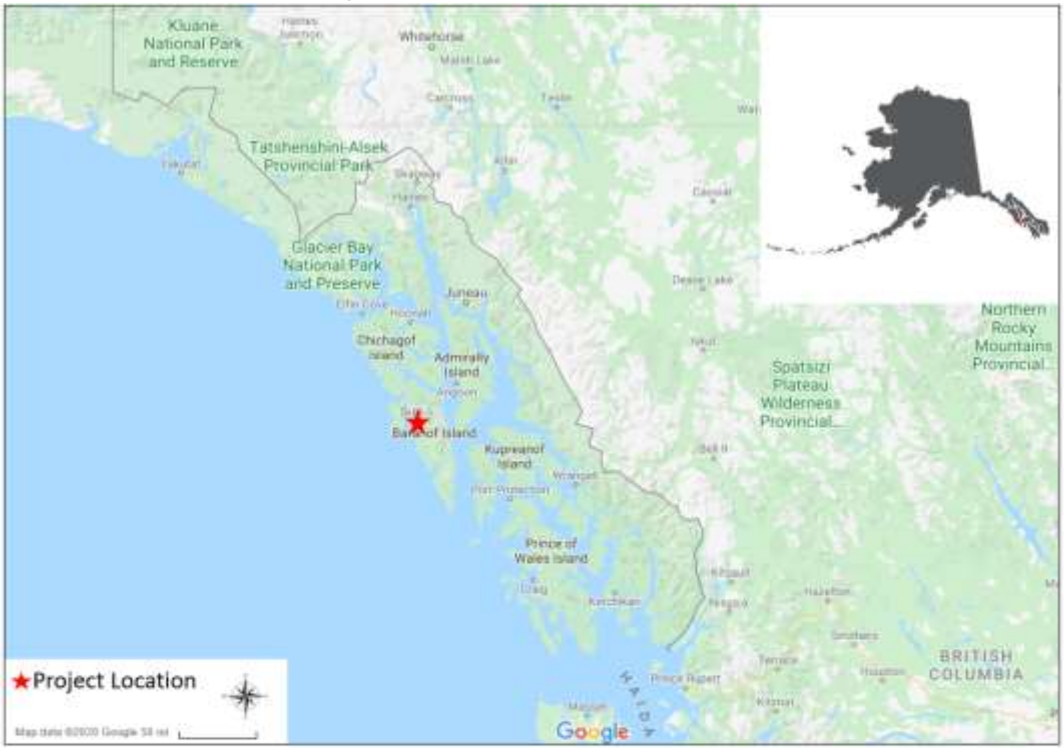
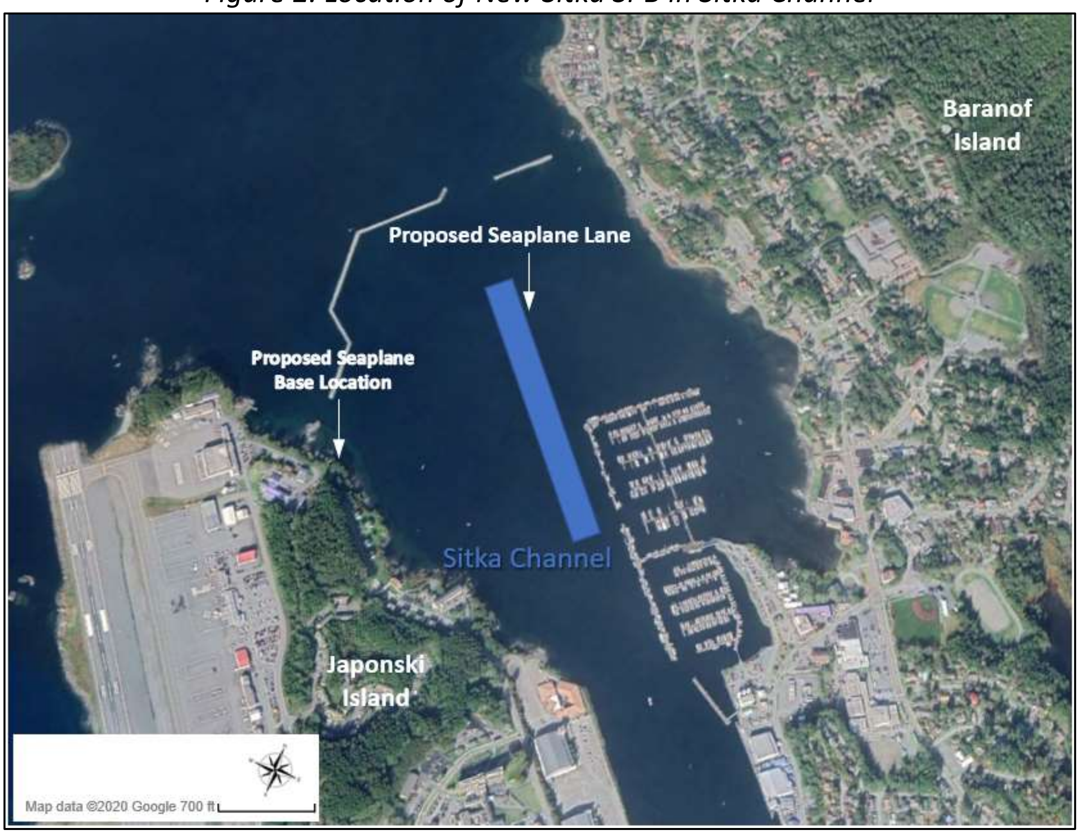


Figure 2. Location of New Sitka SPB in Sitka Channel



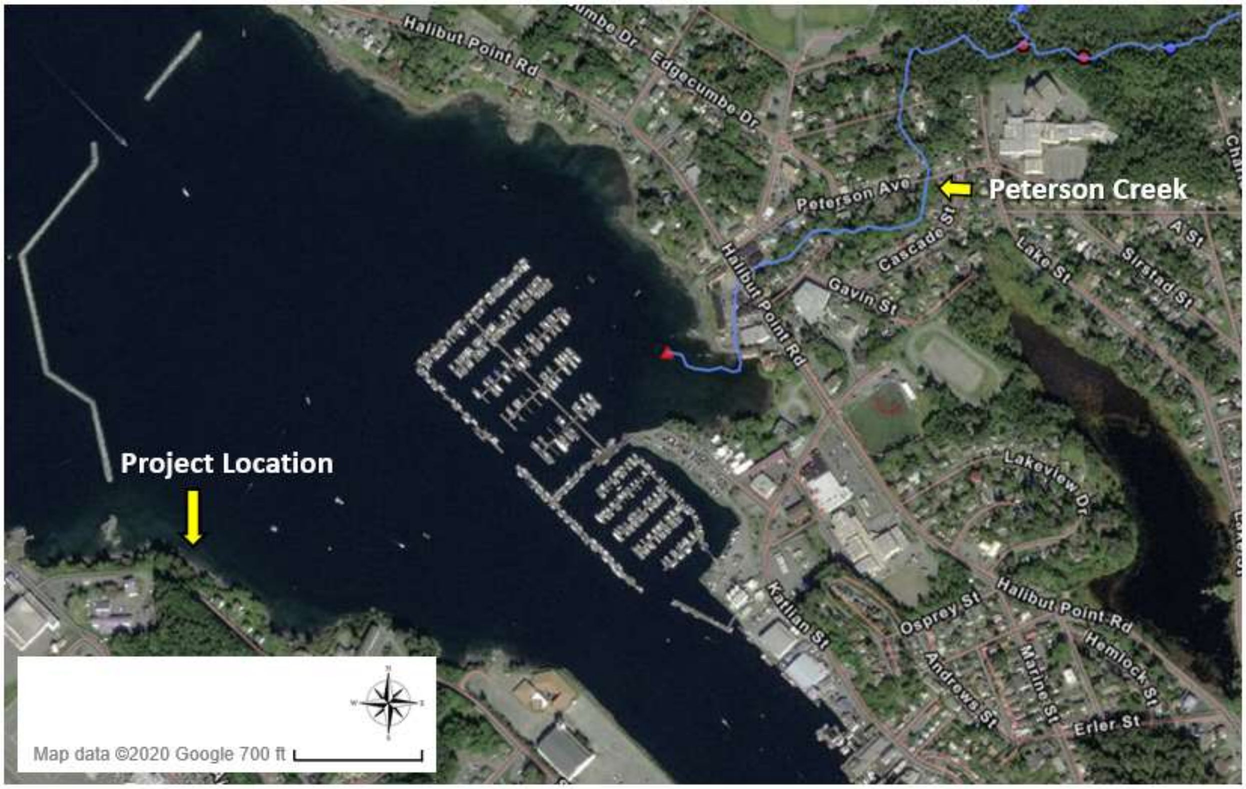
3.2 DEFINITION OF ACTION AREA

The project action area designates the area where any effect will or could occur from the proposed action. For EFH, the action area is the area of water that at any given time could be ensonified above acoustic thresholds for fish species with EFH. The action area will be ensonified where direct underwater noise levels from vibratory installation of 16-inch and 24-inch piles is expected. The action area is confined to marine waters within the northern half of Sitka Channel, extending approximately 1.5 miles from the western opening in the Channel Rock Breakwaters and over 1 mile from the eastern opening in the Channel Rock Breakwaters (Figure 3).

