APPENDIX D:

ESSENTIAL FISH HABITAT ASSESSMENT

Essential Fish Habitat Assessment

Alaska Department of Transportation and Public Facilities

Saint Mary's Airport Improvements

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1 INTRODUCTION

The Alaska Department of Transportation and Public Facilities (DOT&PF) is proposing to develop a temporary barge landing in Saint Mary's, Alaska to support improvements needed at the Saint Mary's Airport. The barge landing will allow barges to safely dock and offload surfacing material. The barge landing work, which includes placing fill in approximately 0.51 acres and driving piles within the Yukon River, is anticipated to begin with installation of the temporary barge landing in spring 2022 and removal of the temporary barge landing in December 2024.

This assessment of Essential Fish Habitat (EFH) 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. Section 305(b)(2) of the Magnuson-Stevens Act requires Federal action agencies to consult with National Oceanic and Atmospheric Administration (NOAA) 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 barge landing is located within the Yukon River, an area designated as EFH, and the below assessment satisfies EFH consultation requirements.

2 PROJECT PURPOSE

The purpose of this effort is to construct a new temporary barge landing on the Yukon River near Saint Mary's Airport. The barge landing is needed to support DOT&PF's planned improvements of the primary north/south runway, crosswind runway, taxiways, and apron areas at the Saint Mary's Airport.

Currently, there are no existing road-accessible material sites near the airport that could provide the required type, quality, and quantity of surfacing required for the airport upgrades. Although there is a barge landing in Saint Mary's, its use would require dump trucks to drive through the middle of the community and then 5.7 miles to the airport, which is neither acceptable to the community nor economical.

There is an existing access road to a causeway/dock structure on the north bank of the Yukon River at the airport barge landing adjacent to the Boreal Fisheries site near the airport. While silt has accumulated around the causeway and it no longer extends to deep enough water, the general location is suitable for a new barge landing and staging area.

