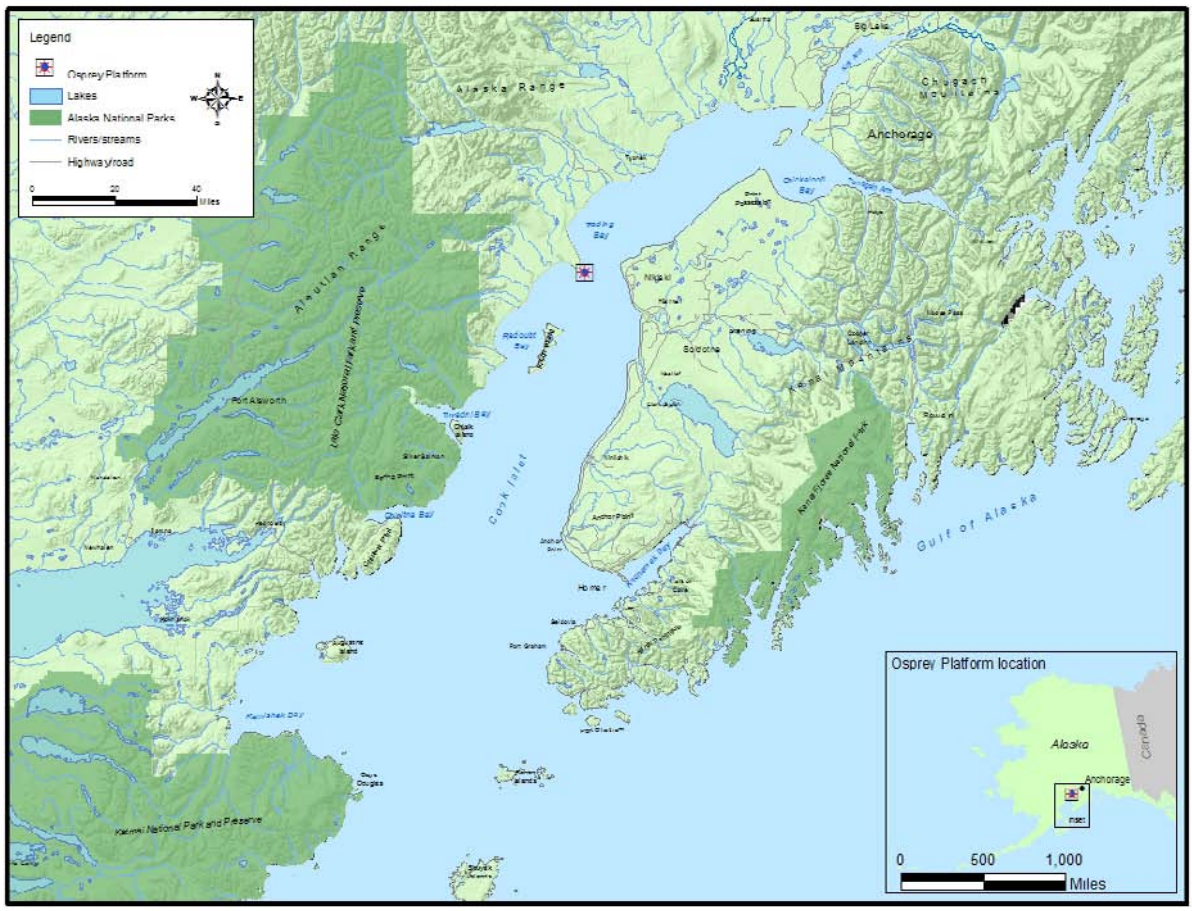
# FINAL

## ENVIRONMENTAL ASSESSMENT FOR THE REISSUANCE OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR THE OSPREY PLATFORM

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# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AAC | Alaska Administrative Code |
| ADEC | The Alaska Department of Environmental Conservation |
| ADF&G | Alaska Department of Fish and Game |
| ADNR | Alaska Department of Natural Resources |
| AKDOC | Alaska Department of Commerce |
| AML | Average Monthly Limit |
| AMSA | Area Meriting Special Attention |
| ANILCA | Alaska National Interest Lands Conservation Act |
| AOGCC | Alaska Oil and Gas Conservation Commission |
| ASBC | Alaska Biological Science Center |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| avg | Average |
| BC EMPR | British Columbia Ministry of Energy, Mines, and Petroleum Resources |
| bcf | billion cubic feet |
| BE | Biological Evaluation |
| BIA | Bureau of Indian Affairs |
| BMP | Best Management Practice |
| BOD | Biochemical Oxygen Demand |
| BSAI | Bering Sea and Aleutian Islands |
| CAA | Clean Air Act |
| CEQ | Council of Environmental Quality |
| CFR | Code of Federal Regulations |
| cm | Centimeter |
| CISPRI | Cook Inlet Spill Prevention and Response, Inc. |
| CMP | Coastal Management Program |
| CO | Carbon Monoxide |
| COD | Chemical Oxygen Demand |
| CO-OPS | Center for Operational Oceanographic Products and Services |
| C-Plan | Oil Discharge Prevention and Contingency Plan |
| CWA | Clean Water Act |
| CZMA | Coastal Zone Management Act |
| DDD | Dichlorodiphenyldichloroethane |
| DDE | dichlorodiphenyldichloroethylene |
| DDT | Dichlorodiphenyltrichloroethane |
| DO | Dissolved Oxygen |
| EA | Environmental Assessment |
| EEZ | Exclusive Economic Zone |
| EFH | Essential Fish Habitat |
| EID | Environmental Information Document |
| EIS | Environmental Impact Statement |
| EO | Executive Order |
| ESA | The Endangered Species Act of 1973 |
| F | Fahrenheit |
| FC | Fecal Coliform |

| | |
|---|---|
| FMP | Fishery Management Plan |
| FONSI | Finding of No Significant Impact |
| FR | Federal Register |
| ft | feet |
| GOA | Gulf of Alaska |
| gpd | gallons per day |
| $H_2S$ | Hydrogen Sulfide |
| HPC | Habitat of Particular Concern |
| hr | Hour |
| IWC | International Whaling Commission |
| JP-4 | Jet Fuel 4 |
| L | liter |
| lb | pound |
| LC50 | Lethal Concentration which half the organisms die |
| m | meter |
| max | maximum |
| MDL | Maximum Daily Limit |
| mgd | million gallons per day |
| mg/L | milligrams per liter |
| mg/kg | milligrams per kilogram |
| $mg/m^3$ | milligrams per cubic meter |
| mL | milliliter |
| MLLW | Mean Lower Low Water |
| MMBO | million barrels of oil |
| MMPA | Marine Mammal Protection Act of 1972 |
| MMS | Minerals Management Service |
| MSD | Marine Sanitation Device |
| MSFCMA | Magnuson-Stevens Fishery Conservation and Management Act |
| N | Nitrogen |
| NA | Not Applicable |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| ng/kg | nanograms per kilogram |
| NMFS | National Marine Fisheries Service |
| NOS | National Ocean Service |
| NOx | Nitrogen oxides |
| NPDES | National Pollutant Discharge Elimination System |
| $O_3$ | Ozone |
| OCDD | octachlorodibenzo-p-dioxin |
| OW | Office of Water |
| PAH | Polyaromatic hydrocarbons |
| PCB | Polychlorinated biphenyls |
| PCDD | polychlorinated dibenzo-p-dioxins |
| PCDF | polychlorinated dibenzofurans |
| PERL | Pacific Energy Resources Ltd. |
| PHC | Petroleum Hydrocarbon |

| | |
|---|---|
| PM | Particulate Matter |
| ppb | parts per billion |
| ppm | parts per million |
| ppt | parts per trillion |
| PSD | Prevention of Significant Deterioration |
| RO | Reverse Osmosis |
| SIP | State Implementation Plan |
| $SO_2$ | Sulfur dioxide |
| SOx | Sulfur oxides |
| SPCC | Spill Prevention Control and Countermeasure |
| TAH | Total Aromatic Hydrocarbons |
| TAHC | Total Aliphatic Hydrocarbons |
| tcf | trillion cubic feet |
| TEK | Traditional Ecological Knowledge |
| THPS | Tetrakis (hydroxymethyl) phosphonium sulfate |
| TOC | Total Organic Carbon |
| TPAH | Total Polycyclic Aromatic Hydrocarbons |
| TRC | Total Residual Chlorine |
| TRC-a | Total Residual Chlorine (acute) |
| TRC-c | Total Residual Chlorine (chronic) |
| TSP | Total Suspended Particulates |
| TSS | Total Suspended Solids |
| TU-c | Toxic Units – chronic |
| $\mu g/m^3$ | micrograms per cubic meter |
| U.S. | United States |
| U.S.C. | United States Code |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | United States Fish and Wildlife Service |
| VOC | Volatile Organic Carbon |
| WET | Whole Effluent Toxicity |
| WQS | Water Quality Standards |
| WRCC | Western Regional Climate Center |
| ww | wet weight |

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# 1. INTRODUCTION

This Environmental Assessment (EA) addresses the potential effects from the reissuance of a National Pollutant Discharge Elimination System (NPDES) permit for oil and gas production on the Osprey Platform in Cook Inlet, Alaska. On December 28, 2006, Forest Oil Corporation submitted an NPDES permit renewal application to the United States Environmental Protection Agency (USEPA), Region 10 (Alaska, Idaho, Oregon, Washington, and 267 Indian Tribes), requesting the reissuance of the NPDES permit (AK-005330-9) for the Osprey Platform to continue oil and gas production in Cook Inlet, Alaska (Forest Oil, 2006a). Discharges from the Osprey Platform are regulated under the Coastal and Offshore Subcategory of the Oil and Gas Extraction Point Source Category contained within Subchapter N Effluent Guidelines and Standards pursuant to the Clean Water Act (CWA; Title 40 of the Code of Federal Regulations [CFR], Part 435, Subparts A and D). The Osprey Platform's NPDES permit expired on June 30, 2007; however, because Forest Oil submitted the application for permit renewal in a timely manner, USEPA administratively extended the existing permit. Since submitting the application, Osprey Platform ownership has changed. Pacific Energy Resources Ltd. (hereafter referred to as PERL or applicant) acquired Forest Oil's Alaskan assets, including the Osprey Platform, on August 27, 2007.

## 1.1 PURPOSE OF ACTION

USEPA proposes to reauthorize the discharges under the existing NPDES discharge permit (AK-005330-9) for the Osprey Platform and authorize two additional discharges not currently included in the existing permit. The additional discharges include filter backwash and desalination backwash. The NPDES permit reissuance application (Forest Oil, 2006a) includes other waste streams currently or potentially generated on offshore oil and gas platforms; however, these other waste streams are not discharged to receiving waters of Cook Inlet. None of these other waste streams will be authorized under the reissued permit; nonetheless, they are described in this EA for completeness.

All surface water discharges from the Osprey Platform are subject to water quality standards (WQS) for the State of Alaska (18 Alaska Administrative Code [AAC] 70.005).

## 1.2 NEED FOR ACTION

The Cook Inlet basin contains large oil and gas deposits, including several offshore oil and gas fields. In 2005, there were 16 offshore oil and gas platforms in Cook Inlet. The oldest operating platform is the XTO A Platform, installed by Shell in 1964. Osprey Platform is the newest platform, installed by Forest Oil in 2000. The Cook Inlet Oil and Gas Exploration General NPDES Permit (AKG-31-5000) covers all of the oil and gas platforms in Cook Inlet except for the Osprey Platform. Reissuance of NPDES permit AK-005330-9 is needed to allow the Osprey Platform to continue operations and establish discharge controls and monitoring to protect receiving waters.

## 1.3 PROJECT LOCATION

The Osprey Platform is a fixed drilling platform that was constructed to support exploration and production drilling operations for the Redoubt Shoal Unit. In June 2000, the platform was placed onsite approximately 1.8 miles southeast of the end of the West Foreland (latitude 60º41′46.3″ N, longitude 151º40′10.2″ W). The platform is located approximately 12 miles northwest of Kenai, Alaska, and 70 miles southwest of Anchorage, Alaska (Figure 1-1). The water depth at the platform is approximately 45 feet (ft) (referenced to mean lower low water [MLLW]). The platform is designed to withstand the oceanographic, meteorological, and seismic conditions of the area.

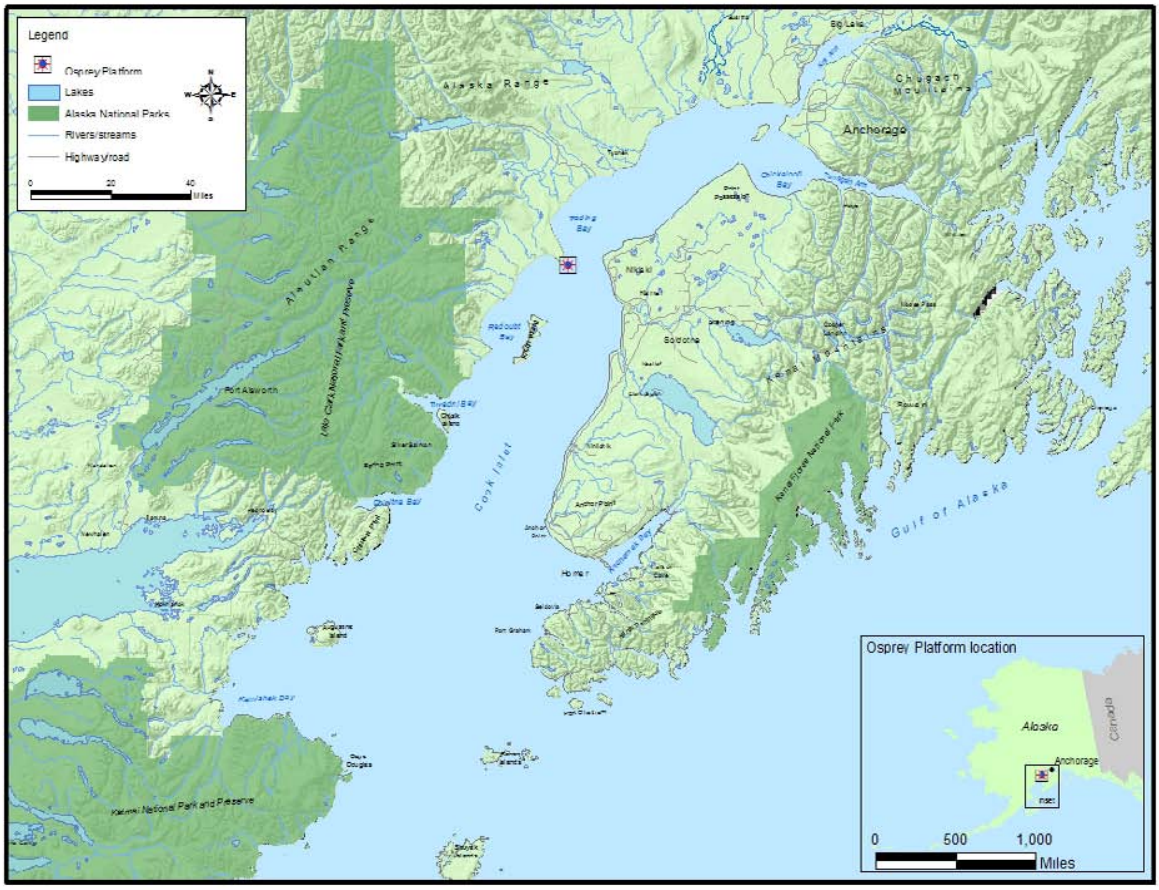


**Figure 1-1. Geographic location of Osprey Platform in Cook Inlet, Alaska**

## 1.4 PROJECT HISTORY

On October 15, 1999, Forest Oil Corporation submitted an NPDES application to USEPA for the Osprey Platform in Cook Inlet, Alaska. On January 28, 2002, after a review of the project's EA and subsequent determination of a Finding of No Significant Impact (FONSI), USEPA issued a public notice indicating its intent to issue an NPDES permit to Forest Oil Corporation (USEPA, 2002a). USEPA issued NPDES permit AK-005330-9 to the Forest Oil Corporation for its

Osprey Platform on July 1, 2002. The Osprey Platform was converted from exploration to production status in late 2002.

On August 29, 2006, Forest Oil Corporation agreed to pay civil penalties ($813,000) to resolve violations of the CWA that occurred at the Osprey Platform. Between January 2001 and July 2002, when Forest Oil conducted exploratory operations at the Osprey Platform, discharges from the platform were required to comply with the Cook Inlet Oil and Gas Exploration general permit. As a result, Forest Oil was discharging wastewater from the Osprey Platform under an individual NPDES permit. Based on Forest Oil's discharge monitoring reports, there were approximately 2,600 effluent limit violations during the period of January 2001 through July 2005. Most of these violations were for sanitary and domestic wastewater discharges. Additional information can be found at http://yosemite.epa.gov/opa/admpress.nsf/3ee0a48cce87f7ca85257359003f533d/0a85b2b02346fc5e852571d900775884!OpenDocument.

USEPA received the Forest Oil Corporation's NPDES reissuance application (AK-005330-9) (Forest Oil, 2006a) and Wastewater Mixing Zone application (Forest Oil, 2006b) for the Osprey Platform on December 28, 2006. Forest Oil requested an administrative extension of the existing permit should the new permit not be issued prior to its expiration date of June 30, 2007. In a letter dated April 2, 2007, USEPA responded to Forest Oil Corporation, recording the receipt of the permit application and informing the applicant that the application package was timely and complete. In the same letter, USEPA informed Forest Oil that a new NPDES permit would not be issued prior to the expiration of the existing permit; therefore, the existing permit remains in effect and enforceable until a new permit is issued.

To begin the environmental analyses, USEPA initiated informal consultations with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) pursuant to the Endangered Species Act (ESA) and Magnuson-Stevens Fishery Conservation and Management Act on July 31, 2007. In a letter dated August 24, 2007, the USFWS identified listed and candidate species that have been documented in Cook Inlet (USFWS, 2007a). On September 5, 2007, USEPA received a response from NMFS outlining the Essential Fish Habitat (EFH) requirements and providing a list of ESA species in the Cook Inlet area (NMFS, 2007a).

On August 9, 2007, USEPA invited 10 Cook Inlet area tribes to initiate government-to-government consultation regarding the National Environmental Policy Act of 1969 (NEPA) process and the permit reissuance. USEPA received a response from the Kenaitze Indian Tribe on September 1, 2007, requesting formal government-to-government consultation. USEPA continues to share project information with the Cook Inlet area tribes as it becomes available.

## 1.5 USEPA'S ROLE, RESPONSIBILITY AND LIMITS OF AUTHORITY AND JURISDICTION

This EA has been prepared in accordance with NEPA and the Council on Environmental Quality (CEQ) regulations for implementing procedural provisions of NEPA (40 CFR Parts 1500-1508). NEPA establishes requirements that Federal agencies must follow in analyzing environmental impacts of major Federal actions inside the United States (U.S.), its territories, and possessions. In addition, USEPA established regulations codified in 40 CFR Part 6 to govern its procedures for implementing NEPA, including the provisions of "cross-cutting" statutes — such as ESA;

National Historic Preservation Act; the Marine Mammal Protection Act (MMPA); and Executive Orders (EO) on environmental justice, wetlands, floodplains, farmland, and biodiversity. The USEPA NEPA Compliance program requires analysis of information regarding potential impacts, including environmental, cultural and public health impacts, and the development and analysis of options to avoid or minimize impacts and to mitigate adverse impacts. Areas of consideration under NEPA might include natural resources and cultural, social, and economic issues.

USEPA effluent limitations guidelines and new source performance standards for oil and gas extraction point source category projects went into effect on December 16, 1996 (61 Federal Register [FR] 66123). With promulgation of the new source performance standards for oil and gas extraction, those oil and gas extraction projects requiring NPDES permits — defined as "new sources" — are subject to the provisions of NEPA. Pursuant to USEPA's NEPA implementing regulations (40 CFR Part 6), new source NPDES applicants are required to submit an Environmental Information Document (EID) in conjunction with their NPDES permit application. USEPA made the decision that the applicant did not need to prepare and submit an EID to support the permit application because this is a permit reissuance.

# 2. PROPOSED ACTION AND ALTERNATIVES

## 2.1 INTRODUCTION

USEPA Region 10 proposes to reissue the NPDES permit for the Osprey Platform located in Cook Inlet, Alaska. The permit reissuance application is included in this EA as Appendix A.

Discharges from the Osprey Platform are regulated under The Coastal and Offshore Subcategory of the Oil and Gas Extraction Point Source Category contained within the Subchapter N Effluent Guidelines and Standards pursuant to the CWA (40 CFR Part 435, Subparts A and D). This section of the EA describes the proposed action (the permit reissuance), identifies the alternatives considered, and discusses the No Action Alternative.

### 2.1.1 Osprey Platform

The Osprey Platform (Figure 2-1) is a fixed drilling platform constructed to support exploration and production drilling operations for the Redoubt Shoal Unit. In June 2000, the platform was placed onsite approximately 1.8 miles southeast of the end of the West Foreland (latitude 60º41′46.3″ N, longitude 151º40′10.2″ W) (see Figure 1-1). The platform is located approximately 12 miles northwest of Kenai, Alaska, and 70 miles southwest of Anchorage, Alaska. The water depth at the platform is approximately 45 ft (referenced to MLLW). The platform is designed to withstand the oceanographic, meteorological, and seismic conditions of the area.

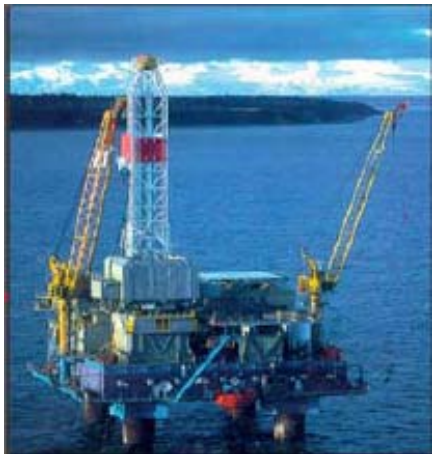

**Figure 2-1. Osprey Platform in Cook Inlet, Alaska**
(Source: BC EMPR, 2004)

The fluid produced from the oil reservoir consists of crude oil, natural gas, and connate or "produced" water. Electric submersible pumps make production fluids flow to the surface through tubing inserted within the cased borehole. As production fluids are extracted, the natural pressure in the reservoir decreases, and additional pressure must be added to the reservoir to continue production. The additional pressure is provided artificially to the reservoir using waterflooding, which is the injection of water into the reservoir to maintain formation pressure that would otherwise drop as the withdrawal of the formation fluids continues. Sources of injected water at the Osprey Platform presently include the following three discharges: deck drainage (Discharge No. 002), sanitary waste (Discharge No. 003), and domestic waste (Discharge No. 004). On occasion, desalination backwash (Discharge No. 005) and filter backwash (Discharge No. 021) are also injected. A constant supply of water is needed for waterflooding, and since the listed discharges are periodic, additional water from Cook Inlet can be added to the injected discharges to maintain adequate pressure for production.

As the produced fluids (natural gas, crude oil, and produced water) surface from the wells, the natural gas is separated from the liquids in a two-phase separator on the platform. The "wet" natural gas from the separator passes through a glycol dehydrator to remove water. The resultant product is used to support platform heating or is shipped by pipeline to the onshore production

facility. The liquids (crude oil and produced water) are pumped to the Wet Oil Surge Vessel and then pumped to the Kustatan Production Facility for oil-water separation. There is no storage capacity onboard the Osprey Platform for separated liquids. The produced water separated from the crude oil at the onshore production facility is pumped back to the Osprey Platform by pipeline for downhole injection to maintain formation pressures within the Redoubt Shoal Unit.

Typical offshore oil production activities can create potentially 20 discrete waste streams; the Osprey Platform produces or can potentially produce 17 such waste streams (refer to Appendix B). Of these 17 discharges, three (fire control test water, excess cement slurry, and non-contact cooling water) are presently discharged into Cook Inlet; three (blowout preventer fluid, uncontaminated ballast water, and bilge water) are not produced on the Platform; and the remaining 11 are currently injected into the Osprey Platform's Alaska Oil and Gas Conservation Commission (AOGCC)-permitted Class I/II injection well. The applicant has requested that the reissued permit include the seven discharges allowed under the existing permit (deck drainage, sanitary waste, domestic waste, boiler blowdown, fire control test water, non-contact cooling water, and excess cement slurry), plus two additional discharges (desalination backwash and filter backwash).

For completeness, this EA describes all 20 potential waste streams created by typical offshore oil and gas production activities from the Osprey Platform.

### 2.1.2 Alternatives Identification

The following sections describe the Proposed Action and alternatives for the proposed reissuance of the Osprey Platform NPDES permit. Brief descriptions of the alternatives are listed below and detailed in Sections 2.2 through 2.4.

#### *2.1.2.1 Proposed Action (Alternative 1)*

The Proposed Action (Alternative 1) would reissue the Osprey Platform's NPDES permit AK-005330-9 with many of its current provisions to treat waste streams and monitor effluent requirements. The seven discharges covered under the existing permit — deck drainage, sanitary waste, domestic waste, boiler blowdown, fire control test water, non-contact cooling water, and excess cement slurry — would be reauthorized. Two additional discharges requested by the applicant would also be authorized: desalination backwash and filter backwash. The Alaska Department of Environmental Conservation (ADEC) has authorized a mixing zone for sanitary waste of approximately 0.12 acres around the platform for dilution of total residual chlorine (TRC) and fecal coliform (FC) bacterial colony counts (ADEC, 2008a).

#### *2.1.2.2 Alternative 2*

Under Alternative 2, only the two waste streams currently produced by the Osprey Platform and discharged to surface waters of Cook Inlet would be authorized: fire control test water and excess cement slurry. Other waste streams currently produced by platform operations would continue to be injected into the Osprey Platform's AOGCC-permitted Class I/II injection well. The additional discharges requested by the applicant — desalination backwash and filter backwash — would not be authorized. There would be no mixing zone under this alternative.

#### *2.1.2.3 No Action Alternative*

Under the No Action Alternative, the existing NPDES permit would remain the same. All provisions in the proposed reissued permit would be identical to the existing permit. The additional waste streams requested by the applicant — desalination backwash and filter backwash — would not be authorized. The reissued permit would only allow deck drainage, sanitary waste, domestic waste, boiler blowdown, fire control test water, non-contact cooling water, and excess cement slurry to be discharged to Cook Inlet receiving waters. The existing 48-acre mixing zone would be retained. Table 2-1 provides a summary of the discharges proposed under each alternative.

**Table 2-1. Discharge permit alternatives considered for the Osprey Platform**

| No. | Discharge | Description of Release | Permit Alternatives | | |
|---|---|---|---|---|---|
| | | | Proposed Action (Alt #1) | Alt #2 | No Action |
| 001 | Drilling Muds and Cuttings | Disposal to AOGCC-permitted Class I/II injection well. | | | |
| 002 | Deck Drainage | Commingled with sanitary waste (003) and domestic waste (004) discharges and injected into AOGCC-permitted Class I/II injection well. | √ | | √ |
| 003 | Sanitary Waste | Commingled with deck drainage (002) and domestic waste (004) discharges and injected into AOGCC-permitted Class I/II injection well. ADEC has authorized a mixing zone (TRC and FC) for discharge to Cook Inlet. | √ | | √ |
| 004 | Domestic Waste | Commingled with deck drainage (002) and sanitary waste (003) discharges and injected into AOGCC-permitted Class I/II injection well. | √ | | √ |
| 005 | Desalination Backwash | Discharge was not included in the existing permit, because the platform did not have a desalination plant at the time the original permit was issued. | √ | | |
| 006 | Blowout Preventer Fluid | Discharge is not produced on the Osprey Platform. | | | |
| 007 | Boiler Blowdown | Discharge is not presently produced on Osprey Platform. Discharge to Cook Inlet is allowed under the existing permit. | √ | | √ |
| 008 | Fire Control Test Water | Weekly discharge to Cook Inlet. | √ | √ | √ |
| 009 | Non-contact Cooling Water | Discharge is not presently produced on Osprey Platform. Discharge to Cook Inlet is allowed under the existing permit. | √ | | √ |

**Table 2-1 (cont.). Discharge permit alternatives considered for the Osprey Platform**

| No. | Discharge | Description of Release | Permit Alternatives | | |
|---|---|---|---|---|---|
| | | | Proposed Action (Alt #1) | Alt #2 | No Action |
| 010 | Uncontaminated Ballast Water | Discharge is not produced on the Osprey Platform. | | | |
| 011 | Bilge Water | Discharge is not produced on the Osprey Platform. | | | |
| 012 | Excess Cement Slurry | Discharged to Cook Inlet intermittently during well workover. Discharge is allowed under the existing permit. | √ | √ | √ |
| 013 | Mud, Cuttings and Cement at Seafloor | Discharge was not permitted under the existing permit. In the application letter dated December 12, 2006, applicant requested this discharge under the reissued permit. However, in a letter to USEPA dated January 23, 2008, the applicant withdrew the discharge request. | | | |
| 014 | Waterflooding Discharges | Disposal to AOGCC-permitted Class I/II injection well. | | | |
| 015 | Produced Water and Solids | Disposal to AOGCC-permitted Class I/II injection well. | | | |
| 016 | Completion Fluids | Disposal to AOGCC-permitted Class I/II injection well. | | | |
| 017 | Workover Fluids | Disposal to AOGCC-permitted Class I/II injection well. | | | |
| 018 | Well Treatment Fluids | Disposal to AOGCC-permitted Class I/II injection well. | | | |
| 019 | Test Fluids | Disposal to AOGCC-permitted Class I/II injection well. | | | |
| 021 | Filter Backwash | Disposal to AOGCC-permitted Class I/II injection well. Applicant has requested discharge under the reissued permit. | √ | | |

## 2.2 DISCHARGES

The 20 potentially discrete waste streams created by typical offshore oil and gas platform activities on the Osprey Platform are described below in order of the discharge number.

### Drilling Muds and Cuttings (Discharge No. 001)

Drilling muds and cuttings are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of circulating fluids (muds) used in the rotary drilling of wells to clean and condition the hole, to counterbalance formation pressure, and to transport drill cuttings to the surface. A water-based drilling fluid is the conventional drilling mud in which water is the continuous phase and the suspending medium for solids, whether or not oil is present. An oil-based drilling fluid has diesel, mineral oil, or some other oil as its continuous phase with water as the dispersed phase. Production drilling operations on the Osprey Platform use a combination of freshwater-based and oil-based drilling fluids. The

freshwater-based drilling muds are typically used for the upper 2,500 ft of the well, and the oil-based drilling fluids are used for depths below 2,500 ft (USEPA, 2006). Drill cuttings are the particles generated by drilling into subsurface geologic formations and are carried to the surface with the drilling fluid. The drilling muds are separated from the drill cuttings on the platform for use as make-up drilling fluids. The separated drill cuttings are disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Deck Drainage (Discharge No. 002)

Deck drainage is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of wastewater resulting from platform and deck washings; spillage; rainwater; and runoff from curbs, gutters, and drains on the Osprey Platform. Deck drainage flows into an overflow tank and then to a skim tank where it is treated by physical separation. Oil floats to the top of the tank, and water is discharged from the lower portion of the tank. The oil fraction from the skim tank is added to the produced oil and sent by pipeline to the shore storage facility. Although not required under this existing permit, domestic waste (Discharge No. 004) is also treated in this skim tank.

The average daily flow of deck drainage from the platform is approximately 1,435 gallons per day (gpd), with a maximum daily flow of 18,000 gpd depending on precipitation (Forest Oil, 2006a). According to the permit application (Forest Oil, 2006a), deck drainage is currently injected into the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Sanitary Waste (Discharge No. 003)

Sanitary waste is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is wastewater from toilets and urinals. According to the permit application (Forest Oil, 2006a), sanitary waste is aerated and treated in a Coast Guard certified marine sanitation device (MSD), chlorinated and held in a tank, dechlorinated, and injected into the Osprey Platform's AOGCC-permitted Class I/II injection well. The pollutants associated with this discharge include suspended solids, 5-day biochemical oxygen demand (BOD), FC, and TRC.

Typically, two people reside on the Osprey Platform, but as many as 59 people could be present based on the amount of room in the escape pods. A daily average flow volume of 300 gpd (with a maximum daily flow of 3,600 gpd) was calculated using an equation of 60 gallons per person daily and an average of five people on the platform (with a maximum population of 60) (Forest Oil, 2006a). The applicant has requested a mixing zone for this waste stream. ADEC has authorized a mixing zone for TRC and FC of approximately 0.12 acres for the discharge of sanitary waste (ADEC, 2008a).

### Domestic Waste (Discharge No. 004)

Domestic waste is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge, also referred to as graywater, is composed of wastewater from sinks, showers, laundries, safety showers, eyewash stations, and galleys. Graywater originating from Platform's galley includes kitchen solids, detergents, cleansers, and oil and grease. Treating domestic waste before discharge is not required, but for operational convenience on the Osprey Platform, domestic waste is currently piped to the skim tank and treated along with deck drainage. The

applicant has requested permission to modify its operational procedures to bypass domestic waste around the skim tank so that it can be discharged directly to Cook Inlet.

Domestic waste was calculated as a daily average flow volume of 500 gpd (with a maximum daily flow of 6,000 gpd) using an equation of 100 gallons per person daily and an average of five people on the platform (with a maximum population of 60) (Forest Oil, 2006a). According to the permit application (Forest Oil, 2006a), domestic waste is currently injected into the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Desalination Backwash (Discharge No. 005)

Desalination backwash is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of wastewater created from the process of making fresh (potable) water from seawater through a packaged treatment plant using pretreatment and reverse osmosis (RO) filtration. The Osprey Platform does not currently have a desalination plant, and therefore, this discharge was not included in the existing permit. However, the applicant has requested that this discharge be authorized under the reissued permit enabling the applicant to add a desalination plant in the future (Forest Oil, 2006a).

The anticipated maximum daily flow of desalination backwash is 100,000 gpd with a long-term average flow of 10,000 gpd (Forest Oil, 2006a). This discharge volume and sample data were obtained from the Monopod Platform NPDES permit application that was submitted for the Cook Inlet general permit reissuance. (Forest Oil was part owner of the Monopod Platform; however, all of Forest Oil's Alaska assets are now owned by PERL.)

### Blowout Preventer Fluid (Discharge No. 006)

Blowout preventer fluid is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of the fluid used to actuate hydraulic equipment on the blowout preventer stacks during well drilling. Blowout preventer fluid would be released only by catastrophic failure of the blowout preventer. It would not be a regularly released fluid; therefore, blowout preventer fluid will not be considered as a discharge from the Osprey Platform.

### Boiler Blowdown (Discharge No. 007)

Boiler blowdown waste is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of water and minerals drained from boiler drums. The Osprey Platform does not presently produce boiler blowdown water. If produced, boiler blowdown would be treated through an oil-water separator prior to discharge (USEPA, 2002b).

Water sample data were obtained from the King Salmon Platform NPDES permit application that was submitted for the Cook Inlet general permit reissuance. (Forest Oil was part owner of the King Salmon Platform; however, all of Forest Oil's Alaska assets are now owned by PERL.) The average and maximum anticipated daily flow of boiler blowdown from the King Salmon Platform is approximately 100 gpd (Forest Oil, 2006a).

### Fire Control Test Water (Discharge No. 008)

Fire control test water is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge, composed largely of seawater, is generated during the training of personnel in fire protection and when maintaining fire protection equipment. The discharge is intermittent and is expected to occur approximately 52 times per year for about 30 minutes. The average daily flow of fire control test water is approximately 13,400 gpd, with a maximum daily flow of 120,000 gpd (Forest Oil, 2006a).

### Non-Contact Cooling Water (Discharge No. 009)

Non-contact cooling water is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is seawater that is used for non-contact, once-through cooling of crude oil, produced water, power generators, and various pieces of machinery on the platform. The Osprey Platform does not presently produce this discharge but discharge to Cook Inlet is allowed under the existing NPDES permit.

Water sample data were obtained from the King Salmon Platform NPDES permit application that was submitted for the Cook Inlet general permit reissuance. (Forest Oil was part owner of the King Salmon Platform; however, all of Forest Oil's Alaska assets are now owned by PERL.) Potential average daily flow and maximum daily flow of non-contact cooling water is 1,890,000 gpd (Forest Oil, 2006a).

### Uncontaminated Ballast Water (Discharge No. 010)

Uncontaminated ballast water is not an authorized discharge under the existing Osprey Platform NPDES permit. Deepsea platforms are floating devices that require ballast water to keep the underwater portions of the structure submerged and the structure stable. Ballast water is occasionally discharged from and replaced in such structures. The Osprey Platform is a fixed platform (not floating) and does not produce or release this discharge.

### Bilge Water (Discharge No. 011)

Bilge water is not an authorized discharge under the existing Osprey Platform NPDES permit. Bilge water is water that collects in the lower internal parts of the drilling vessel hull. The Osprey Platform is a fixed structure and has no such discharge.

### Excess Cement Slurry (Discharge No. 012)

Excess cement slurry is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of excess mixed cement and equipment washdown wastewater from cementing operations. This waste stream is discharged intermittently while drilling, depending on drilling, casing, and testing program/problems (USEPA, 2006). Approximately 78 discharge events are anticipated per year, with an average daily flow of 2,000 gpd and a maximum daily flow of 3,000 gpd (Forest Oil, 2006a). Excess cement slurry is not treated prior to discharge.

### Muds, Cuttings, and Cement at the Seafloor (Discharge No. 013)

Muds, cuttings, and cement at the seafloor is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of the circulating fluids (muds)

used in the rotary drilling of wells to clean and condition the hole, to counterbalance formation pressure, and to transport drill cuttings to the surface. When reconditioning a well bore, cement that previously lined the well bore might be ground up and entrained with the rock and mud particles. Drill cuttings are the particles generated by drilling into subsurface geologic formations and are carried to the surface with the drilling fluid. The drilling muds are separated from the drill cuttings on the platform for use as make-up drilling fluids.

The applicant initially requested that muds, cuttings, and cement at the seafloor be added as a permitted discharge under the permit reissuance. According to the permit application, this outfall would be required in the new permit so that wells associated with the Osprey Platform could be properly abandoned. In a letter to USEPA dated January 23, 2008, PERL withdrew the request. Muds, cuttings, and cement at the seafloor will not be an authorized discharge. Correspondingly, Discharge No. 013 is not analyzed in this EA (PERL, 2008).

### Waterflooding Discharges (Discharge No. 014)

Waterflooding discharges are not authorized under the existing Osprey Platform NPDES permit. This discharge is created during the process of treating seawater and other appropriate fluids before they are injected into a hydrocarbon-bearing formation to improve the flow of hydrocarbons from production wells, and prior to use in operating physical/chemical treatment units for sanitary waste. These discharges include strainer and filter backwash water. All waterflooding discharges will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Produced Water and Solids (Discharge No. 015)

Produced water and solids is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of water brought up from the hydrocarbon-bearing strata during the extraction of oil and gas. It includes formation water, injection water, and any chemicals added downhole or during the oil/water separation process. Produced solids are sands and other solids that collect in vessels and lines, and must be removed to maintain adequate vessel and line capacities. The produced water and solids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Completion Fluids (Discharge No. 016)

Completion fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of salt solutions, weighted brines, polymers, and various additives used to prevent damage to the well bore during production well completion. The completion fluids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Workover Fluids (Discharge No. 017)

Workover fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of salt solutions, weighted brines, polymers or other specialty additives used in a producing well to allow safe repair and maintenance or abandonment procedures. The workover fluids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

#### Well Treatment Fluids (Discharge No. 018)

Well treatment fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of acid solutions, polymers, or hot water/brine fluids used to restore or improve well productivity by chemically or physically altering hydrocarbon-bearing strata. The well treatment fluids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

#### Test Fluids (Discharge No. 019)

Test fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge can include oils, weighted brines, polymers, and assorted additives used to assist the various measuring instruments that are inserted downhole when evaluating wells during exploration activities. The Osprey Platform is now a production facility; therefore, it will not be discharging test fluids. If test fluids were to be generated in future exploration activities, they would be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

#### Filter Backwash (Discharge No. 021)

Filter backwash is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is generated when filters are cleaned and maintained for various platform and production purposes. Filter backwash is primarily composed of seawater, with low levels of contaminants from platform equipment and from biofouling treatment chemicals such as tetrakis (hydroxymethyl) phosphonium sulfate (THPS). The anticipated maximum daily and long-term average discharge of filter backwash at the Osprey Platform is 105,000 gpd (Forest Oil, 2006a). This discharge is usually injected in the Osprey Platform's AOGCC-permitted Class I/II injection well. The applicant has requested that this discharge be authorized under the reissued permit (Forest Oil, 2006a).