There is one anadromous stream across Sitka Channel from the action area. Peterson Creek is anadromous (Anadromous Waters Catalog [AWC] #113-41-10185) for all five species of salmon and Dolly Varden and located along the eastern perimeter of the action area (ADF&G 2020). Since the proposed project will be exclusively located in marine waters opposite Sitka Channel from Peterson Creek, impacts beyond the mouth of the creek are not anticipated (Figure 4).

Figure 3. New Sitka SPB Action Area and Pile Driving Location

Figure 4. Location of Peterson Creek



3.3 CONSTRUCTION DETAILS

Construction of the proposed project will include the installation of piles to support a based seaplane ramp float, transient seaplane float, drive-down gangway, landing dock, trestle, and wave attenuator(s) (Table 1-2 and Figure 5-6). The project will:

- Install 30 temporary 18-inch-diameter steel piles as templates to guide proper installation of permanent piles (these temporary piles will be removed prior to project completion).
- Install 32 permanent 24-inch-diameter piles and 36 permanent 16-inch-diameter piles to support the ramp float, transient float, vehicle turnaround float, drive-down gangway, landing dock, and trestle.
- Construct and install 350-foot by 46-foot ramp float, 220-foot by 30-foot transient float, 120-foot by 12-foot drive-down gangway, 30-foot by 20-foot turnaround float, 120-foot by 46-foot landing dock, and 240-foot by 16-foot trestle (Table 1-2 and Figure 5-6).
- Install 50 permanent 24-inch-diameter piles to support two 20-foot by 600-foot wave attenuators (25 piles per wave attenuator).
- Install other SPB float components such as bull rail, floating fenders, mooring cleats, electricity connections, waterlines, lighting, passenger walkway, hand rail, and mast lights. Additional upland features include a haul-out ramp, aviation fueling infrastructure, fuel storage, vehicle driveway, curb, gravel parking for seaplanes and

vehicles, security fencing, landscape buffer, and a covered shelter (Note: all upland components will be installed out of the water).

- Discharge fill to develop 1.47 acres of uplands and conduct blasting of 24,000 cubic yards of material extending 200 feet inshore from the high tide line. The side slopes of fill will have ratio of 2 horizontal to 1 vertical (2H:1V) slopes with heavy open graded armor rock and interstitial spaces.
- Conduct one month of blasting and rock excavation at the end of the Seward Avenue in the southwest corner of the project uplands, approximately 150 to 200 feet from the high tide line.

Table 1. New Sitka SPB Construction Components

Construction Component	Material	Dimensions (ft)	Distance Above Mean High Water (ft)
Primary Seaplane Float	Treated timber, galvanized steel, coated polystyrene billets and polyethylene floatation tubs	350 x 46	2
Transient Seaplane Float	Treated timber, galvanized steel, coated polystyrene billets and polyethylene floatation tubs	200 x 30	2
Vehicle Turnaround Float	Treated timber, galvanized steel, coated polystyrene billets and polyethylene floatation tubs	30 x 20	2
Drive-Down Gangway	Marine grade aluminum, fiberglass and polyethylene	120 x 12	2-13 (sloped gangway)
Landing Dock	Treated timber, galvanized steel, coated polystyrene billets and polyethylene floatation tubs	120 x 46	2
Trestle	Galvanized steel and treated timber	240 x 16	13
Haul-out Ramp	Concrete	Part of Uplands	N/A
Wave Attenuator(s)	Concrete	2 each @ 20 x 600	3
Piles	Galvanized Steel	See Table 2	15 to top of pile

Table 2. New Sitka SPB Pile Installation and Removal Summary

Description	Project Component			
	Temporary Pile Installation	Temporary Pile Removal	Permanent Pile Installation	Permanent Pile Installation
Diameter of Steel Pile (inches)	18	18	24	16
# of Piles	30	30	82	36
Vibratory Pile Driving				
Total Quantity	30	30	82	36
Diameter	18	18	24	16
Max # Piles Vibrated per Day	4	4	4	4
Vibratory Time per Pile	15 min	15 min	15 min	15 min
Vibratory Time per Day	60 min	60 min	60 min	60 min
Number of Days (46 days)	8	8	21	9
Vibratory Time Total (44 hours 30 min)	7 hours 30 min	7 hours 30 min	20 hours 30 min	9 hours
Socketing Pile Driving				
Total Quantity	--	--	82	36
Diameter	--	--	24	16
Max # Piles Socketed per Day	--	--	2	2
# of Strikes per Pile	--	--	0	0
Socketing Time per Pile	--	--	5 hrs	5 hrs
Socketing Time per Day	--	--	10 hrs	10 hrs
Number of Days (59 days)	--	--	41	18
Socketing Time Total (590 hours)	--	--	410 hours	180 hours
Impact Pile Driving				
Total Quantity	30	30	82	36
Diameter	18	18	24	16
Max # Piles Impacted per Day	2	2	2	2
Impact Time per Pile	5 min	5 min	5 min	5 min
Impact Time per Day	10 min	10 min	10 min	10 min
Number of Days (89 days)	15	15	41	18
Impact Time Total (14 hours 50 min)	2 hours 30 min	2 hours 30 min	6 hours 50 min	3 hours