Figure 1. Saint Mary's Airport Barge Landing Location

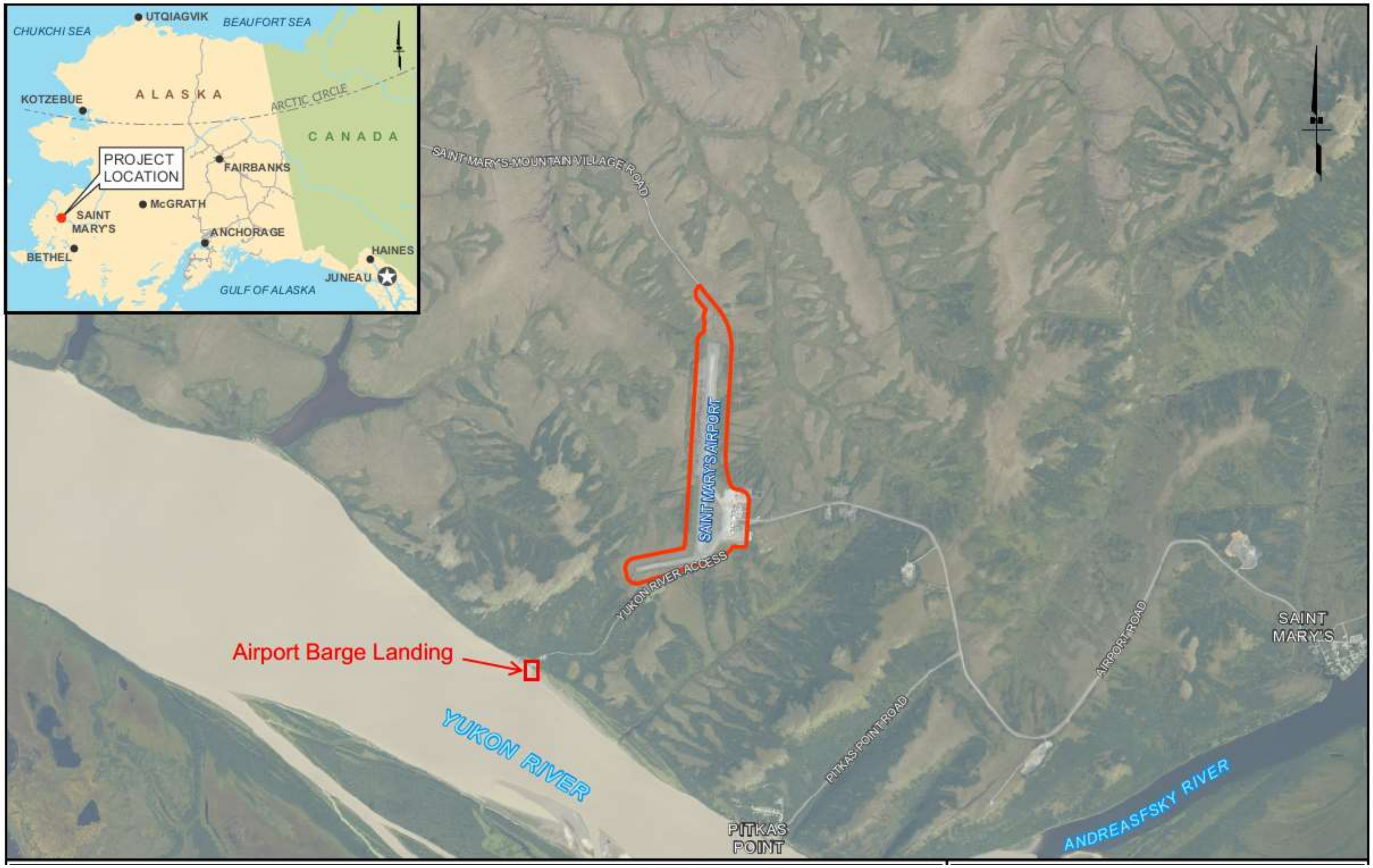


Figure 2. Saint Mary's Airport Barge Landing Components

3 PROPOSED ACTION

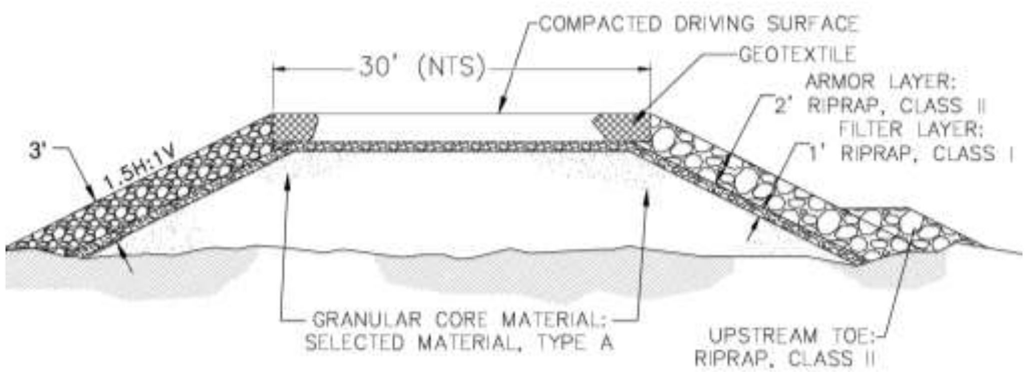
3.1 PROJECT LOCATION

The proposed Saint Mary's Airport barge landing is located on the north shore of the Yukon River in Western Alaska at Township 23 N, Range 77 W, Section 36, Seward Meridian; latitude 62.045090 and longitude -163.329720 (Figures 1 and 2). This location is at the end of an existing gravel road about 1.4 miles southeast of the Saint Mary's Airport. The location is about 13 miles upriver from Mountain Village and 1.5 miles and 5.5 miles downriver from Pitka's Point and Saint Mary's, respectively.

3.2 CONSTRUCTION DETAILS

The proposed design of the Airport Barge Landing would include a 0.28-acre solid fill causeway extending approximately 500 feet into the Yukon River. The causeway would be approximately 65 feet wide at the toe of slope, with a 430-foot-long by 30-foot-wide compacted driving surface. The upstream 1.5(H):1(V) causeway side slope would be reinforced with Class I riprap and armored with Class II riprap and additional Class II riprap at the toe of the slope. The causeway's downstream 1.5(H):1(V) side slope would have Class II riprap (Figure 3). The causeway end would extend another 70 feet into the river at an approximate 5 percent average slope, to approximately 10 feet below ordinary high water (OHW) and protected with Class II riprap.