### 2.2.1 Discharge with an Associated Mixing Zones – Sanitary Waste

Mixing zones are established by States in coastal or State waters to specify a limited portion of a water body in which otherwise applicable water quality criteria may be exceeded. Only ADEC can authorize mixing zones in Alaskan surface waters (18 AAC 70.055). Where mixing zones are established, water quality criteria for acute or chronic effects to aquatic life and human health can be exceeded as long as water quality criteria are met outside the mixing zone. Usually, mixing zones that allow exceedance of acute aquatic life criteria are smaller than mixing zones that allow exceedance of chronic aquatic life criteria.

In the fact sheet for the 2002 permit, USEPA determined that the discharge of sanitary wastes had the reasonable potential to cause or contribute to excursions above WQS for TRC and FC bacterial colony counts. Thus, USEPA established water quality-based effluent limits for these parameters in the 2002 permit. In December 2006, Parametrix evaluated mixing zones for the Osprey Platform Sanitary Waste (003) discharge in support of the pending application for renewal of its NPDES permit [AK-005330-9]. In that evaluation, Parametrix calculated mixing zone needed for the Sanitary Waste (003) discharge to meet WQS for FC and TRC by using the CORMIX dilution model to evaluate a comprehensive range of ambient and effluent conditions.

Based upon this modeling, the applicant initially requested a mixing zone for chlorine in the sanitary wastes discharge, which would have provided a chronic dilution factor of 1,800:1 and an acute dilution factor of 1,038:1. Because these dilution factors are larger than the dilution factor used to calculate effluent limits in the previous permit (500:1 for chlorine, with no mixing zone for fecal coliform), and because the applicable water quality criteria for chlorine have become less stringent since the time the previous permit was issued, chlorine effluent limits based solely on the applicant's initial mixing zone request and the applicable water quality criteria would be considerably less stringent than those in the previous permit.

Section 402(o) of the Clean Water Act generally prohibits reissuing an NPDES permit with a less-stringent water quality-based effluent limit than the corresponding limit in the previous permit, though some exceptions are provided in Sections 402(o)(2) and 303(d)(4). The less stringent chlorine effluent limits that would have resulted from the dilution factors in the applicant's initial mixing zone request may not have complied with Section 402(o) of the Clean Water Act. Following discussions with EPA and ADEC, the applicant requested a smaller mixing zone, providing a dilution factor of 133:1, which would allow the facility to discharge chlorine at the effluent limits in the previous permit and meet all applicable water quality criteria (both acute and chronic) at the edge of that mixing zone. Because these effluent limits are not less stringent than those in the previous permit, the effluent limits also comply with Section 402(o) of the Clean Water Act.

ADEC prepared a draft Certificate of Reasonable Assurance for NPDES Permit AK-005330-9 (ADEC, 2008a) authorizing a mixing zone for sanitary waste approximately 0.12 acres in size based upon a dilution factor of 133:1. Compliance with Alaska WQS must be achieved at the edge of the mixing zone for TRC and FC. However, under the authority provided in Section 402(a)(1) of the CWA, EPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone. Table 2-2 describes the discharges that are subject to the proposed effluent limitation and sampling requirements. Descriptions of these discharges can be found in Section 2.2.

Under most conditions, chlorine in the sanitary waste (Discharge No. 003) should meet Alaska WQS well before the diluted discharge reaches the edge of the mixing zone. Although deck drainage (Discharge No. 002) and domestic waste (Discharge No. 004) discharge through the same outfall as the sanitary waste discharge, the authorized mixing zone is for the sanitary waste discharge alone. The commingled discharges require less dilution to meet WQS and dilute faster in shorter distances than sanitary waste alone. Therefore, the approved mixing zone is representative of reasonable worst-case conditions and is protective for any combination of deck drainage, domestic waste, and sanitary waste.

### 2.2.2 Activities for Which Discharges to Surface Water Would Not Occur

The NPDES permit reissuance application included additional activities for which no discharges are anticipated. While none of these waste streams will be discharged from the Osprey Platform, for completeness, they are described in Section 2.2. Because these discharges will not occur and will not be authorized under the reissued NPDES permit, USEPA assumed no environmental impacts would occur. These discharges, therefore, are not analyzed further in this EA.

The discharges to surface water that would not occur are the following.

- Drilling Muds and Cuttings (Discharge No. 001)
- Blowout Preventer Fluid (Discharge No. 006)
- Uncontaminated Ballast Water (Discharge No. 010)
- Bilge Water (Discharge No. 011)
- Muds, Cuttings, and Cement at the Seafloor (Discharge No. 013)
- Waterflooding Discharges (Discharge No. 014)
- Produced Water and Solids (Discharge No. 015)
- Completion Fluids (Discharge No. 016)
- Workover Fluids (Discharge No. 017)
- Well Treatment Fluids (Discharge No. 018)
- Test Fluids (Discharge No. 019)

## Table 2-2. Osprey Platform NPDES Permit Reissuance Proposed Effluent Limitations and Monitoring Requirements

| Discharge | Discharge Description | Effluent Parameter | Units | Effluent Limitations | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|
| | | | | AML | MDL | Sample Frequency | Sample Type |
| 001 | Drilling Muds and Cuttings | No discharge | | | | | |
| 002 | Deck Drainage | Free oil[3] | Visual[1] | No discharge[1] | | Daily | Visual[1] |
| | | WET, chronic[4] | $TU_c$ | Report | Report | Annually | Grab |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| 003 | Sanitary Wastes | BOD | mg/L | 30 | 60 | Monthly | Grab |
| | | | lbs/day | 0.9 | 1.8 | Monthly | Calculated |
| | | TSS | mg/L | 30 | 60 | Monthly | Grab |
| | | | lbs/day | 0.9 | 1.8 | Monthly | Calculated |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| | | Fecal Coliform (FC) Bacteria[3] | colonies/100 mL | 137 | 200 | Monthly | Grab |
| | | Enterococci[3] | Number per 100 mL | 35[2] | 276[5] | Monthly | Grab |
| | | Total Residual Chlorine (TRC)[3] | mg/L | 0.8 | 1.6 | Monthly | Grab |
| | | | lbs/day | 0.01 | 0.03 | Monthly | Calculated |
| 004 | Domestic Wastes | Floating solids, garbage, or foam | Visual | No discharge | | Daily | Visual |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| 005 | Desalination Unit Wastes | Salinity (intake and effluent) | parts per thousand | Report | Report | Monthly | Grab |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| | | WET, chronic[4] | $TU_c$ | Report | Report | Quarterly | Grab |
| | | Temperature (intake and effluent) | ºC | Report | Report | Monthly | Grab |
| 006 | Blowout Preventer Fluid | No discharge | | | | | |
| 007 | Boiler Blowdown | Flow | mgd | Report | Report | Monthly | Estimated |
| | | Temperature | ºC | Report | Report | Monthly | Grab |
| 008 | Fire Control System Test Water | Flow | mgd | Report | Report | Monthly | Estimated |

## Table 2-2 (cont.). Osprey Platform NPDES Permit Reissuance Proposed Effluent Limitations and Monitoring Requirements

| Discharge | Discharge Description | Effluent Parameter | Units | Effluent Limitations | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|
| | | | | AML | MDL | Sample Frequency | Sample Type |
| 009 | Non-contact Cooling Water | Flow | mgd | Report | Report | Monthly | Estimated |
| | | Temperature (intake and effluent) | ºC | Report | Report | Monthly | Grab |
| 010 | Uncontaminated Ballast Water | No discharge | | | | | |
| 011 | Bilge Water | No discharge | | | | | |
| 012 | Excess Cement Slurry | Free oil[3] | Visual[1] | No discharge[1] | | Daily when discharging | Visual[1] |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| 013 | Mud, Cuttings, Cement at Seafloor | No discharge | | | | | |
| 014 | Waterflooding Discharges | No discharge | | | | | |
| 015 | Produced Water and Solids | No discharge | | | | | |
| 016 | Completion Fluids | No discharge | | | | | |
| 017 | Workover Fluids | No discharge | | | | | |
| 018 | Well Treatment Fluids | No discharge | | | | | |
| 019 | Test Fluids | No discharge | | | | | |
| 021 | Filter Backwash | Flow | mgd | Report | Report | Monthly | Estimated |
| | | TRC[3] | µg/L | Report | 13 | Monthly | Grab |
| | | | lb/day | Report | 0.011 | Monthly | Calculated |
| | | TSS (intake and effluent) | mg/L | Report | Report | Monthly | Grab |
| | | Turbidity (intake and effluent) | NTU | Report | Report | Monthly | Grab |

Acronyms:
mgd = millions of gallons per day
mg/L = milligrams per liter
NTU = turbidity units

Footnotes:
1. As determined by the presence of a film or sheen upon or a discoloration of the surface of the receiving water (visual sheen) using the static sheen test defined in appendix 1 to 40 CFR part 435, subpart A.
2. Average monthly enterococci results must be reported as the geometric mean of the samples. See Section VI. for a definition of the geometric mean.
3. Reporting is required within 24 hours of a maximum daily limit violation (see I.B.14).
4. For a complete discussion of the Whole Effluent Toxicity (WET) monitoring requirements and WET trigger limits, please refer to the draft NPDES permit and fact sheet.
5. Instantaneous maximum limit.

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# 3. AFFECTED (BASELINE) ENVIRONMENT

This section describes the affected (baseline) environment of the project area for the proposed action (reissuance of the Osprey Platform NPDES permit) from which decision makers and the public can determine the potential environmental consequences of the proposed action and alternative actions, compare those effects, and assess the significance.

The affected (baseline) environment has been grouped into the following categories:

- Physical Environment: geology and soils (Section 3.1), climate and air quality (Section 3.2), physical oceanography (Section 3.3), marine water quality (Section 3.4), and freshwater resources (Section 3.5)
- Biological Environment: marine biological resources (Section 3.6), threatened and endangered species (Section 3.7), and terrestrial biological resources (Section 3.8)
- Cultural, Social, and Economic Environment: socioeconomic conditions (Section 3.9); subsistence harvesting (Section 3.10); land use and shoreline use and management (Section 3.11); transportation systems (Section 3.12); visual environment and aesthetics (Section 3.13); recreation (Section 3.14); cultural, historical, and archaeological resources (Section 3.15); environmental justice (Section 3.16); and traditional ecological knowledge (Section 3.17).

## 3.1 GEOLOGY AND SOILS

### 3.1.1 Regional Setting

Cook Inlet is a shallow tidal estuary, approximately 220 miles long and 30 miles wide, that flows into the Gulf of Alaska. Cook Inlet separates the Kenai Peninsula from mainland Alaska and branches into the Knik Arm and Turnagin Arm at its northern end, almost encircling the city of Anchorage. Mountain ranges surround Cook Inlet, including the Alaska, Aleutian, Chugach, Kenai, and Talkeetna ranges (Figure 3-1). Upper Cook Inlet lies between Point Campbell and the East and West Forelands. The Forelands are opposing peninsulas that constrict Cook Inlet to a width of about 8 miles, whereas the upper inlet typically ranges 12 to 19 miles wide (Mulherin et al., 2001).

Upper Cook Inlet has a maritime climate that becomes a continental climate in the lower reaches of Cook Inlet. Several major glaciations have altered the landscape of the region. In the Pleistocene epoch (2 million to 10,000 years ago), glaciers pushed beyond the mountain ranges, depositing sediment and debris. As the glaciers receded, Cook Inlet assumed its present form. The thick sedimentary deposits underlying Cook Inlet basin exceed 30,000 ft in places and are composed of conglomerates, sandstones, siltstones, limestone, chert,[1] volcanics, and clastic[2] rocks (USEPA, 2006). The basin and mountain ranges were formed by plate tectonics. Earthquakes and active volcanoes are common to the area (Minerals Management Service [MMS], 2003). There are five volcanoes along the mountain ranges bordering the west side of Cook Inlet (USEPA, 2006).

[1] A fine-grained silica-rich sedimentary rock
[2] Composed of fragments, or clasts, of pre-existing rock

### 3.1.2 Soils/Sediments

Sediments of the upper Cook Inlet seafloor typically consist of silts, sands, gravels, cobbles, and boulders. Because of strong high tidal currents, layers of gravel, cobble, and boulders cover the seafloor, and there are formations of sand and gravel waves (USEPA, 2002b). The surrounding Cook Inlet shore areas are covered by glacial silts and muds. Grain size distribution for surficial sediments in the vicinity of the Osprey Platform is listed in Table 3-1; this sample is believed to be generally representative of sediments in the subtidal areas.

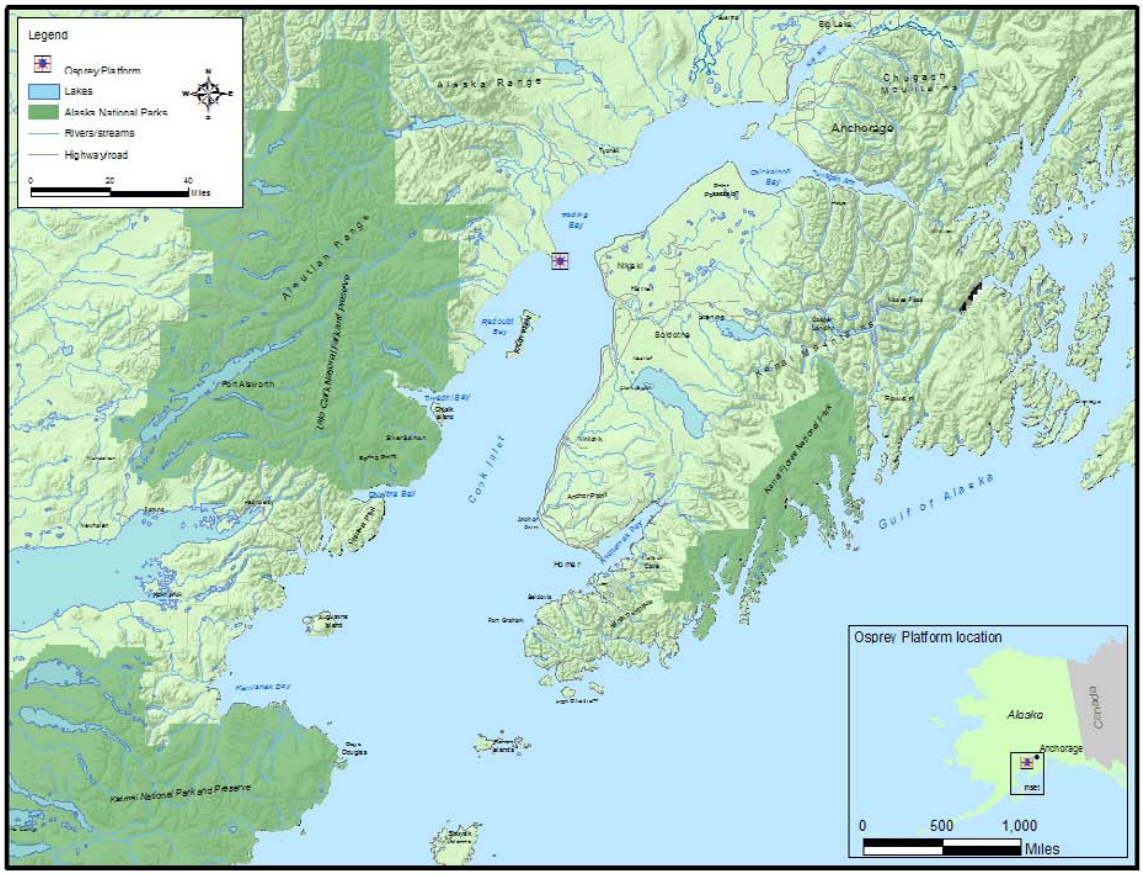



**Figure 3-1. Geographic location of Osprey Platform in Cook Inlet, Alaska**

### 3.1.3 Geologic Hazards

Earthquakes, volcanoes, seafloor instability/mobility, and shallow gas-charged sediments are geologic hazards potentially present in the Cook Inlet area. The following sections address each of the geologic hazards.

**Table 3-1. Grain size distribution of benthic sediments at Osprey Platform location, Cook Inlet, Alaska (USEPA, 2002b)**

| Grain Size Diameter | Percent Passing |
|---|---|
| 12 inches | 100 |
| 6 inches | 63 |
| 4 inches | 37 |
| 3 inches | 28 |
| 2 inches | 13 |
| 1.5 inches | 8 |
| 1 inch | 4 |
| 0.75 inch | 3 |
| 0.5 inch | 1 |
| 3/8 inch | 1 |
| #4 screen | 0 |

#### *3.1.3.1 Earthquakes*

Along the Pacific Ocean, one of the most active seismic zones includes the Cook Inlet area located along the boundary of the Aleutian trench, which is the site of subduction between the Pacific and North American plates. Since 1902, more than 100 earthquakes of magnitude 6 (Richter scale) or greater have occurred in the Cook Inlet area. The most recent great earthquake[3] occurred in March 1964 at an estimated magnitude of 9.2, causing uplift, subsidence, ground cracking, landslides, and horizontal movements that affected areas in and around Cook Inlet. The recurrence interval of great earthquakes is estimated to range from 33 to 800 years. Earthquakes are normally associated with fault locations. Major faults in the area include the Bruin Bay and Castle Mountain faults to the northwest and the Border Ranges fault to the southeast. However, lesser faults also occur throughout the area (USEPA, 2002b).

#### *3.1.3.2 Volcanoes*

Cook Inlet's western boundary is one of the most active volcanic regions in the world (MMS, 2003). Five volcanoes (four active, one dormant) border the west side of Cook Inlet (Table 3-2). Figure 3-2 illustrates the Cook Inlet area volcanoes. Three volcanic eruptions have occurred in the Cook Inlet basin since 1980, and the most recent eruption was from Mt. Spurr in 1992. The main effect of these eruptions is widespread distribution of airborne ash, which causes disruptions to air traffic and closure of oil platforms and public facilities. The 1989 – 1990 eruption from Mt. Redoubt was the second-most costly volcanic eruption in the history of the United States. This eruption significantly affected Alaska's aviation and oil industries, as well as the people of the Kenai Peninsula. The three eruptions from Mt. Spurr's Crater Peak in 1992 deposited ash as far as Anchorage and its surrounding communities, closing airports, and disrupting air travel as far east as Cleveland, Ohio (Alaska Volcano Observatory, 2008).

Many of the volcanoes in the project area are active and capable of erupting (Table 3-2). Volcanic hazards can include severe blast effects, turbulent clouds of ash and gases, lightning, volcanic mudflows, pyroclastic flows, debris flows, corrosive rain, flash floods, outburst floods, earthquakes, and tsunamis (USEPA, 2002b).

[3] A great earthquake is defined as higher than 7.8 on the Richter scale

**Table 3-2. Cook Inlet area volcanoes (Alaska Volcano Observatory, 2008)**

| Volcano | Historical Eruptions | Present State |
|---|---|---|
| Mt. Augustine | 1812, 1883, 1935, 1944, 1963, 1971, 1976, 1986, 2005 | Active, potentially eruptive |
| Mt. Iliamna | — | Active, steam only |
| Mt. Katmai | 1912 | Dormant |
| Mt. Redoubt | 1902, 1966, 1989-90 | Active, potentially eruptive |
| Mt. Spurr | 1953, 1992 | Active, potentially eruptive |

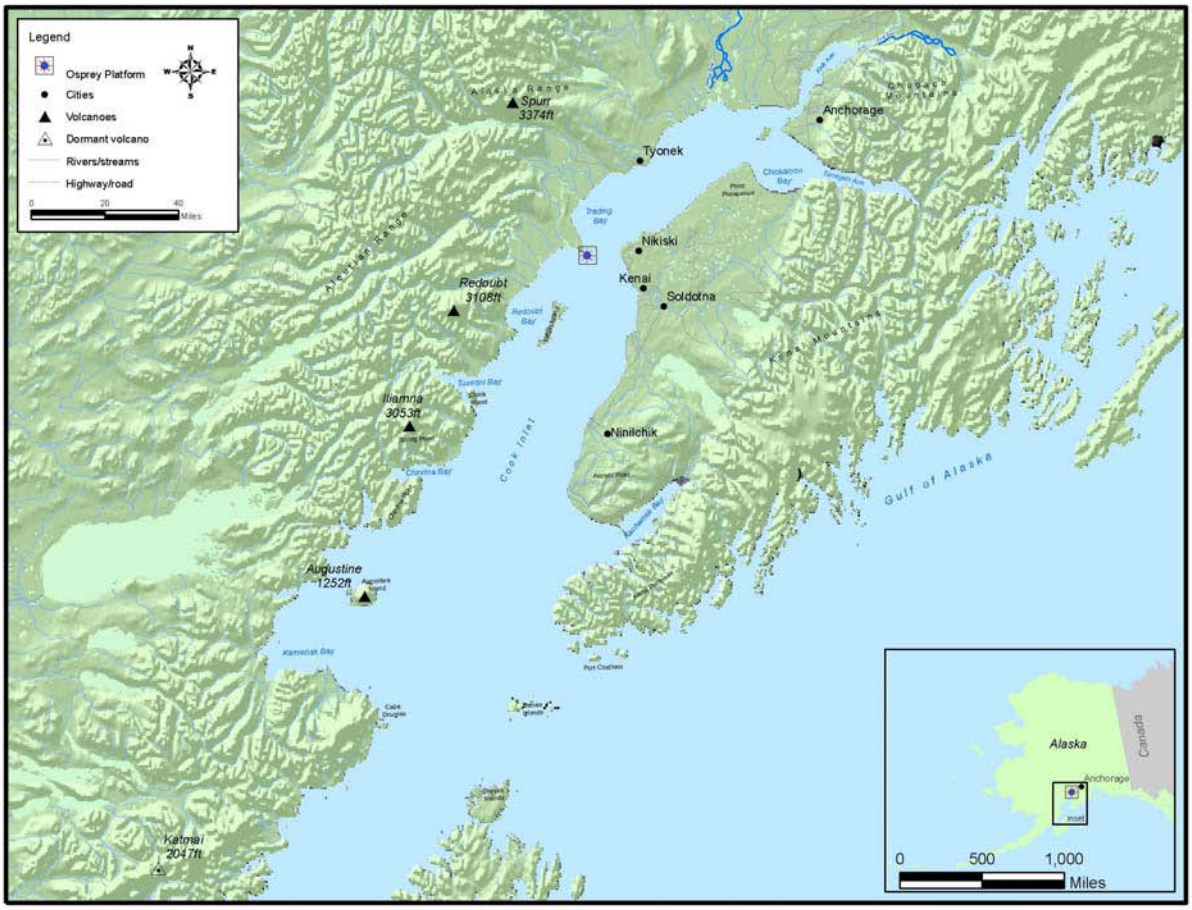



**Figure 3-2. Cook Inlet area volcanoes**

### *3.1.3.3 Tsunamis and Seiches*

Cook Inlet is subject or vulnerable to tsunamis and seiches[4] because of the relatively high level of seismic and volcanic activity in the area. Tsunamis can be generated when large volumes of seawater are displaced by tectonic movement of the seafloor or by large rockfalls or landslides. Seiches start in partially or completely enclosed bodies of water by seismic activity or by large rock or landslides in coastal areas.

[4] Defined as a standing wave in an enclosed body of water

#### *3.1.3.4 Seafloor Stability/Movement*

As summarized in Section 3.1.2 and Table 3-1, sediments of the upper Cook Inlet seafloor typically consist of silts, sands, gravels, cobbles, and boulders. Cook Inlet surface sediments have low accumulation rates with the gently to steeply sloping seafloors in lower Cook Inlet. Mean grain size generally decreases from north to south, with the central inlet area having the most abundant sand-size sediment. Strong tidal currents in Cook Inlet cause the formation of sand, gravel, and cobble wave-like bottom features, which are thought to be mobile. These wave-like bottom features are documented in both upper and lower Cook Inlet at heights of 5 to 10 ft. Higher wave features have been documented (USEPA, 2006).

#### *3.1.3.5 Shallow, High-Pressure Gas*

Shallow (1,000 to 2,000 ft) high-pressure natural gas is present in upper Cook Inlet and can cause potential problems to drilling operations. Over the past 20 years within the upper inlet, two offshore blowouts (Grayling Platform in 1985, Steelhead Platform in 1987) have occurred as a result of drilling operations encountering shallow, high-pressure gas (USEPA, 2006).

## 3.2 CLIMATE AND AIR QUALITY

### 3.2.1 Climate

The term "climate" describes the meteorological conditions in a particular area, including temperature, precipitation, and wind. Upper Cook Inlet has a maritime climate that transitions into a continental climate in its lower reaches (USEPA, 2006). Areas within the maritime climate are known for their mild winters, cool summers, and moderate precipitation. In the summer (June through August), temperatures average from 44$^{o}$ Fahrenheit ($^{o}$F) to 67 $^{o}$F and rarely exceed 70$^{o}$F. Winter months (November through March) typically exhibit temperatures ranging from 4 $^{o}$F to 34$^{o}$F. The mean annual temperatures are a maximum of 43$^{o}$F and minimum of 29$^{o}$F (Western Regional Climate Center [WRCC], 2008). Winter months frequently experience wind, precipitation, and heavy snowfall. The Alaska Range to the north provides a barrier to the cold winter air masses that dominate the Alaskan Interior. Precipitation in Cook Inlet is not as high as that in other regions of Alaska, but is substantially greater than in the Interior region (Alaska Climate Research Center, 2008). The mountains surrounding Cook Inlet influence winds in the area, where prevailing winds are south/southwest in summer and north/northeast in winter. Average wind speeds range from 5 knots (December) to 7 knots (May) (USEPA, 2002b). Temperature and precipitation data for various locations adjacent to the project area are summarized in Table 3-3.

Ice forms in Cook Inlet during the winter months and is generally concentrated in the far reaches of upper Cook Inlet (such as Knik and Turnagin arms) where the freshwater from rivers creates high potential for ice occurrence. These areas begin to freeze in October and November and ice forms in upper Cook Inlet by December. Ice coverage in the area is variable and ice melts/breaks might occur as early as mid-March or as late as mid-May (WRCC, 2008). Section 3.3.5 provides a description of ice conditions for the project area.

**Table 3-3. Summary of temperature and precipitation data for project area (WRCC, 2008)**

| | Kenai (1983 – 2007) | Nikiski (1967 – 1978) |
|---|---|---|
| **Temperature (°F)** | | |
| January Mean Minimum | 8.5 | 4.8 |
| January Mean Maximum | 23.8 | 20.6 |
| April Mean Minimum | 25.3 | 25.2 |
| April Mean Maximum | 43.8 | 40.3 |
| July Mean Minimum | 48.8 | 48.9 |
| July Mean Maximum | 63.6 | 61.7 |
| October Mean Minimum | 27.3 | 30.3 |
| October Mean Maximum | 42.8 | 42.7 |
| **Precipitation (Inches)** | | |
| January | 1.39 | 0.61 |
| April | 0.74 | 0.97 |
| July | 1.65 | 1.26 |
| October | 3.54 | 2.48 |
| Mean Annual Snowfall | 87.0 | 33.0 |

### 3.2.2 Air Quality

USEPA Office of Air Quality Planning and Standards has set National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) for six principal pollutants, referred to as "criteria" pollutants — nitrogen dioxide ($NO_2$), carbon monoxide (CO), ozone ($O_3$), sulfur dioxide ($SO_2$), lead (Pb), and particulate matter (PM). Units of measure for NAAQS are parts per million (ppm) by volume, milligrams per cubic meter of air ($mg/m^3$), and micrograms per cubic meter of air ($\mu g/m^3$). ADEC assesses NAAQS compliance, and has not established additional or more stringent standards. Pollutants consist of scattered emissions, principally from population centers (area sources) and industrial sources (point sources). The project area within Cook Inlet is considered to have good air quality because the area is in attainment for all NAAQS (USEPA, 2006).

Many areas in Alaska, including the Kenai Peninsula, have published emissions summaries by the USEPA. These can be viewed online at: http://www.epa.gov/ttn/naaqs/ozone/areas/state/cnty/akcy.htm. Offshore and onshore population centers and industrial sources emit air pollutants, such as PM, sulfur oxides (SOx), CO, nitrogen oxides (NOx), Pb, and volatile organic compounds (VOCs). Emissions impacts tend to be localized. Industrial source emissions on the Kenai Peninsula predominantly occur from gas processing, oil refining, power generation, and petrochemical production. Mobile sources contributing to emissions are motor vehicles (highway and off-highway activities). Cook Inlet vessel traffic is a significant source of emissions (MMS, 2003). Cumulatively, the largest emissions sources are in the industrialized areas and population centers of Kenai (Nikiski) and Anchorage (USEPA, 2006).

Air quality is monitored primarily in population centers, such as Anchorage (MMS, 2003). The most comprehensive ambient air quality data in the area were collected in 1993 and 1994 from a monitoring station on the west shore of Cook Inlet near Beluga. Table 3-4 summarizes the data collected from this station on CO, hydrogen sulfide ($H_2S$), $O_3$, NOx, $SO_2$, total suspended particulate matter (TSP), and particulate matter less than or equal to 10 microns (PM10). As shown on Table 3-4, the ambient levels of regulated air pollutants in the project vicinity are well below the applicable NAAQS.

**Table 3-4. Summary of baseline air quality data, Beluga area (July 1993 to September 1994) (adapted from USEPA, 2006)**

| Air Quality Parameter | Beluga Area Concentration ($\mu g/m^3$) | NAAQS ($\mu g/m^3$) |
|---|---|---|
| **$NO_2$** (Annual Mean) | 1.9 | 100 |
| **$O_3$** | | |
| 8-Hour (Hr) | — | 160 (0.08 ppm)[a] |
| 1-Hr | 104 | 235 (0.12 ppm)[b] |
| Annual Mean | 52.6 | No Standard |
| **$SO_2$** | | |
| Maximum 3-Hr | 13.1 | 1,300 |
| 2nd Highest 3-Hr | 10.5 | — |
| Maximum 24-Hr | 5.2 | 365 |
| 2nd Maximum 24-Hr | 5.2 | — |
| Annual Mean | 2.6 | 80 |
| **$H_2S$** | | |
| Maximum 1-Hr | 8.4 | No Standard |
| 2nd Highest 1-Hr | 8.4 | — |
| Annual Mean | 1.4 | No Standard |
| **CO** | | |
| Maximum 1-Hr | 3,092 | 40,000 |
| 2nd Highest 1-Hr | 2,634 | — |
| Maximum 8-Hr | 1,489 | 10,000 |
| 2nd Highest 8-Hr | 1,489 | — |
| **PM10** (Beta Gauge) | | |
| Maximum 24-Hr[c] | 32 | —[d] |
| 2nd Highest 24-Hr[c] | 32 | — |
| Annual Average | 6.5 | 50 |

Notes:
[a] To attain this standard, the 3-year average of the 4th-highest daily maximum 8-hr average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm
[b] (a) Standard attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1; (b) As of June 15, 2005 USEPA revoked the 1-hr ozone standard in all areas except the 14 8-hr ozone nonattainment Early Action Compact Areas
[c] This value reflects a measurement of midnight to midnight, not a 24-hr running average
[d] Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, USEPA revoked the annual PM10 standard in 2006 (effective December 17, 2006)

The operation of a new major stationary source in an area that is in attainment for all NAAQS, such as the Cook Inlet area, is governed by the Prevention of Significant Deterioration (PSD) Program of the Clean Air Act (CAA). Areas in Alaska are currently designated as PSD Class I or II. The Class I air quality designation is the most restrictive and applies to certain national parks, monuments, and wilderness areas. Tuxedni National Wildlife Refuge (about 50 miles from the project site) is designated as a National Wilderness Area and is the only Class I area in the general Cook Inlet area; remaining areas are classified as Class II (USEPA, 2006).

## 3.3 PHYSICAL OCEANOGRAPHY

### 3.3.1 Bathymetry

Cook Inlet is a shallow tidal estuary, approximately 220 miles long and 30 miles wide, that flows into the Gulf of Alaska. It is divided naturally into the upper and lower inlet by the East and West Forelands. The project area is located in the vicinity of the West Foreland (see Figure 3-1). The upper Cook Inlet is typically about 17 to 19 miles wide. Shallow water depths are typically 100 to 200 ft (below MLLW). Water depths at the Osprey Platform location are 45 ft (below MLLW) or less (USEPA, 2006).

Upper Cook Inlet receives large volumes of seasonally dependent freshwater inflows and high tidal currents allowing for a well-mixed water column. Little vertical stratification is present except near the mouths of major rivers. Glacier-fed rivers such as the Susitna and Knik Rivers provide freshwater and suspended sediments into Cook Inlet (USEPA, 2002b). Cook Inlet waters tend to moderate the atmospheric temperatures in the area (USEPA, 2006).

### 3.3.2 Tides

In Cook Inlet, Turnagin Arm is one of only about 60 waterbodies worldwide to exhibit a tidal bore — a tidal phenomenon in which the leading edge of the incoming tide forms a wave(s) of water that travels up a river or narrow bay against the direction of the current. Tides in Cook Inlet are semidiurnal, having two unequal high and low tides per tidal day[5] with the mean range increasing northward of the inlet (USEPA, 2002b). The mean diurnal tidal range can vary from roughly 19 ft at Homer to 30 ft at Anchorage (ADF&G, 2000). In Cook Inlet, a tidal bore can be more than 6 ft high and travel at up to 13 knots during high tides in spring. On a typical day, tides near Turnagin Arm are more than 30 ft high, second in North America to Canada's Bay of Fundy. Tidal fluctuations in the main body of Cook Inlet, while not as extreme as the shallow and narrow Turnagin Arm, regularly reach 25 ft and exhibit currents in excess of 5 knots (USACE, 2008). Table 3-5 summarizes tidal data for various locations in upper Cook Inlet.

Upper Cook Inlet surface circulation is driven by incoming and outgoing tidewater mixing with freshwater inputs. The Coriolis force causes a southward flow along western lower Cook Inlet as the Coriolis force acts on freshwater entering the upper inlet from rivers (Moore et al., 2000).

[5] Tidal day = 24 hours 50 minutes

**Table 3-5. Summary of Cook Inlet tidal data (depths in ft above MLLW) (NOS CO-OPS, 2008; USEPA, 2002b)**

| Datum | Drift River | Nikiski |
|---|---|---|
| Est. Extreme High Water | 23.00 | 27.69 |
| Mean Higher High Water | 17.90 | 20.56 |
| Mean High Water | 17.20 | 19.83 |
| Mean Tide Level | 9.60 | 10.98 |
| Mean Low Water | 2.00 | 2.13 |
| Mean Lower Low Water (MLLW) | 0.00 | 0.00 |
| Est. Extreme Low Water | -5.50 | -6.19 |

### 3.3.3 Currents

Upper Cook Inlet currents are predominantly driven by tidal flows with the direction of the currents running parallel to bathymetric contours. Near the mouths of major rivers, such as the Susitna River, currents can influence both the speed and direction of local waters based on the large volume of freshwater inflow. Surface currents in the general vicinity of the Osprey Platform reach mean peak velocities of approximately 4 knots. Flood tides generally flow in a northeasterly direction and ebb currents flow in a southerly direction. Higher peak currents occur with high tides, whereas lower peak currents occur with lower tidal ranges. Currents near the seafloor are lower velocity because of bottom friction (USEPA, 2002b).

Tidal rips can occur because of strong tidal currents at various locations in the inlet. Surface debris and steep waves are often signs of tidal rips, which can be hazardous to small boat traffic. Area tidal rips would not be expected to be a significant problem for the Osprey Platform or associated boat operations. A consistent tidal rip occurs within a half mile east of the Osprey Platform; the platform was originally sited to avoid this rip area and placed in deeper waters to the east (USEPA, 2002b).

### 3.3.4 Waves

Waves in upper and central Cook Inlet are driven by distance (referred to as fetch) and depth limited. Wave heights are usually less than 10 ft. During storm events, waves in the upper inlet (Beluga area) can reach 15 ft with waves lasting up to 6 to 8 seconds (USEPA, 2002b).

### 3.3.5 Ice Conditions

Ice is present in Cook Inlet seasonally for up to 5 months each year but varies greatly year to year. Different sources of ice are found in Cook Inlet — sea ice, beach ice, and river ice (USEPA, 2002b; Mulherin et al., 2001). The predominant form, sea ice, forms in seawater from the surface downward. Strong tidal currents affect and restrict the size of ice sheets in Cook Inlet; however, ice pans greater than 3 ft thick and 1,000 ft across are common. Pressure ridges might also form reaching up to 18 ft (USEPA, 2002b).

Sea ice forms in the upper inlet starting in the fall (October or November), and floats freely on the surface brushing the shoreline during the winter months from the West Foreland to Cape Douglas. On the average, significant ice coverage is present in the inlet from late November through early April (USEPA, 2002b; Mulherin et al., 2001). About half the inlet area north of

the Forelands is covered with new ice and pancake ice (ice up to 10 centimeters [cm] thick) and thin first-year ice (ice 30 to 70 cm thick) by December. Much of the ice in the upper inlet is broken in pieces by tidal movement (referred to as brash ice), which further thickens as it is compacted with other ice. South of the Forelands remains relatively ice free in December most years (Mulherin et al., 2001). Ice usually melts by March, April, or May. The primary factor for sea ice formation in upper Cook Inlet is air temperature. In lower Cook Inlet, the Alaska coastal current temperature and inflow rate governs ice formation (USEPA, 2002b). Dates of first significant ice and ice-free conditions in northern Cook Inlet are summarized in Table 3-6 (Mulherin et al., 2001; USEPA, 2002b). Figures 3.3 to 3.6 illustrate mean ice conditions and stage of development around the Osprey Platform within Cook Inlet during the winter months.

Beach ice is made of frozen mud that is exposed to air by ebbing tides. Water in contact with the frozen mud also freezes during flood tides (USEPA, 2002b). Beach ice forms on tidal flats as seawater comes in contact of the cold tidal muds. Beach ice thickness is limited only by the range of the tides. Beach ice in Cook Inlet has been noted to reach 30 ft in thickness. During cold months, beach ice generally remains on the beach. However, during warmer weather and with the high tides, beach ice can melt free and enter into the inlet. Typically, these blocks of beach ice are relatively small (less than several tens of ft across) and have relatively low strengths (USEPA, 2002b).

River ice also occurs in Cook Inlet. River ice is composed of freshwater and is similar to sea ice except it is harder. River ice is unaffected by tidal action until the spring season when the ice breaks up and melts (USEPA, 2002b).

