Appendix T

Essential Fish Habitat Assessment

- NMFS EFH Response
- EFH Submittal Letter
- EFH Assessment

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

May 21, 2012

Colonel Reinhard W. Koenig
U.S. Army Corps of Engineers,
Alaska District, Regulatory Division
P.O. Box 6898
JBER, Alaska 99506-0898

Re: Point Thomson Essential Fish Habitat Assessment

Attn: Harry A. Baij, Jr.

Dear Colonel Koenig:

The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with the National Marine Fisheries Service (NMFS) on any action that may adversely affect Essential Fish Habitat (EFH) [50 CFR 600.920 (a)(1)]. The U.S. Army Corps of Engineers (USACE), Alaska District has requested consultation for the proposed development of the Point Thompson Project. NMFS has previously reviewed and provided comment (January 18, 2012) on the Public Notice of Application for Permit, POA-2001-1082-Ml, Beaufort Sea (Public Notice), and the Point Thomson Project Draft Environmental Impact Statement (DEIS).

The EFH Assessment provides a description of the impacts to EFH and an analysis of those impacts, for the five possible alternatives described in the DEIS. NMFS offers the following comments on the EFH Assessment and the applicant's preferred alternative (Alternative B of the DEIS).

Proposed Action

Point Thomson is the largest discovered undeveloped natural gas field in Alaska. The DEIS for the proposed project notes that the requirements for full field development cannot be accurately defined until further evaluation of the resources within the reservoir are completed. Exxon Mobil Corporation and PTE Pipeline LLC (the applicants), propose to initiate commercial hydrocarbon production of the Thomson Sand Reservoir on the North Slope of Alaska by the winter season of 2015-16, and to delineate and evaluate hydrocarbon resources in the Point Thomson area. The project area is located on the northern edge of Alaska's Arctic Coastal Plain. There is potential for the project to extend eastward from Deadhorse to the Staines River, and from the coastal lagoons near Flaxman Island along the Beaufort Sea to approximately 8 miles inland. Most of the Thomson Sand Reservoir is offshore under state coastal waters, while most of the proposed facilities would be located on land. An export pipeline and transportation routes would extend from the Point Thomson facilities to existing facilities to the west.

As described in the Public Notice, the total amount of wetland fill would be approximately 267.5 acres. Fill would include gravel for drilling/production pads and connecting roads, an airstrip, gravel mine and overburden replacement, vertical support members (VSMs) for pipelines, and

pilings for a proposed barge offloading facility and service pier. Fill material would come from a new mine site located at approximately 2.5 miles inland at approximate Latitude 70.146.65°N and Longitude 146.2528° W. Minor dredging and screeding in marine waters will be required in the barge docking area offshore of the sealift bulkhead and service pier with a small amount of fill placed onshore.

Essential Fish Habitat and EFH Assessment

EFH is designated in the Arctic Ocean for snow crab (*Chionoecetes opilio*), saffron cod (*Eleginus gracilis*), Arctic cod (*Arctogadus glacialis*), and all five species of Pacific salmon (*Salmonidae*). Freshwater EFH has also been designated for pink salmon (*Oncorhynchus gorbuscha*) and chum salmon (*Oncorhynchus keta*) in the Canning/Staines, Kavik/Shaviovik, and Sagavanirktok Rivers.

In Section 3.1, of the EFH Assessment, under EFH Descriptions, the language states:

> *EFH is designated in the Arctic Ocean for snow crab (Chionoecetes opilio), saffron cod (Eleginus gracilis), Arctic cod (Arctogadus glacialis) and Pacific salmon. Of these, Arctic cod is the only species in the Arctic Management Area for which designated EFH extends into the study area.*

This statement is incorrect. The Pacific Salmon Fishery Management Plan (FMP) describes EFH for Pacific salmon species, including Arctic waters, and the project area is within their general distribution or range. Of the five salmon species, Chinook, coho, and sockeye salmon are considered rare in Arctic waters. Similarly, the Arctic FMP describes EFH for saffron and Arctic cod and the project area is within their general distribution or range. It should also be clarified that saffron cod have been identified in nearshore surveys conducted for this project within marine waters of the project area (Williams 2011). NMFS led investigations have documented saffron and Arctic cod presence in Beaufort Sea inner lagoons and nearshore marine waters (Jarvela and Thorsteinson 1999, Johnson et al. 2010).

Adverse Effects of the Proposed Action

As described in the EFH Assessment adverse effects of the proposed action on EFH could result from several project activities:

- Dredging and screeding to accommodate barges and vessel traffic
- Marine and freshwater withdrawal and ice road construction

EFH Conservation Recommendations

The USACE has determined that the proposed action may adversely affect EFH. NMFS agrees with this determination. NMFS recognizes the proposed mitigation measures noted in the EFH Assessment may avoid and minimize impacts on fish and EFH. They are as follows:

- Minimize impact to natural stream flow conditions through application of hydrology study results to pad, road, bridge, and culvert design using conservative criteria.
- Construct ice roads in a manner that protects fish habitat and slotting ice roads at designated stream crossings at the end of the season.