Figure 3. Cross Section of the Saint Mary's Airport Barge Landing Causeway



Approximately 50 feet upstream of the barge landing, a 10,000-square-foot offloading and staging area would be constructed 8 feet above OHW. The offloading and staging area would be constructed of Type C selected granular core material with side slopes armored with geotextile overlain with Class I riprap, as required.

To construct the barge landing, fill would be brought to the site by truck via the access road from a nearby permitted location. A bulldozer would place the material from shore into the river. Riprap would be placed either from a barge or from the causeway and the offloading and staging area using an excavator. It is expected all the riprap for the barge landing would be brought to the site on a single barge.

Two mooring dolphins would be installed along the causeway. The dolphins would consist of four 10-inch diameter steel piles. Each 50-foot-long pile would be driven about 25 feet into the bed of the Yukon River using a vibratory hammer. It is expected that it will take 30 minutes to drive each pile and a four piles will be driven per day. Removal of the piles is expected to take approximately 15 minutes and would be completed over 2 day. It is expected that a barge (around 55 feet by 200 feet and 2,500 tons) equipped with a crane and vibratory hammer pile driver and supported by a skiff would complete the work.

Total fill areas and quantities for the causeway and staging and offloading area are shown in Table 1. Pile details are provided in Table 2.

Table 1. Saint Mary's Airport Barge Landing Fill in EFH

Project Feature	EFH Impacts	
	Fill Area (acres)	Fill Volume (cubic yards)
CAUSEWAY		
Selected Material, Type C	0.28	9,200
Class I Riprap		1,500
Class II Riprap		1,000
Total		11,700
STAGING AREA		
Selected Material, Type C	0.23	1,600
Class I Riprap		200
Total		1,800
TOTAL FILL IMPACTS	**0.51**	**13,500**

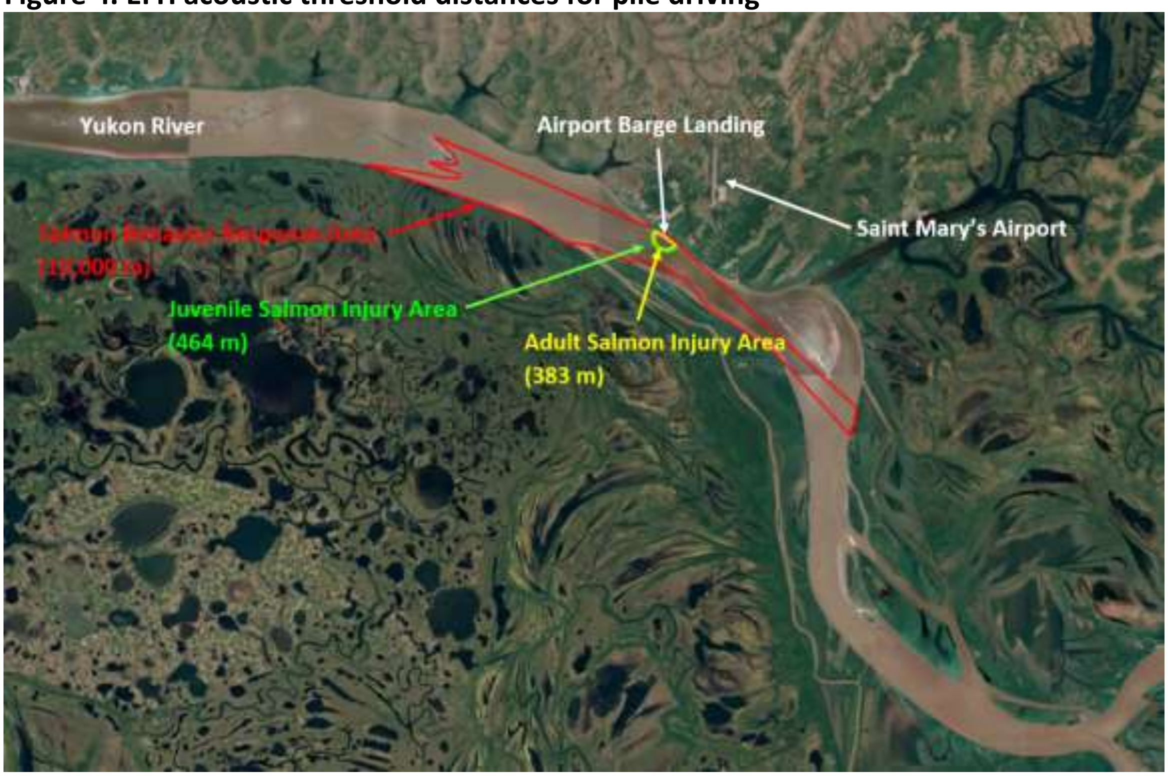
Table 2. Saint Mary's Airport Barge Landing Pile Summary