Figure 5. Proposed Action

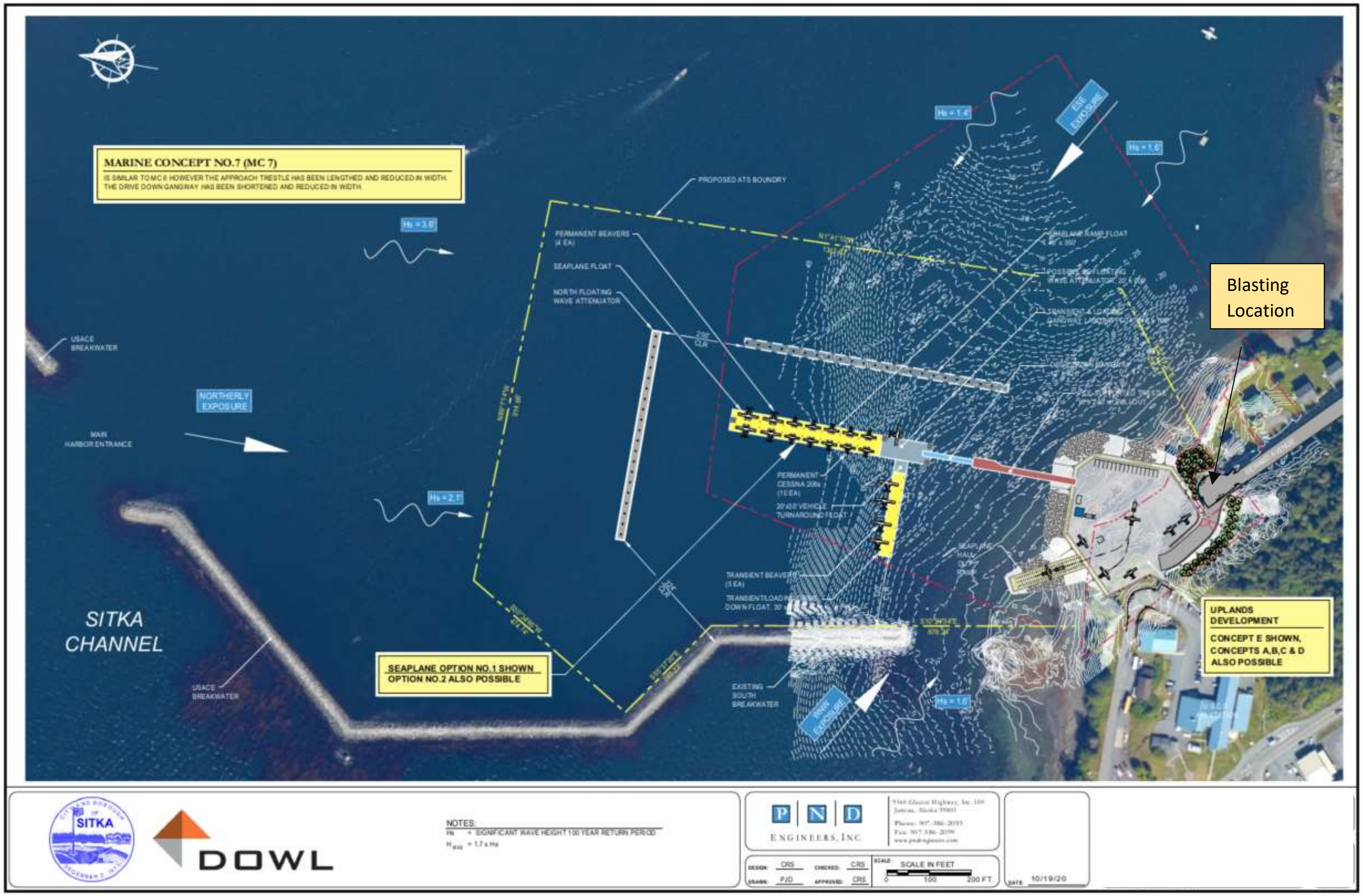
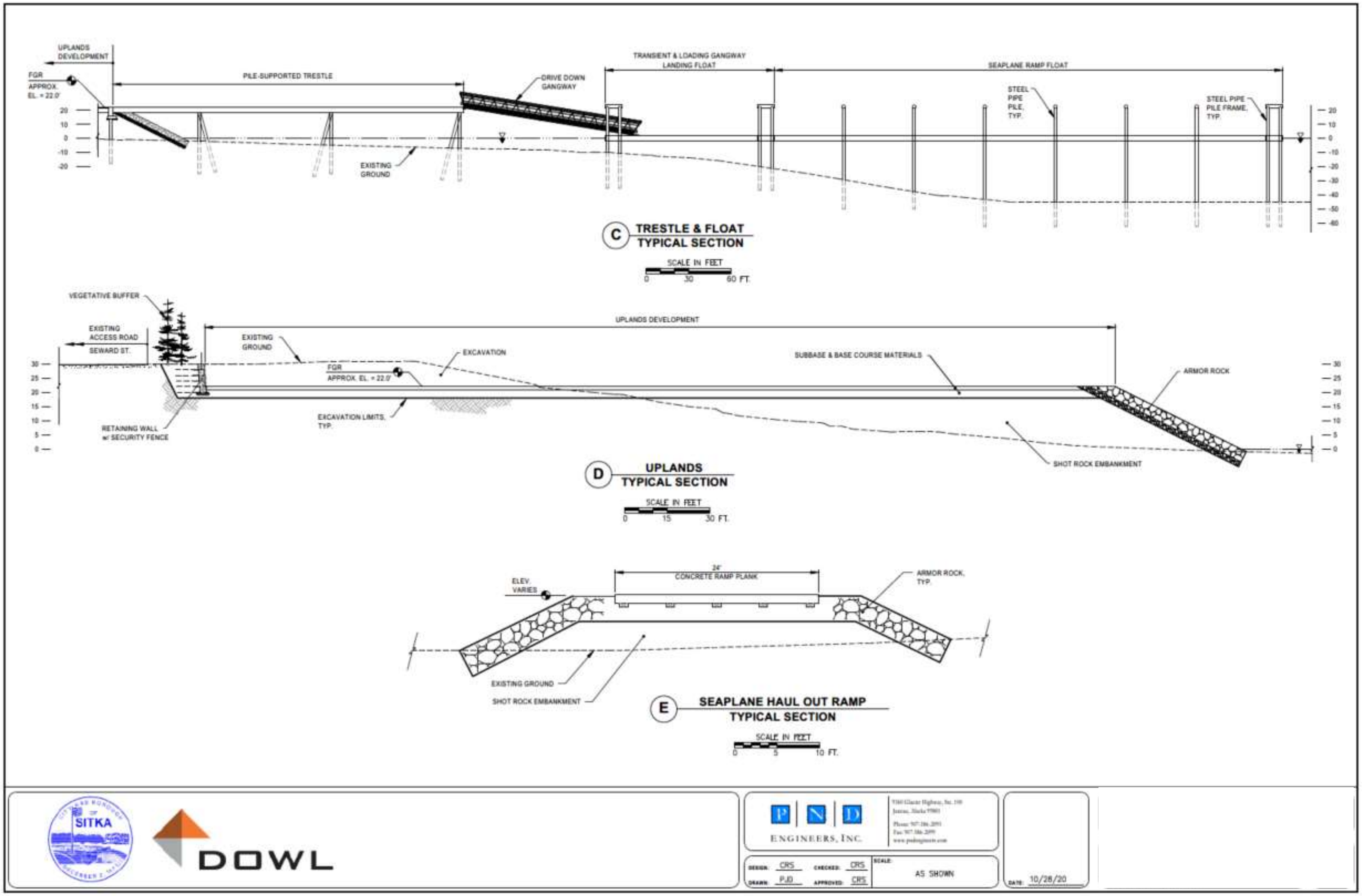


Figure 6. Side Profile of Proposed Action



3.3.1 Pile Installation Equipment

The following pile installation equipment is expected to be used:

- Vibratory Hammer: ICE 44B/Static weight 12,250 pounds
- Socketing Hammer: Holte 100,000 feet-pounds top drive with down-the-hole hammer and bit
- Diesel Impact Hammer: Delmag D46/Max Energy 107,280 feet-pounds

3.3.2 Pile Installation Methods

Installation and Removal of Temporary (Template) Piles

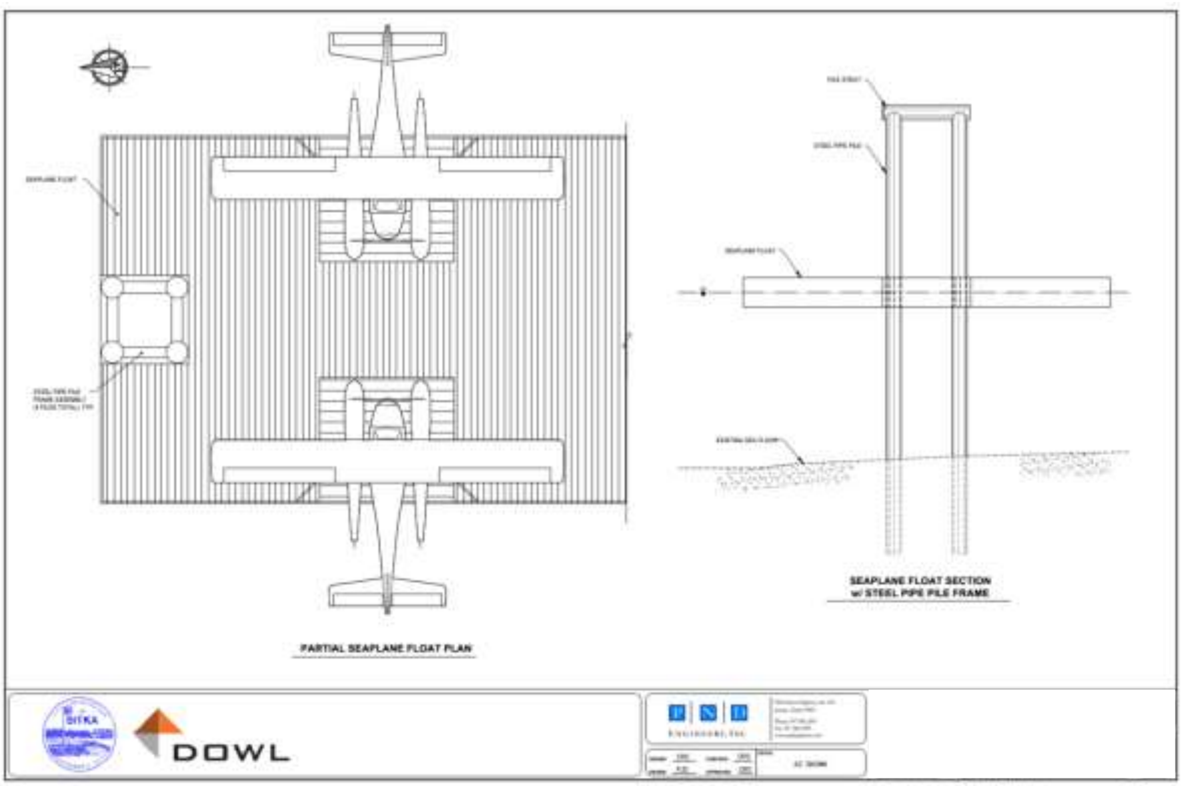
A maximum of 30 temporary 18-inch-diameter piles will be installed and removed using a vibratory hammer in constructing the project trestle.

Installation of Permanent Piles

All permanent 24-inch-diameter and 16-inch-diameter piles will be initially installed with a vibratory hammer. After vibratory driving, piles will be socketed into the bedrock with down-the-hole drilling equipment. Finally, piles will be driven the final few inches of embedment with an impact hammer.

Piles at the end of the based seaplane float and the corners of the landing dock will be installed as a steel pipe pile frame for added stability and reinforcement (Figure 7). Please see Table 2 for a conservative estimate of the amount of time required for pile installation and removal.