- Limit lake withdrawal volumes and using proper withdrawal methods to protect fish.
- Implement a tracking system including coordination with other water users to ensure water withdrawal limitations are met.
- Maintain natural stream flow through the design of bridges and culverts to accommodate fish passage.
- Implement spill prevention and response programs.
- Manage snow melt and runoff under site-specific Stormwater Pollution Prevention Plans to protect water quality.
- Use long-reach directional drilling to develop offshore resources without placing drilling structures in marine waters.
- Limit dredging/screeding for the barge-bridge system and service pier to a small area in the vicinity of the central pad.
- Dredge the barge landing area through the ice during the winter preceding an open water sealift to minimize sedimentation effects on water.
- Limit structures in marine waters to six vertical piles for the service pier and eight mooring dolphins for barge landings, and a small boat launch at the shoreline.
- Locate the sealift bulkhead and approach gravel ramp for the service pier above mean high water to minimize the effect on sediment transport or deposition.
- Maintain the barge-bridge system in place for the minimum time period needed (estimated 2 to 4 weeks) to offload the modules each sealift open water season, which limits the effects on coastal sediment transport. Routing the export pipeline and gathering lines to avoid locating VSMs in lakes, and crossing streams at locations that minimize the need for VSMs in active channels.
- Design bridges and culverts at stream crossings for a 50-year flood design flow to reduce impacts to natural drainage to the extent practicable.
- Reduce surface discharge of wastewaters through use of a disposal well, including zero discharge of produced water and drilling wastes.
- Implement dust control measures for roads and construction areas to avoid impacts of dust on nearby water bodies.
- Construct a permanent service pier on piles, not fill, for offloading coastal barges to reduce the number of barge trips and minimize disturbance to the ocean bottom and associated impacts to marine water quality.
- Install mooring dolphins and pilings through the ice in the winter to minimize potential suspended sediment effects on water quality.
- Conduct field surveys during breakup and other times to identify natural drainage patterns and to measure streamflows at proposed road crossings.
- Route infield roads a sufficient distance inland to avoid coastal marshes and estuarine habitat, as well as major stream crossings.

After reviewing the information presented in the DEIS and the mitigation measures offered in the EFH Assessment, NMFS has no additional EFH Conservation Recommendations at this time.

Should you have any questions, please contact Doug Limpinsel of my staff at 907-271-6379 or by email at Doug.Limpinsel@noaa.gov.

Sincerely,

for James W. Balsiger, Ph.D.
Administrator, Alaska Region

cc: jeanne.hanson@noaa.gov
steven.k.davis@noaa.gov
timothy.mccune@noaa.gov
steve.kokkinakis@noaa.gov
louise_smith@fws.gov
soderlund.dianne@epa.gov
harry.a.baij@usace.army.mil

References:

Jarvela, L. E., and L. K. Thorsteinson. 1999. The epipelagic fish community of Beaufort Sea coastal waters, Alaska. Arctic 52:80-94.

Johnson, S. W., J. F. Thedinga, A. D. Neff, and C. A. Hoffman. 2010. Fish fauna in nearshore waters of a Barrier Island in the western Beaufort Sea, Alaska. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-210, 28 p.

Williams, B. C. and S. E. Burril. 2011. 2010 Point Thomson Nearshore Fish Study. Prepared by LGL Alaska Research Associates, Inc. for ExxonMobil Development Company, Inc. 39p.

G:COE Point Thomson EFH assessment dl-ls-jh 5-20-12

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
REGULATORY DIVISION
P.O. BOX 6898, CEPOA-RD
JBER, ALASKA 99506-0898

REPLY TO
ATTENTION OF:

January 23, 2012

Regulatory Division
POA-2001-1082-M1

National Oceanic and Atmospheric Administration
National Marine Fishery Service
Attention: Mr. Brad Smith
222 West 7th Avenue, #43
Anchorage, AK 99513-7577

Dear Mr. Smith:

Enclosed is the US Army Corps of Engineers' (Corps) Point Thomson Project Essential Fish Habitat (EFH) Assessment which addresses expected impacts to managed fish species, as designated by the North Pacific Fishery Management Council. A printed copy and electronic copy (CD) are provided. The EFH Assessment was prepared in response to a Department of the Army (DA) permit application received from Exxon Mobil Corporation and PTE Pipeline LLC (ExxonMobil). The permit application has been assigned Corps' file number POA-2001-1082-M1, Beaufort Sea. The project would be located along the Beaufort Seacoast near Mary Sachs and Flaxman Islands approximately 60 miles west of Kaktovik, AK.

ExxonMobil proposes construction of on-shore facilities near Point Thomson to construct infrastructure to produce liquid hydrocarbons and to further delineate the Thomson Sand and Brookian Sandstone Reservoirs, located mostly offshore, by directional drilling. ExxonMobil would construct 3 on-shore gravel pads, connecting gravel roads, above-ground pipelines, a gravel mine site, airstrip, ice roads, a marine barging facility, and conduct barging operations during ice free periods.

The EFH Assessment is provided to the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (Service), for review and coordination with us under the Magnuson-Stevens Fishery Conservation and Management Act, Section 305(b)(2).