**Table 3-6. Dates of first significant ice and ice-free conditions for northern Cook Inlet (adapted from Mulherin et al., 2001)**

| Year | First Ice | Ice-Free |
|---|---|---|
| 1969 – 70 | November 18 | March 23 |
| 1970 – 71 | October 17 | May 7 |
| 1971 – 72 | November 23 | May 15 |
| 1972 – 73 | November 13 | April 10 |
| 1973 – 74 | November 18 | April 6 |
| 1974 – 75 | November 24 | April 9 |
| 1975 – 76 | November 12 | April 10 |
| 1976 – 77 | December 17 | April 9 |
| 1977 – 78 | November 20 | March 18 |
| 1978 – 79 | December 16 | March 31 |
| 1979 – 80 | December 12 | March 26 |
| 1980 – 81 | December 6 | March 10 |
| 1981 – 82 | November 20 | April 19 |
| Average | November 24 | April 8 |
| Median | November 20 | April 9 |

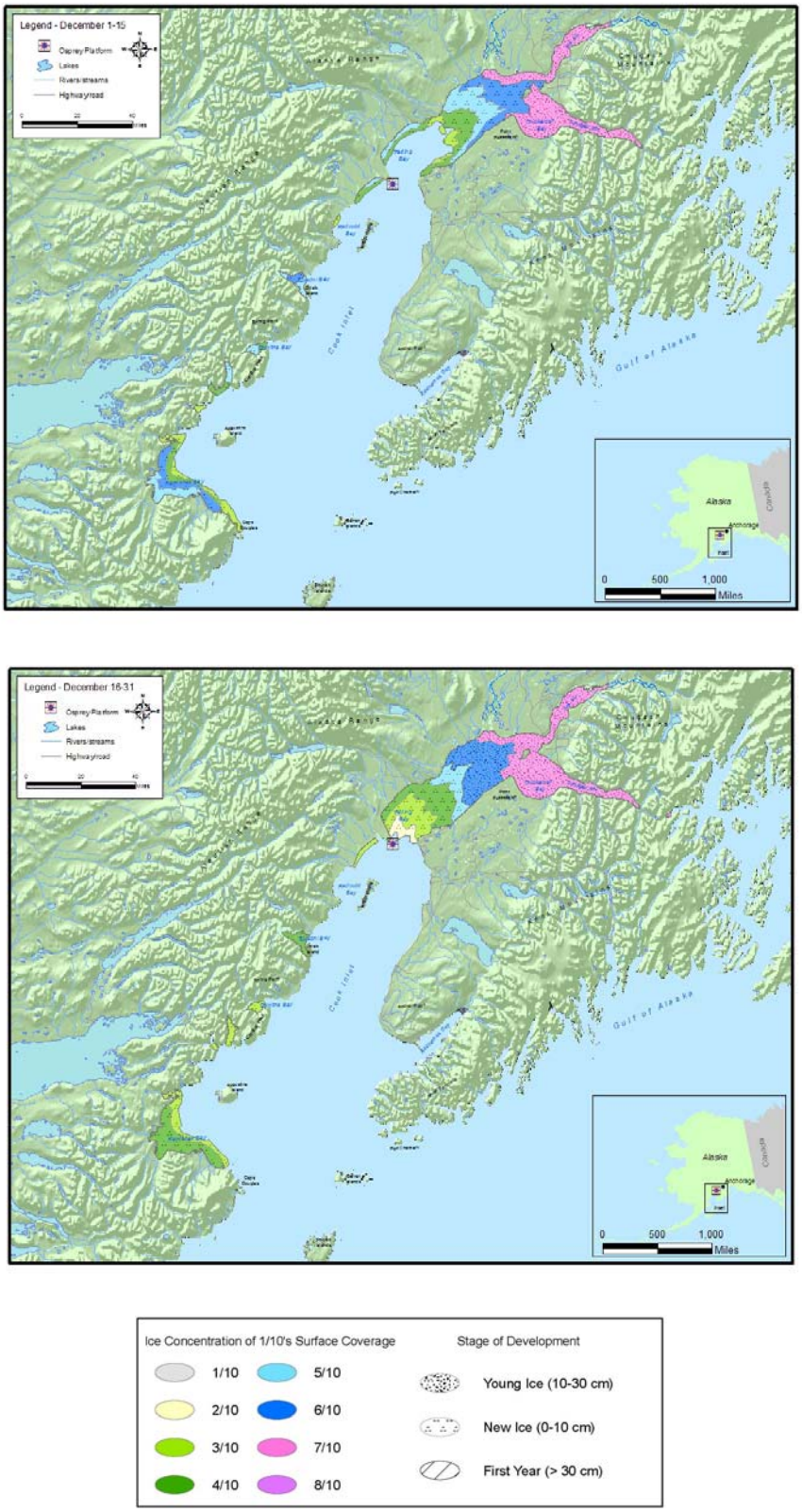



**Figure 3-3. December sea ice concentration in Cook Inlet**

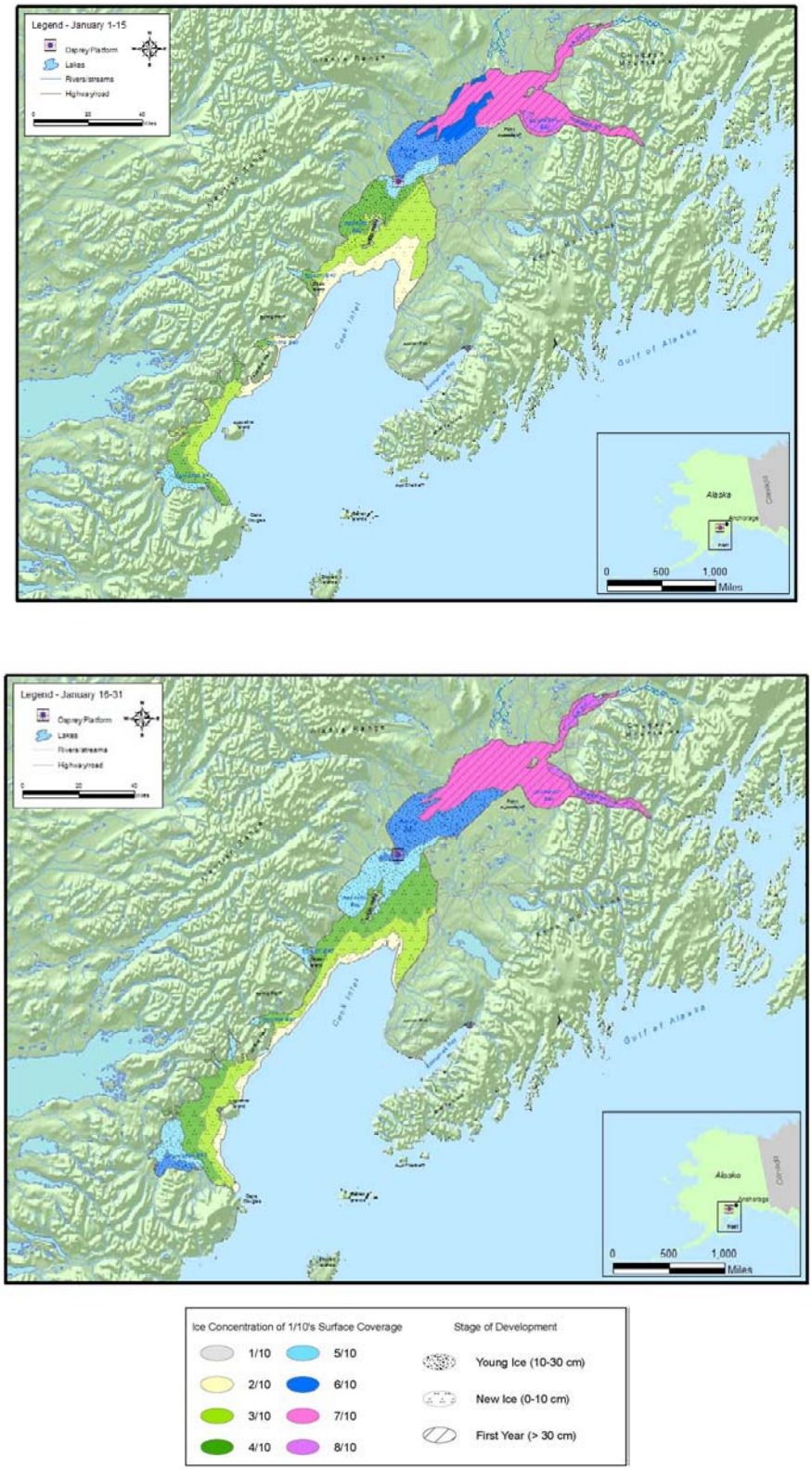



**Figure 3-4. January sea ice concentration in Cook Inlet**

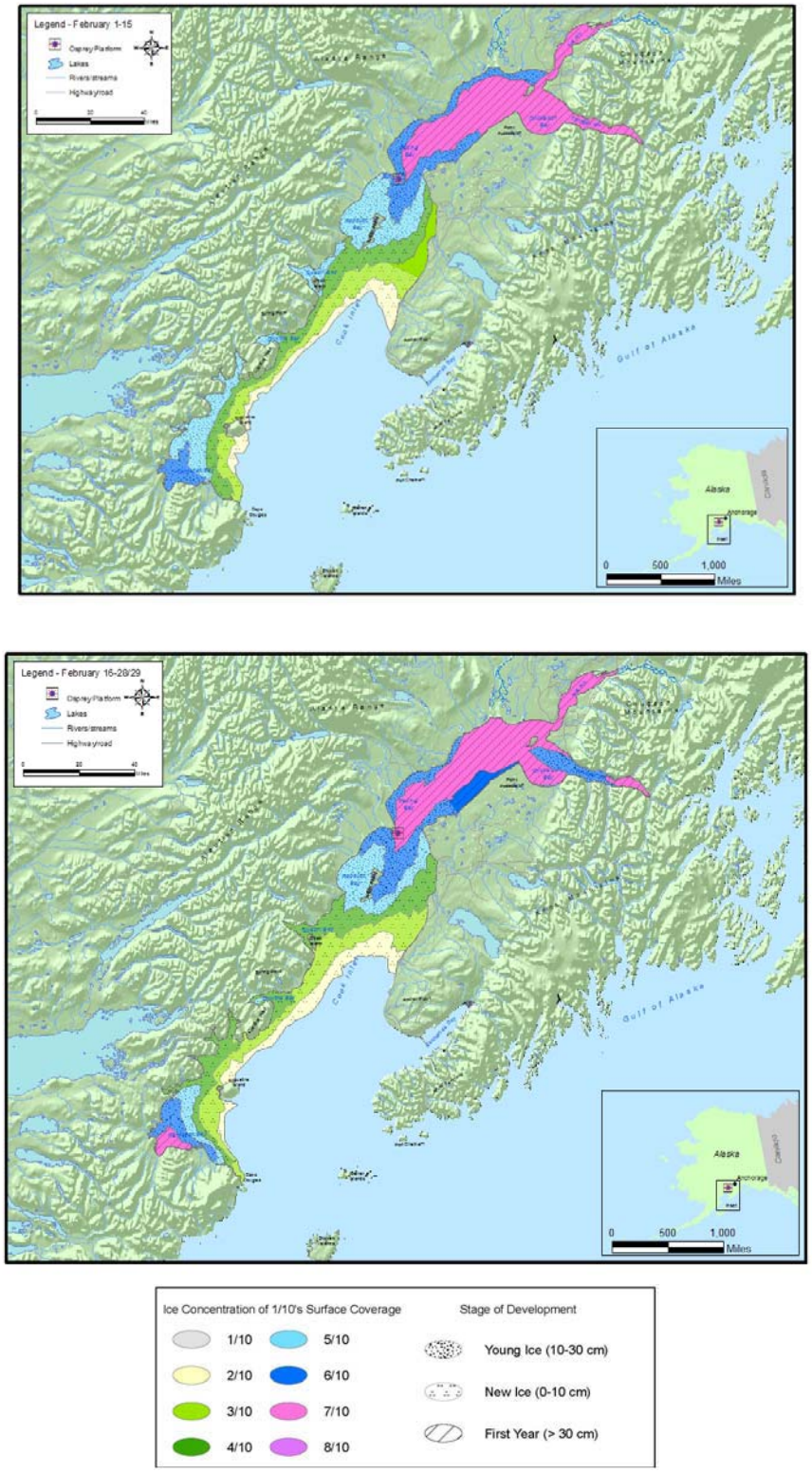
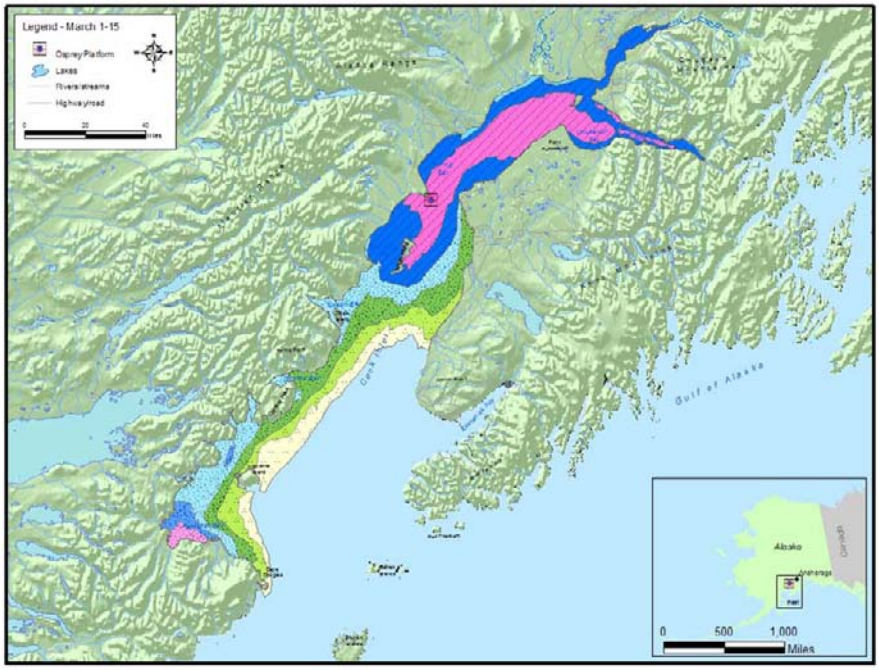
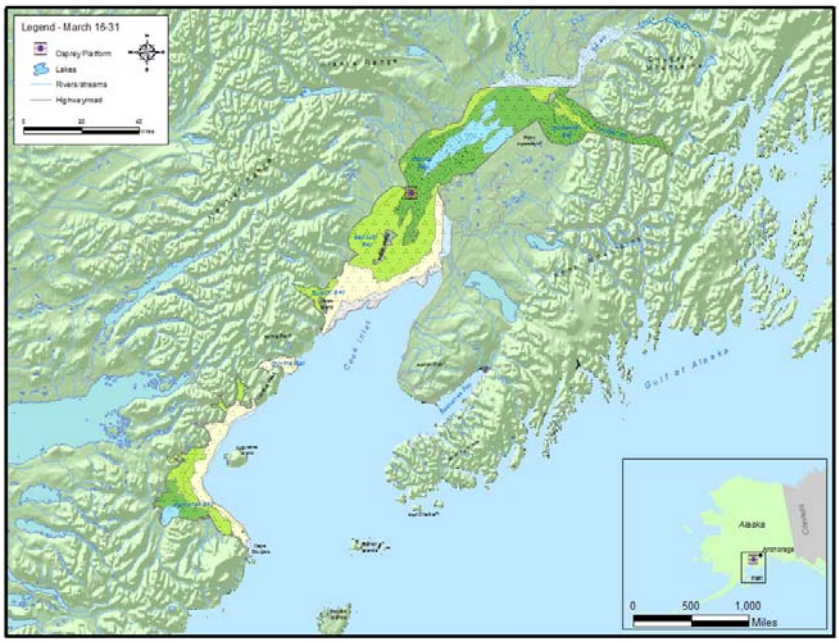



**Figure 3-5. February sea ice concentration in Cook Inlet**



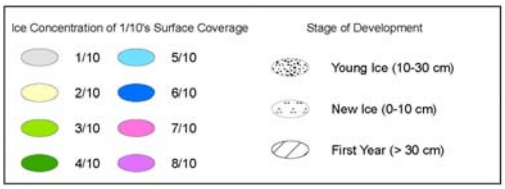




**Figure 3-6. March sea ice concentration in Cook Inlet**

## 3.4 MARINE WATER QUALITY

Constituents in water are mainly composed of naturally occurring substances but might include manmade substances. Naturally occurring substances come from atmospheric, terrestrial, and other aquatic (freshwater and marine) environments (MMS, 2003). Manmade sources contributing to the marine environment include discharges from municipal wastewater treatment systems and industrial activities (e.g., petroleum industry, chemical manufacturers, and seafood processing) and stormwater runoff from urban, agricultural, and mining areas (USEPA, 2002b).

Naturally occurring and contaminant substances entering the waters of Cook Inlet are diluted and dispersed by the currents associated with the tides, estuarine circulation, wind-driven waves, and currents, and the Coriolis force (see Section 3.3.2). Salt balance calculations by MMS (2003) predict that 90 percent of waterborne contaminants would be flushed from Cook Inlet in 10 months. Water quality in Cook Inlet is influenced by tidal turbulence and currents keeping the entire water column well mixed. Little vertical stratification occurs except near the mouths of major rivers in the area (USEPA, 2006).

Seasonally varying freshwater inflows from large, glacier-fed streams and rivers that flow into the inlet, particularly near the head of the inlet, contribute large amounts of freshwater and suspended sediments. The amounts of individual substances discharged into the inlet are relatively site-specific. Constituents that remain in suspension or are dissolved in the water column are dispersed by tidal currents and winds (USEPA, 2006).

Data for general water quality parameters (such as salinity, suspended sediment, and temperature) near the East Foreland are summarized in Table 3-7. Other water quality parameters have been summarized from baseline studies by the Institute of Marine Science (Rosenberg et al., 1969, as cited in USEPA, 2002b).

### 3.4.1 Salinity

Cook Inlet waters are influenced by saltwater (marine) and freshwater (riverine) inputs. Near the Forelands, oceanic waters from the lower inlet mix with the brackish estuarine waters of the upper inlet. These inputs vary seasonally and within the tidal cycle of the inlet, particularly near the mouths of the major rivers where waters can shift from near oceanic to freshwater within a period of several hours (USEPA, 2002b). Salinities in the winter are higher (27 to 31 parts per thousand) because freshwater inflows are lowest. In the summer, salinities range 20 to 25 parts per thousand in the Forelands. In the upper inlet near Anchorage where freshwater inputs are greatest, salinities range 6 to 15 parts per thousand in the summer (USEPA, 2006).

### 3.4.2 Sediment

The upper inlet is generally characterized by high-suspended sediment concentrations derived from the numerous glacier-fed rivers that flow into the inlet (USEPA, 2002b). Concentrations of suspended sediments are greater in upper Cook Inlet than in the lower inlet, due to relatively higher currents in the upper inlet and proximity to sediment sources. Sediment distribution and suspension are affected by tidal currents. Near the Forelands, suspended sediment concentrations range 100 to 200 milligrams per liter (mg/L; parts per million [ppm]), whereas

near Anchorage, they are in excess of 2,000 mg/L (USEPA, 2006). Suspended silicate (sand) concentrations in the project area are range 9 to 90 parts per billion (ppb) (USEPA, 2002b).

**Table 3-7. General water quality data near East Foreland (USEPA, 2002b)**

| Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Salinity (parts per thousand)** | | | | | | | | | | | | |
| Samples | 2 | 6 | 6 | 10 | 14 | 14 | 22 | 14 | 4 | 19 | 1 | 0 |
| Minimum | 25.4 | 27.7 | 27.2 | 27.6 | 27.9 | 24.4 | 21.2 | 19.4 | 25.2 | 23.7 | 26.7 | — |
| Average | 27.8 | 29.3 | 28.5 | 28.7 | 29.4 | 28.0 | 24.6 | 23.8 | 26.1 | 25.5 | 27.4 | — |
| Maximum | 29.0 | 31.1 | 30.0 | 29.9 | 30.0 | 29.1 | 27.3 | 27.3 | 27.3 | 27.1 | 27.8 | — |
| **Water Temperature (°F)** | | | | | | | | | | | | |
| Samples | 34 | 43 | 36 | 48 | 50 | 50 | 64 | 54 | 36 | 63 | 36 | 0 |
| Minimum | 28 | 29 | 29 | 31 | 37 | 47 | 53 | 54 | 52 | 43 | 35 | — |
| Average | 29 | 30 | 30 | 31 | 38 | 48 | 55 | 57 | 52 | 46 | 36 | — |
| Maximum | 29 | 30 | 31 | 33 | 38 | 48 | 58 | 60 | 53 | 53 | 38 | — |
| **Suspended Sediments (mg/L = ppm)** | | | | | | | | | | | | |
| Samples | 2 | 6 | 6 | 10 | 14 | 14 | 24 | 0 | 0 | 0 | 2 | 0 |
| Minimum | 34 | 37 | 147 | 170 | 86 | 33 | 26 | — | — | — | 111 | — |
| Average | 101 | 204 | 280 | 465 | 209 | 131 | 126 | — | — | — | 152 | — |
| Maximum | 212 | 444 | 530 | 840 | 333 | 256 | 312 | — | — | — | 188 | — |

As summarized in USEPA (2006), it is unknown if polycyclic aromatic hydrocarbons (PAH) in Cook Inlet suspended sediments are from natural or manmade sources (accidental spills or discharges of crude or refined petroleum products), or whether the samples are representative of baseline conditions. USEPA (2002b) reported that sediment sampling conducted in Cook Inlet and Shelikoff Straits from 1993 to 1997 suggest that suspended and bottom sediments are relatively free of man-induced contaminants, with total polycyclic aromatic hydrocarbon (TPAH) concentrations ranging from 6 to 469 ppb (mean of 83 ppb). TPAH levels were lowest in the areas closest to oil production activities; however, they did not appear to have any predictable pattern. Levels of total aliphatic hydrocarbons (TAHC) ranged from 50 to 2,816 ppb and exhibited no apparent spatial trend (USEPA, 2002b).

### 3.4.3 Temperature

Water temperatures in upper Cook Inlet are primarily influenced by the air temperatures. In the winter months, water temperatures are typically at or near the freezing point of seawater (29°F). During the summer, water temperatures can exceed 59°F (USEPA, 2002b). Temperatures between the Forelands are approximately 50°F. Western Cook Inlet water temperatures are cooler in spring and warmer in fall than incoming oceanic water from the Gulf of Alaska (GOA) (MMS, 2003).

### 3.4.4 Dissolved Oxygen, Nutrients, and Ammonia

Dissolved oxygen levels typically range from 11 ppm at the water surface to 7.2 ppm at a depth of approximately 100 ft. Waters in Cook Inlet have not been found to be oxygen deficient. Phosphate (as phosphorus) concentrations vary from 0.31 to 2.34 ppb, whereas nitrate (as nitrogen) concentrations range from 0 to 23.5 ppb. Phosphate generally increases in

concentration toward the mouth of Cook Inlet, while nitrate concentrations decrease. Ammonia (as nitrogen) concentrations are reported to range from 0.2 to 3.1 ppb. Ammonia concentrations appear to be lower in the area of the Forelands (USEPA, 2006).

### 3.4.5 Sources of Contamination

Anthropogenic contaminants in Cook Inlet waters originate from multiple, diffuse sources of pollution, such as urban areas and communities, farms, and mining areas. The principal contaminant sources in Cook Inlet are discharges from municipal wastewater treatment plants, seafood processors, and the petroleum industry. Major sources of suspended solids and associated contaminants include municipalities (2.03 thousand metric tonnes), refineries (0.03 thousand metric tonnes), and drilling fluids and cuttings (0.93 thousand metric tonnes), compared to 36,343 thousand tones of natural sediments discharged to Cook Inlet through the Knik, Matanuska, and Susitna Rivers. Estimates of the annual discharge of biochemical oxygen demand or organic wastes from municipalities (4.27 thousand metric tonnes), seafood processors (2.52 to 8.58 thousand metric tonnes), and produced waters from the petroleum industry (3.67 thousand tonnes) are all about the same order of magnitude (USEPA, 2006).

Upper Cook Inlet petroleum production operations discharge large volumes of water and a variety of chemicals used to conduct the various industrial operations associated with petroleum production. The following paragraphs summarize USEPA (2006) and MMS (2003) reports that provide an extensive overview of the characteristics of produced waters, as well as other discharges (except drilling fluids and cuttings) from the Cook Inlet Discharge Monitoring Study that was conducted in 1988 and 1989.

The largest source of naturally occurring and manmade substances discharged into the waters from oil exploration and production activities is produced water. Produced water is part of the oil/gas/water mixture created from the wells, and it contains a variety of dissolved substances from the geologic formation. Chemicals might be added to the produced water as part of various activities, including water flooding; well work-over, completion, and treatment; and the oil/water separation process. These chemicals might include flocculants, oxygen scavengers, biocides, cleansers, and scale and corrosion inhibitors. Produced water can be a concern because the types and amounts of naturally occurring substances they carry and the addition of manmade substances (USEPA, 2006).

Prior to being discharged in Cook Inlet waters, produced water passes through separators that remove oil and gas. Although the treatment process removes suspended oil particles from the water, the discharge might still contain dissolved hydrocarbons or hydrocarbons held in colloidal suspension. Relative to crude oil, treated produced waters are enriched in the more soluble low-molecular weight saturated and aromatic hydrocarbons (USEPA, 2006). Tables 3-8 and 3-9 summarize characteristics of discharge samples into Cook Inlet from the 1987 – 1988 Cook Inlet Discharge Monitoring Study, as reported by USEPA (2006).

## Table 3-8. Chemical analyses of produced water samples: The Cook Inlet Discharge Monitoring Study (MMS, 2003)

| Facility | Field DO (ppm) | Field pH | Lab pH | Oil & Grease Spec (mg/L) | Oil & Grease Grav (mg/L) | BOD (mg/L) | COD (mg/L) | Salinity ‰ | | TOC (mg/L) | 96-hr LC50 | | TAH (ppm mg/L) | Total Napthalene Hydrocarbons (ppm=mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Offshore Production Treatment Facility** | | | | | | | | | | | | | | |
| **Granite Point** | | | | | | | | | | | | | | |
| Mean | 1.0 | 6.5 | 7.4 | 147.0 | 36.2 | 413 | 1,071 | 33.74 | 11.28 | 238 | 13.50 | 0.038 | 12.226 | 2.177 |
| Minimum | 0.0 | 6.3 | 7.1 | 25.0 | 24.8 | 340 | 865 | 31.40 | 9.60 | 224 | 5.81 | 0.025 | 10.028 | 0.357 |
| Maximum | 1.8 | 6.9 | 7.6 | 209.0 | 50.7 | 504 | 1,290 | 36.30 | 12.90 | 251 | 19.36 | 0.100 | 15.205 | 5.765 |
| **Trading Bay** | | | | | | | | | | | | | | |
| Mean | 3.6 | 6.7 | 6.8 | 46.0 | 36.0 | 518 | 963 | 25.83 | 5.14 | 255 | 17.99 | 0.038 | 8.428 | 2.003 |
| Minimum | 0.1 | 6.5 | 6.5 | 28.0 | 3.2 | 315 | 731 | 25.10 | 0.82 | 126 | 9.43 | 0.025 | 6.593 | 0.312 |
| Maximum | 8.1 | 7.0 | 7.1 | 58.0 | 70.1 | 780 | 1,100 | 25.56 | 7.70 | 367 | 25.00 | 0.100 | 11.739 | 5.480 |
| **East Foreland** | | | | | | | | | | | | | | |
| Mean | 0.3 | 7.5 | 7.8 | 12.3 | 18.9 | 470 | 962 | 20.60 | 10.55 | 306 | 21.66 | 0.101 | 13.091 | 4.190 |
| Minimum | 0.0 | 6.9 | 7.4 | 11.0 | 10.3 | 360 | 731 | 19.38 | 8.50 | 234 | 13.15 | 0.025 | 10.077 | 0.293 |
| Maximum | 0.8 | 8.5 | 7.9 | 14.0 | 41.4 | 630 | 1,240 | 21.59 | 13.00 | 393 | 30.88 | 0.170 | 24.044 | 15.525 |
| **Oil-Production Platforms** | | | | | | | | | | | | | | |
| **Baker** | | | | | | | | | | | | | | |
| Mean | 1.1 | 7.5 | 8.0 | 52.7 | 34.0 | 435 | 800 | 9.76 | 4.98 | 208 | 23.98 | 0.416 | 21.213 | 1.443 |
| Minimum | 0.6 | 7.0 | 7.8 | 25.2 | 7.7 | 120 | 400 | 7.76 | 0.05 | 10 | 8.84 | 0.025 | 8.197 | 0.173 |
| Maximum | 2.0 | 8.2 | 8.3 | 96.4 | 131.0 | 758 | 1,154 | 13.00 | 7.70 | 749 | 41.61 | 4.300 | 31.622 | 2.847 |
| | | | | | | | | | | | | | | |
| Mean | 1.7 | 6.7 | 7.3 | 73.3 | 52.6 | 1,480.8 | 2,995.8 | 13.80 | 13.68 | 1,154.8 | 0.90 | 3.688 | 41.287 | 4.108 |
| Minimum | 1.4 | 6.1 | 7.1 | 67.0 | 28.5 | 1,170 | 2,950 | 13.5 | 10.90 | 967.0 | 0.27 | 0.430 | 22.130 | 0.764 |
| Maximum | 2.1 | 7.3 | 7.5 | 82.0 | 81.3 | 1,860 | 3,050 | 14.16 | 17.00 | 1,430 | 2.47 | 8.000 | 62.335 | 13.277 |
| **Gas-Production Platform** | | | | | | | | | | | | | | |
| **Phillips "A"** | | | | | | | | | | | | | | |
| Mean | 2.0 | 7.3 | 7.5 | 1.3 | 3.8 | 105 | 438 | 4.97 | 2.09 | 172 | 63.69 | 0.031 | 0.704 | 0.609 |
| Minimum | 1.6 | 6.8 | 7.4 | 0.7 | 1.2 | 58 | 200 | 0.40 | 1.70 | 86 | 47.56 | 0.025 | 0.358 | 0.078 |
| Maximum | 2.5 | 7.6 | 7.7 | 2.1 | 7.0 | 124 | 533 | 9.90 | 2.14 | 209 | 82.47 | 0.60 | 1.271 | 0.400 |

Notes: BOD = biochemical oxygen demand; COD = chemical oxygen demand; DO = dissolved oxygen; LC50 = lethal concentration at which half the organisms die; mg/L = milligrams per liter (equivalent to parts per million); N = nitrogen; ppm = parts per million; ‰ = practical salinity units (parts/thousand); TAH = total aromatic hydrocarbons; TOC = total organic carbon.

Produced water contains a variety of hydrocarbons that includes benzene (2.280 - 30.200 ppm), toluene (1.050 - 15.800 ppm), phenol (0.0005 - 3.6800 ppm), naphthalene (0.0025 - 6.500 ppm), fluorene (0.0050 - 0.118 ppm), pyrene (0.005 - 1.240 ppm), and chrysene (0.0050 - 0.0500 ppm) (MMS, 2003; USEPA, 2006). The Cook Inlet Discharge Monitoring Study reported that the toxicity of produced water was determined by using a standard 96-hour static acute toxicity test (96-hour LC50) on the marine invertebrate *Mysidopsis bahia* (shrimp species). Toxicities ranged from 0.27 to 82.47 percent of the produced water discharge (classified as toxic to moderately toxic) (USEPA, 2006).

**Table 3-9. Chemical analyses of Cook Inlet area produced water samples**

Samples from Shelikof Strait sediment quality study and produced water samples from the Trading Bay production facility outfall (USEPA, 2006)

| Parameters | Net Weight (ppm wet weight) |
|---|---|
| Total PAH | 0.380 |
| Total PHC | 6.20 |
| Silver | <0.0001 |
| Arsenic | 0.0024 |
| Barium | 20.7 |
| Beryllium | <0.0001 |
| Cadmium | 0.000 |
| Chromium | 0.0032 |
| Copper | 0.0060 |
| Iron | 0.76 |
| Mercury | <0.0005 |
| Manganese | 1.71 |
| Nickel | 0.0075 |
| Lead | 0.0001 |
| Antimony | 0.0001 |
| Selenium | <0.0002 |
| Tin | 0.008 |
| Thallium | 0.00025 |
| Vanadium | 0.067 |
| Zinc | 0.0030 |

### 3.4.6 Oil Spills

Oil production activities such as those that occur on the Osprey Platform have the potential to result in oil spills. ADEC's Prevention and Emergency Response Program conducted a 10-year (July 1, 1995 to June 30, 2005) statewide oil and hazardous substance spill evaluation, and reported that approximately 5.6 million gallons of oil, hazardous substances, and process water were spilled. During this period, 85 percent of the spills were cleaned up or removed from the environment. The report notes that spills from State-regulated facilities (i.e., tank vessels, oil barges, and pipelines) occur much less frequently (26 percent) than spills from unregulated facilities (74 percent), which were responsible for two-thirds of the total volume spilled statewide (ADEC, 2007).

ADEC reported 50 spills of 10,000 gallons or greater in size (eight spills >100,000 gallons), with 4 percent (12 percent by volume) of these spills being composed of crude oil, such as extracted during Osprey Platform activities. From the last five years of ADEC's study period, the number of crude oil spills decreased by 25 percent. Tank vessels shipping crude oil from Prince William Sound and Cook Inlet accounted for 1 percent of the spills reported and less than 1 percent of volume released (ADEC, 2007). Table 3-10 summarizes available information on large oil spills in Cook Inlet.

The crude oil tanker transportation system in Alaska received a great deal of attention following the T/V *Exxon Valdez* oil spill in 1989, which had a large impact on the Cook Inlet area. Specifically, fish health suffered, as many fish displayed sores and other signs of injury. USEPA (2006) reported that traditional ecological knowledge (TEK) interviewees stated that the *Exxon Valdez* oil spill had impacts on the local environment and on the social structure of local communities. According to TEK interviewees, before the oil spill, the only concerns for subsistence harvesting of fish centered on red tides. Tribal members had been very traditional in social practices, such as subsistence production and sharing (Stephen R. Braund & Associates, 2005). A major shift to cash and a wage economy occurred during the *Exxon Valdez* oil spill cleanup, as Exxon employed local residents for cleanup activities and temporarily distracted them from the event with big payoffs and high wages. Several interviewees also indicated that the marine life is starting to recover from the effects of the spill (USEPA, 2006).

Oil spills and releases are usually the result of chance casualty. In 2003, MMS reported on its modeling evaluation of oil spills to Cook Inlet and found that small spills (less than 1,000 barrels) were not expected to affect the overall water quality of Cook Inlet. However, as oil is toxic to many species' life stages, even at low concentrations, effects in intertidal areas could persist for generations and could affect more than one life stage of marine organisms.

Based on the history of oil and gas extraction activities in Cook Inlet, the risk of a large spill (>1,000 barrels) from the Osprey Platform is considered to be low (MMS, 2003). The overall adverse effects on the Cook Inlet ecosystem from oil spills would likely be low to moderate in magnitude and possibly of long duration. A large oil spill would primarily affect beach and intertidal habitats because it would persist in those areas, possibly for 10 years or more. Other marine habitat would likely experience limited effects with a rapid (months to a few years) recovery (USEPA, 2006).

**Table 3-10. Recent oil spills in Cook Inlet (ADEC, 2008b)**

| Year | Name | Type | Gallons |
|---|---|---|---|
| 1987 | T/V Glacier Bay | Crude oil | 207,000 |
| 1989 | Marathon Spark Platform | Crude oil | 46,000 |
| 1989 | Tug Boat *Lorna B* | Diesel | 80,000 |
| 1992 | Pipeline rupture, Port Nikiski | Crude oil | 9,500 |
| 1995 | Tesoro Refinery, tank overfill | Crude oil | 5,700 |
| 1997 | Steelhead Platform | Diesel | 9,000 |

## 3.5 FRESHWATER RESOURCES

The project area is indirectly influenced by freshwater inflows to the upper Cook Inlet. Overall, the mean annual volume of freshwater discharged by streams flowing into Cook Inlet exceeds 18.5 trillion gallons. This volume is an underestimate because the discharge rates for a number of streams, particularly along western Cook Inlet, have not been measured. An estimated 80 percent of this freshwater inflow comes from the Susitna, Knik, and Matanuska Rivers in upper Cook Inlet (USEPA, 2006; MMS, 2003). These rivers are also the primary source for the suspended sediments that occur in the inlet (USEPA, 2006). Generally, freshwater discharge rates are lowest from November through March. A rise in discharge rates is seen in April, peaking in the summer months (June to August), and declining in September and October (MMS, 2003).

The Alaska Department of Natural Resources (ADNR) monitors groundwater use in Alaska. ADNR grants both temporary (via a permit system) and permanent rights to groundwater and surface water uses. Water rights have not been granted to anyone but Forest Oil (now PERL) within 5 miles of the Osprey Platform onshore production facility (USEPA, 2002b).

## 3.6 MARINE BIOLOGICAL RESOURCES

### 3.6.1 Lower Trophic Level Organisms

This section discusses the lower trophic level organisms of Cook Inlet that can found in the planktonic, benthic, and intertidal habitats. Planktonic organisms are plants and animals that live in the water column and are incapable of swimming against a current, whereas benthic organisms live on or in the seafloor. Lower trophic level animals are primarily invertebrates, several of which are commercially important (such as shrimp, crabs, and clams). Information on these commercially important invertebrates in Cook Inlet is summarized on the Alaska Department of Fish and Game (ADF&G) Web site at http://www.state.ak.us/ADF&G/notebook/notehome.htm.

#### *3.6.1.1 Plankton*

Planktonic communities of phytoplankton[6] and zooplankton[7] form the base of marine food chains, including those of the Cook Inlet ecosystem. Lower Cook Inlet is among the most productive high-latitude shelf areas in the world, particularly during the summer (USEPA, 2006). Lower Cook Inlet's intertidal and subtidal habitats are considered very environmentally sensitive because of their concentrations of lower trophic level organisms and vulnerability to environmental degradation from oil spills or slicks (MMS, 2003). In comparison to the lower inlet, marine productivity in northern Cook Inlet is relatively low due to tidal variations and turbidity. Sediment-laden waters in upper Cook Inlet reduce primary (phytoplankton) productivity of these waters (USEPA, 2002b). As reported by USEPA (2002b), lower Cook Inlet marine productivity decreases in a northerly direction. Monitoring at a station due south of the Forelands found the euphotic zone[8] to be relatively shallow, ranging from 3 to 10 ft. The suspended sediments in the water column limit light penetration and can cause reduced surface nitrate utilization, particularly in the spring (USEPA, 2006).

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6 Microscopic planktonic plants such as diatoms and dinoflagellates
7 Planktonic animals such as larval fish
8 Upper limit of effective light penetration for photosynthesis

Zooplankton is a common food source for fish, shellfish, aquatic birds, and some marine mammals. Zooplankton typically feed on phytoplankton, and their growth cycles are tied to phytoplankton production. Zooplankton production varies seasonally with peaks in late spring and summer. Lower Cook Inlet has a greater abundance of zooplankton in comparison to the lower abundances in the upper Cook Inlet (USEPA, 2006).

#### *3.6.1.2 Benthic Communities*

As described in Section 3.2.2, Cook Inlet experiences high turbidity and extreme tidal fluctuations. The periodic scouring or movement of substrate caused by Cook Inlet's currents can bottleneck at the Forelands near the Osprey Platform and reduce the amount of protected benthic habitat.

Dominant benthic species in Cook Inlet include mollusks, polychaetes, and bryozoans. Infauna[9] organisms are important trophic links for crabs, flatfishes, and other species common in Cook Inlet waters (USEPA, 2006). Mollusks and polychaetes occupy substrates with muddy bottoms, whereas mollusks dominate sandy-bottom substrates. In areas where sediments are fine and sedimentation rates are high, mobile deposit-feeding organisms are widely distributed.

Crustaceans, mollusks, and echinoderms are the predominant epifauna[10] in Cook Inlet. The percentage of sessile[11] organisms in Cook Inlet is relatively low inshore and increases toward the continental shelf (USEPA, 2002b). Lush kelp beds are found near rocky-bottom areas and exhibit low epifaunal diversity. Areas with moderate kelp beds tend to have well developed sedentary and predator/scavenger communities of invertebrates. Areas with little to no kelp have moderately developed predator/scavenger communities and a well-developed sedentary invertebrate community (USEPA, 2006). Table 3-11 reports benthic organisms collected in upper Cook Inlet in 1969 and 1978, as cited by USEPA (2006). Limited benthic community assessments have been conducted recently in upper Cook Inlet.