Project Feature	Pile Installation	Pile Removal
DOLPHINS (2)		
Pile Diameter (inches)	10	10
# of Piles	8	8
Max # Piles Vibrated per Day	4	4
Vibratory Time per Pile	30 minutes	15 min
Vibratory Time per Day	120 minutes	60 min
Total Vibratory Time	4 hours	2 hours
TOTAL HOURS	**6 hours**	
Number of Days	2	2
TOTAL DAYS	**4 days**	

3.3 DEFINITION OF ACTION AREA

The project action area designates the area where any effect will or could occur from the proposed action. For this assessment, the action area is the area of water that at any given time could be ensonified above acoustic thresholds for fish species with EFH and where salmons' behavior could be impacted by sound. The action area will be ensonified where direct underwater noise levels from vibratory installation of 10-inch piles is expected. Based on

Figure 4. EFH acoustic threshold distances for pile driving



modelling, the action area is confined to the Yukon River, extending approximately 10,000 meters from the proposed barge landing site (Figure 3).

4 ESSENTIAL FISH HABITAT IN THE ACTION AREA

The Yukon River in the action area is identified as an anadromous fish stream (ID #334-20-11000-2451), which is designated as EFH under the Magnuson-Stevens Act. The Alaska Department of Fish and Game (ADF&G) documents all five species of Pacific salmon and Chinook, Coho, and Chum Salmon as present in the proposed Airport Barge Landing action area at certain times during the year (ADF&G 2021a). These species are described below.

Other anadromous waters near the proposed Airport Barge Landing location include Andreafski River (#334-20-11000-2451; 3 miles upstream) and Archuelinguk River (#334-20-11000-2321; 15 miles downstream); however, they are outside the action area for this project.

4.1 ESSENTIAL FISH HABITAT SPECIES DESCRIPTIONS

4.1.1 Salmonid Species Descriptions

Chinook Salmon (*Oncorhynchus tshawytscha*)
According to ADF&G, about 183,000 adult Chinook Salmon migrate upstream through the project's action area annually between mid-to-late May through early July (ADF&G 2020b). After July 15, migration is typically completed. It is likely that Chinook Salmon juveniles are in the project area during outmigration immediately before or after ice-out in early May (Ohlberger et al. 2016); however, the timing varies between different cohorts of fish from different parts of the Yukon River and may be influenced by physical factors, such as water temperature (Miller et al. 2020).

Chum Salmon (*O. keta*)
An average 1.9 million adult Chum Salmon make up the summer run and migrate through the project's action area from early May through July 15, and about 740,000 adult Chum Salmon are present migrating through the project area between July 18 through early September during the fall run (ADF&G 2020b). Juvenile Chum Salmon outmigration downstream past the project's action area peaks in late June when millions of fry are dispersed by high river discharges through numerous distributary channels into coastal habitats. Juvenile out migration through the project area decreases as water temperatures increase (18-21°C) in mid-July (The National Academies 2005).

Coho Salmon (*O. kisutch*)
About 209,000 adult Coho Salmon travel upstream past the project's action area each year between mid-July through early September (ADF&G 2020a), typically during periods of high water (Yukon River Panel 2017). Coho Salmon juvenile outmigration timing from the Yukon River is less understood.

Pink Salmon (*O. gorbuscha*)

Adult Pink Salmon migrate upstream through the Airport Barge Landing action area between late June and mid-August. A total of 689,607 Pink Salmon were estimated to have migrated past the Pilot Station sonar (about 20 miles upriver from the project area) in 2018 (Dreese and Lozori 2019). Outmigration of juvenile Pink Salmon through the project area peaks before mid-June as they move rapidly through delta habitats (The National Academies 2005).