Figure 7. Steel Pipe Pile Frame



3.3.3 Construction Vessels

The following vessels are expected to be used to support construction:

- One material barge (approximately 250 ft by 76 ft by 15.5 ft) to transport materials from Washington to the project site and to be used onsite as a staging area during construction.
- One construction barge (crane Barge 280 ft by 76 ft by 16 ft) to transport materials from Washington to the project site and to be used onsite to support construction.
- 1 skiff (25-foot skiff with a 125–250 horsepower outboard motor) transported to the project site on the material barge or acquired locally in Sitka to support construction activities.
- 1 skiff (25-35-foot skiff powered with a 35-50 horsepower outboard motor) transported to the project site on the material barge or acquired locally in Sitka to support Protected Species Observer efforts.

3.3.4 Other In-water Construction and Heavy Machinery Activities

In addition to the activities described above, the proposed action will involve other in-water construction and heavy machinery activities. Examples of other types of activities include using standard barges, tug boats, or clamshell equipment to place and position piles on the substrate via a crane (i.e., “stabbing the pile”).

The seaplane floats will be constructed of treated timber and galvanized steel fasteners. The submerged timber structural elements of the floats will be pressure treated with creosote because it is the only effective preservative for wood that will remain wet at all times. All other timber components that will not be fully submerged will be pressure treated with ammoniacal copper zinc arsenate. All preservative treatment will be in accordance with best management practices (BMP’s) as set forth by the Western Wood Preservers Institute. Floatation includes closed cell expanded polystyrene billets covered with 100 percent solid polyurethane and/or polyethylene floatation tubs to protect from physical damage, water absorption, colonization by encrusting organisms, and other factors.

3.3.5 Project Operation Activities

The new SPB includes operation of a new seaplane takeoff and landing lane and taxi path, which will not require any construction. The new water lane is farther north of but overlapping with the existing seaplane water lane, away from the O’Connell Bridge and seafood processing facilities. The new water lane is 4,000 ft long by 200 ft.

Use and operation of the SPB float will include seaplane loading and unloading, general maintenance, connections for water and electric power, and fueling. SPB uplands will provide above ground fuel tank storage, an access ramp for hauling out seaplanes, seaplane and vehicle parking, general storage, and covered shelter for passenger waiting.

SPB operation protocols will incorporate BMP's to prevent or minimize contamination from seaplane accidents, general maintenance, fueling, and nonpoint source contaminants from upland facilities

4 ESSENTIAL FISH HABITAT IN THE ACTION AREA

The waters southwest of the breakwaters on the northern shore of Japonski Island in the Sitka Channel are designated as EFH under the Magnuson-Stevens Act for all 5 species of Pacific salmon and 23 species of Gulf of Alaska (GOA) groundfish (NMFS 2020; Balsiger 2019). Alaska Department of Fish and Game (ADF&G) also identified Pacific Herring and Pacific Halibut as important in the project area (ADF&G 2019). Additionally, U.S. Army Corps of Engineers (USACE) identified 11 additional EFH fish species when conducting work on the nearby Channel Rock Breakwaters, suggesting additional EFH listed species in Sitka Channel and the general project vicinity (USACE 2011). EFH listings are summarized in Tables 3 and 4 and a description of each EFH species is provided below.

Table 3. Essential Fish Habitat Salmon Species in Action Area

Salmon Species	Juvenile	Immature	Mature	Juvenile-marine	Adult-marine waters	Spawning-freshwater only
Coho Salmon				X	X	
Chum Salmon		X		X	X	
Pink Salmon				X	X	
Chinook Salmon		X			X	
Sockeye Salmon		X		X	X	

Table 4. Essential Fish Habitat Groundfish Species in Action Area

Ground Fish Species	Egg	Larvae	Late Juvenile	Adult	Spawning
Aleutian Skate				X	
Pacific Cod			X	X	
Walleye Pollock	X			X	
Shortspine Thornyhead Rockfish				X	
Shortraker Rockfish			X		
Pacific Ocean Perch		X			
Redbanded Rockfish			X		
Black Rockfish				X	
Dusky Rockfish			X		
Silvergray Rockfish			X		
Quillback Rockfish				X	
Redstriped Rockfish			X		
Rosethorn Rockfish			X	X	
Sablefish		X			
Yellow Irish Lord				X	
Great Sculpin			X	X	
Bigmouth Sculpin			X	X	
Arrowtooth Flounder			X	X	
Northern Rock Sole				X	
Dover Sole		X	X		
Yellowfin Sole	X			X	
Alaska Plaice				X	
Octopus				X	

4.1 ESSENTIAL FISH HABITAT SPECIES DESCRIPTIONS

4.1.1 Salmonid Species Descriptions

Coho Salmon (*Oncorhynchus kisutch*)

Coho Salmon EFH inhabit Sitka Channel off the north shore of Japonski Island (NMFS 2020). Coho Salmon enter spawning streams from July to November, usually during periods of high runoff. The eggs hatch early in the spring, where the embryos remain in the gravel using the egg yolk until emerging in May or June. Juvenile Coho Salmon spend up to three winters in streams and may spend five winters in lakes before migrating to the sea as smolt (ADF&G 2008). Coastal streams, lakes, estuaries, and tributaries to large rivers provide Coho Salmon rearing habitat. Coho Salmon juveniles may also use brackish-water estuarine areas in summer and migrate upstream to fresh water to overwinter. They spend about 16 months at sea before returning to coastal areas and entering fresh water to spawn (North Pacific Fishery Management Council [NPFMC] 2018). Because Coho Salmon have been documented in nearby Peterson Creek, it is likely that they could be found in marine waters of the action area at certain times of the year.

Chum Salmon (*O. keta*)

Chum Salmon EFH inhabit Sitka Channel off the north shore of Japonski Island (NMFS 2020). Returning after 2 to 7 years, Chum Salmon spawn between June and November in gravel in streams, side-channel sloughs, and intertidal portions of streams when the tide is below the spawning grounds (NPFMC 2018). Chum Salmon fry do not overwinter in the streams, but instead migrate out of the streams directly to the sea shortly after emergence (ADF&G 2008). This outmigration occurs between February and June, with most leaving streams during April and May. Chum Salmon tend to linger and forage in the intertidal areas at the head of bays. Estuaries are important for Chum Salmon rearing during spring and summer. Chum Salmon have been documented in nearby Peterson Creek; therefore, they could be found in marine waters of the action area at some point in their lifecycle.

Pink Salmon (*O. gorbuscha*)

Pink Salmon EFH inhabit Sitka Channel off the north shore of Japonski Island (NMFS 2020). Pink Salmon are distinguished from other Pacific salmon by having a fixed two-year life span. Because of the life span, pink salmon spawning in a particular river system in odd and even years are reproductively isolated from each other and have developed into genetically different lines (NPFMC 2018). Adult Pink Salmon enter spawning streams between late June and mid-October. They spawn within a few kilometers of the coast, and spawning within the intertidal zone or the mouth of streams is very common. Shallow riffles where flowing water breaks over coarse gravel or cobble-size rock and the downstream ends of pools are favored spawning areas. The eggs hatch in early to mid-winter, and fry emerge from gravel to migrate downstream into salt water by late winter or spring (ADF&G 2008). Pink Salmon have been documented in nearby Peterson Creek and could be found in marine waters of the action area at some point in their lifecycle.

Chinook Salmon (*O. tshawytscha*)

Chinook Salmon EFH inhabit Sitka Channel off the north shore of Japonski Island (NMFS 2020). Adult Chinook Salmon are found over a broad geographic range, encompassing different ecotypes and very diverse habitats in Southeast Alaska. Chinook Salmon generally spawn from mid-June to mid-August in waters ranging from a few centimeters deep to several meters deep. Eggs hatch in the late winter or early spring, and juveniles typically remain in fresh water for at least one year before migrating to the ocean in springtime (ADF&G 2008). Chinook Salmon spend up to six years at sea before returning to freshwater streams to spawn between July through September (NPFMC 2018; Morrow 1980). Because Chinook Salmon have been documented in nearby Peterson Creek, it is likely that they could be found in marine waters of the action area at certain times of the year.

Sockeye Salmon (*O. nerka*)

Sockeye Salmon EFH inhabit Sitka Channel off the north shore of Japonski Island (NMFS 2020). Sockeye Salmon exhibit a greater variety of life history patterns than other Pacific salmon and are known to use lake-rearing habitats in the juvenile stages (NPFMC 2018). Sockeye Salmon generally spawn in late summer and autumn. They use a wide variety of spawning habitats, including rivers, streams, and upwelling areas along lake beaches. Eggs hatch during the winter, and the young salmon move into the rearing areas. In systems with lakes, juveniles usually spend up to three years in fresh water before migrating to the ocean in the spring as smolts. However, in systems without lakes, many juveniles migrate to the ocean shortly after emerging from the gravel (ADF&G 2008). Sockeye Salmon have been documented in nearby Peterson Creek and could be found in marine waters of the action area at some point in their lifecycle.