[9] Animals that live within the sediments of the seafloor
[10] Animals that live on, or attach to, a substrate surface
[11] Animals that are permanently attached to a substrate

**Table 3-11. Benthic organisms in upper Cook Inlet area**

| Benthic Organisms Observed on Beaches[a] | | Major Species in Offshore Waters[b] |
|---|---|---|
| **Chlorophyta** | **Amphipoda** | **Polychaetes** |
| *Ulothric laetevirens* | *Gammarus* sp. | *Gylcera tenuis* |
| *Enteromorpha* sp. | *B. wilkitzskii* | *G. capitata* |
| *E. intestinalis* | *Anisogammarus* sp. | *Nephtys* sp. |
| *E. compressa* | *A. confervicolus* | *N. ciliata* |
| *Ulva lactuca* | *Caprella* sp. | *Ophelia limacina* |
| **Coelenterata** | *Atylus* sp. | *Polygordius* sp. |
| Hydrozoa | Cirripedia | *Scolelepis* sp. |
| *Obelia* sp. | *Balanus crenatus* | *Scoloplos armiger* |
| *Plumularia* sp. | *B. balanoides* | *Sphaerosyllis pirifera* |
| *Thuiaria* sp. | Decapoda | *Spiophanes bombyx* |
| *Tubularia larynx* | *Crago* sp. | *Streotistkkus br. katuoakoa* |
| Anthozoa | *Cancer* sp. | *S. nr. latipalpa* |
| *Anthopleura* sp. | *Cragon franciscorum* | *Chaetozone setosa* |
| **Ectoprocta** | Isopoda | *Eteone ne. longa* |
| *Membranipora* sp. | *Idotoega entomon* | **Amphipoda** |
| *Eucratea* sp. | *Neosphaeroma oregonensis* | *Orchomene cf. pacifica* |
| *Scrupocellaria* sp. | *Saduria entomon* | *Paraphoxus milleri* |
| **Platyhelminthes** | *Gnorimosphaeroma oregonensis* | *Photis* sp. |
| *Notoplana* sp. | Pycnogonida | **Mollusca** |
| **Brachiopoda** | *Pseudopallene* sp. | *Astarte* sp. |
| *Terebratilia* sp. | **Echinodermata** | *Glycymeris subobsoleta* |
| **Annelida** | Asteroidea | *Liocyma fluctuosa* |
| Polychaete larvae | *Leptasterias* sp. | *Propebela* sp. |
| **Mollusca** | **Chordata** | *Tellina nucloides* |
| Gastropoda | Unidentified cling fish | **Echinodermata** |
| *Anisodoris* sp | | *Echinarachnius parma* |
| *Acmaea* sp. | | |
| *A. pelta* | | |
| *Littorina* sp. | | |
| *Phenacoptygma* sp. | | |
| *Buccinium* sp. | | |
| *Buccinium* sp. egg cases | | |
| Lamellibranchia | | |
| *Tresus* sp. | | |
| *Macoma* sp. | | |
| *Yoldia myalis* | | |
| *Y. limatula* | | |

NOTES:

[a] Samples obtained from Salamatof, Nikishka Bay (Rosenberg et al., 1969 as cited in USEPA, 2006)
[b] Samples obtained from lower Cook Inlet off Kachemak Bay (Dames & Moore, 1978 as cited in USEPA, 2006)

### 3.6.2 Fish

Few studies have been published of marine fish in upper Cook Inlet. Due to their importance to commercial fisheries, extensive studies have been conducted on marine fish in central and lower Cook Inlet. With its extreme tidal currents and low phytoplankton productivity, upper Cook Inlet might not support abundant food sources or provide safe habitat for fish. Beluga whales and their utilization of Cook Inlet might warrant further studies of Cook Inlet forage fish (USEPA, 2002b). Table 3-12 lists documented fish species in marine waters of central Cook Inlet; these species are likely present near the Osprey Platform.

#### *3.6.2.1 Anadromous Fish*

Anadromous fish are those fish that breed in freshwater but spend most of their adult life at sea. In Cook Inlet, anadromous fish migrate through northern inlet waters to freshwater spawning habitat in rivers and streams. Juveniles travel through Cook Inlet toward marine feeding areas. A primary source of these anadromous fish in upper Cook Inlet is the Susitna River. Table 3-13 presents the timing of anadromous fish migrations in Cook Inlet.

**Table 3-12. Fish species in central Cook Inlet area (adapted from USEPA, 2002b)**

| Common Name (Scientific Name) | |
|---|---|
| **Freshwater** | **Marine** |
| Arctic lamprey (*Lampetra japonica*) | Pacific herring (*Clupea pallasi*) |
| Burbot (*Lota lota*) | Eulachon (*Thaleichthys pacificus*) |
| Arctic grayling (*Thymallus arcticus*) | Longfin smelt (*Spirinchus thaleichthys*) |
| Threespine stickleback (*Gasterosteus aculeatus*) | Surf smelt (*Hypomesus pretiosus*) |
| **Anadromous** | Pacific cod (*Gadus macrocephalus*) |
| Bering cisco (*Coregonus laurettae*) | Pacific tomcod (*Microgadus proximus*) |
| Pink salmon (*Onchorhynchus gorbuscha*) | Walleye pollock (*Theragra chalcogramma*) |
| Chum salmon (*O. keta*) | Armorhead sculpin (*Gynmocanthus galeatus*) |
| Chinook salmon (*O. tshawytscha*) | Pacific staghorn sculpin (*Leptocottus armatus*) |
| Sockeye salmon (*O. nerka*) | Sturgeon poacher (*Agonus acipenserinus*) |
| Coho salmon (*O.kisutch*) | Tubenose poacher (*Pallasina barbata*) |
| Inconnu (*Stenodus leucichthys*) | Variegated snailfish (*Liparis gibbus*) |
| Dolly Varden (*Salvelinus malma*) | Masked greenling (*Hexagrammos octogrammus*) |
| White sturgeon (*Acipenser transmontanus*) | Daubed shanny (*Lumpenus maculates*) |
| | Snake prickleback (*Lumpenus maculatus*) |
| | Pacific sand lance (*Ammodytes hexapterus*) |
| | Arrowtooth flounder (*Atheresthes stomias*) |
| | Butter sole (*Pleuronectes Isolepis*) |
| | Starry flounder (*Platichthys stellatus*) |
| | Yellowfin sole (*Pleuronectes asper*) |

**Salmon.** Five Pacific salmon species spawn and have directed fisheries in Alaska, and in particular Cook Inlet: pink salmon (*Oncorhynchus gorbuscha*); chum or dog salmon (*O. keta*); sockeye or red salmon (*O. nerka*); coho or silver salmon (*O. kisutch*); and Chinook salmon (*O. tshawytscha*). The timing and migration routes for these salmon species overlap (see Table 3-13). Adult salmon for all species inhabit marine and estuarine waters in upper Cook Inlet from early May to early November (USEPA, 2006).

**Table 3-13. Migration periods of anadromous fish species in Cook Inlet area (adapted from USEPA, 2002b)**

| Species | Timing of Adult In-Migration | Timing of Smolt Out-Migration |
|---|---|---|
| Chinook Salmon (*Oncorhynchus tshawytscha*) | Early May – Late July | Mid-June – Late August |
| Sockeye Salmon (*O. nerka*) | Late June – Early August | Mid-May – Late August |
| Coho Salmon (*O. kisutch*) | Late July November | March – Late September |
| Pink Salmon (*O. gorbuscha*) | Early July | Early Spring |
| Chum Salmon (*O. keta*) | Early July – Early August | Late May – Late June |
| Eulachon (*Thaleichthys pacificus*) | Early to Mid-May | June |
| Dolly Varden (*Salvelinus malma*) | Late Summer – Fall | Spring – Fall |

The smallest adult salmon species present in Cook Inlet is the pink salmon (average weight of 3 to 5 lbs). Pink salmon are characterized as the least dependent on freshwater because their fry migrate to saltwater within weeks after hatching. Adults typically spawn between late June and October in freshwater streams a few miles from shore within the intertidal zone (Woodby et al., 2005). The eggs are laid in substrates of medium to coarse gravel in the winter. Salmon fry migrate downstream to the open ocean within 15 days after hatching in the spring. Pink salmon stay close to shore during their first summer, feeding on small organisms (e.g., plankton, insects, and young fish). At about 1 year of age, pink salmon move offshore to ocean habitats to feed on plankton, fish, and squid (NMFS, 2005). Pink salmon have a fixed 2-year life cycle that results in genetically distinct odd- and even-year runs (Woodby et al., 2005). Return migration to freshwater occurs during the second summer with few exceptions. In Cook Inlet, the even-year pink salmon return is typically stronger than the odd-year return (ADF&G, 1994).

Adult chum salmon (average weight 7 to 18 lbs) are second largest after Chinook salmon (Woodby et al., 2005). Most chum salmon spawn in areas similar to pink salmon (e.g., small streams within a few miles of the shore or within the intertidal zone) but some travel great distances up large rivers (e.g., up to 2,000 miles up the Yukon River). Chum salmon fry leave streams within 15 days and remain near shore in estuarine waters during the spring before migrating toward the open ocean. Chum salmon generally migrate in darkness in the upper water column. In the fall, they start moving offshore to feed on plankton. They return to freshwater in the fall and spawn late in the year. Chum salmon usually return to streams to spawn after 1 to 5 years at sea. Eggs are laid in medium to course stream gravel (NMFS, 2005a; Woodby et al., 2005).

Sockeye salmon spawn in stream systems with lakes. Juvenile sockeye salmon require year-round rearing habitat. Fry can reside up to 3 years in freshwater lakes before migrating downstream to the open ocean. Under-yearling, yearling, and older smolt occupy estuaries from March through early August. Adults often spawn in lake and stream substrates consisting of medium to course gravel (NMFS, 2005a). Most sockeye spend two to three winters in the North Pacific Ocean before returning to natal streams to spawn and die. Sockeye salmon is the most important commercial salmon species in Cook Inlet (Woodby et al., 2005).

Chinook salmon are the first of the five species to return to the Cook Inlet each season (Woodby et al., 2005). Chinook salmon spawn in small and large streams. Soon after hatching, the juveniles migrate from these freshwater areas in April toward the open ocean and might spend up to a year in major tributaries or rivers, such as the Kenai, Yukon, Taku, and Copper Rivers.

Most Chinook salmon return to natal streams to spawn in their fourth or fifth year (NMFS, 2005a). The largest river systems tend to support the larger Chinook salmon runs in upper Cook Inlet (Woodby et al., 2005). Wild Kenai River (two runs) Chinook salmon support the largest recreational fishery for this species in Alaska (ADF&G, 2008). Adult Chinook salmon spawn in substrates consisting of gravels from April through September. Eggs are laid in the gravel of streambeds (NMFS, 2005a).

Coho salmon return to spawn in their natal streams from July to November. Coho salmon are usually the last of the five salmon species to return to Cook Inlet. Similar to pink salmon, coho salmon generally spend one winter in the ocean and return to spawn the following fall (Woodby et al., 2005). Fry tend to migrate to freshwater areas and emerge in May or June. Fry live in ponds, lakes, and stream pools for up to 2 years, feeding on drifting insects (NMFS, 2005a). Wild coho salmon returning to the Kenai River support the largest recreational freshwater coho salmon fishery in Alaska. Other small streams, on both the east and west sides of Cook Inlet, support smaller recreation coho salmon fisheries (ADF&G, 2008).

**Other Anadromous Fish.** Bering cisco (*Coregonis laurettae*) has been reported in the Susitna River drainage beginning in late summer. Egg incubation occurs over winter. Larvae migrate into northern Cook Inlet after ice-out in the spring (late April to May) (USEPA, 2006).

Eulachon (*Thaleichtys pacificus*) is one of five species of smelt found in Alaska. Eulachon, also known as candlefish or hooligan, are small anadromous forage fish found throughout Cook Inlet. Prior to spawning, eulachon gather in large schools near the mouths of their natal streams and rivers. Mature eulachon, typically 3 years old, spawn in May soon after ice-out in the lower reaches of the river or stream. Females “broadcast” eggs over sandy gravel substrates where the eggs attach to sand grains. Depending on the water temperature, eggs typically hatch in 21 to 40 days. Larvae are then carried out to sea with the current. After 3 to 4 years at sea, eulachon return as adults to spawn. After spawning, most eulachon die (ADF&G, 1994). Eulachon are an important food source for other fish, birds, and marine mammals. The Cook Inlet populations of eulachon supports dip net fisheries in upper Cook Inlet (USEPA, 2006).

In Cook Inlet, Dolly Varden (*Salvelinus malma*) can be anadromous or reside in freshwater. Most Dolly Varden migrate to sea in May or June at 3 or 4 years of age. After their first seaward migration, Dolly Varden usually spend the rest of their lives overwintering in and migrating to and from freshwater. Dolly Varden often overwinter in freshwater drainage areas, and then disperse into coastal waters during summer to feed on small fishes and marine invertebrates. At maturity, Dolly Varden return to spawn in their natal streams from which they originated. Dolly Varden spawn in Cook Inlet rivers annually during the fall (late August to October). Similar to other salmonids, Dolly Varden lay eggs in gravel streambeds; hatching occurs the following spring. Juvenile Dolly Varden remain in their natal streams for 2 to 3 years (ADF&G, 1994).

The white sturgeon (*Acipenser transmontanus*) is a slow growing, late maturing anadromous fish. White sturgeon are found in northern Cook Inlet. They are believed to spend most of their life in nearshore environments at water depths of 98 ft or less. Little is known about white sturgeon migrations while in salt water. Anadromous white sturgeon most commonly travel into large rivers in the early spring and spawn May through June. White sturgeon spawn over rocky bottoms in swift water where the sticky eggs adhere to the river bottom. They can spawn every 4

to 11 years as they grow and mature. Older sturgeon produce more eggs and the time between spawning is longer. Eggs can hatch in 4 days to 2 weeks, depending on water temperature (PSMFC, 1996). After spawning, adult sturgeon return to the open ocean (USEPA, 2006).

#### *3.6.2.2 Pelagic Fish*

Pelagic fish inhabit water layers above the abyssal zone[12] and beyond the nearshore zone (between high- and low-water marks). They often travel long distances in response to changing environmental conditions, reproduction needs, or food resources. Pelagic fish might spend only part of their life in Cook Inlet, whereas others might reside for their full lifecycles.

Pacific herring (*Clupea pallasi*) are a large forage fish that enter lower Cook Inlet to spawn in nearshore areas in early April. Female herring lay adhesive eggs over rock and seaweed substrates in intertidal and subtidal vegetation. Depending on water temperature, eggs hatch in 3 to 7 weeks. Herring stay nearshore until winter when colder water temperatures drive them offshore to deeper, warmer waters. Herring are important prey for a wide variety of fishes, mammals, and birds. Pacific herring migrate in schools. They are found along both shores of the North Pacific Ocean ranging from San Diego Bay to the Bering Sea and Japan (MMS, 2003).

Pacific sand lances (*Ammodytes hexapterus*) are schooling fish and spawn intertidally every year in late September and October. They spawn vigorously in dense formations over fine gravel or sandy beaches after the seasonal peak in water temperatures. Eggs are demersal, but will suspend in turbulent waters. Pacific sand lance larvae are found both offshore and in intertidal zones. Early juvenile stages are pelagic, while the adults burrowing behavior begins to develop gradually. Schools in Cook Inlet were dominated 2:1 by males as they approached the intertidal zone at a natal spawning site (Robards and Rose, 1999). The Pacific sand lance is an important foraging fish that is preyed on by a wide variety of seabirds, marine mammals, fish, and terrestrial birds and animals. Population fluctuations and distribution of predators can often be linked to sand lance abundance (USEPA, 2006).

#### *3.6.2.3 Groundfish*

Groundfish are finfishes that spend the majority of time on the seafloor. During spawning and early life-cycle stages, these fish might be found in pelagic waters. The following groundfish are found in the Cook Inlet area and are commercially valuable.

Pacific halibut (*Hippoglossus stenolepis*), a large flatfish, occurs throughout Cook Inlet. Halibut concentrate on spawning grounds along the edge of the continental shelf at water depths of 600 to 1,500 ft from November through March. Significant spawning sites near lower Cook Inlet are Portlock Bank, northeast of Kodiak Island and Chirikof Island, south of Kodiak Island (USEPA, 2006). Water temperatures influence the rate of egg development, but eggs normally hatch in 15 to 20 days. As eggs develop into larvae, they drift within the water column following the ocean currents. As the larvae mature, the drift higher into the water column (upper 325 ft) where they are pushed by winds and surface currents to shallower coastal waters of the continental shelf (USEPA, 2002b). Halibut larvae begin life in an upright position similar to other fish, with an eye on each side of the head. However, when the larvae are about 1-inch long, the left eye moves over the snout to the right side of the head and the pigmentation on the left side of the fish

[12] A benthic zone between 1 to almost 4 miles deep

fades. The halibut begin to settle to the bottom in shallow, nearshore areas and typically move to deeper waters as they grow older. Halibut migrate seasonally from deeper water in the winter to shallow water in summer (PFMC, 2007).

Walleye pollock (*Theragra chalcogramma*) occur throughout the Cook Inlet area. Spawning occurs in the pelagic zone in early spring, with eggs hatching in 10 to 20 days (depending on water temperatures) throughout the water column. Larvae spend 20 to 30 days in the upper portions of the water column, whereas juveniles and adults are most often in the lower and middle portions of the water column. These life stages have no substrate preference. Seasonal migrations occur from the outer continental shelf to shallow waters for spawning (NMFS, 2005a).

Other groundfish, such as arrowtooth flounder, starry flounder, yellowfin sole, and Atka mackerel, might inhabit the upper Cook Inlet region. These species occur in lesser numbers but within similar habitats as the groundfish species discussed above.

### 3.6.3 Shellfish

Harvestable mollusks and crustaceans are generally referred to as "shellfish." The coastal waters in the GOA underwent a "reorganization" of domineering species as a result of ocean climate changes in the late 1970s. The coastal ecosystem of the GOA underwent a shift from a largely crustacean dominated epibenthic community to one now dominated by several finfish species (MMS, 2003). Descriptions of the dominant shellfish species in upper Cook Inlet are below.

Razor clams (*Siliqua patula*) are bivalve mollusks harvested by commercial and sport fisheries. The most common species of razor clam within Cook Inlet is the Pacific razor clam (*S. patul*a). The Pacific razor clam is widely distributed and can be found from southern California to the Aleutian Islands. Razor clams inhabit surf-swept and protected beaches of the open ocean, from 4 ft above MLLW to depths of 180 ft. Large groups of razor clams occur in western Cook Inlet near Augustine Island and in Kachemak Bay (MMS, 2003).

The Pacific weathervane scallop *(Patinopecten caurinus)* is one of several true scallop species found in the eastern North Pacific Ocean. The Pacific weathervane scallop supports an irregular but important commercial fishery in Alaska. The adult stage of weathervane scallops can swim as a means to escape predation or other disturbing conditions. They "swim" by rapidly ejecting water from the interior of their shell in a jet-like action. They can swim for 15 to 20 seconds at a distance of 20 ft. Weathervane scallops have numerous jewel-like eyes that are sensitive to changing light or moving objects. They also have small highly sensitive tentacles that can detect waterborne chemicals and water temperature. Scallops are often found on sand, gravel, and rock bottoms in a depth from 150 to 600 ft. In Cook Inlet, two scallop beds east of Augustine Island in waters 120 to 360 ft deep are commercially harvested. Weathervane scallops feed by filtering plankton from the water column (MMS, 2003).

Shrimp are an important element of Alaska's marine ecosystems. In the late 1950s through early 1980s, shrimp were a large commercial fishery, particularly in the central and western GOA. However, recent commercial harvests are much smaller in volume and predominantly harvested within Southeast Alaska. Five species of pandalid shrimp are found in the waters off the coast of Alaska (Woodby et al., 2005). Pink shrimp (*Pandalus borealis*) are the main commercial trawl

shrimp fishery in Alaska. Pink shrimp are circumpolar in distribution, though the greatest concentrations occur in the GOA. The humpy shrimp (*P. goniurus*) are found from Puget Sound to the arctic coast of Alaska. Humpy shrimp are usually harvested incidentally when trawling for pink shrimp. However, in some cases, the humpy shrimp is the primary species caught. The sidestripe shrimp (*Pandalopsis dispar*) is a deeper water shrimp species caught incidentally during trawling for pink shrimp. There are small trawl fisheries in Prince William Sound and Southeast Alaska that target sidestripe shrimp. For pot shrimp fisheries, the coonstripe shrimp (*Pandalus hypsinotis*) is the prized target around the State. Coonstripe shrimp are found from the Bering Sea to the Strait of Juan de Fuca, whereas sidestripe shrimp range from the Bering Sea to Oregon. Spot shrimp (*P. platyceros*) are the largest shrimp in the North Pacific and range from Unalaska Island to San Diego. Sidestripe, coonstripe, and spot fisheries catch is sold fresh in local and foreign markets (MMS, 2003).

Shrimp often migrate seasonally from deep to shallow waters. Shrimp also exhibit diel[13] vertical migration within the water column. Pink shrimp, for example, migrate from the seafloor in the evening, occupy the whole water column for much of the night, and return to the seafloor in the early morning. Pandalid shrimp are opportunistic bottom feeders and eat a wide variety of prey (i.e., worms, diatoms, detritus[14], algae, invertebrates). As part of the food web, shrimp are the diet of large predator fish such as Pacific cod, Walleye pollock, flounders, and salmon (USEPA, 2006).

Three commercial king crab species are found in Alaska. Red king crabs (*Paralithodes camtschaticus*) have been the primary commercial Alaskan crabs found from British Columbia to Japan. In Alaska, Bristol Bay and the Kodiak Archipelago are the centers of its abundance. Blue king crabs *(P. platypus*) live from southeastern Alaska to Japan. In Alaska, highest abundances are found at the Pribilof Islands and St. Matthew Island. Golden king crabs (*Lithodes aequispinus*) are distributed from British Columbia to Japan. In Alaska, the Aleutian Islands are the main concentration of abundance. Red and blue king crabs are found within the intertidal zone to about 100 fathoms or deeper. Golden king crabs live mostly between 100 and 400 fathoms, but it is not uncommon to find them from 50 to 500 fathoms (USEPA, 2006).

Adult red and blue king crabs exhibit annual migrations. They spend time in shallow waters (late winter and spring) to allow embryos to hatch and adults to molt and mate, before returning to offshore feeding areas in deeper waters. Red, blue, and golden king crabs are seldom found coexisting with one another, even though their habitats and depth ranges might overlap (USEPA, 2006).

Dungeness crabs *(Cancer magister)* inhabit bays, estuaries, and nearshore waters ranging from Cook Inlet and Prince William Sound south to Mexico. Dungeness crabs are widely found subtidally, preferring sandy or muddy seafloors and estuarine environments. They scavenge along the seafloor for prey that live partly or completely buried in the sand. As predators, Dungeness crabs consume shrimp, mussels, small crabs, clams, and worms. A large commercial fishery and a personal-use fishery exist in Alaska (USEPA, 2006). Dungeness crabs have

[13] Referring to events that occur with a 24-hour periodicity
[14] Dead organic matter

smaller and shorter legs relative to body size than king and Tanner crabs, and have no spines on the top side of its shell (ADF&G, 1994).

Tanner crabs (*Chionoecetes bairdi* and *C. opilio*) are two of the four species of the genus *Chionoecetes* occurring in the eastern North Pacific Ocean and Bering Sea. These species form the basis of a thriving domestic Tanner crab fishery from southeastern Alaska north through the Bering Sea. Often, these crabs are sold under the trade names of snow crab (*C. opilio*) and Tanner crab (*C. bairdi*). Tanner crabs feed on a variety of worms, clams, mussels, snails, crabs and other crustaceans, and fish parts (ADF&G, 1994).

Migration patterns for Tanner crabs are not well known; however, it is known that the sexes are isolated during much of the year and cohabit only during mating season. Tanner crab females mate with an adult male for the first time during the female's last (maturity) molt. A pheromone released by the female attracts the male crab to mate while she is in the soft-shell condition. Hatching occurs late the following spring with the peak hatching during April to June. The hatching occurs concurrently with the peak of the spring plankton bloom, which is a major food source for the larvae crab (ADF&G, 1994).

### 3.6.4 Essential Fish Habitat

Originally established in 1976, the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA; Public Law 94-265) established regional fishery management councils and mandated the development of fishery management plans (FMP) so that exploited fish and invertebrate species in Federal waters of the United States would be managed responsibly. MSFCMA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), charged the NMFS with designating and conserving EFH for species managed under existing FMPs. This requirement is intended to minimize, to the extent practicable, any adverse effects on habitat caused by fishing or non-fishing activities, and to identify other actions to encourage the conservation and enhancement of such habitat.

"Essential Fish Habitat," as defined in MSFCMA, includes "…those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." The regulations promulgated by NMFS in 2002 (50 CFR §§ 600.805 – 600.930) further clarify EFH. "Waters" refers to aquatic areas and their associated physical, chemical, and biological properties that are used by fish and might include aquatic areas historically used by fish where appropriate. "Substrate" refers to sediment, hard bottom structures underlying the waters and associated biological communities. "Necessary" refers to the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem. "Spawning, breeding, feeding or growth to maturity" refers to stages representing a species' full life cycle.

The EFH regulations define an adverse effect at 50 CFR § 600.810(a) as "…any impact which reduces quality and/or quantity of EFH. Adverse effects might include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH might result from action occurring within EFH or outside of EFH and might include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions."

Section 305(b)(2) of the MSFCMA requires a Federal agency to consult with NMFS regarding any action that might adversely affect EFH. To initiate the preparation of the EFH Assessment, in a letter dated July 31, 2007, USEPA contacted NMFS to identify those species whose habitat might be affected by the proposed action (USEPA, 2007b). The action under consideration in this assessment is the reissuance of an NPDES permit to discharge wastewater to Cook Inlet from the Osprey Platform during production operations. In a letter dated September 5, 2007, NMFS notified USEPA of those species for which EFH has been designated in Cook Inlet (NMFS, 2007a).

The North Pacific Fishery Management Council has prepared and implemented five FMPs for fisheries in Alaska. The five FMPs and areas covered are: 1) Bering Sea and Aleutian Islands (BSAI) Groundfish FMP; 2) GOA Groundfish FMP; 3) Scallop Fisheries off the Coast of Alaska FMP; 4) BSAI King and Tanner Crab FMP; and 5) Salmon Fisheries in the Exclusive Economic Zone (EEZ) off the Coast of Alaska FMP. In 2005, NMFS completed an environmental impact statement (EIS) for EFH in the Alaskan region affected by these FMPs. The *Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska* (NMFS, 2005) contains the most recent FMPs for fisheries in Alaska. Of these, the GOA Groundfish FMP, the Scallop Fisheries off the Coast of Alaska FMP, and the Salmon Fisheries in the EEZ off the Coast of Alaska FMP were the primary documents used for fishery resources information in this EFH assessment.

An EFH Assessment has been performed for the proposed Osprey Platform wastewater discharges from the Osprey Platform (see Appendix C). Federally managed fish species and important forage fishes known to be distributed within Cook Inlet and the GOA are listed in Appendix C, Table 3-1. A total of 31 species were identified as EFH species: five species of salmonids, three species of groundfish, two species of shallow water flatfish, 13 species of other fish, and eight species from the forage fish complex. Of the salmonids, only late juvenile and adult stages use the habitat of Cook Inlet, predominantly during migration. Many of the EFH species identified in Appendix C are not distributed in the project area. Of the 31 species, several are associated with soft muddy or sandy bottoms, unlike the seafloor found at the Osprey Platform. Only nine EFH species exhibit distributions near the project area during at least one life stage. Many of the species are benthic or demersal, inhabiting waters of substantially greater depths than the 45 ft in which the Osprey Platform is located.

FMPs are obliged to identify habitat areas of particular concern (HPC) within EFH. These HPCs include living substrates in shallow water that provide food and rearing habitat for juvenile fish, and spawning grounds that might be impacted by shore-based activities. Estuarine and nearshore habitats for the salmonids (e.g., eelgrass) and herring spawning grounds (e.g., rockweed and eelgrass) are HPCs present in Cook Inlet. All anadromous streams qualify as HPCs (USEPA, 2002b).

### 3.6.5 Marine Birds

This section describes seabirds and shorebirds in the Cook Inlet area. Threatened and endangered species are discussed in Section 3.7. Waterbirds (including loons) and waterfowl (such as swans, geese, and ducks) occur as breeding birds and migrants in the Cook Inlet region. Section 3.8 (Terrestrial Biological Resources) highlights waterbirds because they predominantly use freshwater habitat (i.e., lakes) rather than marine habitat.

#### *3.6.5.1 Seabirds*

Seabirds are characterized as birds that spend almost all of their time on or near the sea. Seabirds retrieve all their food from the water. Some seabirds overwinter at sea, residing several hundred miles from land. Some seabirds retreat onshore to raise young birds over the summer. Oftentimes, seabirds nest on protected cliffs or islands within dense groups (colonies). Seabirds have special adaptations allowing them to live at sea and retrieve food from the sea. Many seabirds consume small fish or zooplankton. Some seabirds pick their prey from the water's surface, whereas others dive for their prey and chase it underwater (USFWS, 2007b). Table 3-14 provides a list of nesting seabirds in Alaska.

Alaska's coastline is home to about 50 million seabirds each summer, 87 percent of all seabirds in the United States. Seabirds nest in more than 1,600 seabird colonies along the Alaskan shoreline. Alaska's popularity for seabirds has been attributed to the State's lengthy coastline (30,000 miles), the many cliffs and islands that provide protected habitat for nesting seabirds along the Alaskan coast, and the numerous seas near Alaska (the Arctic Ocean, Bering Sea, GOA and north Pacific Ocean) that are very rich feeding grounds for the seabirds (USFWS, 2007b).

**Table 3-14. Seabird species in Cook Inlet area (adapted from USEPA, 2002b)**

| Common Name | Scientific Name | ESA Status[a] | Occurrence |
|---|---|---|---|
| Short-tailed albatross | *Diomedea albatrus* | E | A |
| Northern fulmar | *Fulmarus glacialis* | — | C/S,M; R/W |
| Sooty shearwater | *Puffinus griseus* | — | C/S,M |
| Short-tailed shearwater | *Puffinus tenuirostris* | — | U/S,M |
| Fork-tailed storm petrel | *Oceanodroma furcata* | — | C/M |
| Leach's storm petrel | *Oceanodroma leucorboa* | — | U/S |
| Double-crested cormorant | *Phalacrocorax auritus* | — | C/B,M; U/W |
| Pelagic cormorant | *Phalacrocorax pelagicus* | — | C/B,M,W |
| Red-faced cormorant | *Phalacrocorax urile* | — | U/B,M,W |
| Bonaparte's gull | *Larus philadelphia* | — | C/B,M |
| Mew gull | *Larus canus* | — | C/B,M,W |
| Herring gull | *Larus argentatus* | — | C/M; R/S,W |
| Glaucous-winged gull | *Larus glaucescens* | — | C/B,M,W |
| Glaucous gull | *Larus hyperboreus* | — | R/S,W,M |
| Black-legged kittiwake | *Rissa tridactyla* | — | C/B,M; U/W |
| Sabine's gull | *Xema sabini* | — | U/M; R/S |
| Arctic tern | *Sterna paradisaea* | — | C/B,M |
| Aleutian tern | *Sterna aleutica* | — | U/B,M |
| Common murre | *Uria aalge* | — | U/B,M,W |
| Pigeon guillemot | *Cepphus columba* | — | C/B,M,W |
| Marbled murrelet | *Brachyramphus marmoratus* | — | C/M,W |
| Kittlitz's murrelet | *Brachyramphus brevirostris* | — | C/S; U/W |
| Ancient murrelet | *Synthliboramphus antiquus* | — | U/S,M,W |
| Parakeet auklet | *Cyclorrhynchus psittacula* | — | R/B,M |
| Rhinoceros auklet | *Cerorhinca monocerata* | — | R/S,M |
| Tufted puffin | *Fratercula cirrhata* | — | C/B,M; R/W |
| Horned puffin | *Fratercula corniculata* | — | U/B,M; R/W |

[a] Federal status under the ESA; E = endangered

Notes: C = common, U = uncommon, R = rare, A = accidental, B = breeding bird, M = migration, W = winter, S = summer.

During the spring, large concentrations of seabirds are found in Cook Inlet and the GOA. This is when returning breeding species and migrants from breeding grounds in the southern hemisphere transit into the area. Seabirds tend to remain in the area (in high concentrations) through the summer, and numbers begin to decline in the fall as the seabirds begin to migrate to their wintering grounds. The winter season exhibits the lowest concentration of seabird numbers in Cook Inlet (USFWS, 2007b).

#### *3.6.5.2 Shorebirds*

Alaska provides breeding habitat for more shorebirds than any other State in the United States. One-third of the world's species of shorebirds — 71 species — are found in Alaska. Of these, 37 species regularly breed in Alaska, whereas 9 species breed irregularly or annually but only in small numbers. Alaska hosts between 7 and 12 million shorebirds or as much as 50 percent of all the shorebirds that occur in North America (USFWS, 2004). Approximately 30 shorebird species occur as breeding birds or migrants in Cook Inlet (Table 3-15).

**Table 3-15. Shorebird species in Cook Inlet area (adapted from USEPA, 2002b)**

| Common Name | Scientific Name | Occurrence |
|---|---|---|
| Black-bellied plover | *Pluvialis squatarola* | C/M |
| Lesser golden-plover | *P. dominica* | C/M |
| Semipalmated plover | *Charadrius semipalmatus* | C/B,M |
| Black oystercatcher | *Haematopus bachmani* | C/B,M,W |
| Greater yellowlegs | *Tringa melanoleuca* | C/B,M |
| Lesser yellowlegs | *T. flavipes* | C/B,M |
| Solitary sandpiper | *T. solitaria* | R/B; U/M |
| Wandering tattler | *Heteroscelus incanus* | U/B; C/M |
| Pribilof Islands rock sandpiper | *Calidris ptilocnemis* | C/W |
| Spotted sandpiper | *Actitis macularia* | C/B,M |
| Whimbrel | *Numenius phaeopus* | C/M |
| Hudsonian godwit | *Limosa haemastica* | U/B,M |
| Bar-tailed godwit | *L. lapponica* | U/B,M |
| Ruddy turnstone | *Arenaria interpres* | C/M |
| Black turnstone | *A. melanocephala* | C/M; U/W |
| Surfbird | *Aphriza virgata* | U/B; C/M |
| Red knot | *Calidris canutus* | C/M |
| Sanderling | *C. alba* | U/M; R/W |
| Semipalmated sandpiper | *C. pusilla* | U/M |
| Western sandpiper | *C. mauri* | C/M |
| Least sandpiper | *C. minutilla* | C/B,M |
| White-rumped sandpiper | *C. fuscicollis* | A |
| Baird's sandpiper | *C. bairdii* | U/M |
| Pectoral sandpiper | *C. melanotos* | C/M |
| Rock sandpiper | *C. ptilocnemis* | C/M,W |
| Dunlin | *C. alpina* | C/M,W |
| Short-billed dowitcher | *Limnodromus griseus* | C/B,M |
| Long-billed dowitcher | *L. scolopaceus* | C/M |
| Common snipe | *Gallinago gallinago* | C/B,M; R/W |
| Red-necked phalarope | *Phalaropus lobatus* | C/B,M |

Notes: C = common, U = uncommon, R = rare, A = accidental, B = breeding bird, M = migration, W = winter

Although shorebirds frequently nest in the Cook Inlet area, the most important areas for shorebird use in the region are the migratory stopover areas in the northern GOA and lower Cook Inlet where birds stop to rest and feed. Western Cook Inlet is an important location for shorebirds during migration, specifically within intertidal zones of the Drift River, Iniskin Bay, and Chinitna Bay. Kachemak Bay in lower Cook Inlet is an important feeding and resting area for shorebirds during migration (USEPA, 2002b).

Millions of shorebirds congregate at coastal intertidal mudflats in the spring to feed before migrating northward. Most shorebirds pass through the area between late April and mid-May; peak migration generally occurs in early May. The two most common species to the area are the dunlin (*Calidris alpina*) and western sandpiper (*Calidris mauri*). Individual shorebirds usually stop to feed and rest for only a few days before continuing on their migration (USEPA, 2002b).

### 3.6.6 Non-Endangered Marine Mammals

This section describes marine mammals that range throughout the GOA, including Cook Inlet. Marine mammals are protected under the MMPA (16 U.S.C. 1361) and are managed by USFWS and NMFS. Threatened and endangered marine mammal species are discussed in Section 3.7.

#### *3.6.6.1 Minke Whale*

Minke whales (*Balaenoptera acutorostrata*) have a widespread distribution in polar, temperate, and tropical waters. The International Whaling Commission (IWC) recognizes three stocks of minke whales in the North Pacific: one in the Sea of Japan/East China Sea, one in the rest of the western Pacific west of 180$^{o}$N, and one in the "remainder" of the Pacific. In the remainder area, minke whales are relatively common in the Bering and Chukchi Seas and in the inshore waters of the GOA. Although relatively common in the nearshore waters of the GOA, minke whales are not abundant in any other part of the eastern Pacific. In the northern part of their range, minke whales are believed to be migratory. In the inland waters of Washington and along central California, it would appear that minke whales establish home ranges. The "resident" minke whales from California to Washington appear behaviorally distinct from migratory whales farther north. Therefore, minke whales in Alaska are considered a separate stock from minke whales in California, Oregon, and Washington. Accordingly, two stocks of minke whales are recognized in U. S. waters: one in Alaska and one in California/Washington/Oregon (Angliss and Outlaw, 2007). Minke whales are unlikely to migrate into Cook Inlet.

There are no estimates of the number of minke whales in the north Pacific or Alaskan waters. Similarly, there are no data on trends in minke whale distribution in Alaskan waters. The annual human-caused mortality is considered insignificant. Minke whales are not listed as "depleted" under the MMPA or listed as "threatened" or "endangered" under the ESA. Because minke whales are considered common in the waters off Alaska and human-related mortality is minimal, this stock is not considered a strategic stock (Angliss and Outlaw, 2007).

#### *3.6.6.2 Gray Whale*

Gray whales (*Eschrichtius robustus*) are currently found only in the North Pacific Ocean. Two stocks have been recognized in the North Pacific: the Eastern North Pacific stock (along the west coast of North America) and the western North Pacific (along the coast of eastern Asia). Most of the Eastern North Pacific stock feeds during the summer in the northern Bering and Chukchi Seas. However, gray whales have been reported feeding in waters off Southeast Alaska, British

Columbia, Washington, Oregon, and California in the summer months (Angliss and Outlaw, 2007).

Each fall, gray whales migrate south in November or December along the coast of North America from Alaska to Baja California in Mexico. The Eastern North Pacific stock winters along the west coast of Baja California, usually within shallow, nearly landlocked lagoons and bays. Calves are born from January to mid-February. From February to May, gray whales begin a northbound migration closely following the coast. The whales enter the Bering Sea, primarily through Unimak Pass typically in April and May, and continue to travel along the coast of Bristol Bay. After passing Nunivak Island, the whales head toward St. Lawrence Island where they disperse to spend the summer feeding in shallow waters of the northern and western Bering Sea and the Chukchi Sea. Gray whales begin their southward migration in mid-October, passing through Unimak Pass, and arriving in Baja California in December and January. Along the U.S. West coast, cows and newborn calves travel about 5,000 miles northward. While most North Pacific gray whales spend the summer in the shallow waters of the northern and western Bering Sea and Arctic Ocean, some gray whales feed along the Pacific coast (Angliss and Outlaw, 2007; ADF&G, 1994).

The minimum population estimate for North Pacific gray whales is 17,752 (Angliss and Outlaw, 2007). Gray whale occurrences in Cook Inlet are most likely uncommon. As they move through the GOA on their northward and southward migrations, gray whales closely follow the coastline (ADF&G, 1994).

#### *3.6.6.3 Killer Whale*

Killer whales (*Orcinus orca*) are known to occur in all oceans and seas of the world. They often occur at higher population densities in colder and more productive waters of both hemispheres, with greatest densities at high latitudes. Killer whales are found throughout the North Pacific, and are known to occur along the entire Alaskan coast but occur most commonly over the waters of the continental shelf from Southeast Alaska through the Aleutian Islands and northward into the Chukchi and Beaufort seas. Seasonal and year-round occurrence has been noted for killer whales in Alaska and the intracoastal waterways of British Columbia and Washington, where pods[15] have been labeled as “resident,” “transient,” and “offshore.” Within the Pacific U.S. EEZ, the Alaska resident stock occurs from southeastern Alaska to the Aleutian Islands and Bering Sea (Angliss and Outlaw, 2007; ADF&G, 1994).

Killer whales are known to inhabit Cook Inlet waters. Killer whales using Cook Inlet are most likely from the Alaska stock of killer whales and are estimated to be a minimum of 1,123 resident whales. Currently, there are no reliable data describing the trends in population abundance for the entire Alaska resident stock of killer whales. The eastern North Pacific Alaska resident stock of killer whales is not listed as “depleted” under the MMPA or listed as “threatened” or “endangered” under the ESA, nor is it classified as a strategic stock (Angliss and Outlaw, 2007).

[15] Most killer whale pods in Alaska number fewer than 40 animals. Killer whale pods are matrilineal and consist of a female and her offspring of both sexes.