The EFH Assessment was prepared to ensure EFH consultation procedures occur between the Service and action agency (Corps). It evaluates managed fish species of Arctic cod (Boreogadus saida) and the five species of Pacific salmon (Oncorhynchus spp.) and addresses potential Point Thomson Project impacts to the these species.

Preliminarily, we have determined ExxonMobil's proposed Point Thomson Project may adversely affect EFH in the project area for the Arctic cod (*Boreogadus saida*).

We have prepared a Draft Environmental Impact Statement (DEIS) and Public Notice of Application for Permit (PN) for the Point Thomson Project which

were recently available for public comment until January 18, 2012. The EFH Assessment was included in the DEIS at Appendix T. We are in receipt of the Service's DEIS comments, including those related to the EFH Assessment, and will be coordinating with you on your concerns. Other Point Thomson Project information is available in Appendix A for the DA permit application; a project website is located at www.pointthomsonprojecteis.com; and our PN is located at the Alaska District Regulatory Division website at www.poa.usace.army.mil/reg/PNNew.htm).

Also enclosed, is a copy of the 2010 Point Thomson Nearshore Fish Study completed by LGL Alaska Research Associates, Inc. for the ExxonMobil proposal.

Please contact me at the letterhead address, by e-mail message at harry.a.baij@usace.army.mil, by telephone at 907-753-2784 (office), or 907-350-5097 (cell), in regards to this EFH Assessment and further consultation. I would like to coordinate closely with the Service throughout the process.

Sincerely,

H.Baij

Harry A. Baij Jr.
Project Manager

Enclosures

POINT THOMSON PROJECT EIS

Appendix T – Essential Fish Habitat Assessment

USACE
Post Office Box 6898
Elmendorf AFB, AK 99506

November 2011

Contents

1 Essential Fish Habitat Background

The Sustainable Fisheries Act of 1996 (Public Law 104-297), which amended the Magnuson-Stevens Fishery Conservation and Management Act (MSFCA), requires Federal agencies to consult with the National Marine Fisheries Service (NMFS) on activities that may adversely affect Essential Fish Habitat (EFH). The MSFCA defines EFH as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." In addition, it states "for the purpose of interpreting the definition of essential fish habitat: 'waters' includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; 'necessary' means the habitat required to support a sustainable fishery and a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' covers a species' full life cycle" (Public Law 94-265).

According to Section 600.810 of Subpart J of the MSFCA, adverse effect is "any impact which reduces quality and/or quantity of EFH." This section also states that "adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, or reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative or synergistic consequences."

The objective of the Point Thomson Project EFH assessment is to determine whether or not the proposed action alternatives "may adversely affect" designated EFH for relevant federally-managed fisheries species within the proposed action area. It also describes the conservation measures proposed to avoid, minimize, or otherwise offset potential adverse effects to designated EFH resulting from the proposed action.

2 Proposed Action and Alternatives

2.1 PROJECT AREA

The Point Thomson Project, located on the North Slope of Alaska 60 miles east of Prudhoe Bay on the coast adjacent to Lion Bay, proposes to develop hydrocarbon resources within the Thomson Sand reservoir. The project area is defined to extend eastward from Deadhorse to the Canning/Staines River, and from the lagoon side of Flaxman Island and the Maguire Islands along the Beaufort Sea coast to approximately 8 miles south of the coast line. Most of the Thomson Sand Reservoir is offshore, under state coastal waters, while most of the proposed facilities would be located on land. The western boundary of the Arctic National Wildlife Refuge is approximately 2 miles from the easternmost extent of the proposed project. An export pipeline and transportation routes would extend from the Point Thomson facilities to existing facilities to the west. Figure 1 shows the general location of the Point Thomson Project.

2.2 PROJECT DESCRIPTION

The U.S. Army Corps of Engineers (Corps), the lead federal agency responsible for complying with the National Environmental Policy Act (NEPA), defines the Point Thomson Project's overall project purpose as: 1) produce hydrocarbon liquids from the Thomson Sand Reservoir, 2) delineate the Thomson Sand Reservoir, and 3) test the oil rim and natural gas deposits of the Thomson Sand Reservoir and potential hydrocarbon deposits of the Brookian Group sandstones. Development would result in building facilities associated with the exploration and recovery of hydrocarbon liquids.