Sockeye Salmon (*O. nerka*)

Adult Sockeye Salmon travel past the Airport Barge Landing action area in July and August (Dreese and Lozori 2019). 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 in the spring (ADF&G no date). Little specific information is available on Yukon River Sockeye Salmon.

4.2 EXISTING CONDITIONS IN THE ACTION AREA

The proposed temporary barge landing, including the causeway and mooring dolphins and offloading and staging area, would be located in the Lower Yukon River near the Boreal Fisheries approximately 100 miles upstream from the Yukon River's mouth. There is some existing development in the area associated with Boreal Fisheries near Pitka's Point and Saint Mary's. Much of the riparian area is either unvegetated or somewhat vegetated with alders (*Alnus* spp.), willows (*Salix* spp.), grasses (*Paceae* spp.), and sedges (*Cyperaceae* spp.) (Figure 4).

At the proposed barge landing location, the Yukon River is approximately 0.75 mile wide. At a river cross section taken on June 26, 1996 at Pitka's Point, the Yukon River had a maximum depth of 40 feet. The velocity on that date and at that location was 3.17 feet per second. The river bottom in this area is primarily sediment and mud. At its mouth, the Yukon River transports about 60 million tons of suspended sediment annually into the Bering Sea (Brabets et al. 2000).

Figure 5. The proposed St. Mary's Airport Barge Landing location on the lower Yukon River in May (above) and June (below) 2021.

5 EFFECTS ASSESSMENT

Project actions including the placement of fill and pile driving could potentially cause impacts on EFH and EFH-dependent species (salmon or salmon habitat) in the Yukon River.

5.1 DISCHARGE OF FILL MATERIAL AND UPLANDS DEVELOPMENT

Although salmon spawning and rearing habitat has been avoided, approximately 0.5 acres would be filled and 8 piles would be placed within Yukon River salmon migration EFH. The riprap from the causeway and piles would be removed within two seasons and it is expected that the causeway would erode and be scoured away by the river and ice over time.

5.1.1 Short-Term Impacts

Sedimentation

Discharge of fill material to construct the barge landing and offloading and staging area will temporarily increase sedimentation, turbidity, and available light. These impacts will be temporary, but could contribute to the habitat loss due to impacts to biological functions and hydrologic conditions. Increased turbidity during fill activities can injure fish by temporarily impacting feeding efficiency (although, in this case, migrating adults would not be feeding and it is unlikely that out-migrating juveniles would be feeding) and clogging or damaging fish gills from suspended solids, leading to possible suffocation and increased energy demands. It is expected that turbidity from placement of fill could extend several kilometers downstream from the barge landing area during construction (Limpinsel et al. 2017); however, studies of the effects of turbid water on fish suggest that concentrations of suspended sediment can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993; Wilber and Clarke 2001).

5.1.2 Long-term Impacts

Habitat Loss

About 0.51 acres of EFH would be filled to construct the Airport Barge Landing. Riprap would be removed when the project is complete, and the causeway would be expected to naturally erode or e removed by ice during spring breakup; however, it could take many years until the causeway disappears. The shoreline in the barge landing area provides habitat for migrating salmon, particularly juvenile salmon traveling within the shallow water edges of the Yukon River. Discharge of fill material in this area would reduce available fish habitat, potentially impacting habitats with important biological functions and hydrologic conditions. In addition, the causeway could create a physical barrier to migration by pushing outgoing juvenile salmon into deeper water, where they could be more susceptible to predation, and creating a minor obstacle to adult salmon migrating upstream.

Placement of fill also has the potential to impact hydrological conditions by obstructing flow, changing water velocity and direction, and altering riverine profile, which collectively can impact erosion and deposition (Limpinsel et al. 2017). In this case, the causeway may cause sediment deposition in shallow areas that are potentially important for juvenile and adult salmon migration refuge.

5.1.3 Indirect Impacts

Placement of fill for the causeway and offloading and staging area could exacerbate stormwater runoff. Stormwater runoff can affect sedimentation and siltation and increase contaminants in freshwater habitats. Nonpoint source contamination and debris may increase from introduced hardened surfaces and reduced land use buffers (Limpinsel et al. 2017).