#### *3.6.6.4 Harbor Porpoise*

The harbor porpoise (*Phocoena phocoena*) primarily frequents coastal waters with depths less than 300 ft. In the eastern North Pacific Ocean, the harbor porpoise ranges from Point Barrow, along the coast of Alaska, and down the west coast of North America to Point Conception, California. Three separate harbor porpoise stocks in Alaska are under management, recognizing that boundaries were set arbitrarily: 1) the Southeast Alaska stock occurs from the northern border of British Columbia to Cape Suckling, Alaska; 2) the GOA stock occurs from Cape Suckling to Unimak Pass; and 3) the Bering Sea stock occurs throughout the Aleutian Islands and all waters north of Unimak Pass (Angliss and Outlaw, 2007).

Harbor porpoises are not migratory, and those occurring in Cook Inlet are most likely part of the GOA stock of harbor porpoises. The most recent population estimate for the GOA stock of harbor porpoise in Alaskan waters is 41,854. Currently, there is no reliable information on trends in abundance for them. In 1999 and 2000, observers were placed on Cook Inlet salmon set and drift gillnet vessels because of the potential for these fisheries to incur incidental mortalities of beluga whales. During these observations, one dead harbor porpoise was observed in 2000. The GOA harbor porpoise stock is not listed as "depleted" under the MMPA or listed as "threatened" or "endangered" under the ESA; however, it is classified as a strategic stock because of the older abundance estimates and unknown human-related mortality counts (Angliss and Outlaw, 2007).

#### *3.6.6.5 Dall's Porpoise*

Dall's porpoises (*Phocoenoides dalli*) are widely distributed across the entire North Pacific Ocean, often found along the continental shelf adjacent to the slope and over deep oceanic waters (7,000+ ft depth). Although abundant throughout the GOA, distribution gaps in Alaska waters are found in upper Cook Inlet and the shallow eastern flats of the Bering Sea. They are commonly found in lower Cook Inlet. The current estimate for the Alaska stock of Dall's porpoise is 83,400, with a minimum stock of 76,874 individuals. Currently, there is no reliable information on trends in abundance for them. The Alaska stock of Dall's porpoises is not listed as "depleted" under the MMPA or listed as "threatened" or "endangered" under the ESA, nor is it classified as a strategic stock (Angliss and Outlaw, 2007).

#### *3.6.6.6 Harbor Seal*

Harbor seals (*Phoca vitulina richardsi*) inhabit coastal and estuarine waters along the west coast of the U.S., British Columbia, and Southeast Alaska, west through the GOA and the Aleutian Islands, and in the Bering Sea north to Cape Newenham and the Pribilof Islands. Harbor seals haul out on rocks, reefs, beaches, and drifting glacial ice. They feed in marine, estuarine, and occasionally fresh waters. In general, harbor seals are non-migratory, and their movements are associated with the tides, weather, season, food availability, and reproduction. Three separate stocks are recognized in Alaskan waters:[16] 1) the Southeast Alaska stock occurs from the Alaska/British Columbia border to Cape Suckling, Alaska (144°W); 2) the GOA stock occurs from Cape Suckling to Unimak Pass, including animals throughout the Aleutian Islands; and 3) the Bering Sea stock occurs in all waters north of Unimak Pass. Current population estimates are

[16] In January 2006, NMFS reported that new genetic information on harbor seals in Alaska indicates the current division of Alaskan harbor seals into the Southeast Alaska, GOA, and Bering Sea stocks needs to be reassessed (Angliss and Outlaw, 2007).

reported as GOA, 19,450 seals; Cook Inlet waters, 2,244 seals; Kodiak Peninsula waters, 4,437 seals; and the south side of the Alaska Peninsula, 3,200 seals (USEPA, 2006). Despite signs of growth in certain areas, the overall GOA harbor seal stock size remains small in comparison to the numbers reported in the 1970s and 1980s (Angliss and Outlaw, 2007).

Harbor seal haul-out areas have not been documented in the vicinity of the West Foreland (USEPA, 2002b). Important harbor seal haul-out areas are found within Kamishak and Kachemak bays and along the coast of the Kodiak Archipelago and the Alaska Peninsula. Pupping appears to take place at most haul-out areas, and several of these contain large concentrations of harbor seals (USEPA, 2006).

### 3.6.7 Contaminants in Cook Inlet Marine Biota

USEPA Office of Water (OW), Office of Science and Technology collected marine biota tissue data in 1997 with assistance from Port Graham and Nanwalek tribal residents and professional staff. USEPA's summary report of the analytical data includes average, maximum and minimum concentrations of detected chemical contaminants. As reported in USEPA (2006), the Port Graham Village Council petitioned the Agency for Toxic Substances and Disease Registry (ATSDR) in May 2003 to review the data presented in USEPA's *Survey of Chemical Contaminants in Fish, Invertebrates and Plants Collected in the Vicinity of Tyonek, Seldovia, Port Graham and Nanwalek, Cook Inlet, Alaska*. USEPA (2006) noted that the ATSDR's prepared a health consult, entitled *Evaluation of Biota Data Collected in the Vicinity of Tyonek, Seldovia, Port Graham, and Nanwalek, AK*, that was released in draft form for public comment. The discussion below from USEPA (2006) summarizes the contaminant survey and presents the ATSDR's draft findings related to various contaminants.

USEPA's OW collected and analyzed 81 tissue samples comprising seven fish species, eight invertebrates, and three plant species (Table 3-16). A total of 161 chemicals in five chemical groups (metals, PAHs, pesticides, polychlorinated biphenyl [PCB], and dioxins/furans) were analyzed. ATSDR's draft report concluded that these chemical groups pose no apparent public health hazard. Approximately one-half of the 161 analytes (76) were detected by analytical methods selected for the study. The numbers of detected analytes by sample type and chemical group are shown in Table 3-17. These results provide a good survey dataset of environmental chemicals present in whole body (raw) tissues samples of Cook Inlet biota. Detected analytes include global contaminants such as mercury, organochlorine pesticides, and PCB congeners. In the 81 samples analyzed for dioxin and furan congeners, only one type of dioxin (octachlorodibenzo-p-dioxin [OCDD]) was detected in one duplicate Chinook salmon sample (13 ppt) (USEPA, 2006). A major source of OCDD is forest fires; however, anthropogenic sources (e.g., pesticides) are also possible.

Approximately one-half of the 104 individual PAHs were detected in the fish, invertebrate, and plant samples. Chinook salmon tissue samples had the highest total average PAH concentration (253 ppb) (USEPA, 2006). The biota species sampled, the size of the biota, and the harvest locations were intended to represent those traditionally used by members of four Alaskan tribal villages of Tyonek, Seldovia, Port Graham and Nanwalek. However, as reported in USEPA (2006), this one-time sampling event was not statistically representative of contaminant concentrations in these species, nor could it be correlated to lifetime human-health exposure effects (USEPA, 2006).

**Table 3-16. Characteristics of selected Cook Inlet marine species sampled in chemical contaminants study of Cook Inlet by USEPA, 2003 (as cited in USEPA, 2006)**

| Common Name | Scientific Name | Size Range (cm) | Sample Type |
|---|---|---|---|
| **Fish** | | | |
| Chinook salmon | *O. tshawytscha* | 59.7 – 96.5 | Whole body |
| Chum salmon | *O. keta* | 57.2 – 73.7 | Whole body |
| Sockeye salmon | *O. nerka* | 40.6 – 76.2 | Whole body |
| Sea bass | *Sebastes melanops* | 30.5 – 58.4 | Whole body |
| Cod | *Gadus macrocephalus* | 58.4 – 81.3 | Whole body |
| Flounder | *Lepidopsetta bilineata* | 27.9 – 41.9 | Whole body |
| Halibut | *Hippoglossus stenolepis* | 67.3 – 101.6 | Whole body |
| **Invertebrates** | | | |
| Blue mussel | *Mytilus cf. trossulus* sp. | Not reported | Whole body without shell |
| Mussel | Not determined | Not reported | Whole body without shell |
| Butter clam | *Saxidomus giganteus* | Not reported | Whole body without shell |
| Large clam | Not determined | Not reported | Whole body without shell |
| Steamer clam | *Protothaca staminea* | Not reported | Whole body without shell |
| Chiton | *Polyplacophora* sp. | Not reported | Whole body without shell |
| Octopus | Octopodidae | Not reported | Whole body |
| Snail | *Littorina* sp. | Not reported | Whole body without shell |
| **Plants** | | | |
| Goose tongue | *Plantago maritime* | Not reported | Edible "tongue" portion |
| Kelp/bull kelp | *Nereocystis luetkeana* | Not reported | Edible bulb portion |
| Seaweed | *Porphyra* sp. | Not reported | Blades |

**Table 3-17. Chemical contaminants detected in selected Cook Inlet marine species sampled by USEPA, 2003 (as cited in USEPA, 2006)**

| Sample Type | Number of Samples | Number of Samples in Which Chemical was Detected | | | | | |
|---|---|---|---|---|---|---|---|
| | | Metals | PAHs | Pesticides | Aroclors | PCB Congeners | Dioxins/ Furans |
| Fish[a] | 33 | 33 | 33 | 33 | 5 | 33 | 1 |
| Shellfish[b] | 15 | 15 | 10 | 1 | 0 | 1 | 0 |
| Other Invertebrates[c] | 21 | 21 | 19 | 8 | 0 | 8 | 0 |
| Plants[d] | 12 | 12 | 9 | 1 | 0 | 0 | 0 |

[a] Chinook salmon, chum salmon, sockeye salmon, sea bass, cod, flounder, and halibut
[b] Blue mussel, mussel, butter clam, large clam, and steamer clam
[c] Chiton, octopus, and snail
[d] Goose tongue, kelp, and seaweed

### *3.6.7.1 PCBs*

The 81 tissue samples were analyzed for seven commercial PCB mixtures (Aroclors) and 13 individual coplanar PCB congeners. Of these, Aroclor 1260 was the only Aroclor detected (5 of 81 samples) and found only in Chinook salmon, chum salmon, and sea bass samples (Table 3-18). Five of the 13 PCB congeners (114, 126, 157, 169 and 189) were not detected in any of the tissue samples analyzed (USEPA, 2006).

**Table 3-18. Aroclor 1260 and PCB congener concentrations in selected Cook Inlet marine species sampled by USEPA, 2003 (adapted from USEPA, 2006)**

| Species | Aroclor (ng/kg = ppt) | | PCB Congeners[a] (ng/kg = ppt) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1260 | | 77 | | 105 | | 118 | | 123 | | 156 | | 167 | | 170 | | 180 | |
| | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg |
| ***Fish*** | | | | | | | | | | | | | | | | | | |
| Chinook | 3,200 | 3,200 | 12.9 | 9.1 | 220 | 181 | 521 | 443 | 13 | 11 | 38 | 33 | 23 | 21 | 48.3 | 53.3 | 209 | 185 |
| Chum | 4,400 | 4,400 | 3.89 | 3.74 | | | 135 | 128 | | | | | | | 21.1 | 20.1 | 64.7 | 54.9 |
| Cod | | | | | | | 137 | 119 | 106 | 106 | | | | | 30.9 | 28.2 | 93.6 | 80.5 |
| Flounder | | | | | | | 103 | 39 | | | | | | | 56 | 34 | 133 | 63 |
| Halibut | | | 3.39 | 2.73 | 101 | 102 | 251 | 207 | | | 20.5 | 20.1 | | | 47.8 | 40.6 | 154 | 125 |
| Sea bass | 6,260 | 6,260 | | | 344 | 282 | 953 | 593 | 13 | 12 | | | 42 | 31 | 398 | 305 | 1,440 | 807 |
| Sockeye | | | 6.71 | 2.73 | 106 | 100 | 265 | 231 | | | 26 | 23 | | | 39 | 33 | 121 | 107 |
| ***Invertebrates*** | | | | | | | | | | | | | | | | | | |
| Blue mussel | | | | | | | | | | | | | | | | | | |
| Butter clam | | | 9.61 | 9.61 | | | | | | | | | | | | | | |
| Chiton | | | | | | | | | | | | | | | | | | |
| Large clam | | | | | | | | | | | | | | | | | | |
| Mussel | | | | | | | | | | | | | | | | | | |
| Octopus | | | | | | | 25 | 24 | 45 | | | | | | | | 49.6 | 41.9 |
| Snail | | | | | | | | | | | | | | | 28.3 | 23.4 | 81.8 | 57.6 |
| Steamer clam | | | | | | | | | | | | | | | | | | |
| ***Plants*** | | | | | | | | | | | | | | | | | | |
| Goose tongue | | | | | | | | | | | | | | | | | | |
| Kelp | | | | | | | | | | | | | | | | | | |
| Seaweed | | | | | | | | 45 | | | | | | | | | | |

Empty cell indicates that the analyte was below detection limits

a 71

**Fish.** PCB congeners 118, 170 and 180 were detected in all seven fish tissue samples. With the exceptions of flounder and sea bass, PCB congener 118 occurred at higher concentrations than any of the other congeners (average 39 - 593 ppt). PCB congener 180 was detected at the highest concentrations in flounder and sea bass (average 55 - 807 ppt). PCB congener 77 was present at the lowest concentrations (average 3 - 9 ppt). Chinook salmon tissue samples contained all eight of the detected PCB congeners. Sea bass contained the highest sum of averages of all PCB congeners (2,030 ppt), whereas flounder contained the lowest (135 ppt) (USEPA, 2006).

**Invertebrates.** PCB congeners were also detected in butter clam, octopus, and snail samples. PCB congener 77 was detected in one butter clam sample (10 ppt), PCB congeners 118 and 180 in octopus samples (average 24 - 42 ppt), and PCB congeners 170 and 180 in snail samples (average 23 ppt and 57 ppt, respectively) (USEPA, 2006).

**Plants.** The only congener detected in plant tissues, PCB congener 118, was detected in seaweed at an average concentration of 45 ppt (USEPA, 2006).

#### *3.6.7.2 PCDDs and PCDFs*

The 81 samples were analyzed for polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) congeners, and only one congener (OCDD) was detected in a duplicate Chinook salmon sample (13 ppt) (Table 3-19) (USEPA, 2006).

#### *3.6.7.3 PAHs*

The 81 tissue samples were analyzed for 104 PAHs. Approximately 50 percent of the 104 PAHs were detected in the tissue samples (Table 3-19).

**Fish**. All fish tissue samples contained detectable PAHs. Total PAHs average concentrations ranged from 1 to 553 ppb. Chinook salmon had the highest average concentrations, whereas cod had the lowest average concentrations (USEPA, 2006).

**Invertebrates.** Except for the mussel, PAHs were detected in all invertebrate tissue samples (ranging from 3 to 34 ppb). The highest average concentrations were detected in snail samples, with the lowest average concentrations in large clam samples (USEPA, 2006).

**Plants.** All plant samples contained detectable PAHs, with total PAH average concentrations ranging from 5 to 133 ppb. The highest average concentrations were detected in goose tongue (average of 133 ppb) (USEPA, 2006).

USEPA (2006) reported that the ATSDR data review on PAH concentrations from various sources determined that the data on exposure pathways was insufficient to draw firm conclusions. ATSDR therefore reported that PAHs pose an indeterminate public health risk (USEPA, 2006).

**Table 3-19. PCDD/PCDF and PAH concentrations in selected Cook Inlet marine species sampled by USEPA, 2003 (adapted from USEPA, 2006)**

| Species | PCDD/PCDF (ng/kg = ppt) Average[a] | Total PAHs (mg/kg = ppb) Average |
|---|---|---|
| **Fish** | | |
| Chinook salmon | 13.1 | 553 |
| Chum salmon | | 48 |
| Cod | | 1 |
| Flounder | | 60 |
| Halibut | | 44 |
| Sea bass | | 87 |
| Sockeye salmon | | 33 |
| **Invertebrates** | | |
| Blue mussel | | 14 |
| Butter clam | | 16 |
| Chiton | | 12 |
| Large clam | | 3 |
| Mussel | | |
| Octopus | | 5 |
| Snail | | 34 |
| Steamer clam | | 5 |
| **Plants** | | |
| Goose tongue | | 133 |
| Kelp | | 14 |
| Seaweed | | 5 |

[a] Empty cells indicate that the analyte was below detection limits

### *3.6.7.4 Pesticides*

Tissue samples were analyzed for the following organochlorine pesticides: dichlorodiphenyltrichloroethane (DDT) and its metabolites (dichlorodiphenyldichloroethylene [DDE] and dichlorodiphenyldichloroethane [DDD]), chlordane compounds, dieldrin, endosulfan, endrin, heptachlor epoxide, hexachlorobenzene, lindane, mirex, and pentachloroanisole (Table 3-20).

## Table 3-20. Pesticide concentrations in selected Cook Inlet marine species sampled by USEPA, 2003 (as cited in USEPA, 2006)

| Pesticide Concentrations (ng/kg – ww) [a,b] | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Total DDT | | Chlordane | | Dieldrin | | Endosulfan | | Endrin | | Heptachlor Epoxide | | Hexa chlorobenzene | | Lindane | | Mirex | | Penta chloroanisole | |
| | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg |
| **Fish** | | | | | | | | | | | | | | | | | | | | |
| Chinook | NA | 5398 | 2370 | 1227 | 1720 | 769 | 780 | 544 | 813 | 582 | 276 | 238 | 2040 | 1787 | 203 | 185 | | | 1180 | 594 |
| Chum | NA | 2016 | 1140 | 717 | | | | | | | | | 1040 | 696 | | | | | | |
| Cod | NA | 1951 | 657 | 379 | 242 | 237 | | | | | | | 242 | 237 | | | | | | |
| Flounder | NA | 588 | 587 | 372 | | | | | | | | | 286 | 283 | | | | | | |
| Halibut | NA | 2902 | | | 593 | 419 | | | 407 | 407 | | | 1590 | 1280 | | | | | 309 | 226 |
| Sea bass | NA | 5894 | 7490 | 2732 | 477 | 477 | | | | | 310 | 310 | 913 | 798 | | | 417 | 379 | 500 | 500 |
| Sockeye | NA | 3123 | 2190 | 777 | 473 | 382 | 1610 | 664 | 947 | 483 | 251 | 174 | 1450 | 1124 | 793 | 275 | | | 8930 | 1919 |
| **Invertebrates** | | | | | | | | | | | | | | | | | | | | |
| Blue mussel | | | | | | | | | | | | | | | | | | | | |
| Butter clam | | | | | | | | | | | | | | | | | | | | |
| Chiton | | | | | | | | | 309 | 266 | 207 | 207 | | | 175 | 175 | | | | |
| Large clam | | | | | | | | | | | | | | | | | | | | |
| Mussel | | | | | | | | | | | | | 301 | 301 | | | | | | |
| Octopus | | | | | | | | | | | | | | | | | | | | |
| Snail | | | | | | | | | | | | | 747 | 624 | 155 | 155 | | | | |
| Steamer clam | | | | | | | | | | | | | | | | | | | | |
| **Plants** | | | | | | | | | | | | | | | | | | | | |
| Goose tongue | 218 | 218[c] | | | | | | | | | | | | | | | | | | |
| Kelp | | | | | | | | | | | | | | | | | | | | |
| Seaweed | | | | | | | | | | | | | | | | | | | | |

[a] ng/kg - ww = nanograms/kilogram wet weight (parts per trillion = ppt)
[b] Empty cells indicate that the analyte was below detection limits
[c] Only DDD isomers were detected in this sample

**Fish.** All fish samples contained detectable pesticides. Chinook and sockeye salmon had the greatest number of organochlorine pesticides (9 total) with similar proportions of detected pesticides. The highest concentrations of hexachlorobenzene, endrin, and dieldrin were found measured in Chinook salmon. The highest concentrations of DDT compounds (chlordanes, heptachlor epoxide, and mirex) were detected in sea bass. The highest concentrations of endosulfans, lindane, and pentachloroanisole were found in sockeye (USEPA, 2006).

DDT compounds were detected in all of the fish tissue samples. Greatest concentrations for DDT compounds were found for the DDE isomer, followed by DDT, and then DDD. All fish samples, except halibut, contained detectable chlordane compounds, with the highest average concentrations in sea bass (2,732 ppt) and lowest in flounder (372 ppt) (Table 3-20) (USEPA, 2006).

Hexachlorobenzene was detected in all of the fish samples, with the highest average concentrations in Chinook salmon (1,787 ppt) and the lowest in cod (237 ppt). Chum and flounder samples did not contain detectable concentrations of dieldrin. The highest average dieldrin concentrations were in Chinook salmon (769 ppt) and the lowest in cod (237 ppt). Endosulfans were detected only in Chinook and sockeye salmon samples (averages 544 and 664 ppt, respectively). Endrin was detected in Chinook, halibut, seabass, and sockeye (average 407 to 582 ppt). Average concentrations of heptachlor epoxide detected were in Chinook (238 ppt), sea bass (310 ppt), and sockeye (174 ppt). Lindane was detected only in Chinook and sockeye (averages 185 and 275 ppt, respectively). Mirex was detected only in the sea bass (average 379 ppt). Pentachloroanisole was detected in Chinook, halibut, and sockeye, with the highest average concentrations in sockeye (1,919 ppt) and lowest in halibut (226 ppt) (USEPA, 2006).

**Invertebrates.** Organochlorine pesticides were infrequently detected in invertebrates. The chlordane compounds, DDT compounds, dieldrin, endosulfans, and mirex were not found in any of the invertebrate samples. Only endrin was detected in the invertebrate samples (chiton, average 266 ppt); lindane (chiton and snail, average 175 and 155 ppt, respectively); heptachlor epoxide (chiton, average 207 ppt); and hexachlorobenzene (mussel and snail, average 301 and 624 ppt, respectively) (USEPA, 2006).

**Plants.** Of the three plant species analyzed, only DDD was detected in one of the goose tongue samples (218 ppt) (USEPA, 2006).

#### *3.6.7.5 Trace Metals*

**Fish.** Trace elements of arsenic (total), barium, cadmium, chromium, lead, mercury, methylmercury, and selenium were detected in the fish samples. Arsenic was detected in all of the fish samples, with the lowest average concentrations in chum salmon (average 241 ppb). Arsenic, barium, chromium, selenium, and methylmercury were detected in all fish samples. Lead was detected in Chinook salmon and flounder (Table 3-21) (USEPA, 2006). USEPA (2006) reported that the ATSDR found the arsenic exposure in the Cook Inlet biota is unlikely to pose an apparent public health hazard.

**Table 3-21. Trace metal concentrations in Cook Inlet marine species sampled by USEPA, 2003 (as cited in USEPA, 2006)**

| Trace Metal Concentrations (µg/kg – ww)[a,b] | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Arsenic | | Barium | | Cadmium | | Chromium | | Lead | | Total Mercury | | Methyl Mercury | | Selenium | |
| Species | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg | Max | Avg |
| ***Fish*** | | | | | | | | | | | | | | | | |
| Chinook | 709 | 541 | 139 | 139 | 141 | 109 | 267 | 184 | 42 | 42 | 49.9 | 40.5 | 49 | 39 | 405 | 371 |
| Chum | 252 | 241 | 833 | 803 | 58 | 57 | 573 | 417 | | | 21.9 | 21.9 | 19.9 | 19.8 | 599 | 536 |
| Cod | 5,190 | 4,207 | 722 | 443 | | | 689 | 543 | | | 57.8 | 45.8 | 45.8 | 38.3 | 575 | 568 |
| Flounder | 6,300 | 2,917 | 948 | 912 | 74 | 48 | 855 | 355 | 128 | 42 | 43 | 30 | 47 | 22 | 1,580 | 524 |
| Halibut | 1,500 | 1,297 | 172 | 129 | 57 | 39 | 459 | 353 | | | | | 47 | 33 | 505 | 481 |
| Sea bass | 1,060 | 792 | 864 | 656 | 89 | 62 | 702 | 385 | | | | | 122 | 75 | 633 | 590 |
| Sockeye | 399 | 345 | 289 | 221 | 58 | 37 | 11,700 | 1,954 | | | | | 19.8 | 15 | 691 | 621 |
| ***Invertebrates*** | | | | | | | | | | | | | | | | |
| Blue mussel | 1,330 | 1,203 | 462 | 253 | 516 | 465 | 288 | 188 | 47 | 43 | 12.2 | 11.3 | 4.01 | 3.06 | 337 | 304 |
| Butter clam | 5,030 | 3,963 | 1,230 | 1,063 | 107 | 100 | 3,790 | 2,000 | 80 | 59 | 16.9 | 15.6 | 6 | 5 | 415 | 321 |
| Chiton | 2,050 | 1,711 | 1,610 | 668 | 1,080 | 769 | 1,230 | 612 | 461 | 255 | | | 2.16 | 2.16 | 238 | 229 |
| Large clam | 3,340 | 3,180 | 886 | 793 | 95 | 87 | 1,470 | 1,042 | 41 | 41 | | | 6 | 6 | 394 | 354 |
| Mussel | 1,080 | 967 | 170 | 129 | 338 | 302 | 259 | 242 | 32 | 31 | | | 2.03 | 1.84 | 341 | 323 |
| Octopus | 3,610 | 2,958 | 461 | 308 | 1,560 | 1123 | 271 | 188 | 25 | 19 | | | 9.59 | 7.90 | 432 | 379 |
| Snail | 3,700 | 2,919 | 637 | 301 | 10,100 | 4,493 | 936 | 377 | 46 | 38 | | | 8.07 | 5.39 | 812 | 559 |
| Steamer clam | 2,950 | 2,390 | 652 | 585 | 273 | 224 | 364 | 307 | | | | | 5.42 | 3.80 | 375 | 354 |
| ***Plants*** | | | | | | | | | | | | | | | | |
| Goose tongue | 15 | 13 | 167 | 112 | | | 142 | 128 | 30 | 26 | | | | | | |
| Kelp | 2,720 | 2,557 | 466 | 363 | 374 | 301 | 504 | 232 | 25 | 25 | | | | | 172 | 135 |
| Seaweed | 4,250 | 2,873 | | | 779 | 510 | 333 | 185 | | | | | | | | |

[a] µg/kg - ww = micrograms/kilogram wet weight (parts per billion = ppb)
[b] Empty cells indicate that the analyte was below detection limits

Sockeye salmon samples contained the highest concentrations of chromium (maximum 11,700 ppb, average 1,954 ppb). Average arsenic concentrations ranged from 241 to 4,207 ppb, with the highest concentrations detected in cod and lowest in chum salmon. With the exception of chum and sockeye samples, arsenic accounted for the greatest percentage of metals concentrations (USEPA, 2006).

With the exception of the cod samples, cadmium was detected in all of the other fish samples (average of 37 to 109 ppb). Average concentrations of methylmercury ranged from 15 to 75 ppb, with the highest concentrations in sea bass and lowest in sockeye. Selenium was detected in all of the fish samples, with the highest average concentration in sockeye (621 ppb) and the highest maximum concentration in flounder (1,580 ppb) (USEPA, 2006).

**Invertebrates.** Arsenic, barium, cadmium, chromium, methylmercury, and selenium were detected in all of the invertebrate samples. Lead was detected in all invertebrates except steamer clam samples (USEPA, 2006). USEPA (2006) reported that ATSDR determined arsenic exposure from Cook Inlet biota likely poses no apparent public health hazard. Total arsenic average concentrations ranged from 967 to 3,963 ppb with highest concentrations in butter clams and lowest in mussels. Snail samples had the highest trivalent arsenic concentrations (USEPA, 2006).

All invertebrate samples contained chromium, with the highest average concentrations measured in butter clams (2,000 ppb) and large clams (1,042 ppb). Average concentrations in these two species were about 10 times greater than in other invertebrate samples (ranging from 188 to 612 ppb (USEPA, 2006).

Methylmercury average concentrations were detected in all of the invertebrates. Average methylmercury concentrations ranged from 1.84 to 7.90 ppb with the highest concentrations in octopus and lowest in the chiton samples (USEPA, 2006).

**Plants.** Metals were detected in the plant samples analyzed. Barium was found in goose tongue and kelp (averages of 112 and 363 ppb, respectively). Cadmium was detected in kelp and seaweed (averages of 301 and 510 ppb, respectively). Average chromium concentrations ranged from 128 to 232 ppb. Lead concentrations were detected in goose tongue and kelp (averages of 26 and 25 ppb, respectively). The average selenium concentration detected in kelp was 135 ppb (USEPA, 2006). USEPA (2006) reported that because of the insufficient amount of data available for arsenic in plants, ATSDR determined that inorganic arsenic in plants poses an indeterminate public health hazard.

**Cook Inlet Beluga Whales.** Tissues from Cook Inlet beluga whales collected as part of the Alaska Marine Mammal Tissue Archival Project were analyzed for PCBs, chlorinated pesticides, heavy metals, and other elements. Concentrations of total PCBs, total DDT, chlordane compounds, hexachlorobenzene, dieldrin, mirex, toxaphene, and hexachlorocyclohexane measured in the whale blubber were compared with beluga samples from two Arctic Alaska locations (Point Hope and Point Lay), Greenland, Arctic Canada, and the highly contaminated stock from the St. Lawrence estuary in eastern Canada (Becker et al., 2000). Becker et al. (2000) found levels of heavy metals, PCBs, and chlorinated pesticides were much lower in Cook Inlet belugas than in other Alaska beluga stocks.

The Arctic and Cook Inlet belugas had lower concentrations (PCBs and DDT were an order of magnitude lower) than belugas from the St. Lawrence estuary. The Cook Inlet belugas had the lowest concentrations of all the belugas sampled with PCBs averaging 1.49 ± 0.70 and 0.79 ± 0.56 ppm, and DDT averaging 1.35 ± 0.73 and 0.59 ± 0.45 ppm in males and females, respectively). Cook Inlet beluga whales exhibited significantly lower concentrations in their blubber in comparison to the Arctic Alaska males (PCBs and DDT were about half). The lower levels in the Cook Inlet belugas might be attributed to differences in contaminant sources, food web, or age distributions among the animals sampled (Becker et al., 2000).

Cook Inlet beluga males had higher average concentrations in comparison to females, possibly attributed to the transfer of these compounds from mother to calf during pregnancy and lactation. Cook Inlet belugas liver concentrations of cadmium and mercury were lower (cadmium at < 1 ppm and mercury at 0.704 - 11.42 ppm). Levels for copper were higher (3.97 - 123.8 ppm) for Cook Inlet belugas than in Arctic Alaska animals but similar to Hudson Bay belugas. Although total mercury levels were lowest in the Cook Inlet population, methylmercury concentrations were similar among all the Alaska animals examined (0.34 - 2.11 ppm). Hepatic concentrations of silver were relatively high in the Cook Inlet belugas and positively correlated with mercury and selenium concentrations detected in their livers (Becker et al., 2000).

## 3.7 THREATENED AND ENDANGERED SPECIES

As mandated by Section 7 of the ESA, Federal agencies must consult with NMFS and USFWS to ensure that any action authorized is not likely to jeopardize the continued existence of any listed ESA species or result in the destruction or adverse modification of critical habitat required by a listed species (16 U.S.C. 1531 et seq.).

A biological evaluation (BE) was prepared to assess the potential impacts of proposed wastewater discharges from the Osprey Platform on threatened and endangered species of marine mammals or birds that might be present near the project area (Appendix D). The BE provides additional details about the distribution, life history, diet, predators, population status, critical habitat and factors affecting survival for each of the identified species. Table 3-22 lists the NMFS (2007a) and USFWS (2007a) identified ESA species that might be present near the project area.

**Table 3-22. Threatened and endangered species potentially present near the project area (USFWS, 2007a; NMFS, 2007a)**

| Common Name | Scientific Name | ESA Status |
|---|---|---|
| Steller's eider | *Polysticta stelleri* | T |
| Kittlitz's murrelet | *Brachyramphus brevirostris* | C |
| Steller sea lion, western stock | *Eumetopias jubatus* | E |
| Northern sea otter, Southwest Alaska stock | *Enhydra lutris* | T |
| Humpback whale | *Megaptera novaeangliae* | E |
| Beluga whale, Cook Inlet stock | *Delphinapterus leucas* | E |

Notes: Under the ESA, T =Threatened, E = Endangered, C = Candidate

## 3.7.1 Birds

### *3.7.1.1 Steller's Eider – Threatened Species*

The Alaska breeding population of the Steller's eider (*Polysticta stelleri*) was listed as threatened under ESA on June 11, 1997 (62 FR 31748). The Steller's eider is the smallest of the eider species, with both sexes averaging about 1.8 lbs at adult maturity. The Steller's eider occurs infrequently in Alaska and at such low densities during the breeding season that accurate quantification of the population is impossible (66 FR 8850-8884). Historical and recent records indicate that breeding has occurred in two general areas: the Arctic Coastal Plain on the Alaskan North Slope and on the Yukon-Kuskokwim River Delta in western Alaska (USFWS, 2001; 2006). The number of birds found on the North Slope breeding grounds is uncertain, with current estimates ranging from the hundreds to the low thousands. Population size on the Yukon-Kuskokwim Delta is also difficult to estimate. Currently, the birds are extremely scarce on the Yukon-Kuskokwim Delta and have not been found breeding elsewhere in western Alaska for several decades (USFWS, 2006). Only seven nests were found on the Yukon-Kuskokwim River Delta from 1994 to 2002 (USFWS, 2002).

Steller's eiders nest in the terrestrial environment but spend the majority of the year in shallow, nearshore marine waters. These birds tend to reside in areas with waters less than 30 ft deep and are usually found close to shore, except where shallows extend further offshore in bays and lagoons. Steller's eiders move to the marine waters of Southwest and Southcentral Alaska after breeding, where they mix with the more numerous Russian Pacific populations (USFWS, 2006). The birds are numerous on their molting and wintering grounds in Alaska, but these birds are likely from the Russia breeding population, which is not an ESA-protected population (66 FR 8850-8884). Adults experience a flightless autumn; during molting, they simultaneously replace their flight feathers and remain flightless for about 3 weeks. The largest numbers of Steller's eiders molt along the north side of the Alaska Peninsula in Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands. After molting, the birds disperse and venture to the coastal waters of the Aleutian Islands, the south side of the Alaska Peninsula, Kodiak Archipelago and southern Cook Inlet (USFWS, 2006). About 4.2 percent of the Steller's eider population in or near the Cook Inlet area is assumed to be from ESA-listed Alaskan breeding populations (MMS, 2003). Figure 3-7 illustrates the molting and wintering range of the Steller's eider. The Osprey Platform is located within the northern-most portion of their wintering range.

On January 12, 2001, the USFWS designated approximately 2,830 miles$^2$ as critical habitat for the Steller's eider in Alaska. This critical habitat is segregated (or organized) into five units:

1. Kuskokwim Shoals in northern Kuskokwim Bay
2. Seal Islands
3. Nelson Lagoon (including portions of Port Moller and Herendeen Bay)
4. Izembek Lagoon on the north side of the Alaska Peninsula
5. Intertidal zone lands between the Askinuk Mountains and Nelson Island in the Yukon-Kuskokwim Delta.

The area has approximately 65 percent Federal lands or waters, 25 percent State waters and 10 percent native lands (66 FR 8850-8884).

#### *3.7.1.2 Kittlitz's Murrelet – Candidate Species*

The Kittlitz's murrelet (*Brachyramphus brevirostris*) was designated a candidate species in 2004 (69 FR 24875). The Kittlitz's murrelet is a small diving seabird often associated with glaciers. The species' entire North American population, and most of the world's population, inhabits Alaska coastal waters intermittently from Point Lay south to northern portions of Southwest Alaska. Similar in appearance to the marbled murrelet (*B. marmoratus*), the Kittlitz's murrelet is known for its cryptic plumage; however, the Kittlitz's murrelet has a heavier body mass, with a larger head and a short pointy dark-colored bill in comparison to the marbled murrelet (USFWS, 2007c).

Kittlitz's murrelets are typically found in association with marine tidewater glaciers and glacial-influenced waters, near protected fjords or among islands. Detailed information on foraging home ranges is not known but is thought to be approximately a few square miles. All of the North American and a majority of the world population of Kittlitz's murrelets breed, molt, and winter in Alaska (USFWS, 2004). In summer, Kittlitz's murrelets generally are observed in large, sheltered waters such as Prince William Sound, Glacier Bay and Cook Inlet and its associated bays (MMS, 2003). The winter range of this species is not well known, but the birds are assumed to winter at sea and return to protected bays in spring. The Kittlitz's murrelet has been documented in lower Cook Inlet and found nesting on the southern end of the Kenai Peninsula and Kodiak Island (USFWS, 2007a).

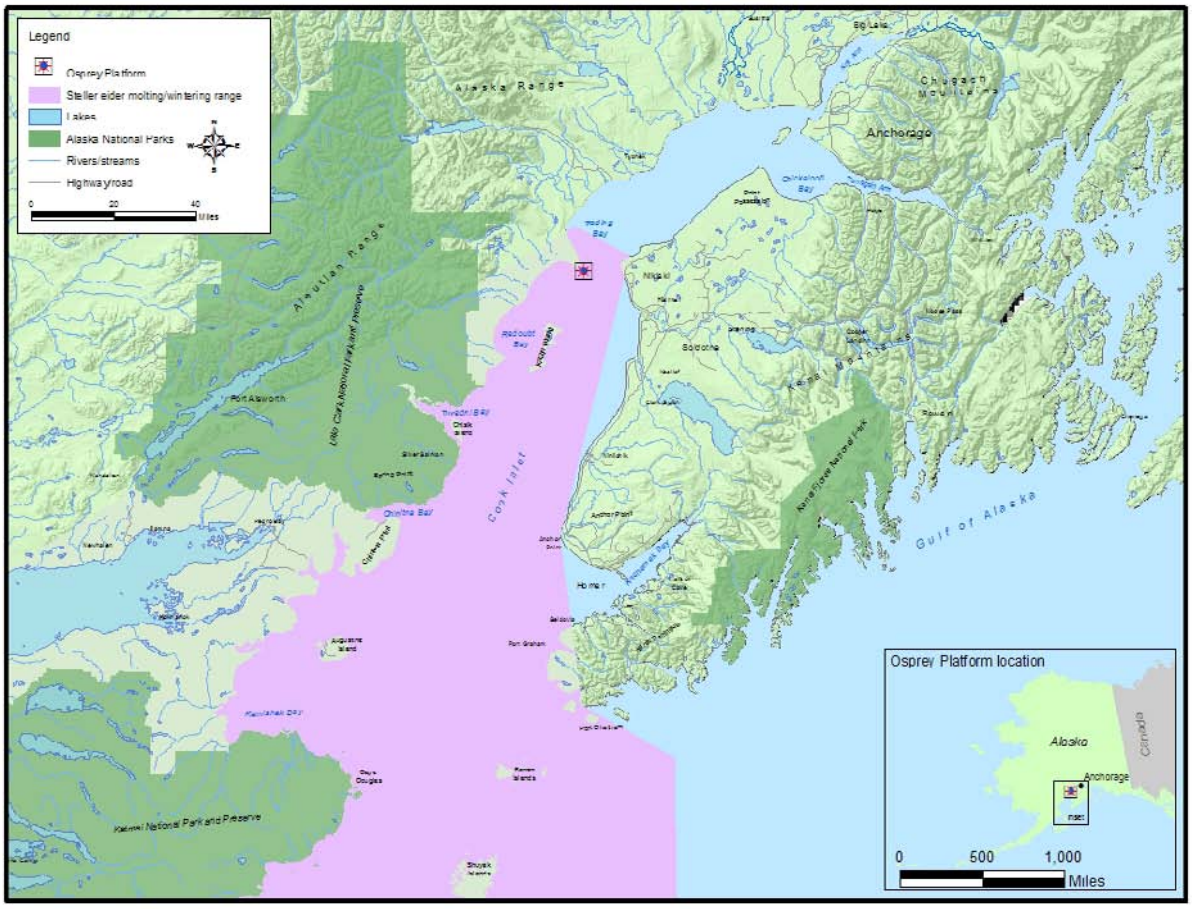


**Figure 3-7. Steller's eider molting and wintering range in Cook Inlet**

In Alaska, the current population estimate for Kittlitz's murrelets is approximately 16,700 birds. This is a decline ranging from 74 to 84 percent in the past 10 to 20 years. Recent surveys support the negative population trend estimates (50 FR 69034). In addition, USFWS (2004) reports a 13 percent decline of this species in lower Cook Inlet from 1984 to 2004. Available information indicates the largest populations of Kittlitz's murrelets are in Southeast and Southcentral Alaska, although a relatively high percentage of nests have been located on the Seward Peninsula. Prince William Sound is believed to represent one of two population centers for the Kittlitz's murrelet; the northern GOA is where most of the world's population nests. In Cook Inlet, current summer population estimates are 3,330 to 5,000 birds; the winter population estimate is zero (MMS, 2003). The Kittlitz's murrelet does not have any designated critical habitat in the United States.