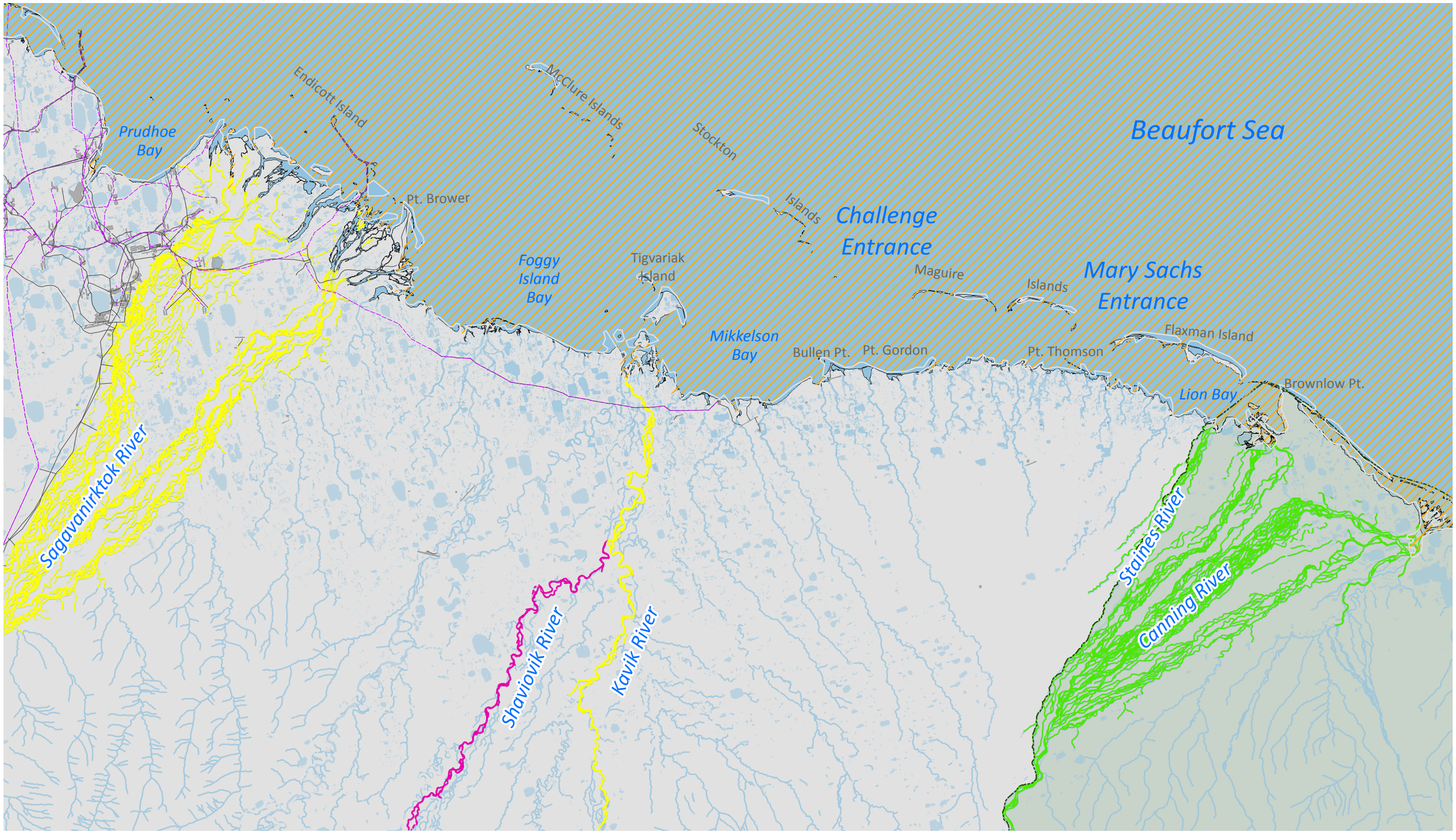
All action alternatives being evaluated in the Environmental Impact Statement being prepared for the project would include the following components: gravel pads to support drilling and production operations; export and infield pipelines; gravel and/or ice roads and airstrips to support transportation needs; and waste disposal and support facilities. While each alternative has a unique configuration of pads for drilling and production, they all incorporate a combination of a Central Well Pad, a Central Processing Facility (CPF), an East Well Pad, and a West Well Pad. The Central Pad is the largest in all the alternatives and would be the primary location for construction, drilling, and operations activities. Each alternative would have five wells capable of either production or injection. Additionally, one disposal well would be drilled at the CPF. Production and injection wells would be drilled using directional drilling techniques to reach the offshore reservoir. The East and West Pads would have wells that would be used initially to delineate and evaluate the reservoir, and to determine whether the rim of oil surrounding the gas reservoir would be viable for production. In addition to infield pipelines, a 22-mile-long export pipeline would be constructed to transport hydrocarbon liquids from Point Thomson to an existing common carrier pipeline at the Badami Development to the west. Pipelines would be elevated on vertical support members (VSMs) with a minimum 7 foot clearance between the bottom of the pipe and the tundra surface. Pipeline stream crossings would be accommodated by adjusting the spacing of VSMs. Gravel roads would cross creeks and small tundra streams with culverts or bridges, but only bridges would be used to cross the larger drainages. In order to build gravel roads, ice roads would be built along the proposed alignment and gravel would be laid in the winter. The project would also include infrastructure such as communications towers and staging facilities at Badami, Prudhoe Bay, and/or Deadhorse. Placement of gravel structures (for pipelines, pads, roads, and airstrip) would involve permanent placement of fill in wetlands while construction of project ice structures (pads, roads and airstrip) would involve seasonal marine and freshwater water extractions for the life of the project. Freshwater also would be extracted annually for drilling activities, dust suppression, potable water, and other camp needs. Below are details of the project for each proposed alternative.

2.2.1 Alternative A: No Action

Under the No Action Alternative, the Corps would not issue a permit for placement of fill in wetlands and other waters of the U.S. and the Applicant would suspend project engineering and planning activities for the evaluation of the Thomson Sand and other hydrocarbon resources at Point Thomson. The two existing wells have been capped, and only ongoing monitoring activities would take place.