Fish that are injured due to increased turbidity and the potential release of contaminants during discharge of fill may have indirect impacts on other species and the freshwater system as a whole. Decreased visibility and an increase in suspended fill discharge particles in the water column can have indirect impacts on other prey species by making them more susceptible to predation (Limpinsel et al. 2017). These effects would occur over a short period in an action area that has a small project footprint relative to the existing available habitat in the area. When combined with fish displacement from the area during construction, there is a minor potential to indirectly affect future fish populations in the area and a minimal risk to local commercial and subsistence harvests.

5.2 PILE INSTALLATION AND REMOVAL

5.2.1 Short-Term Impacts

Sound

Considering sound profiles and area topography, the estimated area in which sound will exceed injury thresholds for juvenile and adult salmon would extend from 383 to 464 meters from the Airport Barge Landing's dolphin sites (Figure 3).[1] This is the distance which current research accepted by NMFS shows that physical injury occurs to fish (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 (Limpinsel et al. 2017). Studies have shown physical injury to fish includes fatal damage to swim bladders in juveniles and compromised swim bladders in adult salmon (Buehler et al. 2015).

A larger area (about 15.8 square kilometers [6.1 square miles]) would be ensonified to a level that could impact salmon behavior (acoustic threshold of 155 decibels [dB] re 1μPa [micropascal] [root mean square] for vibrating). During pile installation and removal this level of noise could affect the distribution and behavior of juvenile salmon and stun small fish, making them more susceptible to predation (Limpinsel et al. 2017).

Sedimentation

The installation and removal of piles could disturb bottom sediments and may cause a temporary increase in suspended sediment. It is estimated that pile driving activities can produce total suspended sediment concentrations of approximately 5.0 to 10.0 mg/L above

[1] Vibratory pile driving source level of 175 SEL/195 RMS is estimated from documented received levels at 10 meters from vibratory piles for the Mad River Slough Pipeline Construction project (Buehler et al. 2015).

background levels within approximately 91 meters of the pile being driven (FHWA 2012). However, as described above, these levels would not be expected to have more than minor impacts on EFH or salmon.

5.3.2 Long-term Impacts

No long-term impacts are expected from the placement of piles since they will be removed after the Saint Mary's Airport Improvements are completed.

5.3.3 Indirect Impacts

EFH loss as a result of indirect impacts related to pile driving activities, such as barging 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.

5.3 VESSEL TRAFFIC

5.3.1 Short-Term Impacts

Short-term impacts to EFH from barges using the landing during construction of the Saint Mary's Airport Improvement could increase wakes and surge in the action area, which could lead to riverbank erosion and increased turbidity.

5.3.2 Long-term and Indirect Impacts

Long term and indirect impacts are not expected because causeway riprap and dolphins will be removed and the barge landing will not be used for commercial traffic after construction of the Saint Mary's Airport Improvements is complete.

6 CONSERVATION MEASURES

Incorporating the following conservation measures would help minimize adverse impacts to EFH and salmon in the action area.

- The project design minimizes the footprint of fill in EFH to the extent practicable, and no spawning or rearing habitats are impacted.
- Fill is sloped flatter than 1(H):1(V) to maintain shallow water and provide refuge for juvenile salmon.
- The project employs the fewest number of pilings necessary to support barge activities, minimizing construction noise and turbidity.
- Fill placement and pile installation and removal timeframes would be negotiated with ADF&G and NMFS to minimize impacts during sensitive time periods when salmon migrate through the area.
- Impact hammer use would be avoided and piles would be driven as deep as possible with a vibratory hammer for only about 6 hours over 4 days (non concurrent).
- Piles would be removed slowly to allow sediment to slough off at or near the mudline to reduce suspended sediment and turbidity.
- Practical measures to avoid, contain, and clean up petroleum spills from material barges would be implemented.

7 CONCLUSIONS AND DETERMINATION OF EFFECTS

The Saint Mary's Airport Barge Landing may adversely affect Yukon River EFH. Approximately 0.51 acres of EFH will be lost due to filling; however, some fill would naturally erode after the barge landing is closed and riprap and piles are removed. Because only vibratory (not impact) pile driving would be employed for less than 120 minutes per day over 4 nonconcurrent days, adverse impacts to EFH and salmon from pile driving would be minor. Temporary sedimentation from the placement of fill and pile driving and removal could occur, but would be minimized through conservation measures. EHF impacts due to vessel use of the barge landing, including potential shoreline erosion and risk of spills, would be minor and short-lived and mitigated.

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