### 3.7.2 Marine Mammals

In a letter to USEPA dated September 5, 2007, NMFS reported that four species of protected marine mammals might be found in Cook Inlet within the project area (NMFS, 2007a). These four species are the western U.S. stock of Steller sea lion (*Eumetopias jubatus*), the Southwest Alaska population of northern sea otter (*Enhydra lutris kenyoni*), humpback whale (*Megaptera novaeangliae*) and Cook Inlet stock of Beluga Whale (*Delphinapterus leucas*). These species are described below.

#### *3.7.2.1 Steller Sea Lion, Western U.S. Stock – Endangered Species*

The Steller sea lion (*Eumetopias jubatus)* was listed as a threatened species on April 5, 1990, because of substantial declines in the western portion of its range (55 FR 12645). The western U.S. stock of Steller sea lions was reclassified as endangered in 1997 because of persistent decline (62 FR 24345). Steller sea lions range from northern Japan to California along the North Pacific Rim. In Alaska, they are most abundant in the GOA and most distributed within the Aleutian Islands. The species is non-migratory, but individuals disperse and intermingle with animals from other areas outside of the breeding season (late May to early July) (Angliss and Outlaw, 2007). Steller sea lions inhabit marine and terrestrial areas. They breed, pup, and seek rest and refuge on relatively remote islands and points of land along the Alaskan coastline (62 FR 24345). Sites where sea lion adults congregate for pupping and breeding are referred to as rookeries. The western U.S. stock of Steller sea lion breeds on rookeries in Alaska from Prince William Sound (144°W) west through the Aleutian Islands and in Russia on the Kamchatka peninsula, Kuril Islands, and the Sea of Okhotsk (NMFS, 2008).

Rookeries are usually located on beaches exposed to wind and waves on relatively remote islands, where access by humans and other predators is difficult. During times other than the breeding season, sea lion adults use haul-out areas. Non-breeding adults and subadults use haul-outs year-round and often occupy haul-outs adjacent to rookeries because they are unable to hold territories. During the non-breeding season, rookeries are often used as haul-outs. Even though juveniles and adult males disperse widely, exchange between rookeries by breeding adult females and males (other than between adjoining rookeries) appears low (Angliss and Outlaw, 2007). Figure 3-8 illustrates the major rookery and haul-out sites for Steller sea lions near Cook Inlet. No rookeries or haul-outs are located near the Osprey Platform or within Cook Inlet.

From 1956 to 1960, counts of Steller sea lions in Alaska indicated at least 140,000 sea lions resided in the GOA and Aleutian Islands. Population declines were observed from 1976 to 1998, but the rate of the declines has been slowing in recent years. The 2006 NMFS stock assessment report for the western stock of the Steller sea lion details the most recent, comprehensive estimate of abundance in Alaska as 44,800 sea lions. This estimate is based on aerial surveys of non-pups in June 2004 and on actual pup counts from all rookeries and major haul-out sites in June and July of 2004 and 2005. These counts have not been corrected to account for animals that were at sea during the surveys (Angliss and Outlaw, 2007).

The diet of the Steller sea lion consists mainly of fishes, cephalopods, and occasionally other marine mammals and sea birds. In Southeast Alaska, the most commonly identified prey items were Walleye pollock, Pacific cod, flatfishes, rockfishes, herring, salmon, sand lance, skates, squid and octopus. Scat data[17] (food remnants) analyzed from rookeries and haul-outs suggest that pollock is a dominant prey species for sea lions in the GOA. Atka mackerel was the most frequently occurring prey in central and western Aleutian Islands scats. In the winter, Pacific cod has been an important prey source in the GOA, with salmon more frequently eaten in the summer months (NMFS, 2008).

[17] Scat data, like stomach contents, may be biased because some prey species may have hard body parts that are more or less likely to make it though the digestive tract.

Critical habitat for the Steller sea lion was designated on August 27, 1993 (58 FR 45269; 50 CFR § 226.202), based on the location of terrestrial rookery and haul-out sites, spatial extent of foraging trips and prey availability. Adult males and females use rookeries for pupping, nursing and mating during the mating season (late May to early July). Designated critical habitat is located at Cape Douglas, the Barren Islands, and marine areas adjacent to the Southwestern Kenai Peninsula. Designations are also at the extreme southern end of Cook Inlet. Critical habitat for Steller sea lions includes the following:

- A terrestrial zone that extends 3,000 ft landward from the baseline or base point of each major rookery and major haul-out
- An air zone that extends 3,000 ft above the terrestrial zone, measured vertically from sea level
- An aquatic zone that extends 3,000 ft seaward in State and Federally managed waters from the baseline or base point of each major haul-out in Alaska that is east of 144º W longitude
- An aquatic zone that extends approximately 121,400 ft seaward in State and Federally-managed waters from the baseline or base point of each major rookery and major haul-out in Alaska that is west of 144º W longitude.

NMFS administers a complex plan of fishery management measures designed to minimize competition between commercial fishing activities and the endangered population of Steller sea lions in critical habitat areas (NMFS, 2008).

Over the past decade, research efforts have generated an extensive amount of information about the Steller sea lions and the North Pacific ecosystem. For the western U.S. Steller sea lion stock, population decline has been attributed to many factors, including commercial fishing of prey species, predation, and environmental change. However, this attribution is inconclusive about which single or combination of these factors is most important in causing the decline (Angliss and Outlaw, 2007). Known predators of Steller sea lions include sharks and killer whales (*Orcinus orca*). The most recent recovery plan for the species outlines several threats that are considered relatively minor, including subsistence harvesting, illegal shooting, entanglement in marine debris, disease, and disturbance from vessel traffic and scientific research (NMFS, 2008).

There is no evidence that the availability of rookery or haul-out space is a limiting factor. As the number of sea lions continues to decline, some rookeries and haul-outs have been abandoned, providing an increase in the availability of suitable terrestrial habitat. Terrestrial habitat destruction and modification do not appear to have a significant role in this species' population decline. However, indications in the Steller sea lion population decline might be related to changes in the availability or quality of sea lion prey as a result of environmental changes or human activities (e.g., commercial fisheries) (62 FR 24345).

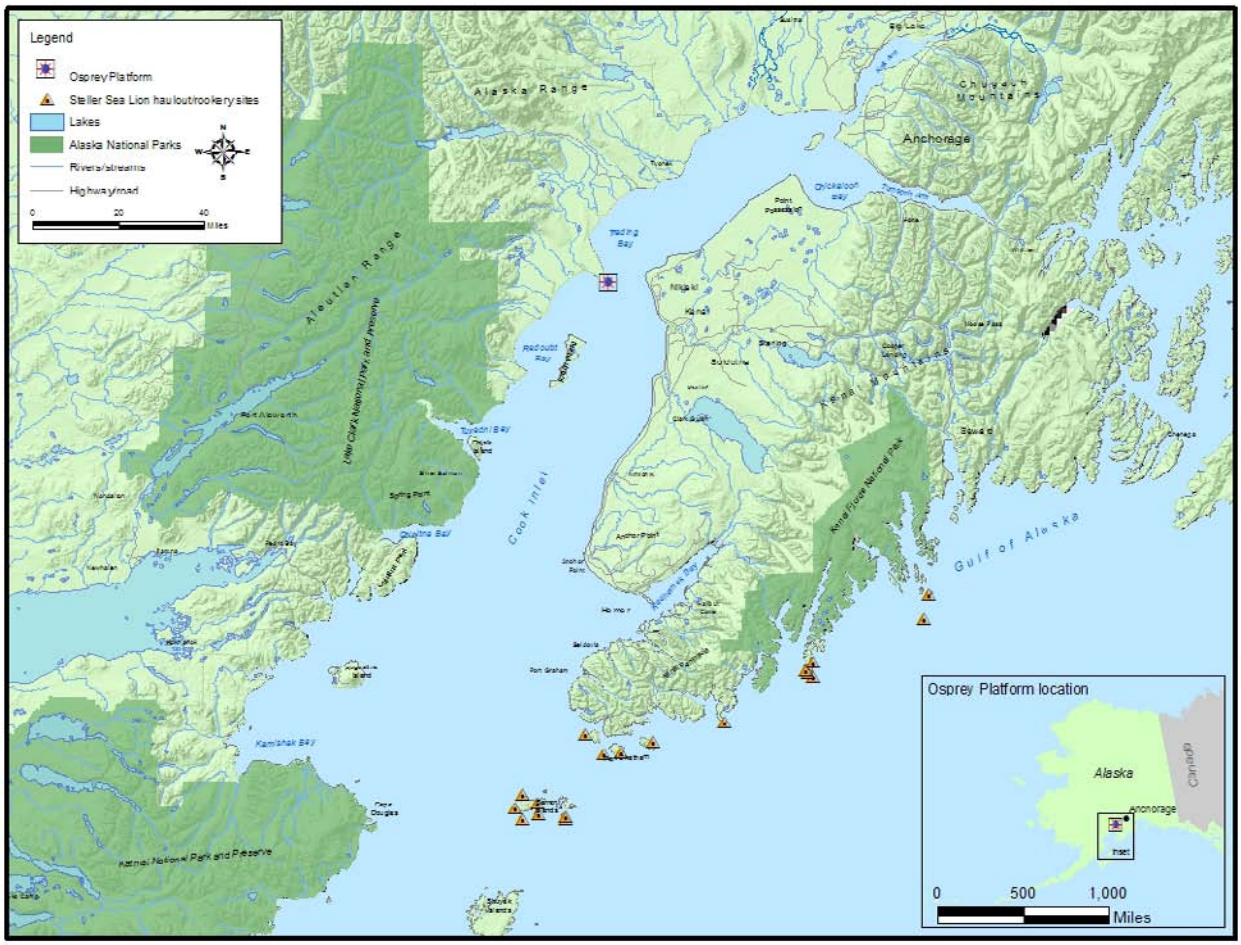


**Figure 3-8. Rookery and haul-out sites for Steller sea lions near Cook Inlet**

### *3.7.2.2 Northern Sea Otter, Southwest Alaska – Threatened Species*

Sea otters (*Enhydra lutris*) generally occur in nearshore coastal waters along the North Pacific Rim from the Aleutian Islands to California (USFWS, 2003). Sea otters are the smallest marine mammals and are most closely related to river otters (USFWS, 2005). In Alaska, sea otters are not migratory and do not usually disperse over long distances, although movements of up to 60 miles are normal. However, sea otter movements are likely limited by geographic barriers, high-energy requirements of the species and their social behavior. Sea otters are most commonly observed within the 130 ft depth contour because they require frequent access to foraging habitat in subtidal and intertidal zones (USFWS, 2003). Based on evidence indicating that sea otter numbers in this area are declining, USFWS designated the Southwest Alaska Distinct Population Segment of the Northern sea otter *(Enhydra lutris kenyoni)* as threatened on August 9, 2005 (70 FR 46366).

Historically, sea otters were found across the North Pacific Rim, ranging from Japan to the Aleutian Islands, along the south coast of Alaska and as far south as California and Mexico. In the early 1700s, estimates for the worldwide population were between 150,000 and 300,000 individuals. The northern sea otters remained abundant, even with subsistence hunting throughout their range until the mid-1700s. Extensive commercial harvesting of sea otters — to

the point of near extinction — occurred over the next 150 years with the arrival of Russian explorers to Alaska in 1741. By 1900, commercial harvesting practically ceased as the sea otter populations were reduced to 13 remnant populations totaling a few hundred in each colony. Fewer than 2,000 sea otters remained by the time the International Fur Seal Treaty halted commercial hunting of sea otters in 1911. Population re-growth began following protection by the International Fur Seal Treaty; sea otters have since recolonized much of their historic range in Alaska (USFWS, 2003).

Today, there are three sea otter stocks in Alaska: Southeast, Southcentral and Southwest. For this evaluation, the Southwest stock (occupying waters of the Alaska Peninsula and Bristol Bay coasts and the Aleutian, Barren, Kodiak, and Pribilof Islands) is applicable to the project area (USFWS, 2003). The Southeast and Southcentral stocks are not addressed in this evaluation, as indicated in the September 5, 2007 letter from NMFS (2007a).

Otters are year-round residents within portions of Cook Inlet. Estimates indicate that there are 41,474 northern sea otters in the Southwest Alaska Distinct Population Segment (USFWS, 2003). In comments on the Draft EIS for MMS lease sales within Cook Inlet, USFWS reported that observations of sea otters in the area were minimal. The Osprey Platform is located within the same area that is covered for the proposed lease sale. USFWS also reported that the majority of sea otter sightings occurred southwest of Augustine Island in the southwestern portion of Cook Inlet (MMS, 2003). A recent precipitous decline in northern sea otter populations in Southwest Alaska (from Kodiak Island to the western Aleutian Islands) has become a significant conservation issue. The reasons for the decline are unknown (USFWS, 2003). The Southwest Alaska Distinct Population Segment of the northern sea otter does not have any designated critical habitat.

The northern sea otter is a generalist predator of more than 150 different prey species often dominated by benthic invertebrates. Sea urchins, crabs, and a variety of mollusks are principal prey. In the Aleutian Islands, fish are an important prey in areas with high population densities. Rocks or other hard objects are often used as tools to open exoskeletons of invertebrate prey. However, individual sea otters have varying diets and foraging behaviors (Alaska Natural Heritage Program [AKNHP], 2005b).

Potential threats to sea otter populations include disease or predation and indirect effects resulting from human activities. In the Aleutian Islands, sea otter population studies suggest recent declines are the result of increased adult mortality. One other factor being researched as a leading potential cause of the population decline is the effect of predation by transient killer whales (USFWS, 2005). Other studies of sea otters in the Aleutian Islands suggest that disease, starvation, and contaminants might also be threats (USFWS, 2003). In areas with greater human activities, sea otter survival is potentially threatened by exposure to persistent and bioaccumulative contaminants (including PCBs, PAHs, and dioxins), fishing equipment (e.g., set nets or gill nets), seafood processing plant wastes and competition from commercial fishing activities (USFWS, 2005).

#### *3.7.2.3 Humpback Whale – Endangered Species*

The humpback whale (*Megaptera novaeangliae*) was listed as an endangered species on December 2, 1970 (35 FR 18319) and was designated as depleted under the MMPA. Found

worldwide, the humpback whale often resides in temperate and tropical waters in the northern and southern hemispheres during winter. In the North Pacific, however, the humpback whale does not occur in Arctic waters (Angliss and Outlaw, 2007). The humpback whale is the baleen whale most frequently observed close to shore along the southern Alaskan coast. When beginning to dive, animals often lift their tails (flukes) out of the water exposing individual patterns of black and white on the ventral side (ADF&G, 1994). The unique patterns on the humpback's tail flukes can be used to identify individuals within a population, making the humpback whale one of the most studied cetacean species. Humpback whale songs are considered an important general communication tool for the species (Richardson et al., 1995). Humpback whales in the North Pacific are seasonal migrants that feed on euphausiids and small schooling fishes in the coastal and inland waters of the western United States, Canada, and the Russian Far East (Angliss and Outlaw, 2007).

Generally, humpback whale distribution has been largely correlated to prey species and abundance. Humpback whale summer feeding grounds extend from central California and Washington State through Southeast Alaska and the Aleutian Islands to the Bering Sea. In the GOA, areas of concentration include the Portlock and Albatross Banks and the eastern Aleutian Islands, Prince William Sound, and the inland waters of Southeast Alaska. Breeding and calving occur on the wintering grounds and most births occur between January and March (Angliss and Outlaw, 2007). Sightings of humpback whales in Cook Inlet are rare, although humpbacks are observed near the Barren Islands, south of Cook Inlet, in the summer months (ADF&G, 1994).

Humpback whales in the North Pacific are from three separate stocks that migrate between winter/spring calving and mating areas and summer/fall feeding grounds (ADF&G, 1994). The three stocks of humpback whales, as recognized within the U.S. EEZ of the North Pacific, are the eastern North Pacific (the California/Oregon/Washington – Mexico stock), the central North Pacific and the western North Pacific (Angliss and Outlaw, 2007). When in Alaska, humpback whales tend to concentrate in several specific areas, primarily in Southeast Alaska, Prince William Sound, the area near Kodiak and the Barren Islands, the area between the Semidi and Shumagin Islands, the eastern Aleutian Islands, and the southern Bering Sea (ADF&G, 1994). Survey efforts using photographic identification suggest humpbacks that feed in the GOA region migrate to the Hawaiian Islands for the winter. For humpback whales that summer in the Kodiak region, uncertainty remains on what location(s) they typically migrate to in the winter to calve and to breed (MMS, 2003).

An estimated 15,000 humpback whales inhabited the North Pacific prior to commercial whaling. During the 20th century, humpbacks were subjected to severe harvest pressure from commercial whaling before being granted protection from whaling in 1966. Photographic surveys from 1991 to 1993, designed to estimate abundance throughout the entire North Pacific, were the largest and most complete during this period. These surveys calculated an abundance estimate of 394 individuals for the western North Pacific humpback whale stock. However, this population estimate is believed to be an underestimate of the population's true size (Angliss and Outlaw, 2007). More recent studies, including those following the *Exxon Valdez* oil spill, indicate that more than 500 humpbacks might be found in Southeast Alaska in the summer months, with more than 100 within Prince William Sound (ADF&G, 1994). No reliable estimates are available for the abundance of humpbacks at feeding grounds for this stock because some feeding grounds are

unknown, and known feeding grounds have not been comprehensively surveyed (Angliss and Outlaw, 2007). No critical habitat in Alaska has been designated for the humpback whale.

Humpback whales feed largely on swarms of euphausiids (krill) and small schooling fish (e.g., herring, capelin, and sand lance) (Angliss and Outlaw, 2007). Humpback whales use a variety of feeding behaviors to catch their prey, including bubble columns (underwater exhalation of columns of bubbles that concentrate prey in one area), formation feeding, prey herding and lunge feeding. As a baleen whale species, the humpback whale has ventral grooves to allow its throat to widely expand and take in large volumes of water, which are then forced out across baleen plates that act as a filter to retain the food (NMFS, 2005b).

Quantitative abundance trends for the western North Pacific humpback whales are unavailable. Humpback whale populations were depleted throughout their range by commercial whaling from the 1800s to 1966. No other factors are known to have contributed to their decline. Subsistence hunting for humpbacks in Alaska has not been reported. No commercial fishery-related mortalities have been observed during 1990 to 1997 monitoring (Angliss and Outlaw, 2007). No habitat concerns have been identified for the western North Pacific humpback whale stock (NMFS, 1991); however, Angliss and Outlaw (2007) noted that underwater noise from sonar and shipping is a potential concern.

#### *3.7.2.4 Beluga Whale, Cook Inlet Stock – Endangered Species*

In Alaskan waters, there are five stocks of recognized beluga whales (*Delphinapterus leucas*): Cook Inlet, Bristol Bay, Eastern Bering Sea, Eastern Chukchi Sea and Beaufort Sea. In 2000, NMFS designated the Cook Inlet stock of beluga whales as depleted under the MMPA, as amended (65 FR 34590). In 2008, NMFS issued a final determination listing the Cook Inlet beluga whale as endangered under the ESA (73 FR 62919).

The beluga whale is often seasonally dispersed within ice-covered arctic and subarctic waters of the northern hemisphere. Belugas are social animals that travel, hunt, and interact together, often in close, dense groups (Hobbs et al., 2006). Cook Inlet beluga whales are a stock genetically and geographically isolated from the other four Alaska beluga whale populations. The majority of observed Cook Inlet beluga whales congregate, particularly from June to October, in the upper Cook Inlet in or near the Susitna Delta, Knik Arm and Point Possession within shallow areas near river mouths. Belugas are occasionally observed in the central or southern portions of Cook Inlet during these warmer temperature months. Outside of the summer months, beluga whales in Cook Inlet are often more dispersed and sightings are fewer (Hobbs et al., 2006).

A 2006 review of this species, based on data from tagged belugas (14 tags from 2000 to 2003), concluded the whales are found predominately in the upper inlet between summer and late autumn and are dispersed to mid-inlet offshore waters during winter months (Hobbs et al., 2006). Figure 3-9 illustrates habitat usage for beluga whales within Cook Inlet. Belugas disperse throughout much of the upper inlet by the end of June, and dispersal of large groups of belugas is generally not observed until later in the summer. By mid to late October, the whales travel south from the upper inlet; however, belugas have been observed in the upper inlet well into November (Hobbs et al., 2005). There have been sightings of belugas in central Cook Inlet in winter (MMS, 2003).

The 2006 NMFS Marine Mammal Stock Assessment Report notes that the exact winter distribution of this stock of beluga whales is not well known; however, evidence has shown that much of the Cook Inlet stock of belugas inhabits Cook Inlet year-round (Angliss and Outlaw, 2007; Hobbs et al., 2005). Seasonal migrations in and out of Cook Inlet are not likely based on data from tagged whales and surveys within Cook Inlet and in the GOA. The only area outside of Cook Inlet with a known beluga population is Yakutat Bay (Hobbs et al., 2006). The Cook Inlet beluga whale stock does not have any designated critical habitat.

Since 1993, NMFS has conducted annual, comprehensive, systematic aerial surveys of the Cook Inlet beluga whale population. Between 1994 and 1998, nearly 50 percent of the population was reduced (653 whales to 347 whales sighted), which correlated to increased Alaska Natives subsistence harvesting. Although subsistence harvests have been limited to one to two belugas per year since 1999, the expected 2 to 6 percent population growth has not occurred (NMFS, 2007b; Hobbs et al., 2006). The 2006 aerial survey recorded only 302 whales (Angliss and Outlaw, 2007). The 2008 surveys found the abundance unchanged from 2007, with a total of 375 whales recorded. NMFS determined that the annualized population growth of beluga whales between 1999 and 2008 was -1.45 percent. This number is significantly less than the expected growth of 2 to 4 percent for an un-harvested population (73 FR 62919).

Beluga whales feed on a variety of prey species following the patterns of seasonal abundance of the different types of forage. In the spring, preferred prey are eulachon (*Thaleichthys pacificus*), saffron cod (*Eleginus gracilis*) and Pacific cod (*Gadus macrocephalus*). From late spring and through the summer, belugas prey on eulachon and Pacific salmon (*Oncorhynchus* spp.). In the fall, as these anadromous fish runs begin to decline, beluga whales return to consuming their spring season cod species in addition to bottom-dwelling prey such as Pacific staghorn sculpin (*Leptocottus armatus*), starry flounder (*Platichthys stellatus*), and yellowfin sole (*Limanda aspera*). The precise type of prey belugas consume in the winter months (November through March) is unknown. Researchers believe that belugas feed in deeper waters in the winter on prey species such as flatfish, cod, sculpin, and pollock (Hobbs et al., 2006).

The decline of Cook Inlet beluga whales has been generally attributed to subsistence harvest by Alaska Natives. In the 1980s, Cook Inlet beluga whales were primarily hunted by a small group of Alaska Natives from Tyonek (of Dena'ina Athabascan descent) and by hunters living in or visiting the area from northern and western Alaska tribes and villages (of Inupiat and Yup'ik Eskimo descent). Although an exact number does not exist, the number of Eskimo hunters (or non-area hunters) in the 1980s and 1990s was greater than that of Cook Inlet tribal hunters (NMFS, 2007b). During 1995 to 1998, annual subsistence takes averaged 77 beluga whales, with the harvest as high as 20 percent of the population in 1996 (73 FR 62919). With the decline of the Cook Inlet beluga whale stock, in 1999 NMFS placed a moratorium on beluga harvest in Cook Inlet until the Service developed a cooperative plan for harvest management with the local Alaska native organizations. No subsistence takes occurred in 1999 and 2000 (Angliss and Outlaw, 2007; NMFS, 2007b).

A harvest management plan developed between the Alaska native organizations and NMFS (interim plan through 2004) allowed for a total take[18] of six whales from 2001 to 2004 (71 FR 15697-15698). A subsequent ruling in 2005 for a long-term harvest management plan resulted in a proposed total subsistence take (harvest) allowance of one take for 2006, two takes for 2007, one take for 2008 and two takes for 2009. This harvest management strategy was proposed and adopted by motion by Cook Inlet Treaty Tribes, Native Village of Tyonek and native hunters (NOAA, 2004). Harvests in the following 5-year periods will depend on the average abundance in the previous 5-year period and the observed population growth rate (NMFS, 2003). No subsistence harvesting would be allowed if the average population size dropped below 350 whales (Angliss and Outlaw, 2007).

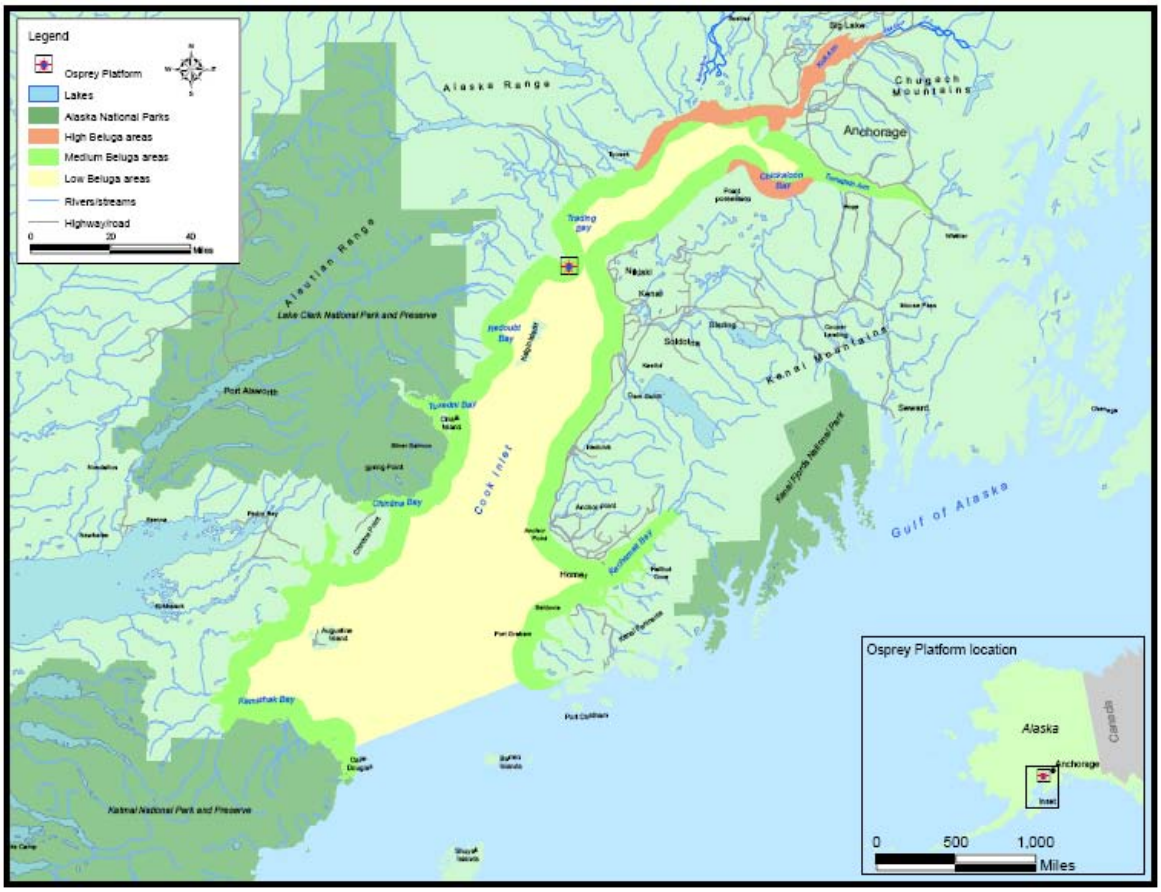


**Figure 3-9. Beluga whale habitat use within Cook Inlet**

[18] The term "take" is defined under ESA to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct (16 U.S.C. 1532 (19)). The term "harass" is defined as "an intentional or negligent act that creates the likelihood of injuring wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns such as breeding, feeding, or sheltering" (50 CFR 17.3). "Harm" is defined by USFWS to include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, and sheltering (50 CFR 17.3). NMFS' definition of "harm" includes significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, spawning, migrating, rearing, and sheltering (64 FR 60727).

Because of the limited range of the Cook Inlet beluga whale population, this stock is assumed sensitive to human-induced or natural disturbances. Contaminants, underwater noise, onshore or offshore development and construction are potential impacts for the recovery of the Cook Inlet beluga stock or their habitat (Angliss and Outlaw, 2007).

The killer whale is the only natural predator of the beluga whale. Killer whales are common visitors to Cook Inlet and have been known to pursue belugas in the inlet (NMFS, 2007b). Killer whales are believed to take at least one Cook Inlet beluga whale annually (73 FR 62919). No mortalities or injuries have been observed or reported for fishery-related activities such as trawling or drift gillnets in Cook Inlet (Angliss and Outlaw, 2007).

Individual and groups of Cook Inlet beluga whale strandings have been found along mudflats in upper Cook Inlet. The cause of these strandings is unknown but may be attributed to extreme tidal fluctuations, predator avoidance, and pursuit of prey. NMFS records report more than 200 Cook Inlet beluga whale stranding events, most resulting in animal mortality (73 FR 62919).

## 3.8 TERRESTRIAL BIOLOGICAL RESOURCES

### 3.8.1 Terrestrial Mammals

Many terrestrial mammals occur in the Cook Inlet region, and at least 31 species of terrestrial mammals are known or suspected to inhabit the lowland areas bordering the west side of upper Cook Inlet. The mainland species that use the marine coastal environments to some degree are the river otter, brown bear, and black bear.

River otters frequently occur in nearshore waters along the coast, often foraging on beaches and intertidal areas for small fish, clams, crustaceans, and other invertebrates. Sculpins and rockfish were reported to be the predominant prey items of river otters occurring along the coast of Southeastern Alaska (USEPA, 2002b).

Brown bears use marine coastal areas from April to November. During spring, bears rely heavily on coastal meadows, beaches, and shorelines to forage on newly emergent plants, carrion, and intertidal infauna (i.e., clams). During the summer and early fall, brown bears congregate along coastal streams (such as the Kustatan River) to feed on salmon and other spawning fish (USEPA, 2002b).

Black bears are most abundant in wooded areas. They can be found along the Cook Inlet shoreline near streams, bogs, and clearings. A black bear feeding concentration area has been documented along the shore between Kustatan and the Kustatan River (USEPA, 2002b).

### 3.8.2 Terrestrial Birds

Upper Cook Inlet provides a variety of terrestrial habitats for birds. Major species groups that occur in upper Cook Inlet during some portion of the year include those associated with freshwater and marine habitats (waterfowl) and those associated with more terrestrial habitats (raptors, grouse, woodpeckers, and passerines). These are addressed in the following paragraphs.

#### *3.8.2.1 Waterbirds*

Waterbirds (such as loons) and waterfowl (i.e., swans, geese, and ducks) occur as breeding birds and migrants in the Cook Inlet region. Waterbirds are discussed in this section because they predominantly use freshwater habitat such as lakes and wetlands rather than marine coastal environments. Nineteen species of waterbirds are common or abundant in the Cook Inlet/Shelikof Strait area as residents or migrants. Table 3-23 identifies waterbird species occurring in the Cook Inlet region.

Waterbird density peaks in the Cook Inlet region during April to May as large numbers of birds migrate through the area. Upper Cook Inlet supports large populations of staging waterfowl on its tidal flats (i.e., Susitna Flats, Portage Flats, Palmer Hay Flats, and Chickaloon Flats), along river mouths and in bays, particularly on the western side of the inlet. Areas of particularly high populations are in Redoubt Bay for geese and ducks, (USEPA, 2002b). Within Cook Inlet, sites considered as important waterbirding areas include nesting grounds of almost the entire population of the Tule race of the Greater White-fronted Goose, tidal flats where almost the entire population of the Pribilof Island race of the Rock Sandpiper overwinters, and seabird colonies where hundreds of thousands of Common Murres nest (Audubon, 2007). Distinct habitat types are known for various waterbirds. Loons, grebes, and sea ducks are typically found on bays and exposed inshore waters. Geese and dabbling ducks are associated with river floodplains and marshes. Bay waters are the preferred habitat for diving ducks (USEPA, 2002b).

In the summer, waterbird abundances in Cook Inlet begin to decline as sea ducks and other waterbirds leave the area. During July and August, a molt migration of all three scoter species concentrates thousands of birds in the coastal areas from Kotzebue Sound to Cook Inlet. Important staging areas for fall migration are numerous bays, rivers, and mudflats within lower Cook Inlet. In the fall, densities of dabbling duck and geese as migrants increase and begin to move into the area. Four areas of lower Cook Inlet retain high bird densities: inner Kachemak Bay, southwestern Kamishak Bay, Tuxedni Bay, and northwestern Kachemak Bay. In these four areas, dabbling ducks, sea ducks, and gulls comprise 85 percent of all observed waterbirds. More than one million scoters winter in the Bering Sea, and several hundred thousand range from the eastern Aleutians east to Kodiak Island, Cook Inlet, and Prince William Sound (USEPA, 2002b).

Approximately 30 to 35 species of waterbirds are regularly found in the Cook Inlet area, including two species of swans (trumpeter and tundra swans), six species of geese, 20 to 25 species of ducks, and six species of loons/grebes (see Table 3-23). This distribution varies between the upper and lower inlet on a seasonal basis. In addition, waterbirds are distributed differently between the eastern and western sides of Cook Inlet. Wintering populations are confined primarily to lower Cook Inlet due to limited open waters north of the Forelands. Several species occurring in the Cook Inlet area are of particular concern because of their limited breeding distribution, small population size or use of critical habitats (USEPA, 2002b). These species of concern are the trumpeter swan, Tule white-fronted goose, and snow goose. Details about these three species are provided in the following paragraphs.

**Trumpeter Swan.** Trumpeter swans migrate to Cook Inlet in early April and move to their breeding areas by late April. Nesting and brood rearing continue through August and September. Migration ends in late September and early October. Nesting swans are found on both sides of

the central and upper Cook Inlet, with major concentrations on the western side in Trading Bay, along the Kustatan River, and in Redoubt Bay. The 1990 census for trumpeter swans counted over 13,000 swans in Alaska (more than 80 percent of the world's population), and 1,661 swans in the Cook Inlet area (ADF&G, 1994).

**Table 3-23. Waterbird species in Cook Inlet area (adapted from USEPA, 2006)**

| Common Name | Scientific Name |
|---|---|
| Common loon | *Gavia immer* |
| Pacific loon | *G. pacifica* |
| Red-throated loon | *G. stellata* |
| Yellow-billed loon | *G. adamsii* |
| Red-necked grebe | *Podiceps grisegena* |
| Horned grebe | *P. auritus* |
| Tundra swan | *Cygnus columbianus* |
| Trumpeter swan | *C. buccinator* |
| Greater White-fronted Goose | *Anser albifrons* |
| Snow goose | *Chen caerulescens* |
| Emperor goose | *Chen canagica* |
| Brant | *Branta bernicla* |
| Canada goose | *Branta canadensis* |
| Green-winged teal | *Anas crecca* |
| Mallard | *A. platyrhynchos* |
| Northern pintail | *A. acuta* |
| Northern shoveler | *A. spatula* |
| Gadwall | *A. strepera* |
| American wigeon | *A. americana* |
| Canvasback | *Aythya valisineria* |
| Ring-necked duck | *A. collaris* |
| Greater scaup | *A. marila* |
| Lesser scaup | *A. affinis* |
| Common eider | *Somateria mollissima* |
| King eider | *S. spectabilis* |
| Steller's eider | *Polysticta stelleri* |
| Harlequin duck | *Histrionicus histrionicus* |
| Oldsquaw | *Clangula hyemalis* |
| Black scoter | *Melanitta nigra* |
| Surf scoter | *M. perspicillata* |
| White-winged scoter | *M.fusca* |
| Common goldeneye | *Bucephala clangula* |
| Barrow's goldeneye | *B. islandica* |
| Bufflehead | *B. albeola* |
| Hooded merganser | *Lophodytes cucullatus* |
| Common merganser | *Mergus merganser* |
| Red-breasted merganser | *M. serrator* |

**Tule White-Fronted Goose.** The distribution of Tule geese is very limited, and they are found only in a few areas of California and Oregon during autumn, winter, and spring (ABSC, 2002). Their Alaska breeding range has not yet been fully determined; however, the west side of Cook Inlet in Redoubt Bay is a known nesting area (ADF&G, 1994). During the summer, Tule geese

nest only in the Cook Inlet basin and glacial valleys of Southeast Alaska (ABSC, 2002). Tule geese arrive in early April to begin nesting in May. Most depart the area by late August. The nesting population in Cook Inlet is estimated at about 1,500 (total population estimated at 7,000) (ADF&G, 1994). The presence of nesting areas in the Redoubt Bay area was one of the main factors for creating the Redoubt Bay State Critical Habitat Area. Recent surveys indicate a 90 percent decline in the number of Tule geese using the west side of Cook Inlet since the early 1980s. This decline has been attributed to the Redoubt Volcano eruption that caused considerable alteration to much of the habitat Tule geese use for nesting and brood rearing (ABSC, 2002).

**Snow Goose.** Snow geese can be found in large numbers near the mouth of the Kenai River along the Kenai River flats in spring. There are very few nesting snow geese in Alaska. Most snow geese in Alaska are spring and fall migrants, stopping to feed and rest on their migration routes to and from their nesting grounds (ADF&G, 1994). Total numbers of snow geese using the area vary annually based on spring weather conditions, but counts in spring have ranged between 2,000 and 15,000 birds. In addition to the Kenai River flats, snow geese are often found during the spring on the Kasilof River flats, the Susitna Flats, and Redoubt Bay. An estimated 30,000 to 35,000 snow geese move through Cook Inlet in spring before they leave for their breeding grounds by early May (USEPA, 2002b). For snow geese, the timing of ice and snowmelt in spring on both staging and nesting grounds is more critical than for other geese species because snow geese nest in the far north and have a short breeding season. A late spring means less food availability at their northern "refueling" areas and snow cover could delay or prevent nesting, resulting in fewer young snow geese (ADF&G, 1994).

#### *3.8.2.2 Terrestrial Species*

Most terrestrial bird species found in the Cook Inlet region are migratory and are observed during the summer when temperatures and food availability are conducive for breeding. Major species groups found in the area include owls, raptors, grouse, woodpeckers, and passerines. In the Cook Inlet region, most species are widely distributed and abundant. Only two species, the bald eagle and peregrine falcon, have been identified as species of concern because of their sensitivity to human disturbance during nesting or limited population size.

The bald eagle is Alaska's largest resident bird of prey, with a wingspan up to 7.5-ft wide. Bald eagles are more abundant in Alaska than anywhere else in the United States. The Alaskan population has been estimated to include 30,000 birds at the time of fledging. Bald eagles are often found along Alaska's coast, offshore islands, and interior lakes and rivers (ADF&G, 2003a). Bald eagles commonly occur in coastal habitats in Cook Inlet and along inland rivers and lakes where fish are abundant (USEPA, 2002b). The bald eagle is a breeding, year-round resident along the coasts of lower Cook Inlet and Shelikof Strait (USEPA, 2006). However, bald eagles are present in the general area of Redoubt Bay (USEPA, 2002b). The highest nesting densities occur on the islands of Southeast Alaska (ADF&G, 2003a).

Peregrine falcons, which were previously listed as threatened and endangered, might occur in the general area while migrating to other locations in Alaska. Peregrines frequent the heads of bays, where they prey on seabirds, waterfowl and shorebirds (MMS, 2003). In southern Alaska, Peale's peregrine falcons are found along the coast in the GOA. In a 1990 field survey of peregrine falcons conducted in the northern GOA, researchers recorded the highest nest-site

densities along the southern coast of the Kenai Peninsula. Extrapolation from their population estimate for the entire study area indicated a population of more than 60 adults for the southern Kenai Peninsula (USEPA, 2006).

## 3.9 SOCIOECONOMIC CONDITIONS

The proposed project is located within the Kenai Peninsula Borough. The communities most likely to be affected include Tyonek, Kenai, Nikiski, and Soldotna (Figure 3-10). These communities will be the primary focus of this evaluation.