2.2.2 Alternative B: Applicant's Proposed Action

Alternative B would utilize seasonal and infield ice roads, marine transport by coastal and oceangoing (sealift) barges, air transport by helicopters and fixed-wing aircraft, and gravel roads. This alternative includes construction of a sealift facility and a service pier on the coast at the Central Pad to allow docking by sealift and coastal barges. A small amount of dredging and screeding would be needed to level the seafloor for barge landing. Infield gravel roads would be constructed to connect the Central, East, and West Pads, airstrip, gravel mine and stockpile, and freshwater supply sources. During construction, there would be seasonal ice access roads between the Endicott Spur Road and Point Thomson to provide winter access and to support export pipeline construction. Infield ice roads would be constructed to support gathering pipeline construction. A gravel airstrip would be constructed south of the Central Pad, approximately 3 miles inland from the coast. During operations, ice access roads would be constructed approximately once every 5 years.



POINT THOMSON PROJECT EIS

Legend

- Marine Essential Fish Habitat (Arctic Cod/Salmon)
- Freshwater Essential Fish Habitat
  - Pink Salmon Spawning
  - Chum Salmon Presence/Pink Salmon Presence
  - Chum Salmon Presence/Pink Salmon Spawning
- Upland
- Arctic National Wildlife Refuge
- Existing Facilities and Roads
- Existing Road
- Existing Pipelines

N

0 2.5 5 Miles

Figure 1
Point Thomson Project Area
Essential Fish Habitat

Date: 21 October 2011
Map Author: HDR Alaska Inc.
Source: NMFS 2005, ADF&G Johnson and Blanche 2011

This page intentionally left blank

2.2.3 Alternative C: Inland Pads with Gravel Access Road

Alternative C would minimize impacts to coastal resources to the extent possible by locating project components inland from the coastline and reducing coastal access to the Point Thomson site. The alternative is composed of four gravel pads (a Central Processing Pad 2 miles inland, East and West Pads both one-half mile inland, and a Central Well Pad) and a gravel access road between Point Thomson and the Endicott Spur Road in lieu of constructing a coastal barge facility at Point Thomson. The gravel access road would allow year-round access to Point Thomson and would remove direct marine transport, therefore, no barge facilities would be built. A 51-mile export pipeline would be constructed from the Central Pad to connect to the existing Endicott common carrier pipeline. The proposed pipeline route from Point Thomson to Endicott would be 500 feet south of and parallel to the gravel access road. Under this alternative, the pipeline would cross larger, braided rivers which contain EFH.

2.2.4 Alternative D: Inland Pads with Seasonal Ice Access Road

Alternative D would minimize impacts to coastal resources to the extent possible by locating project components inland from the coastline and reducing coastal access to the Point Thomson site. Similar to Alternative C, no barging facilities would be built. The alternative is composed of the same four gravel pads as described in Alternative C. Alternative D would require construction of a sea or tundra ice road between the Endicott Spur Road and the Point Thomson site annually for the life of the project.

2.2.5 Alternative E: Coastal Pads with Seasonal Ice Roads

Alternative E would reduce impacts to wetlands and surrounding water resources by minimizing the development footprint. To achieve this, this alternative would reduce the amount of gravel fill needed for some of the project components. During drilling, the gravel well pad footprints would be expanded by multiyear ice pads to support all the necessary equipment. Over the long term during operations, the ice pad footprint would be removed and only the gravel fill would remain. The gravel footprint would also be reduced by the use of seasonal ice roads for much of the infield road system. Alternative E would include barging facilities as described for Alternative B.

3 Essential Fish Habitat

3.1 EFH DESCRIPTIONS

In 2009, the Arctic Fisheries Management Plan (AFMP) was developed by the North Pacific Fisheries Management Council (NPFMC) for fish in the Chukchi and Beaufort seas (NPFMC 2009, 74 CFR 56734). Increasing water temperatures, changes in fish stock distributions, and changes in ice cover could favor development of commercial fisheries in AFMP waters. The current policy prohibits commercial fishing in the Chukchi and Beaufort seas until there is sufficient information available to enable sustainable management of commercial fisheries in the Arctic (NPFMC 2009, 74 FR 56734). EFH is designated in the Arctic Ocean for snow crab (*Chionoecetes opilio*), saffron cod (*Eleginus gracilis*), arctic cod (*Arctogadus glacialis*) and Pacific salmon. Of these, arctic cod is the only species in the Arctic Management Area for which designated EFH extends into the study area. In addition, nearshore and marine EFH has been designated for all five species of Pacific salmon: pink (*Oncorhynchus gorbuscha*), chum (*Oncorhynchus keta*), Chinook (*Oncorhynchus tshawytscha*), sockeye (*Oncorhynchus nerka*), and Coho (*Oncorhynchus kisutch*) salmon. Freshwater EFH is designated for pink and chum salmon in the

Canning/Staines, Kavik/Shaviovik, and Sagavanirktok Rivers; however, salmon are infrequently encountered on the Arctic Coastal Plain.