4.1.2 Ground Fish Species Descriptions

Aleutian Skate (*Bathyraja aleutica*)

Juvenile and adult skates use the outer shelf regions of the GOA and feed on bottom invertebrates and fish. Not much is known about seasonal movements or early life stage habitat requirements; however, skates are known to use a broad range of substrate types (mud, sand, gravel, and rock) and can typically be found in the lower portion of the water column (NPFMC 2019). It is probable that Aleutian Skates occasionally inhabit Sitka Channel and surrounding waters.

Pacific Cod (*Gadus macrocephalus*)

Pacific Cod prefer soft substrate such as mud, sandy mud, muddy sand, or sand in deeper waters (Marrow 1980). Pacific Cod are concentrated along the continental shelf edge and upper slope from 100 to 200 meters of water during winter and spring before overwintering in shallower waters (<100 meters) (DiCosimo 2001). Larvae are epipelagic and most commonly found in the upper 45 meters of the water column. Juveniles use nearshore waters from 60 to 150 meters deep and often use eelgrass and kelp beds (NMFS 2003). Based on available habitat in Sitka Channel, it is likely Pacific Cod are present in the area.

Walleye Pollock (*Gadus chalcogrammus*)

Walley Pollock is the second most abundant groundfish stock in the Gulf of Alaska and accounts for 25 to 50 percent of the catch and 20 percent of the biomass. Based upon mid-water trawler surveys, Pacific Walleyes prefer waters less than 300 meters. Peak spawning in the GOA happens in late March in Shelikof Strait generally over 100 to 200 meters of water. Juveniles have a widespread distribution and have no known habitat preferences. Adult Walleye Pollock occur throughout the water column on the outer and mid-continental shelf of the GOA (NPFMC 2019). The proposed project is within the GOA stock area which extends from Southeast Alaska to the Aleutian Islands; however, because of the available habitat, it is questionable whether Walleye Pollock inhabit Sitka Channel.

Shortspine Thornyhead Rockfish (*Sebastolobus alascanus)*

Shortspine Thornyhead is a demersal species common throughout the GOA and found along the Pacific Rim from Japan to Baja California as deep as 1,500 meters. Spawning takes place in the late spring (April) and early summer (July) in the GOA. Juveniles remain pelagic period for over a year and settle out in shallow benthic habitats between 100 and 600 meters. They migrate deeper as they grow and range from 90 to 1500 meters. Thornyhead Rockfish prefer muddy areas, sometimes near rocks or gravel (NPFMC 2019). It is questionable whether Shortspine Thornyhead Rockfish inhabit Sitka Channel and surrounding waters; however, they are considered here.

Shortraker Rockfish (*Sebastes borealis*)

Shortraker Rockfish are found in the highest abundance along the continental slope in areas of steep slopes and numerous boulders between 300 to 500 meters. Little is known about the early life stages of this species. It is estimated that Shortraker Rockfish spawn from February to April. The larvae are pelagic and have been found in offshore waters and some larvae have been sampled in coastal Southeast Alaskan waters. Juveniles share the same habitat as adults; however, they have been found in shallower areas (NPFMC 2019). It is questionable whether they Shortraker Rockfish inhabit Sitka Channel and surrounding waters; however, they are considered here.

Pacific Ocean Perch (*S. alutus*)

Pacific Ocean Perch have a wide range throughout the North Pacific. They can be found in Alaskan waters during all life stages. Adults are primarily found offshore during fall and winter months in 150 to 420 meters waters along the outer continental shelf and the upper continental slope. During the summer, adults migrate to shallower depths (150 to 300 meters). Not much is known about the early life stages of Pacific Ocean Perch; however, larvae released offshore in April and May are thought to be pelagic and drift with the current. Larvae release likely occurs offshore, but it is suggested that small juveniles prefer rocky, high relief areas inshore and progressively move into deeper waters (NPFMC 2019). It is questionable whether Pacific Ocean Perch inhabit Sitka Channel and surrounding waters; however, they are considered here.

Redbanded Rockfish (*S. babcocki*)

Redbanded Rockfish are distributed from the central Bering Sea and Aleutian Islands to southern California (Byersdorfer and Watson 2010). This large deep-water species prefers offshore reefs and depths from 50 to approximately 600-meter depths (Mecklenburg et al. 2002). Based on available habitat, it is questionable whether they Redbanded Rockfish inhabit Sitka Channel and surrounding waters; however, they are considered here.

Black Rockfish (*S. melonops*)

Black Rockfish are part of the pelagic shelf rockfish complex and are distributed from Aleutian Islands to southern California. They prefer rocky reefs in shallower waters, but can be found as deep as 350 meters. Spawning generally occurs in the spring from January to May, and typically have a small home range (ADF&G No Date). This species is a likely inhabitant of Sitka Channel and surrounding waters.

Dusky Rockfish (*S. ciliatus*)

Much of the information that has been obtained about Dusky Rockfish comes from data collected during the summer months from the commercial fishery or in research surveys. Based upon this data, Dusky Rockfish appear to be abundant in the GOA. It is presumed that spawning occurs in spring and may extend into summer. Juveniles share the same 100 to 200 meters depth preferences possibly along rocky areas of the outer continental as adults, but they have been found in shallower water during this early life stage (NPFMC 2019). It is questionable whether Dusky Rockfish inhabit Sitka Channel and surrounding waters; however, they are considered here.

Silvergray Rockfish (*S. brevispinis*)

Silvergray Rockfish can be found from the western GOA to Baja California (NMFS No Date). Considered as other rockfish for GOA, EFH for late juveniles is the general distribution area for this life stage and incudes the lower portion of the water column along the middle and outer shelf throughout the GOA (50 to 200 meters) (NPFMC 2019). It is questionable whether Silvergray Rockfish inhabit Sitka Channel and surrounding waters; however, they are considered here.

Quillback Rockfish (*S. maliger*)

Quillback Rockfish are part of the demersal shelf rockfish complex and are distributed from Kodiak Island to southern California. They prefer shallow waters up to 100 meters, but can be found as deep as 250 meters. Spawning generally occurs in the spring from March to June. Juveniles are known to be at the margins of kelp beds, while adults are found over rock substrates or cobble and sand next to reefs (NPFMC 2019). This species is a likely inhabitant of Sitka Channel and surrounding waters.

Redstriped Rockfish (*S. proriger*)

Redstriped Rockfish can be found from the Bering Sea to Baja California (NMFS No Date). Considered as other Rockfish for GOA, EFH for late juveniles is the general distribution area for this life stage and includes the lower portion of the water column along the middle and outer shelf throughout the GOA (50 to 200 m) (NPFMC 2019). It is questionable whether Redstriped Rockfish inhabit Sitka Channel and surrounding waters; however, they are considered here.

Rosethorn Rockfish (*S. helvomaculatus*)
Rosethorn Rockfish are part of the demersal shelf rockfish complex and are distributed from Kodiak Island to southern California. They can be found as deep as 550 meters. Spawning takes places in the spring from February to September, but most commonly takes place in May. Although not much is known about Rosethorn Rockfish lifecycle, juveniles have been observed at the margins of kelp beds and adults are found over rock substrates or cobble and sand next to reefs (NPFMC 2019); therefore, they could be found in Sitka Channel and surrounding waters.

Sablefish (*Anoplopoma fimbria*)
Most adult and late juvenile Sablefish are found in depths of 370 to 920 meters along the continental shelf, the lope, and the deep-water coastal fjords over any substrate (NPFMC 2019). Spawning occurs in late spring and larvae have been found in pelagic waters at 300 to 500 meters (McFarlane 1997). It is questionable whether Sablefish inhabit Sitka Channel and surrounding waters; however, they are considered here.

Yellow Irish Lore (*Hemilepidotus jordani*)
Yellow Irish Sole are bottom-dwelling fish that live in tide pools and in shallow marine waters, but can be found in deeper waters. They can occasionally can be found in freshwater. Sculpins generally spawn in the winter; however, larvae have been found year-round. Adults and late juveniles are distributed from subtidal areas near shore to the edge of the continental shelf (down to 200 meters), and Sitka is the eastern most known location that Yellow Irish Lore have been observed. Because Yellow Irish Lore are known to use a wide range of habitats, including intertidal pools and all shelf habitats, e.g., mud, sand, gravel, etc. (NPFMC 2019), it is likely that they are found in Sitka Channel and surrounding waters.