Located on a bluff on the northwest shore of Cook Inlet, Tyonek is a Dena'ina (Tanaina) Athabascan Indian Village. Settlements in the area include Old Tyonek Creek, Robert Creek, Timber Camp, Beluga, and the Moquawkie Indian Reservation. Russian trading settlements were established at Tuiunuk and Iliamna before the 1790s; however, these settlements were destroyed because of disagreements between the parties. Between 1836 and 1840, half of the region's Indians died from a smallpox epidemic. The Alaska Commercial Company established a major outpost in Tyonek by 1875. Once gold was discovered at Resurrection Creek in the 1880s, Tyonek became a major disembarkment point for goods and people. Tyonok village moved to its present location when the old site near Tyonek Timber flooded in the early 1930s. The population declined to join with Anchorage when the capital was founded. In 1965, the Federal court ruled that the Bureau of Indian Affairs (BIA) had no right to lease Tyonek Indian land for oil development without permission of the Indians themselves. Subsequently, the tribe sold rights to drill for oil and gas beneath the reservation to a group of oil companies for $12.9 million. In 1971, the Tyonek Reservation status was revoked with the passage of the Alaska Native Claims Settlement Act (USEPA, 2006).

The current population in the village of Tyonek is 199, and the village practices a subsistence lifestyle. Subsistence activities provide salmon, moose, and waterfowl. Twenty residents hold commercial fishing permits, and many offer recreational fishing and hunting guide services. The North Foreland Port Facility at Tyonek is the preferred site for export of coal from Beluga. The village is not accessible by road. One needs to receive permission to land at the local gravel airstrip owned by the Village of Tyonek, although regularly scheduled flights are available. Heavy goods are delivered to the village by barges (Alaska Department of Commerce [AKDOC], 2006).

Kenai is located on the western coast of the Kenai Peninsula, at the tip of Cook Inlet. Before becoming a Russian settlement, Kenai was a Dena'ina Athabascan Indian village. Kenai was founded in 1741 as a Russian fur trading post with 1,000 Dena'ina villagers living nearby in Shk'ituk't. In 1791, a fortified Russian trading post, Fort St. Nicholas, was established for fur and fish trading; it was the second permanent Russian settlement in Alaska. In 1869, the U.S. military established a post for the Dena'ina Indians in the area, called Fort Kenay. The fort was abandoned in 1870 after Alaska was purchased by the United States. Through the 1920s, commercial fishing was the primary activity in Kenai. In 1957, oil was discovered at Swanson River, 20 miles northeast of Kenai — the first major Alaska oil strike. Kenai has been a center for oil and gas exploration and development since that time (USEPA, 2006)

The City of Kenai was incorporated in 1960, and the Kenai Peninsula Borough was formed in 1964. In 1965, offshore oil discoveries in Cook Inlet fueled a period of rapid growth. Tesoro Alaska's oil refining operations and Unocal's urea plant are located in North Kenai. Both in-state and out-of-state tourists support a significant service industry on the Kenai Peninsula. Kenai is accessible by the Sterling Highway to Anchorage, Fairbanks, Canada, and the lower 48 States. The city-owned Kenai Municipal Airport has an asphalt runway, a gravel landing strip, a floatplane strip, and helicopter service; there are several private airstrips in the area. The current population is 6,864 residents. Kenai has a home-rule city form of government (AKDOC, 2006).

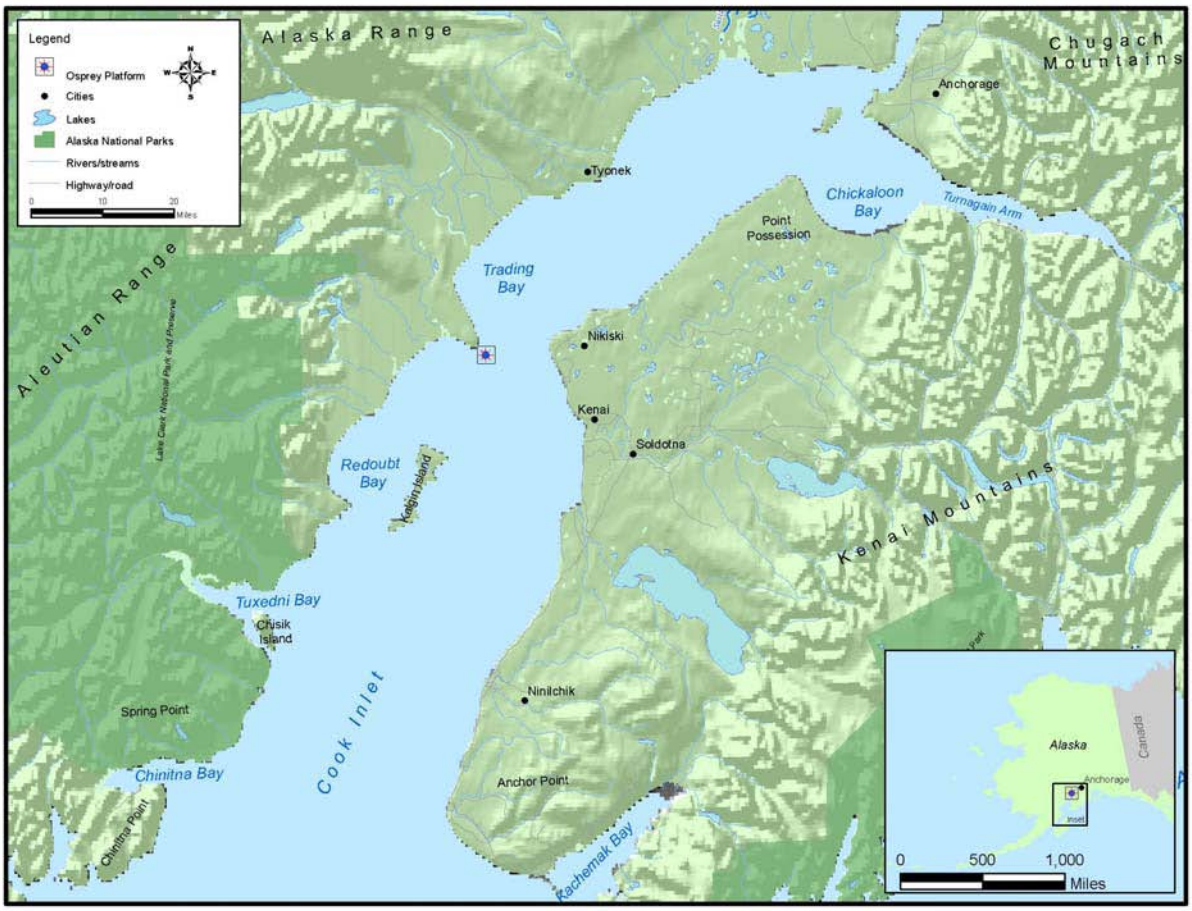


**Figure 3-10. Communities within the Kenai Peninsula Borough**

Nikiski was homesteaded in the 1940s. Traditionally in Kenaitze Indian territory, the area experienced a population growth with the discovery of oil on the Kenai Peninsula in 1957. By 1964, oil-related industries located in Nikiski included Unocal, Phillips 66, Chevron, and Tesoro. Currently, Nikiski is the site of a Tesoro Alaska oil refinery, where Cook Inlet and some North Slope crude oil is processed into jet fuel, gasoline, and diesel. BP has constructed a natural gas to liquid fuel pilot plant in Nikiski. Agrium, Inc. employs 500 residents at its fertilizer plant. The Sterling Highway provides access to Anchorage. Nearby Kenai offers an airport and docking facilities. The Port Nikiski docks service offshore drilling platforms. There are two

private airstrips in the vicinity, one owned by Shell Oil Company. Currently Nikiski is an unincorporated city, home to 4,179 residents (AKDOC, 2006).

Similar to Nikiski, Soldotna was the home to Kenaitze Indians and developed by non-natives. The first homesteaders were World War II veterans, given a 90-day preference over non-veterans in selecting and filing for property in 1947. Soldotna's growth occurred as a result of the construction of the Sterling Highway from Anchorage in the late 1940s. In 1957, with the discovery of oil in the Swanson River region, new growth and development resulted. Soldotna was incorporated as a city in 1960. The area's economy is highly diverse (USEPA, 2006).

Soldotna residents are employed in oil industry services for Cook Inlet oil and natural gas drilling and exploration. Soldotna is the site of the Central Peninsula General Hospital, the Kenai Peninsula Community College, the State Troopers' Headquarters, the Kenai National Wildlife Refuge, and the Borough and School District offices. The Soldotna Municipal Airport provides facilities for charter services and local air traffic with two paved runways. Currently, Soldotna has 3,807 residents (AKDOC, 2006).

### 3.9.1 Regional Population and Employment

Table 3-24 provides population data for the communities potentially impacted by the proposed project. Between 1980 and 1990, Tyonek experienced a sharp decrease (35 percent) in population size. The population has since increased by 25 percent between 1990 and 2000. Since 1980, population growths have been experienced in Kenai (61 percent), Nikiski (290 percent), and Soldotna (62 percent). In addition, the Kenai Peninsula Borough and Anchorage populations have increased in those two decades at 97 percent and 49 percent, respectively (U.S. Census Bureau, 2000; USEPA, 2006).

**Table 3-24. Historical populations for the project area (based on 2000 census data) (adapted from USEPA, 2006)**

| Year | Tyonek | Kenai | Nikiski | Soldotna | Kenai Peninsula Borough | Anchorage |
|---|---|---|---|---|---|---|
| 1920 | 58 | 332 | — | — | — | 1,856 |
| 1930 | 78 | 286 | — | — | — | 2,277 |
| 1940 | 136 | 303 | — | — | — | 3,495 |
| 1950 | 132 | 321 | — | — | — | 11,254 |
| 1960 | 187 | 778 | — | 32 | 6,097 | 82,833 |
| 1970 | 232 | 3,533 | — | 1,202 | 15,836 | 124,542 |
| 1980 | 239 | 4,324 | 1,109 | 2,320 | 25,282 | 174,431 |
| 1990 | 154 | 6,327 | 2,743 | 3,482 | 40,802 | 226,338 |
| 2000 | 193 | 6,942 | 4,327 | 3,759 | 49,691 | 260,283 |

Table 3-25 provides a summary of employment by occupation based on 2000 census data. The leading occupation category in the Kenai Peninsula Borough is management, professional and related (27.4 percent); followed by sales and office (23.3 percent); service (17 percent), construction, extraction, and maintenance (13.2 percent); production, transportation, and material

moving (13.2 percent); and farming, fishing, and forestry (2.4 percent). Occupation rankings for Kenai, Nikiski, Soldotna, and Tyonok roughly followed the same general trends with 24 to 29 percent of occupations classified as management, professional, and related (USEPA, 2006).

**Table 3-25. Employment by occupation for the project area (based on 2000 census data) (adapted from USEPA, 2006)**

| Occupation | Tyonek | Kenai | Nikiski | Soldotna | Kenai Peninsula Borough |
|---|---|---|---|---|---|
| Management/Professional | 15 | 688 | 480 | 420 | 5,581 |
| Service | 21 | 539 | 219 | 333 | 3,471 |
| Sales and Office | 12 | 744 | 338 | 477 | 4,740 |
| Farming/Fishing/Forestry | 0 | 5 | 0 | 10 | 485 |
| Construction/Extraction/ Maintenance | 9 | 405 | 397 | 263 | 3,394 |
| Production/Transportation | 7 | 477 | 218 | 184 | 2,693 |
| **Total** | **64** | **2,858** | **1,652** | **1,687** | **20,364** |

Table 3-26 summarizes employment by industry. For the Kenai Peninsula Borough, the leading industries are education, health, and social services (19.6 percent); followed by retail trade (12.6 percent); arts, entertainment, recreation, accommodation, and food services (10.9 percent); agriculture, forestry, fishing, hunting, and mining (10.6 percent); and construction (9 percent).

**Table 3-26. Employment by industry for the project area (based on 2000 census data) (adapted from USEPA, 2006)**

| Occupation | Tyonek | Kenai | Nikiski | Soldotna | Kenai Peninsula Borough |
|---|---|---|---|---|---|
| Agriculture/Forestry/ Fishing/Hunting/Mining | 3 | 327 | 199 | 129 | 2,157 |
| Construction | 11 | 226 | 191 | 82 | 1,898 |
| Manufacturing | 0 | 160 | 175 | 58 | 1,046 |
| Wholesale Trade | 0 | 62 | 38 | 29 | 383 |
| Retail Trade | 0 | 460 | 149 | 296 | 2,568 |
| Transportation/Utilities/ Warehousing | 5 | 176 | 72 | 99 | 1,319 |
| Information | 0 | 63 | 27 | 11 | 294 |
| Finance/Insurance/Real Estate/Rental/Leasing | 0 | 69 | 54 | 84 | 638 |
| Professional/Scientific/ Administrative/Waste Mgmt | 0 | 136 | 79 | 57 | 1,046 |
| Education/Health | 17 | 457 | 345 | 344 | 3,996 |
| Arts/Recreation/Food Services/Accommodation | 8 | 276 | 103 | 268 | 2,209 |
| Other Services | 6 | 158 | 138 | 113 | 1,283 |
| Public Administration | 14 | 288 | 82 | 117 | 1,527 |
| **Total** | **64** | **2,858** | **1,652** | **1,687** | **20,364** |

Table 3-27 provides some additional economic indicators for the general area (based on the 2000 census data). In Tyonek, private and government employment was equally split. In Kenai and Nikiski, about 70 percent of the people were employed in the private sector. In Soldotna, 75 percent were employed in the private sector and 25 percent by local, State, or Federal government. Unemployment in 2000 ranged from 8.9 percent in Soldotna to 27.3 percent in Tyonek. The employment average for the Kenai Peninsula Borough was 11.4 percent.

**Table 3-27. Other economic and employment indicators in the project area (based on 2000 census data) (adapted from USEPA, 2006)**

| Economic Parameter | Tyonek | Kenai | Nikiski | Soldotna | Kenai Peninsula Borough |
|---|---|---|---|---|---|
| Total Potential Workers (16+) | 144 | 4,960 | 3,177 | 2,673 | 36,781 |
| Total Employment | 64 | 2,869 | 1,652 | 1,687 | 20,486 |
| Civilian Employment | 64 | 2,858 | 1,652 | 1,687 | 20,364 |
| Military Employment | 0 | 11 | 0 | 0 | 122 |
| Civilian Unemployed (and seeking work) | 24 | 406 | 307 | 165 | 2,630 |
| Percentage Unemployed | 27.3% | 12.4% | 15.7 | 8.9% | 11.4% |
| Adults not in Labor Force (not seeking work) | 56 | 1,685 | 1,218 | 821 | 13,665 |
| Percentage of all 16+ not working (unemployed and not seeking work) | 55.6% | 42.2% | 48.0% | 36.9% | 44.3% |
| Private Wage/Salary Workers | 31 | 2,117 | 1,158 | 1,266 | 13,691 |
| Self Employed | 3 | 172 | 230 | 112 | 2,578 |
| Government Workers | 30 | 569 | 252 | 300 | 3,976 |
| Unpaid Family Workers | 0 | 0 | 12 | 9 | 119 |
| Percentage below Poverty | 13.9% | 9.8% | 11.4% | 6.6% | 10.0% |

### 3.9.2 Oil and Gas Industry

The oil and gas industry is a major component of the Kenai Peninsula/Cook Inlet economy. The first exploration for oil in Cook Inlet Basin was in the early 1900s. In 1957, the first commercial oil field was discovered in the Swanson River Field in northern Kenai Peninsula. In the late 1950s and the 1960s, several commercial oil and gas fields were discovered, and many of them are still producing today. Discovered in 1965, the largest Cook Inlet oil field, McArthur River, had an estimated 1.5 billion barrels. The most recent oil discovery was in 1991 at Sunfish/Tyonek Deep (British Columbia Ministry of Energy, Mines, and Petroleum Resources [BC EMPR], 2004).

Oil production peaked in 1970 at 82 million barrels of oil (MMBO) per year; in 2002, oil production was 11.5 MMBO per year. To date, the Cook Inlet region has produced 1.3 billion barrels of oil. Proven remaining oil reserves in the area are at 180 MMBO (BC EMPR, 2004). Cumulative production between 2004 and 2009 is an estimated 42.6 MMBO. Oil production in Cook Inlet is expected to continue to 2016 (MMS, 2003).

Natural gas production in Cook Inlet peaked at 331 billion cubic ft (bcf) in 1994 and has remained relatively stable at an average of 213 bcf per year from 1997 to 2001. In 2003, gas production was at 208 bcf per year, and cumulative production for 2004 through 2009 is an estimated 1,131 bcf. To date, 9.124 trillion cubic ft (tcf) of natural gas has been produced, with remaining proven reserves at 2.241 tcf gas. Natural gas production in Cook Inlet is expected to continue beyond 2022 (BC EMPR, 2004). The oil and gas industry currently provides approximately 80 percent of the tax base for the Kenai Peninsula Borough (USEPA, 2002b).

The Trading Bay production facility and Tesoro Refinery handle the existing Cook Inlet region crude oil production (offshore and onshore). The Trading Bay facility transports received crude oil via pipeline to the Drift River Terminal. The Drift River Terminal stores and loads at least 8.2 million barrels annually. As of 1996, all Drift River tanker loadings are transported to the Tesoro refinery in Nikiski. The Tesoro refinery can process up to 80,000 barrels per day, although currently, production is estimated at approximately 50,000 barrels per day. Recent refinery production has been augmented by North Slope oil shipped by tanker from Valdez. In addition, a 70-mile long pipeline links the Tesoro Nikiski refinery with the Tesoro fuel depot at the Port of Anchorage. Refined products from the Tesoro fuel depot include multigrades of gasoline, propane, Jet A fuel, diesel No. 2, diesel, jet fuel 4 (JP-4) and No. 6 fuel oil (MMS, 2003).

The Phillips-Marathon liquefied natural gas plant liquefies 1 million tons (approximately 900,000 tonnes) of liquefied natural gas annually and is the only natural gas liquefaction plant in the United States. Produced liquefied natural gas is shipped by tanker to Japan about once every 10 days (MMS, 2003).

The Agrium chemical plant produces more than 1 million metric tonnes of ammonia and a similar quantity of urea pills and granules used for fertilizer. Some of the produced urea is used in Alaska, while the remaining product is shipped to the west coast of the United States in tankers and bulk freighters (MMS, 2003).

### 3.9.3 Commercial Fisheries

Commercial fishing is a major economic sector for the Cook Inlet area. Management of commercial fisheries in Alaska is under the purview of ADF&G. Cook Inlet is split into two districts, Central and Northern District, for purposes of fisheries management with the boundary as a line that extends from West Foreland to Boulder Point. This section focuses on the Cook Inlet portion of the Central Region and, to a lesser extent the Northern District. Commercial fisheries in these waters include salmon, herring, groundfish, and shellfish. The combined ex-vessel value of these fisheries for the State of Alaska in 2006 was estimated at $685 million (salmon $334 million, herring $6 million, halibut $170 million, groundfish $21 million and shellfish $154 million). The ex-vessel value of these fisheries in Alaska has declined from its high of $2.75 billion in 1988 (ADF&G, 2008).

In Cook Inlet, all five species of Pacific salmon are harvested commercially (as well as for subsistence and sportfishing) (Table 3-28). The salmon fishery in Alaska is second only to the State's groundfish fishery in volume and value. Purse seines, drift gill nets, set gill nets, and (small numbers of) beach seines are used to harvest salmon. The regional salmon fisheries commence in early May and continue through September every year (ADF&G, 2008).

## Table 3-28. Number of salmon (by species) commercially harvested in upper Cook Inlet (ADF&G, 2007)

| Year | Chinook | Sockeye | Coho | Pink | Chum | Total |
|---|---|---|---|---|---|---|
| 1970 | 8,336 | 732,572 | 275,205 | 814,760 | 750,774 | 2,581,647 |
| 1971 | 19,765 | 636,289 | 100,362 | 35,590 | 323,945 | 1,115,951 |
| 1972 | 16,086 | 879,811 | 80,896 | 628,566 | 626,414 | 2,231,773 |
| 1973 | 5,194 | 670,098 | 104,420 | 326,184 | 667,573 | 1,773,469 |
| 1974 | 6,596 | 497,185 | 200,125 | 483,730 | 396,840 | 1,584,476 |
| 1975 | 4,787 | 684,751 | 227,376 | 336,330 | 951,588 | 2,204,832 |
| 1976 | 10,865 | 1,664,149 | 208,663 | 1,256,728 | 469,180 | 3,609,585 |
| 1977 | 14,790 | 2,052,291 | 192,593 | 553,855 | 1,233,436 | 4,046,965 |
| 1978 | 17,299 | 2,621,421 | 219,193 | 1,688,442 | 571,779 | 5,118,134 |
| 1979 | 13,738 | 924,406 | 265,164 | 72,980 | 649,758 | 1,926,046 |
| 1980 | 13,798 | 1,573,588 | 271,416 | 1,786,421 | 387,815 | 4,033,038 |
| 1981 | 12,240 | 1,439,262 | 484,405 | 127,143 | 831,977 | 2,895,027 |
| 1982 | 20,870 | 3,259,864 | 792,224 | 790,644 | 1,432,940 | 6,296,542 |
| 1983 | 20,634 | 5,049,733 | 516,322 | 70,327 | 1,114,858 | 6,771,874 |
| 1984 | 10,062 | 2,106,714 | 449,993 | 617,452 | 680,726 | 3,864,947 |
| 1985 | 24,088 | 4,060,429 | 667,213 | 87,828 | 772,849 | 5,612,407 |
| 1986 | 39,254 | 4,791,562 | 757,319 | 1,300,939 | 1,134,817 | 8,023,891 |
| 1987 | 39,431 | 9,469,248 | 449,692 | 109,381 | 349,022 | 10,416,774 |
| 1988 | 29,080 | 6,843,833 | 561,048 | 471,080 | 710,615 | 8,615,656 |
| 1989 | 26,737 | 5,011,124 | 339,860 | 67,441 | 122,114 | 5,567,276 |
| 1990 | 16,105 | 3,604,259 | 501,643 | 603,434 | 351,123 | 5,076,564 |
| 1991 | 13,542 | 2,178,331 | 426,487 | 14,663 | 280,223 | 2,913,246 |
| 1992 | 17,171 | 9,108,353 | 468,930 | 695,861 | 274,303 | 10,564,618 |
| 1993 | 18,871 | 4,755,329 | 306,882 | 100,934 | 122,770 | 5,304,786 |
| 1994 | 19,962 | 3,565,586 | 583,793 | 523,434 | 303,177 | 4,995,952 |
| 1995 | 17,893 | 2,951,827 | 446,954 | 133,575 | 529,422 | 4,079,671 |
| 1996 | 14,306 | 3,888,922 | 321,668 | 242,911 | 156,501 | 4,624,308 |
| 1997 | 13,292 | 4,176,738 | 152,404 | 70,933 | 103,036 | 4,516,403 |
| 1998 | 8,124 | 1,219,242 | 160,660 | 551,260 | 95,654 | 2,034,940 |
| 1999 | 14,383 | 2,680,510 | 125,908 | 16,174 | 174,541 | 3,011,516 |
| 2000 | 7,350 | 1,322,482 | 236,871 | 146,482 | 127,069 | 1,840,254 |
| 2001 | 9,295 | 1,826,833 | 113,311 | 72,559 | 84,494 | 2,106,492 |
| 2002 | 12,714 | 2,773,118 | 246,281 | 446,960 | 237,949 | 3,717,022 |
| 2003 | 18,490 | 3,476,159 | 101,756 | 48,789 | 120,767 | 3,765,961 |
| 2004 | 27,476 | 4,926,220 | 311,056 | 357,939 | 146,164 | 5,768,855 |
| 2005 | 28,171 | 5,238,168 | 224,657 | 48,419 | 69,740 | 5,609,155 |
| 2006 | 18,029 | 2,192,730 | 177,853 | 404,111 | 64,033 | 2,856,756 |
| 2007 | 17,934 | 3,268,833 | 174,828 | 144,958 | 76,749 | 3,683,302 |
| **Averages** | | | | | | |
| 1966 – 2006 | 16,150 | 2,923,952 | 319,683 | 498,823 | 478,663 | **4,237,270** |
| 1997 – 2006 | 15,732 | 2,983,220 | 185,076 | 216,363 | 122,345 | **3,522,735** |

Due to competition from farm-raised salmon, the combined ex-vessel value of commercially harvested salmon in Alaska has been declining. The ex-vessel value of salmon landed in Cook Inlet ranged from a high of $35.2 million in 1997 to a low of $8.8 million in 2001. Sockeye are commercially harvested in much greater numbers than other species of salmon in Cook Inlet. Upper Cook Inlet accounts for most of the ex-vessel value of salmon within the Cook Inlet area (ADF&G, 2008).

Groundfish are commercially harvested in the Cook Inlet area of the Central District. As stated above, the groundfish fishery in Alaska is the largest commercial fishery in the State based on volume and value. Most Alaskan groundfish are landed in the Bering Sea/Aleutian Islands area of the Central District. Commercially harvested groundfish of the Central District can include rockfish (numerous species), flatfish (including halibut), Pacific cod, lingcod, sablefish, and Walleye pollock. One or more of these fisheries might operate during most of the year. Halibut is the major commercial groundfish in the Cook Inlet area with landings (Homer, Kenai, Ninilchik, Seldovia and Seward) totaling almost 20 million pounds in 2001 (USEPA, 2006).

## 3.10 SUBSISTENCE HARVESTING

The main subsistence food in Alaska is fish. Subsistence is defined by the Alaska National Interest Lands Conservation Act (ANILCA), Section 803 (Public Law 96-487), as:

> "…the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-eatable by-products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

The subsistence use areas and practices differ as greatly as the size and socioeconomic character of each area's populations. Local subsistence fishing and harvesting values are high in households that feel their subsistence activities are important, necessary and satisfying within an overall cultural context. Subsistence use and practices tend to occur in areas located in close proximity to settlements. These practices also tend to occur at locations where accessibility and biomass concentrations are high. The increasing population on the east side of Cook Inlet has limited some subsistence practices; on the west side, many traditional subsistence practices continue with a greater diversity of species. Some subsistence practices are frequently conducted in conjunction with recreation on the east and west sides of Cook Inlet (USEPA, 2006).

Tyonek is the main subsistence focus area due to its proximity to the proposed action. USEPA (2006) reported declining numbers of subsistence harvests for seals, sea lions, clams, and beluga whales. Interviews with tribal members noted declines in species' abundance and concerns about contaminant levels in those foods as reasons for lower subsistence numbers (Stephen R. Braund & Associates, 2005).

The following discussions are on marine-related activities. Terrestrial subsistence activities also occur, but they are distant from and highly unlikely to be affected by the proposed action. Table 3-29 provides information on the use of local resources for Tyonek.

**Table 3-29. 1983 resource harvest summary for Tyonek, Alaska (SAIC, 2002 as cited in USEPA, 2006)**

| Resource Group | Annual Per Capita Harvest (lbs) |
|---|---|
| Fish | 191.64 |
| Salmon | 186.63 |
| Non-salmon fish | 5.01 |
| Land Mammals | 56.05 |
| Large land mammals (moose) | 54.95 |
| Small land mammals (beaver and snowshoe hare) | 1.1 |
| Marine Mammals (beluga whales) | 2.56 |
| Birds and Eggs | 1.77 |
| Migratory birds | 1.43 |
| Other birds | 0.33 |
| Marine Invertebrates (clams) | 4.51 |
| Vegetation (plants, greens, mushrooms) | 3.41 |
| Total | 259.93 |

Note: Species in parentheses account for harvest of an entire resource group.

### 3.10.1 Anadromous Fish

The main subsistence food is fish. About 65 percent of Alaska's subsistence harvest (by weight) is fish, including salmon, halibut, herring, whitefish, cod, and Dolly Varden, among others (ADF&G, 2003b). There are a variety of established subsistence and educational fisheries developed by the ADF&G for Cook Inlet. Table 3-30 provides the top 10 subsistence fish resources from selected communities (Fall et al., 2004).

#### *3.10.1.1 Tyonek Subsistence Salmon Fishery*

Fishing is allowed with a permit. The Tyonek Subsistence salmon fishery is a gillnet fishery and is typically open on specific days between May 15 through October 15, or until 4,200 Chinook salmon are harvested (5 AAC 01.593).

#### *3.10.1.2 Harbor Seals*

The incidental taking of harbor seals generally occurs while in pursuit of other subsistence interests or in transit to subsistence areas. Most harbor seals are incidentally taken around set net sites during salmon season (USEPA, 2002b).

#### *3.10.1.3 Native Village Educational Fisheries*

Under the provisions of 5 AAC 93.210, ADF&G issues educational fishery permits to Alaska residents (applicants) who propose to operate educational fisheries in compliance with the standards set out in the regulation. Since 1989, the Kenaitze Tribe has conducted an educational fishery; the Ninilchik Traditional Council has operated one as of 1993. The educational permits allow the tribes to operate a single set gill net in the Kenai River and Ninilchik River, respectively. The Kenaitze Tribe's fishery permit is also shared with members of the Salamatof Tribal Council (Kenaitze Indian Village, 2008; USEPA, 2006).

## Table 3-30. Major subsistence fish resources in project area (Fall et al., 2004)

| Cooper Landing | | | Hope | | | Nikolaevsk | | | Ninilchik | | | Seldovia | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Species | Pounds per Person | Percent of Total Fish Harvest | Species | Pounds per Person | Percent of Total Fish Harvest | Species | Pounds per Person | Percent of Total Fish Harvest | Species | Pounds per Person | Percent of Total Fish Harvest | Species | Pounds per Person | Percent of Total Fish Harvest |
| Sockeye | 28.0 | 45.4% | Coho | 17.8 | 28.5% | Halibut | 16.5 | 22.4% | Halibut | 28.8 | 35.2% | Chinook | 49.4 | 30.6% |
| Coho | 12.2 | 19.8% | Sockeye | 14.8 | 23.7% | Coho | 15.5 | 21.0% | Sockeye | 20.7 | 25.3% | Halibut | 42.3 | 26.2% |
| Halibut | 10.5 | 17.0% | Halibut | 10.5 | 16.8% | Sockeye | 13.7 | 18.6% | Coho | 11.1 | 13.6% | Coho | 13.9 | 8.6% |
| Chinook | 4.2 | 6.8% | Pink Salmon | 6.5 | 10.4% | Chinook | 10.5 | 14.2% | Chinook | 8.4 | 10.3% | Pacific cod | 12.6 | 7.8% |
| Lake trout | 2.2 | 3.6% | Chinook | 4.2 | 6.7% | Rockfish | 5.1 | 6.9% | Pink | 4.4 | 5.4% | Sockeye | 12.1 | 7.5% |
| Dolly Varden | 1.4 | 2.3% | Chum Salmon | 3.4 | 5.4% | Chum Salmon | 3.2 | 4.3% | Chum Salmon | 2.3 | 2.8% | Chum Salmon | 9.0 | 5.6% |
| Rainbow Trout | 1.2 | 1.9% | Dolly Varden | 1.6 | 2.6% | Eulachon | 1.8 | 2.4% | Pacific cod | 1.6 | 2.0% | Pink Salmon | 6.5 | 4.0% |
| Black Rockfish | 0.7 | 1.1% | Eulachon | 1.4 | 2.2% | Pink Salmon | 1.4 | 1.9% | Black Rockfish | 0.8 | 1.0% | Herring | 6.0 | 3.7% |
| Eulachon | 0.6 | 1.0% | | | | Sablefish | 1.4 | 1.9% | Rainbow Trout | 0.6 | 0.7% | Black Rockfish | 3.0 | 1.9% |
| | | | | | | Rainbow Trout | 1.2 | 1.6% | Dolly Varden | 0.6 | 0.7% | Dolly Varden | 1.6 | 1.0% |

Each season, the Kenaitze Tribe is authorized to set two 10-fathom nets at traditional fishing sites in the Kenai River, Kasilot River, and near the mouth of the Swanson River. The Kenaitze educational fishery is allowed to harvest up to 8,000 salmon from May through November (Kenaitze Indian Tribe, 2008). The Ninilchik Traditional Council fishery and the Ninilchik Native Descendants fishery each had a harvest limit of 850 salmon (Fall et al., 2004).

### 3.10.2 Other Fish

Eulachon are harvested for subsistence and personal use in set nets and dip nets along the west side of upper Cook Inlet from Tyonek south to Shirleyville. About a quarter of all Tyonek households harvest eulachon. Other fish species, such as rainbow trout and Dolly Varden, are harvested in smaller numbers (USEPA, 2006).

### 3.10.3 Shellfish

Approximately 18 percent of the Tyonek households harvest shellfish as a subsistence activity. Cockles and razor clams are harvested in lower Cook Inlet between Drift River and Tuxedni Bay. These areas are well out of the proposed action area (USEPA, 2006).

### 3.10.4 Marine Mammals

Two types of marine mammals can be harvested by subsistence — beluga whales (actively sought) and harbor seals (incidental take). The harvesting of marine mammals is only undertaken by 11 percent of Tyonek households, and the actual contribution to the Tyonek diet is low (USEPA, 2006).

#### *3.10.4.1 Beluga Whales*

Beluga whales have been harvested for subsistence, particularly by Alaska Natives from Anchorage. The harvest is generally centered at the mouth of the Susitna River (Table 3-31). Some belugas have been shot just outside the mouth of the Kenai River, as local firearms ordinances limit the discharge of guns within city limits (USEPA, 2006). Previous beluga whale subsistence harvests have resulted in a substantial decline in their population. In 2008, NMFS issued a final determination listing the Cook Inlet beluga whale as endangered under the ESA (73 FR 62919). Section 3.7 provides further details on subsistence harvesting of beluga whales.

### 3.10.5 Birds

Waterfowl, such as ducks and geese, are harvested around the Trading Bay area. Approximately 47 percent of Tyonek households hunt waterfowl in nearshore marshes (USEPA, 2002b).

**Table 3-31. Summary of Cook Inlet beluga population and Native Alaska subsistence harvests (SAIC, 2002 as cited in USEPA, 2006)**

| Year | Estimated Population | Estimated Subsistence Take |
|---|---|---|
| 1988 | — | 25 |
| 1989 | — | 24 |
| 1990 | — | 16 |
| 1991 | 653 | 20 |
| 1992 | — | — |
| 1993 | — | 20 |
| 1994 | 653 | — |
| 1995 | 491 | 67 |
| 1996 | 594 | 98 |
| 1997 | 440 | 70 |
| 1998 | 347 | 78 |

## 3.11 LAND AND SHORELINE USE AND MANAGEMENT

Most of the area surrounding upper Cook Inlet is in public ownership, including large tracts of Federal and State lands. Land uses in the area include wildlife refuges, Alaska game refuges, and critical habitat areas. The west side of upper Cook Inlet is primarily held by native groups or by the State. Large blocks of land are owned or selected under ANSCA by various native corporations, as well as several native allotments (USEPA, 2006).

### 3.11.1 Current Land Use

Current land uses in the vicinity of the proposed action are primarily associated with the oil and gas industry, and receive only limited use by local residents. Beach areas around the West Foreland may be used for set net fisheries during the summer (a native subsistence activity). The shore area is backed by 50- to 250-ft tall bluffs. An area at the top of the bluff is primarily used by the oil and gas industry, although some cabins might be present and native subsistence activities might occur (USEPA, 2006).

### 3.11.2 Coastal Zone Management

The intent of the Coastal Zone Management Act of 1972 (CZMA), as amended, is to provide for the effective management, beneficial use, protection, and development of the U.S. coastal zone (16 U.S.C. 1451). The Alaska Coastal Management Act was enacted in 1977 (46 Alaska Statute Chapter 39). The Federal CZMA enables individual States to develop and implement regulatory guidelines to ensure appropriate protection and compatibility of uses within their coastal zones. Local coastal districts develop coastal management programs and tailor statewide standards to reflect local concerns. These local coastal management programs are incorporated into the Alaska Coastal Management Program (CMP) upon approval from the Alaska Coastal Policy Council and the Secretary of the U.S. Department of Commerce through the Office of Ocean and Coastal Resource Management (Kenai River Center, 2008).

The Kenai Peninsula Borough has established a local CMP, which was fully incorporated into the Alaska CMP in 1990. Borough-wide policies are general and not intended to create a substantial change from the existing Alaskan coastal zone policies (Kenai River Center, 2008). The Osprey Platform is located within the Alaska seaward coastal zone boundary.[19]

## 3.12 TRANSPORTATION SYSTEMS

Compared to other parts of Alaska, the Cook Inlet area has a well-developed transportation system composed of an established highway network, airports, and marine ports. The following sections briefly describe the transportation systems for local cities in the area.

### 3.12.1 Air Transportation

Airfields are located at Kenai and Homer. The Kenai airport has a single 7,575-ft runway that is equipped for night operations. The city of Kenai is served by scheduled passenger flights from Anchorage. The Homer airport has a single 6,701-ft runway. The airfield does not have a control tower and closes after 10 p.m. Homer has scheduled passenger flights from Anchorage (AirNav, 2008).

### 3.12.2 Surface Transportation

The Cook Inlet – Kenai Peninsula region is connected to Anchorage and the North American highway system by a 224-mile highway. The route is divided into the Seward Highway and the Sterling Highway. The Seward Highway is about 127 miles long beginning in Seward and ending in Anchorage. At mile marker 89, the road has a turnoff to the beginning of the 135-mile-long Sterling Highway, a designated National Forest Scenic Byway (USEPA, 2006).

The Sterling Highway continues south past the city of Kenai, along the Cook Inlet shoreline and ends at the Homer Spit. Vehicle traffic on the Sterling Highway varies substantially according to season. Average daily traffic for the northern segment of the highway reaches 7,000 vehicles in summer; in winter, only 2,000 vehicle passages were noted. The Kenai segment had 12,000 summer and 5,700 winter passages, and the Anchor Point area had 4,300 vehicles counted in the summer and 1,500 in the winter. Because of the increased traffic in the summer season, the Alaska Department of Transportation and Public Facilities limits the use of these highways by long combination trucks (dual-axle trailers) to only weekdays between June 15th and October 1st (USEPA, 2006).

### 3.12.3 Marine Transportation

**Homer.** The port of Homer includes a small boat harbor, a State ferry terminal, a general-purpose dock (up to a 40-ft draft), and numerous private barge landings. Primary users of the area include State ferry traffic to points further south (twice weekly during summer and fall months), Coast Guard vessels (one located in the general area at all times) and cargo vessels (bulk wood pulp ships visit the area year-round to load wood chips). Smaller cargo vessels, fishing boats and pleasure craft use the adjacent small boat harbor area. The Homer area serves

[19] The Alaska seaward coastal zone boundary is the "outer limit of the United States territorial sea" (15 CFR 923.32), which is the "three geographic mile line" (43 CFR 3301.1).

as an embarkation/debarkation point for marine pilots who are required for larger vessels operating in Cook Inlet (USEPA, 2006).

**Kenai and Nikiski**. The port of Kenai includes a number of docks along the mouth of the Kenai River. Vessel use is limited to those generally less than 10 ft in draft. The commercial fishing industry is the primary user of the port. The Kenai and Nikiski areas are located near three docks for deeper draft vessels (40 to 42 ft): the Unocal Agricultural dock, the Phillips Marathon dock, and the Tesoro dock. These docks are dedicated to the transport of shipments from their respective companies (USEPA, 2006).

Several commercial docks are used mainly for handling barge and supply vessel traffic, primarily associated with oil and gas or construction activities in the general area. These include the Rig Tenders Dock (located north of the Tesoro dock) and the OSI dock (north of the East Foreland in Nikishka Bay) (USEPA, 2006).

**Drift River Terminal.** The Drift River Terminal is owned and operated by Cook Inlet Pipe Line Company and is dedicated to loading oil produced on the west side of Cook Inlet. Vessel traffic is limited to oil tankers that travel to the Nikiski area or to points outside Cook Inlet (USEPA, 2006).

**West Side Barge Landings.** A number of barge landings on the west side of Cook Inlet are primarily used in support of oil and gas operations. These barge landings include Trading Bay Production Facility (oil/gas), Shirleyville (local residents and oil/gas), Ladd (local residents and oil/gas in the Beluga area), and Beluga River (local residents) (USEPA, 2006).

**North Forelands.** The North Forelands dock is operated by the Tyonek Native Corporation. The dock and immediate area is being promoted as a site for industrial development (USEPA, 2006).