EFH is designated based on best available scientific information (NMFS 2005). The MSFCA defines categories to describe the level of understanding used to designate EFH; Level 1: Presence/absence distribution data are available for some or all portions of the geographic range of the species; Level 2: Habitat-related densities of the species are available; Level 3: Growth, reproduction, or survival rates within habitats are available; and Level 4: Production rates by habitat are available (NMFS 2005). In addition, Level 0 was established to describe EFH for those life history stages where EFH could be inferred from another life history stage or a species with similar habitat characteristics. Arctic cod EFH is designated based on Level 1 information for adults and late juveniles. There is insufficient data available to designate EFH for eggs, larvae, and early juveniles (NPFMC 2009). Pacific salmon EFH in Alaska is designated based primarily on Level 1 information for all species and life stages (NMFS 2005). **Table 1** displays the level used to determine EFH status for Pacific salmon species in the Arctic.

Table 1. EFH Information Levels for Alaska Stocks of Pacific Salmon

Species	Eggs and larvae	Juveniles fresh water (fry – smolt)	Juveniles estuarine	Juveniles marine	Adults, immature/ maturing marine	Adults freshwater
Chinook	1	1	1	1	1	1
Coho	1	1	1	0a	1	1
Pink	1	0a	0a	0a	0a	1
Sockeye	1	1	0a	0a	0a	1
Chum	1	0a	0a	0a	0a	1-2

0a - Some information on a species' life stage upon which to infer general distribution.
Data from NMFS 2005.

3.2 EFH SPECIES

3.2.1 Arctic Cod

Arctic cod is a demersal marine fish species with a circumpolar distribution (Fechhelm et al. 2009). Distribution is associated with lowered salinity, higher water temperatures (Moulton and Tarbox 1987), and/or the presence of ice (Morrow 1980). Arctic cod move inshore to spawn during winter. Migrations occur from nearshore to offshore, which are partially associated with spawning and the movement of ice (Morrow 1980). Arctic cod may feed along the transition layer between marine and brackish water masses (Moulton and Tarbox 1987). Because arctic cod associate with specific oceanographic conditions, their abundance in nearshore waters is variable (Moulton and Tarbox 1987). In 2010, 77 percent of the arctic cod captured in Lion Bay were captured in a 3 day period in late August (Williams and Burrill 2011). During this time, winds from the north to northwest resulted in the onshore water movement and likely resulted in the increase of arctic cod (Williams and Burrill 2011). Young-of-the-year arctic cod were captured in the Beaufort Sea and Kaktovik Lagoon (approximately 68 miles east of Point Thomson) in November 1975 (Griffiths et al. 1977). Marine EFH for arctic cod in the Point Thomson Project area is shown in Figure 1.

3.2.2 Pink Salmon

Pink salmon are the most abundant salmon species in the North Pacific Ocean, accounting for roughly half of all commercially harvested salmon (Heard 1991). They are distinguished from other salmon species by having a fixed two-year life span, being the smallest of the Pacific salmon as adults (averaging 20 inches in length [Morrow 1980] and 2.2 - 5.5 pounds in weight), young animals migrating to sea quickly after emerging, and maturing males develop a marked hump (Heard 1991). While pink salmon are rare along the Beaufort Sea coast, small runs do occur in some of the larger streams of the North Slope. Pink salmon are known to inhabit the Canning/Staines Rivers and are known to spawn in the Shaviovik, Kavik, and Sagavanirktok Rivers (Johnson and Blanche 2011). Pink salmon generally do not migrate far upstream to spawn and may spawn in the intertidal areas (Morrow 1980). Site selection for spawning is influenced by substrate, water depth, and current velocity with pink salmon preferring coarse gravel, shallow water, and moderate to fast current velocity (Heard 1991). In general, newly emerged fry show a preference for saline water over fresh water which may facilitate migration from the natal stream area. A single adult pink salmon was captured in Lion Bay, near Point Thomson in 2010 (Williams and Burrill 2011). Freshwater EFH for pink salmon in the Point Thomson Project area is shown in Figure 1.

3.2.3 Chum Salmon

Chum salmon are widely distributed throughout the Pacific Ocean. They spawn in streams of various sizes and fry migrate seaward soon after emergence. The maturing adults return to spawn at various ages, usually between two to five years, with adults averaging 25 inches in length (up to 42.8 inches) and 12 pounds in weight (up to 45.8 pounds) (Morrow 1980, Salo 1991). Chum salmon tend to select spawning sites in areas with upwelling spring water and a relatively constant water temperature. Unlike pink salmon that prefer to spawn in areas of high current velocity, chum salmon will spawn without much regard to surface water velocity (Salo 1991). Chum salmon are known to be present in the Canning/Staines and Sagavanirktok Rivers, yet there are no records of spawning (Johnson and Blanche 2011). In addition, no juvenile chum salmon have ever been caught in the nearby Prudhoe Bay area (Fechhelm et al. 2009). Three adult chum salmon were captured in Lion Bay during 2001 (Wilson 2001). Freshwater EFH for chum salmon in the Point Thomson Project area is shown in Figure 1.

3.2.4 Sockeye, Chinook and Coho Salmon

Chinook, sockeye, and Coho salmon are particularly rare, and no known spawning stocks have been found on the North Slope (Craig and Haldorson 1981, Fechhelm and Griffiths 2001). Some evidence indicates that Chinook salmon occurrence on the North Slope may be increasing (BLM 2008), and scientists have postulated that climate change could allow invasion of southern stocks from the Bering Sea northward, where spawning populations might be established (Babaluk et al. 2000).