Great Sculpin (*Myoxocephalus polyacanthocephalus*)
Great Sculpins are bottom-dwelling fish that live in tide pools and in shallow marine waters, but can be found in deeper waters. They can occasionally can be found in freshwater. Sculpins generally spawn in the winter; however, larvae have been found year-round. Adults and late juveniles can be found throughout the intertidal area to 200 meters, most commonly on sand at moderate depths (50 to 100 meters). Sculpins are known to use a wide range of habitats, including intertidal pools and all shelf habitats, e.g., mud, sand, gravel, etc. (NPFMC 2019), and it is likely that they inhabit Sitka Channel and surrounding areas.

Bigmouth Sculpin (*Hemitripterus bolini*)
Bigmouth Sculpins are bottom-dwelling fish that live in tide pools and in shallow marine waters, but can be found in deeper waters. They can occasionally can be found in freshwater. Sculpins generally spawn in the winter; however, larvae have been found year-round. Adults and late

juveniles can be found throughout deeper offshore waters in the GOA and grow up to 70 centimeters in length. Bigmouth Sculpins are known to use a wide range of habitats, including intertidal pools and all shelf habitats, e.g., mud, sand, gravel, etc. (NPFMC 2019); therefore, they could inhabit Sitka Channel and surrounding waters.

Arrowtooth Flounder (*Atheresthes stomias*)

Arrowtooth Flounder have a benthic lifestyle with distinct summer and winter grounds along the eastern Bering Sea shelf. Spawning occurs as early as September and as late as March at depths of 100 to 360 meters (NPMFC 2019; DiCosimo 2001). Pelagic (open seas) eggs and larvae inhabit all areas of the continental shelf, though predominantly inhabiting only the inner and middle shelf regions. Juveniles and adults are demersal (bottom dwelling) in gravel and muddy sand. Juveniles typically inhabit shallow areas until they are about 10 centimeters long. During winter, the flounder migrate to shelf margins and upper continental slopes to avoid cold temperatures (NPMFC 2019). This species is a likely inhabitant of Sitka Channel and surrounding waters.

Northern Rock Sole (*Lepidopsetta polyxystra*)

Northern Rock Sole, a shallow water flatfish, has a wide distribution from the southern Bering Sea and throughout the Aleutian Islands to as far south as Washington (Byersdorfer and Watson 2010). Northern Rock Sole migrate to shallow waters on the continent shelf for feeding after spawning in the spring (NPFMC 2019). They are most often found at depths from 50 to 100 meters in the summer before returning to deeper waters in the winter (Armistead and Nichol 1993). Juveniles spend their first year in shallow waters on the continental shelf (Forrester 1964). It is questionable whether Norther Rock Sole inhabit Sitka Channel and surrounding waters; however, they are considered here.

Dover Sole (*Microstomus pacificus*)

There is a wide spread distribution of Dover Sole in the GOA with a presence in waters deeper than 300 meters, but more common between 100 to 200 meters during the summer (Turnock et al. 2002). Spawning occurs in deeper waters from February through May with peak spawning occurring in May (Abookire and Macewicz 2003). As Dover Sole go through life stages and reach sexual maturity, they move down the continental slope and into deeper waters (NPMFC 2019). Because Dover Sole primarily inhabit deeper waters, it is questionable whether they inhabit Sitka Channel and surrounding waters.

Yellowfin Sole (*Limanda aspera*)

Yellowfin Sole are part of the shallow water flatfish management complex in the GOA and are distributed from waters off of British Columbia to the Sea of Japan. They over-winter near the shelf margins, before migrating to inner shelf in April or early May for spawning. Spawning periods can happen anytime from late May through to August, primarily in shallow water. Juveniles separate from adults and remain in shallow areas until 15 cm. During the summer, eggs are found pelagic waters along the shelf and upper slope (from 0 to 500 meters) and adults prefer sandy substrates in nearshore shallow shelf areas (NPFMC 2019). Yellowfin Sole could inhabit Sitka Channel and surrounding waters.

Alaska Plaice (*Pleuronectes quadrituberculatus*)
Alaska Plaice are present in continental shelf waters year-round and travel seasonally throughout their range. A majority of Alaska Plaice have been sampled along the Alaska Peninsula and around Kodiak Island, but they have also been found within the GOA. Sampling events have obtained fish from near shore waters at depths less than 100 meters. Alaska Plaice spawning typically occurs from March to April on hard sandy ground (Zhang 1987; NPMFC 2019). Alaska Plaice could inhabit Sitka Channel and surrounding waters.

Octopus (*unidentified*)
Octopus can be found from subtidal waters to deep waters close to the outer slope, with the highest diversity along the shelf break and an abundance on the shelf. Life histories of some octopus species in this region are relatively unknown but generally, life spans anywhere from 1 to 2 years or 3 to 5 years depending on species. Adults are preferential to substrate with rocks and cobble, and on sand and mud (NPFMC 2019). This species is a likely inhabitant of Sitka Channel and surrounding waters.

4.1.3 Non-EFH Protected Species

Pacific Herring (*Chupea harengus*) and Pacific Halibut (*Hippoglossus stenolipsis*) do not have EFH in the project action area; however, they serve an important ecological role within Sitka Sound (ADF&G 2019) and are described here due to an expressed interest from NMFS and ADF&G in their December 2019 letters regarding the project. Pacific Herring specifically provide an abundant, high energy food source for a wide variety of fishes, mammals, and birds. Herring are also commercially important and support a roe fishery in Sitka that remains one of the largest and most valuable roe fisheries in Alaska.

The largest herring stock in Southeast Alaska migrates to Sitka Sound each spring for an annual spawning event, spanning several days to several weeks from mid-March to mid-May. Pacific Herring spawn on intertidal and subtidal substrates within the project area in spring, and incubating eggs hatch about two weeks later (ADF&G 2019). Based on ADFG surveys over the last 30 years, herring spawning areas have been highly variable, but observed on marine vegetation around the perimeter of the Sitka Airport which includes the Channel Rock Breakwaters. Herring spawn from the intertidal zone down to about mean lower low water, targeting areas with substantial macroalgae concentrations. Egg deposition occurs on all species of kelp in the Sitka area, particularly *Macrocystis* and *Saccharina*, but herring also use eelgrass, *Fucus*, coralline algae, red algae, and hard rocky substrates.

4.2 EXISTING CONDITIONS IN THE ACTION AREA

4.2.1 Sitka Channel and Channel Rock Breakwaters

Sitka Channel is a narrow passage between Japonski Island and the much larger Baranof Island. Downtown Sitka and multiple harbors are located along the east shore of the channel, and there is a United States Coast Guard Wharf on the west shore. The channel, about 6,500 ft long, 150 ft wide, and about 50 ft at the deepest, is bookended by the Channel Rock breakwaters to the north and the John O'Connell bridge to the south (NOAA 2020).

The mean tide range is 7.7 ft, the diurnal tide range is 9.94 ft, and the extreme range is 18.98 ft (NOAA 2020a). The channel is characterized by multiple marine habitats that support a wide variety of fish and wildlife species. Habitats in the channel range from calm protected embayments to high energy wave-swept exposed coastlines. Much of the developed Sitka waterfront area has a rocky shoreline (USACE 2012). The seafloor in the channel contains a mosaic of bottom types including a mixed-soft bottom (mixture of silt, sand, pebbles, cobbles, boulders, and shell) and bedrock outcrops.

The three Channel Rock breakwaters were authorized in 1992, and initial construction was completed in 1995 with placement of a total of 310,500 cubic yards of rock to provide wave protection for expanded harbor capacity in the Sitka Channel (USACE 2012). The Channel Rock breakwaters were expanded to fill a gap in the existing structure following a 2011 USACE feasibility study in response to elevated wave action and erosion in the channel.

A marine survey conducted June 5-6, 2020 documented habitats and mapped eelgrass present south of the proposed development area.

According to the ShoreZone Mapper, the shoreline at the proposed project site in Sitka Channel has the following characteristics (ShoreZone 2019):

- Habitat Class: protected/partially mobile/sediment or rock and sediment; protected/mobile/sediment; semi-protected/partially mobile or rock and sediment; semi-protected/anthropogenic permeable.
- Coastal Class: ramp with gravel/sand beach; cliff with gravel/sand beach; sand and gravel flat fan; gravel beach, narrow; man-made permeable.
- Biological Wave Exposure: protected; semi-protected; semi-exposed.

Eelgrass Extent

During a June 2020 intertidal habitat survey, one eelgrass bed was identified near the project location (Figure 8). The eelgrass bed is approximately 409 square meters in size with 90% eelgrass coverage and located east of the project footprint (SolsticeAK 2020).

Figure 8. Eelgrass Bed Extent within the Project Area

Contamination History

The are no known contamination issues and no active contaminated sites monitored by the Alaska Department of Environmental Conservation (ADEC) within the project site (ADEC 2020). There are active contaminated sites and locations of known contamination closed with institutional controls near the proposed project on Japonski Island. Previous marine sediment sampling in the project area indicated no marine contamination despite the area's long history of commercial marine activity, including ongoing seaplane operations (USACE 2011).