4 Analysis of Effect to EFH

Impacts to EFH from the Point Thomas Project would be temporary in nature and minor in magnitude. Below are detailed analyses of impacts to EFH for each proposed alternative.

4.1 MPACTS TO EFH FOR ALTERNATIVE A

Because development of the field would not take place, no impacts to fish or EFH would occur under Alternative A.

4.2 IMPACTS TO EFH FOR ALTERNATIVE B

Project activities under Alternative B that could affect Pacific salmon and arctic cod EFH include construction of and water withdrawal for ice roads, dredging and screeding to accommodate barges, and vessel traffic. Marine and freshwater withdrawal and ice road construction would not likely affect EFH because arctic cod and salmon would not be present during winter, and ice roads would be slotted at fish streams before breakup to allow fish passage. Dredging and screeding would affect a small amount of habitat (approximately 3 acres). Sediment deposition would reestablish the habitat adjacent to the bulkhead over time after sealift barging ceased; however, screeding for coastal barges would occur annually. Vessel traffic could affect EFH because repeated disturbances from noise and prop wash could mask biologically important sounds; however, this would occur for discrete periods of time and would be concentrated during barge docking activities at Point Thomson.

4.3 IMPACTS TO EFH FOR ALTERNATIVE C

Project activities under Alternative C that could affect EFH include construction of and water withdrawal for tundra and sea ice roads and construction of bridges and culverts over freshwater EFH (Sagavanirktok, Kavik, and Kadleroshilik Rivers) (Johnson and Blanche 2011) for the gravel access road. However, marine and freshwater withdrawal and ice road construction would not likely affect EFH because arctic cod and salmon would not be present during winter, and ice roads would be slotted at fish streams before breakup to allow fish passage. Potential for marine EFH impacts would be reduced under Alternative C because barge infrastructure would not be constructed and no barging would occur and because the East and West Pads and the Central Processing Pad and processing facilities would be located farther from the coast. Impacts to freshwater EFH (primarily for pink salmon) may be higher under Alternative C than Alternative B because of the construction of the longer export pipeline and gravel access road.

4.4 IMPACTS TO EFH FOR ALTERNATIVE D

Project activities under Alternative D that could affect EFH include construction of and water withdrawal for tundra and sea ice roads. However, marine and freshwater withdrawal and ice road construction would not likely affect EFH because arctic cod and salmon would not be present during winter, and ice roads would be slotted at fish streams before breakup to allow fish passage. Potential for marine and freshwater EFH impacts is reduced under Alternative D because barge infrastructure would not be constructed and no barging would occur (compared to Alternative B and similar to Alternative C), the East and West Pads and the Central Processing Pad and facilities would be located farther from the coast (compared to Alternative B and similar to Alternative C) and the gravel access road would not be constructed (compared to Alternative C and similar to Alternative B).

4.5 IMPACTS TO EFH FOR ALTERNATIVE E

Project activities under Alternative E that could affect EFH include construction of and water withdrawal for ice roads, dredging and screeding to accommodate sealift barges, and vessel traffic. Marine and freshwater withdrawal and ice road construction would not likely affect EFH because arctic cod and salmon would not be present during winter and ice roads would be slotted at fish streams before breakup to allow fish passage. Dredging and screeding would affect a small amount of habitat (approximately 3 acres) and sediment deposition would reestablish the habitat over time after sealift barging ceased. Vessel traffic could affect EFH because repeated disturbances from noise and prop wash could mask

biologically important sounds; however, this would occur for discrete periods of time and would be concentrated during barge docking activities at Point Thomson.

5 Proposed Mitigation Measures

The Applicant has included the following Design Measures as part of the project design to avoid or minimize impacts on fish and EFH. Additional avoidance, minimization, and mitigation measures will be evaluated by the Corps during the NEPA and permitting process.

- Minimizing impact to natural stream flow conditions through application of hydrology study results to pad, road, bridge, and culvert design using conservative criteria.
- Constructing ice roads in a manner that protects fish habitat and slotting ice roads at designated stream crossings at the end of the season.
- Limiting lake withdrawal volumes and using proper withdrawal methods to protect fish.
- Implementing a tracking system including coordination with other water users to ensure water withdrawal limitations are met.
- Maintaining natural stream flow through the design of bridges and culverts to accommodate fish passage.
- Implementing spill prevention and response programs.
- Managing snow melt and runoff under site-specific Stormwater Pollution Prevention Plans to protect water quality.
- Using long-reach directional drilling to develop offshore resources without placing drilling structures in marine waters.
- Limiting dredging/screeding for the barge-bridge system and service pier to a small area in the vicinity of the Central Pad (Alternatives B and E only).
- Dredging the barge landing area through the ice during the winter preceding an open water sealift to minimize sedimentation effects on water quality (Alternatives B and E only).
- Limiting structures in marine waters to six vertical piles for the service pier and eight mooring dolphins for barge landings (Alternatives B and E only), and a small boat launch at the shoreline (all action alternatives).
- Locating the sealift bulkhead and approach gravel ramp for the service pier above MHW to minimize the effect on sediment transport or deposition (Alternatives B and E only).
- Maintaining the barge-bridge system in place for the minimum time period needed to offload the modules (estimated 2 to 4 weeks) each sealift open water season, which limits the effects on coastal sediment transport (Alternatives B and E only).
- Conducting field surveys during breakup and other times to identify natural drainage patterns and to measure streamflows at proposed road crossings.
- Routing infield roads a sufficient distance inland to avoid coastal marshes and estuarine habitat, as well as major stream crossings.