4.2.2 Anadromous Waterways

There is one anadromous stream across Sitka Channel from the action area. Peterson Creek is anadromous (AWC #113-41-10185) for all five species of salmon and Dolly Varden and located along the eastern perimeter of the action area (ADF&G 2020). See Figure 4 in Section 3.2.

5 EFFECTS ASSESSMENT

In general, construction activities and marine vessel operations in estuarine habitats and in coastal marine areas have the potential to impact EFH. The construction and use of the SPB and associated structures may adversely impact marine resources directly and indirectly through increased sound levels, increased turbidity, habitat loss and/or modification. Other impacts that may occur as a result of the proposed project include the following: increased vessel traffic, increased human access (e.g., tourism), and cumulative development of shoreline habitat for commercial uses. Impacts as a result of each construction activity and indirect impacts are described below. Table 5 (see below) details each activity that could impact EFH and what potential adverse impacts the activity may have (NOAA 2017).

Table 5. Potential Adverse Impacts to Essential Fish Habitat and EFH-listed Species for Activities Associated with the Proposed Project

	Project Activity			
Potential Impacts	Discharge of Fill Material and Uplands Development	Overwater Structures	Pile Driving and Temporary Pile Removal	Seaplane and Vessel Traffic
Fish Avoidance/Displacement	X	X	X	
Fish Injury or Mortality	X		X	
Loss or Alteration of Fish Habitat	X	X		X
Release of Contaminants		X	X	X
Increased Mechanism for Invasive Species Introduction or Dissemination				X
Decrease in Ambient Light		X		
Reduction in Wave and Current Regimes	X	X		X

5.1 DISCHARGE OF FILL MATERIAL AND UPLANDS DEVELOPMENT

Approximately 1.47 acres of Sitka Channel below mean high water will be filled to support upland staging and vehicle and seaplane parking. Since blasting will take place upland of the high tide line, there will be no in-water noise impacts to species with EFH in the project action area.

5.1.1 Short-Term Impacts

Sedimentation

Discharge of fill material for the creation of SPB uplands will temporarily increase sedimentation, turbidity, and available light in the process of creating new uplands from fill material. Blasting will not affect sedimentation from uplands development given its proximity inshore from the high tide line and anticipated sedimentation from discharging of fill. These impacts will be temporary, but contribute to the long-term habitat loss impacts to biological functions and hydrologic conditions addressed below. Increased turbidity during upland excavation and fill activities can injure fish by temporarily impacting feeding efficiency and clogging or damaging fish gills from suspended solids, leading to possible suffocation and increased energy demands (NOAA 2017).

5.1.2 Long-term Impacts

Habitat Loss

Discharge of fill material to create project uplands reduces available fish habitat, potentially impacting productive habitats with important biological functions and hydrologic conditions. Given the project's location in a tidal area, discharge of fill will alter both biotic and abiotic conditions. Productive fish habitat can support fish spawning, breeding, and feeding, facilitating growth to maturity. Fill permanently eliminates area fish habitat (NOAA 2017). Reduced low gradient habitat or native substrate in coastal waters could likely negatively affect salmon rearing, by altering shelter important to juvenile salmonids. Changing habitat gradients may impact abundance and productivity of adult salmon, salmon prey, and intertidal rearing flatfish.

Establishing SPB uplands has the potential to impact hydrological conditions by obstructing flow, changing water velocity and direction, and altering coastal profile which collectively can alter aquatic communities, erosion and deposition, and overall water stratification. Zooplankton abundance, an important food source for juvenile Pink and Chum Salmon, depend on currents for transport from offshore to nearshore areas (NOAA 2017).

Within the direct fill footprint, there is a large patch of the invasive algal species *Sargassum muticum*. The process of converting a 1.47-acre area to uplands will eradicate the known population of this invasive species from the action area. During a habitat assessment of the area, the algae species was not identified anywhere else within the footprint of project infrastructure (SolsticeAK 2020); however, it is found in other locations in Sitka Channel and Sitka Sound could be transported within the project footprint.

5.1.3 Indirect Impacts

Development of hardened impervious upland surfaces for the proposed project, including parking and shelter structures, will exacerbate stormwater runoff. Stormwater runoff can affect sedimentation and siltation and increase contaminants in tidal habitats. Nonpoint source contamination and debris may increase from introduced hardened surfaces and reduced land use buffers (NOAA 2017).

Injured fish as a result of increased turbidity and the potential release of contaminants during discharge of fill to create SPB uplands may have indirect impacts on other species and the local marine system as a whole. Decreased visibility and an increase in suspended particles in the water column from discharge of fill can have indirect impacts on prey species by making them more susceptible to predation. These effects will be over a minimal project footprint relative to available habitat in the area. When combined with fish displacement from the area during construction, , there is a small potential to affect future fish populations in the area anda minimal risk to local commercial, sport, and subsistence harvests (NOAA 2017).

5.1.4 Cumulative Effects

Development along and within the Sitka Channel has occurred for several decades. There are no known future or foreseeable actions planned in the action area that will contribute to cumulative effects on EFH or EFH-managed species/species complexes and other fish and marine resources.

5.1.5 Conservation and Mitigation Measures

Incorporating the following conservation measures related to fill will help minimize adverse impacts to EFH and EFH-managed species/species complexes.

- The new SPB design will minimize fill in EFH and avoid a large area of eelgrass just east of project infrastructure (Figure 8).
- The side slopes of fill will be shallow to follow current tidal conditions which facilitates photic zone productivity; allows for unrestricted fish migration; and provides refuge for juvenile fish in interstitial spaces.
- A Section 404 Permit will be obtained to ensure fill activity is essential to the project, project impacts have been reduced, and unavoidable impacts compensated sufficiently.

5.2 VESSEL TRAFFIC

5.2.1 Short-Term Impacts

Short-term impacts to EFH from project vessel traffic during construction could increase wakes and surge in the action area, which could lead to shoreline erosion, disrupted coastal habitats, and increased turbidity.

5.2.2 Long-term Impacts

Seaplane operations could have long-term impacts to EFH. Seaplanes takeoffs, landings, and transiting in the area could cause wakes, leading to shoreline erosion, disrupted coastal habitats, and increased turbidity.

There is a minor but potential risk of contamination, most likely oil spills, from the operation of the new SPB. Seaplanes are permitted to use avgas fuel, an especially toxic petroleum product, necessitating proper mitigation and preventative protocols. There is also a minor risk that seaplane operations could introduce invasive species, requiring proper mitigation and preventative SPB protocols.

Seaplane operations have occurred in the area for several decades, and while the new seaplane base may result in more operations, impacts are expected to remain at a minor level. Sitka Channel experiences high levels of marine traffic, including ongoing seaplane operations. The new SPB will relocate seaplane operations within the channel to an area that currently has less marine traffic, reducing congestion from vessel traffic in Sitka Channel.

5.2.3 Indirect Impacts

Operation of the new SPB has the potential to increase water and air traffic in the Sitka Channel vicinity. With additional vessel traffic there will be an increased potential for shoreline wake impacts, increased turbidity, and spills from vessels or planes which could impact EFH.

5.2.4 Conservation and Mitigation Measures

Incorporating the following vessel and seaplane operation conservation measures will help minimize adverse impacts to EFH and EFH-managed species/species complexes.

- A storm drain system including manholes with catchment sumps to trap solids and an oil water separator will be installed in the upland area to collect surface runoff and to remove contaminants prior to delivery to any receiving waters.
- SPB facilities will be designed to include practical measures to reduce, contain, and clean up petroleum spills.
- Oil spill response equipment will be located at the new SPB facility.
- SPB operation protocols and user agreements will require seaplanes to operate at no wake speeds in Sitka Channel (with the exception of operating within the taxi lane) in compliance with the Sitka Harbor no wake designations (CBS 2020).
- SPB operation protocols will incorporate BMP's to prevent or minimize contamination from seaplane accidents, general maintenance, fueling, and nonpoint source contaminants from upland facilities.

5.3 PILE INSTALLATION AND REMOVAL

5.3.1 Short-Term Impacts

Sound

An action area for the SPB has been determined by the area of water that will be ensonified above the acoustic threshold of 155 decibels (dB) re 1µPa (micropascal) (root mean square) for impacting; this is the area where received noise levels from pile driving could expose fish to impacts described below. The action area includes approximately 4 square kilometers of northern Sitka Channel near downtown Sitka in Southeast Alaska (Figure 3).