- Routing the export pipeline and gathering lines to avoid locating VSMs in lakes, and crossing streams at locations that minimize the need for VSMs in active channels.
- Designing bridges and culverts at stream crossings for a 50-year flood design flow to reduce impacts to natural drainage to the extent practicable.
- Reducing surface discharge of wastewaters through use of a disposal well, including zero discharge of produced water and drilling wastes.
- Implementing dust control measures for roads and construction areas to avoid impacts of dust on nearby water bodies.
- Constructing a permanent service pier on piles, not fill, for offloading coastal barges to reduce the number of barge trips and minimize disturbance to the ocean bottom and associated impacts to marine water quality (Alternatives B and E only).
- Installing mooring dolphins and pilings through the ice in the winter to minimize potential suspended sediment effects on water quality (Alternatives B and E only).

6 Conclusion

The habitats most likely affected by the project would be freshwater streams and lakes. Bridges and culverts at fish-bearing streams could have long-term impacts on EFH due to construction of culvert pipes or bridge abutments; Alternative C has the most potential for impacting EFH (primarily pink salmon) due to crossing structures because the all-season gravel road would cross large braided streams. Additionally, water withdrawal from water bodies has the potential affect EFH; all action alternatives would involve some degree of water withdrawal for ice roads. However, adverse impacts to EFH are unlikely because arctic cod and salmon would not be present during winter months, ice roads would be slotted at fish streams before breakup and the proposed mitigation measures would reduce impacts associated with water withdrawals.

References

Babaluk, J.A., J.D. Reist, J.D. Johnson, and L. Johnson. 2000. "First Record of Sockeye, Oncorhynchus Nerka, and Pink Salmon, O. gorbuscha, from Banks Island and Other Records of Pacific Salmon in Northwest Territories, Canada." *Arctic* 53(2): 161-164.

BLM (Bureau of Land Management). 2008. *Northeast National Petroleum Reserve-Alaska, Final Supplemental Integrated Activity Plan/Environmental Impact Statement.* Anchorage.

Craig, P.C., and L. Haldorson. 1981. "Part 4. Fish." In *Final Reports of Principle Investigators. Beaufort Sea Barrier Island-Lagoon Ecological Process Studies: Final report, Simpson Lagoon*, by Inc. LGL Ecological Research Associates and LGL Ltd. Environmental Research Associates, 384-678. Anchorage: Department of Commerce and Department of Interior.

Fechhelm, R.G., and W.B. Griffiths. 2001. "Pacific salmon in the Beaufort Sea, 2001: A synopsis." Report to BP Exploration (Alaska), Inc., Anchorage, Alaska.

Fechhelm, R.G., S.W. Raborn, and M.R. Link. 2009. "Year 26 of the Long-Term Monitoring of Nearshore Beaufort Sea Fishes in the Prudhoe Bay Region: 2008 Annual Report." Report for BP Exploration (Alaska) Inc., Anchorage: LGL Alaska Research Associates, Inc.

Griffiths, W. B., J. DenBeste, and P. Craig. 1977, "Fisheries Investigations in a Coastal Region of the Beaufort Sea (Kaktovik Lagoon, Barter Island, Alaska)." Arctic Gas Biological Report Series 40.

Johnson, J., and P. Blanche.2011. *Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes - Arctic Region, Effective June 1, 2011.* Special Publication No. 11-04, Anchorage, Alaska: Alaska Department of Fish and Game.

Heard, W. R. 1991. "Life History of Pink Salmon (*Oncorhynchus gorbuscha*)", In *Pacific Salmon Life Histories*, C. Groot and L. Margolis, eds., UBC Press, Vancouver, BC. 564p.

Moulton, L.L., and K.E. Tarbox. 1987. "Analysis of Arctic Cod Movements in the Beaufort Sea Nearshore Region 1978-79." *Arctic*, no. 40(1): 43-49.

Morrow, J.E. 1980. *The Freshwater Fishes of Alaska.* Anchorage: Alaska Northwest Pub. Co.

NMFS (National Marine Fisheries Services). 2005. *Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska.* Alaska Region.

Salo, E. O. 1991. Life History of Chum Salmon (*Oncorhynchus keta*)." In *Pacific Salmon Life Histories*, C. Groot and L. Margolis, eds., UBC Press, Vancouver, BC. 564p.

Wilson, W. 2001. "Point Thomson Fish Studies, 1999 and 2001." Summary.

Williams, B.C., and S.E. Burril. 2011. "2010 Point Thomson Nearshore Fish Study." LGL Alaska Research Associates, Inc for ExxonMobil Development Company, Inc.