Piles will be a central component of the new SPB's marine structures. Steel piles will support the trestle, gangway landing dock, and floating dock structures. To install and remove these piles a vibratory hammer, down-the-hole system, and impact hammer will be used. Each piece of equipment produces sound that exceeds known acoustic thresholds for fish species (Carlson et al 2001; Wursig et al 2000). Impact hammers produce sharp, short bursts of sound, while vibratory hammers produce sound with a longer duration that have more energy in the lower frequency range and create more sensitivity for fish (Carlson et al 2001; Wursig et al 2000).

There are several methods used to remove temporary piles from the substrate. For the proposed project, piles will be removed from the substrate using a vibratory hammer or the direct pull method. The use of the vibratory hammer will cause similar sound impacts as present during pile installation; however, the direct pull method creates little in-water noise.

Considering sound profiles and area topography, the estimated area in which sound will exceed injury thresholds for fish will extend from 500 and 3,000 meters from pile driving at the new SPB site for impact pile driving (Figure 3).[1] Sound will be truncated by landforms, and may radiate across Sitka Channel to the shores of Baranof Island near downtown Sitka and through narrow openings in the Channel Rock Breakwaters reaching the Apple Islands.

Vibratory pile driving will occur for approximately 60 minutes each day; therefore, ensonification of the area by vibratory pile driving will be for approximately 45 hours over 46 days (not concurrent). Socketing pile driving will occur for approximately 10 hours each day; therefore, ensonification of the area by socketing will be for approximately 590 hours over 59 days (not concurrent). Impact driving will occur for approximately 10 minutes each day; therefore, ensonification of the area by impacting will be for approximately 15 hours over 89 days (not concurrent). Total ensonification from pile driving will be for approximately 650 hours over 194 days.

Little is known about the effects of sound on juvenile and adult fish; however, current research accepted by NMFS supports that physical injury can occur when SPLs reach 206 dB re 1 µPa during a single strike and/or when the accumulated sound exposure level (SEL) from multiple strikes reaches 187 dB re 1 µPa for large fishes (≥2 grams) or 183 dB re 1 µPa for small fishes (<2 grams). There is currently not enough research to determine how sound impacts the earlier life stages of fish though it is known that smaller fish are more affected than larger fish by sound pollution (NOAA 2017).

During pile installation and removal, pile driving sound can affect the distribution and behavior of juvenile pink salmon and chum salmon. Other species of fish may change migration routes to avoid the area or leave the area entirely and habitat (NOAA 2017). SPLs of 155 dB re 1 µPa can stun small fish and make them more susceptible to predation. Physical injury to fish such as fatal damage to swim bladders in small fish and compromised swim bladders in larger fish can also result from exposure to underwater sound.

Sedimentation

As piles are installed, it is expected approximately 1.5 cubic meters of material will be excavated of each trestle pile and 4 cubic meters of material will be excavated from each float pile. Less than two piles will be drilled in a day to minimize the volume of sediment disturbance. About 2 cubic meters per day will be released during construction of the trestle and about 8 cubic meters per day will be released during the construction of the floats, with a total of 182 cubic meters overall for the project.

[1] Impact pile driving source level of 186.7 SEL/ 198.6 SPL8 is estimated from documented median received levels at 10 meters from impact hammering of 48-inch piles for the Port of Anchorage test pile project (Austin et al. 2016, Tables 9 and 16).

5.3.2 Long-term Impacts

No long-term impacts are expected from the placement of piles.

5.3.3 Indirect Impacts

EFH loss as a result of indirect impacts related to pile driving activities, such as barging and equipment and piles to the site and staging barges in the area, are expected to be temporary and minimal relative to fish populations and overall available EFH.

Piles can support growth of algal and sessile invertebrate species, which can increase and improve the quality of EFH in areas.

5.3.4 Conservation and Mitigation Measures

Incorporating the following pile driving conservation measures will help to minimize adverse impacts to EFH and EFH-managed species/species complexes.

Sound Conservation and Mitigation Measures

- The project will use the fewest number of piles necessary to support the new SPB facilities and allow light to reach under-pier areas and minimize impacts to the substrate.
- Pile installation and removal will not occur from March to June, when larval and juvenile stages of fish species are present within the action area.
- Impact hammer use will be minimized. When impact hammers are used, the pile will first be driven as deep as possible with a vibratory hammer and socketing, before using an impact hammer to drive the pile to its final position.
- As possible, the impact hammer will be operated at a reduced energy setting and impacted into bedrock.

Sedimentation Conservation and Measures

- A silt curtain will surround the pile driving and temporary pile removal operation.
- Temporary piles will be removed slowly to allow sediment to slough off at or near the mudline.

5.4 OVERWATER STRUCTURES

5.4.1 Short Term Impacts

No short-term impacts are expected as a result of installing overwater structures.

5.4.2 Long-term Impacts

Long-term impacts as a result of installing new SPB overwater structures will include changes in ambient light conditions and alterations of wave and current energy regimes. As a result of the project, there is also an increase in the risk of contamination released from activities associated with seaplanes using the overwater facilities (NOAA 2017). While eelgrass beds, which are important fish rearing habitat, will be mostly avoided by this project (Figure 8), the new SPB's overwater structures will shade approximately 1.62 acres of EFH which could permanently reduce or cause fragmentation of eelgrass and algae beds.

Ambient light is often reduced as a result of overwater structures. Shade caused by overwater structures may limit the distributions of plants, invertebrates, and fish or reduce complexity of the habitat below the structures. This is due to a decrease in available light for photosynthesis to occur in diatoms, benthic algae, eelgrass, and other photosynthesizers that marine and estuarine fishes rely on for food, protection, and rearing young. Structure height, width, composition, and orientation relative to the sun can all influence shading footprints of overwater structures (NOAA 2017).

The height, width, and composition of the project structures, as well as the orientation of the structures in relation to the sun, can influence how large a shade footprint an overwater structure may produce and how much of an adverse impact that shading effect may have on the localized habitat (NOAA 2017).

Juvenile salmonoids may avoid swimming under overwater structures with high activity like floats and docks. Reduced-light conditions can also directly adversely impact fish species that rely on visual cues for spatial orientation, prey capture, schooling, predator avoidance, and migration, encouraging avoidance of shaded areas. However, the protected, low energy nature of certain structures, including the nearby breakwaters or project wave attenuators, may attract some juvenile fish to change behavior and congregate in those spaces (NOAA 2017).

In addition to SPB float structures altering available light, other overwater structures, such as project wave attenuators, can adversely alter wave and current energy regimes in the area. The wave attenuators for the new SPB may interrupt the transportation of detrital materials and alter substrate composition in nearshore habitats (Hanson et al 2005; NOAA 2017). Adequate substrate is required for plant propagation, fish and shellfish settlement and rearing, and forage fish spawning (NOAA 2017).

Some treated wood is incorporated into the overwater marine structures. Contaminants from project materials such as the submerged wood used with creosote and ammoniacal copper zinc arsenate used in the trestle and floating dock structures are commonly known to leak into the marine environment for a short period after installation. These chemicals are known to cause harmful effects to fish such as, but not limited to: cancer, reproductive anomalies, immune dysfunction, and growth and development impairment (NOAA 2017).

5.4.3 Indirect Impacts

A decrease in aquatic vegetation and phytoplankton as a result of a decrease in light from project overwater structures can indirectly impact fish by reducing prey abundance and habitat complexity (NOAA 2017).

5.4.4 Overwater Structures Conservation and Mitigation Measures

Incorporating the following conservation measures will help to minimize adverse impacts to EFH and EFH-managed species/species complexes.

- Wherever possible, the materials used for the overwater portions of the trestle and gangway, will allow some ambient light to penetrate to the water surface and water flow below the structure through grating and openings.
- The largest section of the dock will be installed in a north-south orientation to allow the arc of the sun to cross perpendicular to the structure to reduce the and intensity of shading.
- The float will be located in deep water to avoid light limitation and grounding impacts to the intertidal or shallow subtidal zones.
- The overwater trestle deck will be placed at least 1 meter (3 ft) above the water surface to reduce shading and increase available ambient light. Other floating structures will be approximately 0.5 meters above the water surface.
- All preservative treatment will be in accordance with the Western Wood Preservers Institute BMPs.

6 CONCLUSIONS AND DETERMINATION OF EFFECTS

Approximately 1.47 acres of shallow water EFH will be lost from the implementation of the proposed project due to filling for the upland staging area; however, fill will be minimized as much as possible and conservation measures will help to mitigate the impacts. Construction methods and proposed conservation measures will help to minimize short-term adverse impacts to EFH and EFH-managed species/species complexes. Few long-term adverse impacts to EFH from overwater structures and operations of the SPB are expected. Adverse impacts to EFH will occur over a minimal footprint relative to available fish habitat throughout Sitka Sound, and most will be mitigated through conservations measures. Indirect impacts to EFH and EFH-managed species, including those caused by potential increases in marine traffic will be mitigated through conservation measures, including SPB operating protocols and spill response plans.

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