**Port of Anchorage.** The Port of Anchorage is the largest port in Cook Inlet and is located at the head of the inlet. The port can handle containerized and bulk cargo, refined petroleum products, general cargo and passenger traffic. Current vessel traffic includes container vessels, oil tankers, and barges carrying refined products and some cruise ships in the summer months. Several private wharves in the area are used by barges and smaller cargo vessels, and there are facilities to handle small recreational and commercial fishing boats (USEPA, 2006).

## 3.13 VISUAL ENVIRONMENT AND AESTHETICS

The Cook Inlet region exhibits various visual environments. The western side of Cook Inlet features towering volcanic peaks and massive glaciers. The eastern side of Cook Inlet is characterized by broad expansive lowlands and the snow-covered peaks of the Kenai Mountains in the background. The Kenai and Kasilof Rivers enter into the eastern inlet. The eastern side is marred slightly by the presence of dead and dying spruce trees resulting from spruce bark beetle infestation. Both sides of the inlet have utility lines, including electrical lines and pipelines, which provide evidence of civilization. In the upper inlet, oil and gas production platforms are visible during the day and at night (USEPA, 2002b).

The viewing public in the area (residents or tourists) likely exhibits a variety of sensitivity levels relative to industrial development. Some visitors might perceive the presence of development structures as an intrusion to scenic resources; others might not. Local residents have been exposed to the infrastructure effects of oil development for many years. To a great degree, the livelihoods of many in the community are tied directly to the oil industry. Visitors are likely to be more sensitive to the presence of manmade structures in Cook Inlet (USEPA, 2002b).

Cruise ship passengers are typically a viewing public sensitive to visual quality. Views of existing platforms from cruise ships are distant. Platforms are subordinate to focal points, and utility corridors related to existing development are indiscernible from the low viewing angle on a cruise ship (USEPA, 2002b).

At Federal and State refuges, the predominant visitors are hunters of waterfowl during hunting season and anglers during the salmon runs. These visitors generally view development within the refuges only when airborne en route to and from the area.

## 3.14 RECREATION

Much of Cook Inlet's recreational value is based on some access to the outdoor environment. Many recreational uses involve public lands and depend on the use of public waterbodies.

Recreation values contribute to the quality of life for Alaska residents. Recreation expenditures by residents and tourists alike contribute to the area's economy. The recreation and tourism activities in the area rely on the region's scenery, rivers and lakes, coastal waters, and an abundance of fish and wildlife resources. The entire coastline of the Cook Inlet basin has an abundance of vistas, natural features, and manmade scenic resources of varying aesthetic value. Natural scenic resources include wetlands, tidal flats, beaches, vertical bluffs, rocky coasts, lakes, stream corridors, undulating hills, bays, and inlets. Existing oil and gas platforms in Cook Inlet have been part of the coastal viewshed for more than 40 years. Table 3-32 lists the national and State parks and special use areas in the Cook Inlet area.

### 3.14.1 Fishing

The drainages of the northern inlet support some of the most intense sport fisheries in Alaska because of their proximity to Anchorage. Sportfishing provides monetary benefits to tourism-related businesses. Cook Inlet consistently supports more than 20 percent of the total annual sportfishing effort in Alaska. Sportfishing in the northern and central inlet has been increasing steadily, with almost 500,000 angler days expended on northern inlet streams. The Kustatan River located immediately southwest of the West Foreland supports a relatively active sports fishery for Chinook, sockeye, pink, and coho salmon and for Dolly Varden. Access to the Kustatan River is primarily by small fixed-wing aircraft. The majority of sportfishing occurs during the summer and fall months.

Sportfishing in Cook Inlet is primarily for Pacific halibut. The marine salmon fishery (i.e., Chinook and coho) is both a substitute and complement for halibut. The percentage of halibut sportfishing of the total sport and commercial halibut fishing has increased steadily between 1977 and 1998. Another increase related to sport fisheries has to do with vessels: the number of vessels licensed for sport or sport/commercial fishing in Alaska has increased steadily.

Sportfishing charters and shore-based fishers frequent Anchor River, Whiskey Gulch, Deep Creek, and Ninilchik River; other areas in Cook Inlet and Gulf Coast west of Gore Point; other areas in Cook Inlet north of the Ninilchik River; Barren Islands; Seldovia; Homer Spit; and various points along the shoreline (USEPA, 2006).

**Table 3-32. National and State parks and other special areas of Cook Inlet (MMS, 2003)**

| Resources | Area (acres) |
|---|---|
| ***National*** | |
| Katmai National Park and Preserve | 4,093,240 |
| Lake Clark National Park and Preserve | 4,440,130 |
| Kenai National Wildlife Refuge | 2,000,000 |
| Kodiak National Wildlife Refuge | 1,900,000 |
| Alaska Maritime National Wildlife Refuge (GOA Unit) | 475,000 |
| Becharof National Wildlife Refuge | 1,157,000 |
| Alaska Peninsula National Wildlife Refuge (Ugashik and Chignik Units) | 2,648,100 |
| Anikchak National Monument and Preserve | 603,000 |
| Kachemak Bay Estuarine Research Reserve | 350,000 |
| Kenai Fjords National Park | 670,000 |
| ***State*** | |
| McNeil River State Game Sanctuary | 128,000 |
| Captain Cook State Recreation Area | 3,620 |
| Clam Gulch State Recreation Area | Not reported |
| Ninilchik State Recreation Area | 97 |
| Deep Creek State Recreation Area | Not reported |
| Stariski State Recreation Area | 30 |
| Anchor River State Recreation Area | Not reported |
| Kachemak Bay State Park and Wilderness Park | 328,290 |
| Ft. Abercrombie State Historic Park | 182,720 |
| Pasagshak State Recreation Site | 20 |

Razor clams and other clams are gathered at various locations along the western side of the Kenai Peninsula and other shoreline areas bordering Cook Inlet. In addition, steamer clams, mussels and various other shellfish are collected within Kachemak Bay. The saltwater sport fishery in Cook Inlet, the freshwater sport fishery on the Kenai Peninsula, and clamming on the shores of Cook Inlet are an important part of the overall economy (USEPA, 2006).

### 3.14.2 Waterfowl Hunting

Cook Inlet accounts for greater than 30 percent of Alaska's hunter days for waterfowl. The inlet is valued for its abundance of waterfowl and its proximity to Anchorage. Most waterfowl hunting occurs in the fall. The Susitna Flats and Palmer Hay Flats account for more than 20 percent of Alaska's total harvest of geese and ducks. Other important waterfowl harvest locations within the upper and central Cook Inlet include Portage, Chickaloon Flats, Trading Bay, and Redoubt Bay (USEPA, 2006).

## 3.15 CULTURAL, HISTORICAL AND ARCHAEOLOGICAL RESOURCES

The Kustatan area has been identified as an area rich in cultural resources with possible burial cache pits. Tribal governments that have claimed cultural or religious significance to the Kustatan area are the Kenaitze Tribe, Tyonek Tribe, and Salamatof Tribe.

A series of archaeological reviews and investigations were conducted from 1998 to 2000 at the existing Osprey Platform onshore production facility site and access roads. As part of these efforts, it was determined that the historic Dena'ina Athapaskan village of Old Kustatan is located within this property (owned by Forest Oil). Ethnohistory suggests that Kustatan was inhabited between 1800 and 1928. In addition, an earlier Eskimo component dating 1,500 to 2,000 years ago might have been located in the area. The site might be eligible for inclusion on the National Register of Historic Places (Pipkin, 1998).

The onshore production facility and access roads avoided known locations of archaeological or cultural resources. The final report detailing the archaeological investigations at and near the existing Osprey Platform onshore production facility found cultural indicators (charcoal artifacts) at 2 of 75 features (depressions in the earth). Earlier investigations noted a house pit, but this was not observed in the 1998 survey (Pipkin, 1998).

## 3.16 ENVIRONMENTAL JUSTICE

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation, and enforcement of environmental laws, regulation, and policies. EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," directs each Federal agency to consider environmental justice as part of its mission and to develop environmental justice strategies with the goal of achieving environmental protection for all communities.

The presidential memorandum regarding EO 12898 highlights important ways for Federal agencies to consider environmental justice under NEPA. These methods include identifying the affected area to determine whether minority or low-income communities will be affected; analyzing the effects of the Federal agency's actions on minority and low-income communities; evaluating public health data; and assessing possible cultural, social or historical factors that might be affected by the action. Integrating environmental justice into Federal agency decision making through existing statutory programs is essential. Integration can be achieved through equal enforcement of environmental laws, ensuring greater public participation, and improving research and data collection for all Federal agency actions. Section 3.9 discusses socioeconomic conditions related to the proposed action.

## 3.17 TRADITIONAL ECOLOGICAL KNOWLEDGE

Traditional ecological knowledge (TEK) is defined by Article 8(j) of the United Nations Convention on Biological Diversity:

> "Subject to its national legislation, respect, preserve, and maintain knowledge, innovations and practices of indigenous and local communities embodying

> traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices;" (Convention on Biological Diversity, 2008)

TEK is often referred to as indigenous knowledge, which is based on information, advice, and wisdom that have evolved over centuries of living as an element of the environment. It is a valuable source of environmental information that allows communities to realize their own expertise. They can apply accumulated knowledge and practices to help protect their way of life.

USEPA (2006) reported that in the Southcentral Alaska region, an extensive amount of traditional knowledge has been collected from Native Alaskans through testimony at community meetings on MMS lease-sale hearings, research sponsored by the MMS Environmental Studies Program, and subsistence-harvest surveys and ethnography conducted by other Federal and State agencies. Incorporating existing records into the EA text provides the TEK information to USEPA decision makers without burdening Native Alaskans by requesting they provide information that has already been collected and disseminated. USEPA (2006) described community meetings held with Native Alaskans in the Cook Inlet area to collect site-specific TEK information that has been incorporated herein.

The TEK interviewees raised questions on the volume and quality of discharges given the large number of offshore platforms (12 active) covered under the general permit (USEPA, 2006; Stephen R. Braund & Associates, 2005). The proposed action for the Osprey Platform is a smaller scale in comparison to the general permit. Certain issues reported by USEPA (2006) are considered within this EA, including concerns regarding discharges from platforms jeopardizing Cook Inlet waters and subsistence resources.

# 4. ENVIRONMENTAL CONSEQUENCES

This section describes the environmental and socioeconomic consequences of implementing the Proposed Action (Alternative 1), Alternative 2, and the No Action Alternative. NEPA requires mitigation measures be identified and implemented if significant adverse environmental effects are identified. CEQ defines mitigation as avoidance, minimization, and reduction of impacts and compensation for unavoidable impacts (40 CFR § 1508.20). Mitigation is not required for beneficial or minor adverse impacts.

## 4.1 GEOLOGY AND SOILS

### 4.1.1 Proposed Action (Alternative 1)

No effects would be expected to geology and soils from reissuance of the NPDES permit under the Proposed Action (Alternative 1). Discharges would be allowed only at depths of 16 ft or greater (as measured from MLLW). Dispersion in the receiving waters would decrease the concentration of pollutants associated with the discharges released from the Osprey Platform. These discharges would be subject to the effluent limitations and monitoring requirements of the permit reissuance. Implementation of the proposed NPDES permit reissuance would not affect seafloor sediments or the shoreline in Cook Inlet.

### 4.1.2 Alternative 2

No effects would be expected to geology and soils from reissuance of the NPDES permit under Alternative 2. Effects from the two discharges — fire control test water and excess cement slurry — on seafloor sediments or shoreline soils would not be expected, similar to Alternative 1 in Section 4.1.1.

### 4.1.3 No Action Alternative

No effects would be expected from the No Action alternative. Discharges to surface waters occurring under continuation of the existing NPDES permit would not affect geology or soils. No new discharges would be authorized; therefore, no increase in discharges from the Osprey Platform would occur.

### 4.1.4 Mitigation

There are no construction activities to impact geology and soils, therefore, no mitigation is required.

## 4.2 CLIMATE AND AIR QUALITY

### 4.2.1 Proposed Action (Alternative 1)

No effect on climate would occur. Effects on air quality would not be expected. No new sources of air emissions would occur as a result of the Proposed Action. The ambient concentrations of regulated air pollutants in the platform's vicinity are well below the applicable NAAQS; air quality is generally considered good in the area. The Cook Inlet area is in attainment with NAAQS and is within PSD limits.

The largest sources of air emissions are found in industrial areas and population centers. Air quality modeling conducted for the 2003 Cook Inlet multiple-sale proposal revealed that $NO_2$ would be the highest pollutant concentration and concentrations were well within the PSD limits and NAAQS, even for wilderness areas of the Tuxedni National Wildlife Refuge (which is subject to strict Class I PSD limits) (USEPA, 2006).

### 4.2.2 Alternative 2

Effects would be the same as those stated for Alternative 1 in Section 4.2.1 above.

### 4.2.3 No Action Alternative

No effects would occur. Under the No Action Alternative, no new sources of air emissions would occur. Therefore, air emissions from the Osprey Platform would be expected to continue at the same level. The Cook Inlet area is in attainment with NAAQS and is within PSD limits.

### 4.2.4 Mitigation

There are no new sources of air emissions, therefore, no mitigation is required.

## 4.3 PHYSICAL OCEANOGRAPHY

### 4.3.1 Proposed Action (Alternative 1)

No effects would occur from the Proposed Action (Alternative 1). Implementation of the proposed NPDES permit reissuance would not affect bathymetry, currents, tides, sea ice or water temperature in Cook Inlet.

### 4.3.2 Alternative 2

Effects would be the same as those stated for Alternative 1 in Section 4.3.1 above.

### 4.3.3 No Action Alternative

No effects would occur. Under the No Action Alternative, no new discharges would be permitted. The No Action Alternative would not affect bathymetry, currents, tides, sea ice or water temperature in Cook Inlet.

### 4.3.4 Mitigation

There are no impacts to physical oceanography, therefore, no mitigation is required.

## 4.4 MARINE WATER QUALITY

### 4.4.1 Proposed Action (Alternative 1)

No long-term adverse effects would be expected as a result of the Proposed Action (Alternative 1). The proposed permit reissuance contains water quality- and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. There will be no authorized discharge of produced water, muds, cuttings, or cement at the seafloor.

Under the Proposed Action (Alternative 1), the authorized discharges in the existing permit would be maintained as permitted discharges in the permit reissuance. The two additional discharges — desalination backwash and filter backwash — would not be expected to cause any long-term adverse effects to marine water quality. The Osprey Platform currently does not have a desalination plant; however, the applicant requested coverage of this discharge in case a desalination plant is constructed in the future. Current and anticipated future practice for filter backwash is to dispose of the discharge to the AOGCC-permitted Class I/II injection well. However, the permittee has requested that the discharge be added to this discharge permit reissuance.

The water quality of upper Cook Inlet generally is good. The proposed permit reissuance would not authorize the discharge of produced water, muds, or cuttings and the majority of the Osprey Platform's permitted discharges are expected to be injected into the AOGCC-permitted Class I/II injection well during production. When an authorized discharge is released it would be required to meet the applicable water quality- and technology-based effluent limitations, special conditions, and monitoring and reporting requirements established in the permit reissuance.

ADEC prepared a draft Certificate of Reasonable Assurance for NPDES Permit AK-005330-9 (ADEC, 2008a) authorizing a mixing zone for sanitary waste approximately 0.12 acres in size based upon a dilution factor of 133:1. Compliance with Alaska WQS must be achieved at the edge of the mixing zone for TRC and FC. However, under the authority provided in Section 402(a)(1) of the CWA, USEPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

Although the sanitary waste mixing zone allows for the release of TRC greater than Alaska WQS within the defined boundaries, it is not anticipated that marine water quality would be adversely affected. The authorized mixing zone area (0.12 acres) is minuscule in comparison to Cook Inlet and Alaska WQS for TRC must be achieved at the edge of the mixing zone. Additionally, when sanitary waste is discharged it enters into a section of Cook Inlet that has been demonstrated to be a non-depositional, high-energy environment characterized by a seafloor of cobble and sand. Tidal currents and mixing produce rapid dispersion of the relatively low constituent concentrations of the sanitary waste discharge (Forest Oil, 2006b).

### 4.4.2 Alternative 2

Effects would be the same as those stated for Alternative 1 in Section 4.4.1 above. The provisions for the existing discharges covered under Alternative 2 — fire control test water and excess cement slurry — would be maintained as they are in the existing permit.

### 4.4.3 No Action Alternative

No effects would be expected. The discharges would continue to operate under the limitations and conditions of the existing NPDES permit, which is designed to maintain the water quality of Cook Inlet in compliance with Alaska WQS and Federal water quality criteria to prevent degradation of the marine environment. No new discharges would be permitted.

### 4.4.4 Mitigation

The proposed permit reissuance contains water quality-based and technology-based effluent limitations and monitoring requirements necessary to attain Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. Unless otherwise indicated, the permittee must comply with all applicable effluent limitations, special conditions, and monitoring and reporting requirements contained in the proposed permit reissuance.

Under the authority of Section 402(a)(1) of the Clean Water Act, USEPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone.

In addition, the Osprey Platform has developed and implemented an ADEC-approved Oil Discharge Prevention and Contingency Plan (C-Plan) with specific methods to prevent, detect, and respond to oil spills, in the event they occur. The C-Plan includes a Spill Prevention Control and Countermeasure (SPCC plan) (Forest Oil, 2007) and a Best Management Plan (BMP) that specifically lists potential major spill sources, maximum worst-case volumes, and major mitigation measures. The SPCC plan and BMP include practices and procedures for training personnel operating the Osprey Platform to minimize the risk of spills and appropriately respond when accidents occur. The C-Plan is periodically reviewed, drills conducted, and appropriate updates made to ensure the ongoing viability and usefulness of the plans' practices and procedures. Lastly, per USEPA (2002), the owner of the Osprey Platform should maintain membership in the Cook Inlet Spill Prevention and Response, Inc. (CISPRI), a Federally-approved Oil Spill Removal Organization that maintains a response capability to handle in excess of a 50,000-barrel spill in Cook Inlet waters.

## 4.5 FRESHWATER RESOURCES

### 4.5.1 Proposed Action (Alternative 1)

No long-term adverse effects on freshwater resources would be expected as a result of the Proposed Action (Alternative 1). The proposed permit reissuance contains water quality- and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. There will be no authorized discharges to freshwater resources, and all marine discharges would be required to comply with the applicable effluent limitations, special conditions, and monitoring and reporting requirements contained in the permit reissuance. There will be no authorized discharge of produced water, muds, cuttings, or cement at the seafloor.

Although the sanitary waste mixing zone allows for the release of TRC greater than Alaska WQS within the defined boundaries, it is not anticipated that freshwater resources would be adversely affected. The authorized mixing zone area (0.12 acres) is minuscule in comparison to Cook Inlet and Alaska WQS for TRC must be achieved at the edge of the mixing zone. Under the authority provided in Section 402(a)(1) of the CWA, USEPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would

result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

When sanitary waste is discharged in enters into a section of Cook Inlet that has been demonstrated to be a non-depositional, high-energy environment characterized by a seafloor of cobble and sand. Tidal currents and mixing produce rapid dispersion of the relatively low constituent concentrations of the sanitary waste discharge (Forest Oil, 2006b). Freshwater and anadromous species are typically mobile organisms that are not expected to spend extended periods of time within the mixing zone boundaries. Additionally, discharges would not be permitted within the boundaries of coastal marsh, river delta, river mouth designated as Area Meriting Special Attention (AMSA), game refuge, game sanctuary or critical habitat areas.

### 4.5.2 Alternative 2

No long-term adverse or beneficial effects on freshwater resources would be expected from Alternative 2. Effects would be largely the same as those stated for the Proposed Action (Alternative 1) in Section 4.5.1 above. The effects on freshwater resources from the released discharges are not expected because the two discharges — fire control test water and excess cement slurry — would be required to comply with Alaska WQS. In addition, most species that inhabit Cook Inlet waters are unlikely to be affected by these two discharges from the Osprey Platform. Some improvement in water quality could result from allowing only the intermittent releases for excess cement slurry and fire control test water. However, the water quality improvements would be minor and would be unlikely to be significantly beneficial to marine biological resources in Cook Inlet.

### 4.5.3 No Action Alternative

No effects would be expected. The discharges would continue to operate under the limitations of the existing NPDES permit, which is designed to maintain the water quality of Cook Inlet in compliance with Alaska WQS and Federal water quality criteria and to prevent degradation of the marine environment. No new discharges would be permitted. Most species that inhabit Cook Inlet waters are unlikely to be affected by discharges from the Osprey Platform. There would be no change to affect freshwater resources either adversely or beneficially.

### 4.5.4 Mitigation

Same as mitigation for marine water quality, as described in Section 4.4.4.

## 4.6 MARINE BIOLOGICAL RESOURCES

Appendix C of this document includes the EFH assessment prepared to assess the potential impacts of the waste stream discharges from the Osprey Platform on EFH and designated EFH species within the marine biological environment present near the project area. The EFH assessment provides an in-depth analysis of the potential environmental consequences from the proposed discharges for each of the identified EFH and EFH species. The sections below are a summary of the findings and conclusions contained in the EFH assessment (Appendix C).

### 4.6.1 Proposed Action (Alternative 1)

No long-term adverse effects on marine biological resources would be expected as a result of the Proposed Action (Alternative 1). The proposed permit reissuance contains water quality- and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. Unless otherwise indicated, the permittee would be required to comply with the applicable water quality- and technology-based effluent limitations, special conditions, and monitoring and reporting requirements contained in the permit reissuance. There will be no authorized discharge of produced water, muds, cuttings, or cement at the seafloor.

Most marine species that inhabit Cook Inlet waters are not likely to be present in the waters close to or are unlikely to be affected by discharges from the Osprey Platform. Although the sanitary waste mixing zone allows for the release of TRC greater than Alaska WQS within the defined boundaries, it is not anticipated that marine biological resources would be adversely affected. The authorized mixing zone area (0.12 acres) is minuscule in comparison to Cook Inlet and Alaska WQS for TRC must be achieved at the edge of the mixing zone. Under the authority provided in Section 402(a)(1) of the CWA, USEPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

When sanitary waste is discharged it enters into a section of Cook Inlet that has been demonstrated to be a non-depositional, high-energy environment characterized by a seafloor of cobble and sand. Tidal currents and mixing produce rapid dispersion of the relatively low constituent concentrations of the sanitary waste discharge (Forest Oil, 2006b). Most of the ecologically and economically important species in the area are mobile organisms, with geographic ranges that extend far outside the project area. These organisms and their prey are unlikely to spend extended periods within the mixing zone boundaries. Discharge would not be permitted within the boundaries of coastal marsh, river delta, river mouth designated as AMSA, game refuge, game sanctuary or critical habitat areas.

### 4.6.2 Alternative 2

No long-term adverse or beneficial effects on marine biological resources would be expected from Alternative 2. Effects would be largely the same as those stated for the Proposed Action (Alternative 1) in Section 4.6.1 above. Permitting the two discharges — fire control test water and excess cement slurry — would not likely have an effect because the discharges are discharged intermittently and would be required to comply with Alaska WQS and Federal water quality criteria to maintain the water quality of Cook Inlet and prevent degradation of the marine environment. Some improvement in water quality could result from allowing only the intermittent releases. However, the water quality improvements would be minor and would be unlikely to be significantly beneficial to marine biological resources in Cook Inlet.

### 4.6.3 No Action Alternative

No effects would be expected. The discharges would continue to operate under the limitations of the existing NPDES permit, which is designed to maintain the water quality of Cook Inlet in

compliance with Alaska WQS and Federal water quality criteria and to prevent degradation of the marine environment. No new discharges would be permitted. Most species that inhabit Cook Inlet waters are not likely to be present in the waters close to or are unlikely to be affected by discharges from the Osprey Platform. There would be no change to affect biological resources either adversely or beneficially.

### 4.6.4 Mitigation

Same as mitigation for marine water quality, as described in Section 4.4.4.

## 4.7 THREATENED AND ENDANGERED SPECIES

Appendix D of this document includes the BE prepared to assess the potential impacts of the proposed waste stream discharges from the Osprey Platform on protected marine mammal and birds species present near the project area. The BE provides an in-depth analysis of the potential environmental consequences of the proposed discharges for each of the identified threatened and endangered species. The sections below are a summary of the findings and conclusions contained in the BE (Appendix D).

### 4.7.1 Proposed Action (Alternative 1)

No long-term adverse effects on threatened and endangered species would be expected as a result of the Proposed Action (Alternative 1). The proposed permit reissuance contains water quality- and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. There will be no authorized discharge of produced water, muds, cuttings, or cement at the seafloor.

ADEC prepared a draft Certificate of Reasonable Assurance for NPDES Permit AK-005330-9 (ADEC, 2008a) authorizing a mixing zone for sanitary waste approximately 0.12 acres in size based upon a dilution factor of 133:1. Compliance with Alaska WQS must be achieved at the edge of the mixing zone for TRC and FC. However, under the authority provided in Section 402(a)(1) of the CWA, EPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

Although the sanitary waste mixing zone allows for the release of TRC greater than Alaska WQS within the defined boundaries, it is not likely that threatened and endangered species would be adversely affected. The authorized mixing zone area (0.12 acres) is minuscule in comparison to Cook Inlet and Alaska WQS for TRC must be achieved at the edge of the mixing zone. When sanitary waste is discharged in enters into a section of Cook Inlet that has been demonstrated to be a non-depositional, high-energy environment characterized by a seafloor of cobble and sand. Tidal currents and mixing produce rapid dispersion of the relatively low constituent concentrations of the sanitary waste discharge (Forest Oil, 2006b). Threatened and endangered species and their prey are unlikely to spend extended periods within the mixing zone boundaries and the relatively small size of the mixing zone associated with the sanitary waste discharge would result in low probabilities of exposure to contaminants above effects levels.

Steller's eiders nest in the terrestrial environment but spend the majority of the year in shallow, nearshore marine waters and are generally found close to shore. Kittlitz's murrelets are typically found in association with marine tidewater glaciers and glacial-influenced waters, near protected fjords or among islands. Their foraging home ranges is not known but is thought to be approximately a few square miles. Steller's eiders and Kittlitz's murrelets may be found in the project area, however, they are unlikely to be affected by the discharges. The waste streams from the Osprey Platform would be discharged well offshore and should not affect Steller's eiders habitat in the West Foreland area. However, Steller's eiders and Kittlitz's murrelets are highly mobile organisms and are not likely to be adversely effected by the proposed permit reissuance.

Although Steller sea lions and northern sea otters can occur in the project area, it is unlikely that the permitted discharges would disturb these species. The waste streams from the Osprey Platform would be discharged outside of designated Steller sea lion critical habitat and should not affect Steller sea lion marine habitat in the West Foreland area. Some individual northern sea otters could occur near the Osprey Platform and potentially be exposed to these discharges. However, Steller sea lions and northern sea otters are highly mobile organisms and are not likely to be adversely effected by the proposed permit reissuance.

Humpback whales could occur within the project area covered by the reissued permit. However, humpbacks are highly mobile and are not expected to spend substantial amounts of time within the discharge location. Wastewater discharges would not likely influence marine habitat for humpback whales in Cook Inlet. In the event that individual humpbacks might migrate into Cook Inlet waters, it is unlikely that these wastewater discharges would disturb them. Humpback whales are not likely to be adversely effected by the permit reissuance.

Impacts on beluga whales associated with the waste streams from the Osprey Platform would be limited because discharges would be diluted by the strong tidal flux of Cook Inlet. The wastewater would be discharged from the Osprey Platform outside areas in Cook Inlet where large concentrations of belugas are present, particularly during the summer months (65 FR 34590). While the West Foreland area is located in an area of habitat usage for beluga whales (see Figure 3-9), the West Foreland area is not heavily used by beluga whales (USEPA, 2006; Hobbs et al., 2005). Beluga whales and their marine habitat are not likely to be adversely effected by the proposed permit reissuance.

### 4.7.2 Alternative 2

No long-term adverse or beneficial effects would be expected under Alternative 2. Effects would be largely the same as those stated for Alternative 2 in Section 4.6.2 and the Proposed Action (Alternative 1) in Section 4.7.1. Permitting of fire control test water and excess cement slurry would not likely disturb threatened and endangered species or cause degradation to their marine habitat. Any impact that could potentially occur would be unlikely to have an adverse affect on threatened and endangered species. Impacts on threatened and endangered species associated with desalination backwash and filter backwash would be expected to be negligible, as these wastes will be diluted by the strong tidal influx of Cook Inlet. Threatened and endangered species that occur in Cook Inlet are highly mobile and are not likely to inhabit waters close to the Osprey Platform; therefore, threatened and endangered species are unlikely to be affected by these discharges.

### 4.7.3 No Action Alternative

No effects would be expected. The discharges would continue to operate under the limitations of the existing NPDES permit, which is designed to maintain the water quality of Cook Inlet in compliance with Alaska WQS and Federal water quality criteria and to prevent degradation to the marine environment. No new discharges would be permitted. Threatened and endangered species that might occur in Cook Inlet are highly mobile and are not likely to inhabit waters close to the Osprey Platform; therefore, threatened and endangered species are unlikely to be affected by discharges from the Osprey Platform. There would be no change to affect threatened and endangered species either adversely or beneficially.

### 4.7.4 Mitigation

Same as mitigation for marine water quality, as described in Section 4.4.4.

## 4.8 TERRESTRIAL BIOLOGICAL RESOURCES

### 4.8.1 Proposed Action (Alternative 1)

There will be no discharges to freshwater resources or into terrestrial areas, therefore no adverse effects on terrestrial biological resources would be expected as a result of the Proposed Action (Alternative 1). The discharges covered under the existing NPDES permit would remain authorized discharges in the permit reissuance. The permitting of the two additional discharges — desalination backwash and filter backwash — would not likely have an effect on terrestrial biological resources. Additionally, the discharges would not be permitted within the boundaries of coastal marsh, river delta, river mouth designated as AMSA, game refuge, game sanctuary or critical habitat areas.

### 4.8.2 Alternative 2

No long-term adverse effects on terrestrial biological resources would be expected from Alternative 2. Effects would be largely the same as those stated for the Proposed Action (Alternative 1) in Section 4.8.1 above. The effects on terrestrial species from the released discharges are not expected because the two discharges — fire control test water and excess cement slurry — would be required to comply with Alaska WQS and Federal water quality criteria to maintain the water quality of Cook Inlet and prevent degradation of the marine environment.

### 4.8.3 No Action Alternative

No effects would be expected. The discharges would continue to operate under the limitations of the existing NPDES permit, which is designed to maintain the water quality of Cook Inlet in compliance with Alaska WQS and Federal water quality criteria and to prevent degradation of the marine environment. No new discharges would be permitted. Most terrestrial species that frequent the Cook Inlet area are unlikely to be affected by discharges from the Osprey Platform. There would be no change to affect terrestrial biological resources either adversely or beneficially.

### 4.8.4 Mitigation

There will be no discharges to terrestrial biological resources, therefore no mitigation measures are required.

## 4.9 SOCIOECONOMIC CONDITIONS

### 4.9.1 Proposed Action (Alternative 1)

No long-term adverse or beneficial economic effects would be expected. Under the Proposed Action (Alternative 1), production-related discharges from the Osprey Platform in Cook Inlet would be permitted to continue. In addition, two new discharges — desalination backwash (for potential future operations) and filter backwash — would be authorized. As the Proposed Action is similar to existing activities, Alternative 1 is not expected to generate additional economic activity in the Kenai Peninsula Borough toward increased property taxes, employment and personal income.

Maintaining water quality and biological resources is integral to the region's fishing, recreation, and tourism industries, as well as subsistence harvesting. Degradation of these resources that would affect, for example, fish populations, would adversely affect these industries through a decline in harvest, which in turn could affect sales, income, and employment. The water quality and biological resources in the area are not expected to be significantly affected by implementation of the Proposed Action (Alternative 1) (see Sections 4.4 through 4.6) because the permit is designed to protect these resources from degradation. Therefore, no loss to these industries would be anticipated.

### 4.9.2 Alternative 2

Effects would be the same as those stated for the Proposed Action (Alternative 1) in Section 4.9.1 above.

### 4.9.3 No Action Alternative

No effects would occur. Under the No Action Alternative, discharges would continue to operate per the requirements of the existing permit, and no new discharges would be authorized. No socioeconomic changes to the oil and gas industry or fishing, recreation, and tourism industries would occur.

### 4.9.4 Mitigation

There will be no long-term adverse or beneficial impacts to socioeconomic conditions, therefore, no mitigation is required.

## 4.10 SUBSISTENCE HARVESTING

### 4.10.1 Proposed Action (Alternative 1)

No long-term adverse or beneficial effects to subsistence harvesting would be expected as a result of the Proposed Action (Alternative 1). Maintaining water quality and biological resources is integral to the region's subsistence harvesting. The water quality and biological resources in the area are not expected to be significantly affected by implementation of the Proposed Action

(Alternative 1) (see Sections 4.4 through 4.6). The proposed permit reissuance contains water quality-based and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment.

### 4.10.2 Alternative 2

Effects would be the same as those stated for the Proposed Action (Alternative 1) in Section 4.10.1 above.

### 4.10.3 No Action Alternative

No effects would occur. Under the No Action Alternative, discharges would continue to operate per the requirements of the existing permit, and no new discharges would be authorized. No changes to subsistence harvesting practices would occur.

### 4.10.4 Mitigation

There will be no long-term adverse effects to subsistence harvesting, therefore, no mitigation is required.

## 4.11 LAND AND SHORELINE USE AND MANAGEMENT

### 4.11.1 Proposed Action (Alternative 1)

No effects from the Proposed Action (Alternative 1) on land and shoreline use and management would be expected. Although water dependency is a prime criterion for development along the shoreline, the discharges from the Osprey Platform would not be expected to affect onshore land uses.

The Kenai Peninsula Borough has an approved CMP. Pursuant to 40 CFR § 122.49(d), the requirements of Alaska's CMP must be satisfied prior to issuance of the NPDES permit. USEPA determined that the discharges authorized under the existing NPDES permit are consistent with the Alaska CMP. USEPA will seek concurrence with its determination prior to reissuance of the permit.

### 4.11.2 Alternative 2

Similar to those under the Proposed Action (Alternative 1) in Section 4.11.1, no effects would be expected on land and shoreline use and management from reissuance of the NPDES permit under Alternative 2.

### 4.11.3 No Action Alternative

No effects would be expected. Under the No Action Alternative, discharges would continue to operate per the requirements of the existing permit, and no new discharges would be authorized. Discharges to surface waters occurring under continuation of the existing NPDES permit would not affect land and shoreline use or management.

### 4.11.4 Mitigation

There will be no effects to land and shoreline use or management, therefore, no mitigation is required.

## 4.12 TRANSPORTATION SYSTEMS

### 4.12.1 Proposed Action (Alternative 1)

No effects would be expected. Reissuance of the NPDES permit under the Proposed Action (Alternative 1) would not alter or change existing air, surface or marine transportation use or traffic patterns associated with the existing Osprey Platform.

### 4.12.2 Alternative 2

Effects would be the same as those stated for the Proposed Action (Alternative 1) in Section 4.12.1 above. No changes in air, surface or marine transportation use or traffic patterns associated with the two discharges (fire control test water and excess cement slurry) sources would be anticipated.

### 4.12.3 No Action Alternative

No effects would be expected. Under the No Action Alternative, discharges would continue to operate per the requirements of the existing permit, and no new discharges would be authorized. All provisions in the reissued NPDES permit would be identical to the existing NPDES permit. No changes in air, surface, or marine transportation use or traffic patterns associated with the existing sources would be anticipated.

### 4.12.4 Mitigation

There will be no impacts to transportation systems, therefore, no mitigation is required.

## 4.13 RECREATION, VISUAL ENVIRONMENT, AND AESTHETICS

### 4.13.1 Proposed Action (Alternative 1)

No effects would be expected from the existing or new discharges. Recreation, the visual environment and aesthetics could be affected if the discharges increased contaminants or turbidity to a level at which the water is no longer suitable for recreational use. The existing permit establishes water quality-based limitations and monitoring requirements necessary to ensure that the authorized discharges comply with the Alaska WQS and Federal water quality criteria maintain the water quality of Cook Inlet. Reissuance of the existing permit under the Proposed Action (Alternative 1) would establish criteria to prevent degradation of the marine environment so no effects on recreation, the visual environment, or aesthetics would be expected to occur.

### 4.13.2 Alternative 2

No effects would be expected. Under Alternative 2, intermittent discharges would be permitted from two discharges (fire control test water and excess cement flurry). Similar to the Proposed Action (Alternative 1), the reissued permit would establish water quality-based and technology-

based effluent limitations and monitoring requirements necessary to ensure that the authorized discharges comply with Alaska WQS and Federal water quality criteria to maintain the water quality of Cook Inlet. The implementation of the reissued permit under Alternative 2 would establish criteria to prevent degradation of the marine environment; effects on recreation, the visual environment, and aesthetics are not expected.

### 4.13.3 No Action Alternative

No effects would be expected. Under the No Action alternative, no new discharges would be authorized. The discharges would continue to operate under the limitations of the existing NPDES permit, which is designed to maintain the water quality of Cook Inlet in compliance with Alaska WQS and to prevent degradation of the marine environment in conformance with Federal water quality criteria. No effects on recreation, the visual environment, or aesthetics would be expected to occur.

### 4.13.4 Mitigation

There will be no impacts to recreation, the visual environment, or aesthetics, therefore, no mitigation is required.

## 4.14 CULTURAL, HISTORIC, AND ARCHAEOLOGICAL RESOURCES

### 4.14.1 Proposed Action (Alternative 1)

No effects would be expected. Effects to archaeological resources result primarily from physical disturbance of archaeological resource sites. Implementation of the Proposed Action (Alternative 1) would not result in the disturbance of any archaeological resources sites.

### 4.14.2 Alternative 2

No effects would occur. Effects would be the same as those stated for the Proposed Action (Alternative 1) in Section 4.14.1 above.

### 4.14.3 No Action Alternative

No effects would occur. No new discharges would be permitted. No physical disturbance of archaeological resource sites would occur as a result of the No Action Alternative.

### 4.14.4 Mitigation

There will be no impacts to cultural, historic, or archaeological resources, therefore, no mitigation is required.

## 4.15 ENVIRONMENTAL JUSTICE

### 4.15.1 Proposed Action (Alternative 1)

Potential environmental justice communities were considered near the Osprey Platform, coinciding with the coverage area for the reissued permit. The Kenai Peninsula Borough has been determined to be an appropriate reference area for potentially affected communities. Census data for 2000, the most recent year available, indicate the Kenai Peninsula Borough has

American Indian and Alaska Native populations of 7.5 percent. The percentage of the population below the poverty level in Kenai is 10 percent (see Table 4-1).

As part of USEPA's Tribal trust responsibilities, USEPA invited Cook Inlet Tribes to initiate consultation with the Agency regarding reissuance of the Osprey Platform NPDES permit (USEPA, 2007c). No concerns or issues were identified through tribal correspondence. Only the Kenaitze tribe formally requested Tribal consultation for the permit reissuance (Kenaitze Indian Tribe, 2007).

**Table 4-1. Percentages of the population below the poverty level for Kenai (adapted from USEPA, 2006)**

| Race | Kenai Borough | Alaska | U.S. |
|---|---|---|---|
| White | 86.2 | 69.3 | 75.1 |
| Black/African American | 0.5 | 3.5 | 12.3 |
| American Indian and Alaska Native | 7.5 | 15.6 | 0.9 |
| Asian | 1.0 | 4.0 | 3.6 |
| Hawaiian/Pacific Islander | 0.2 | 0.5 | 0.1 |
| Other Race | 0.8 | 1.6 | 5.5 |
| Two or more Races | 3.9 | 5.4 | 2.4 |
| White, not of Hispanic/Latino Origin | 85.1 | 67.6 | 69.1 |
| Hispanic or Latino | 2.2 | 4.1 | 12.5 |
| Below Poverty | 10.0 | 9.4 | 12.4 |

Environmental justice guidance specifies that Federal agencies should use available means to identify particular natural resources that, if affected by the Proposed Action (Alternative 1), could have a disproportionately high and adverse effect on minority and/or low-income communities, in particular natural resources that support subsistence living. USEPA policy is to collect and evaluate information relative to potential environmental justice community concerns and ensure meaningful involvement has been largely achieved through the communication and information received from interactions with tribal communities as a component of the Agency's trust responsibilities.

For a proposed action to result in environmental justice impacts, there must be significant adverse impacts on human health, socioeconomics or cultural resources and subsequently disproportionately affect minority or low-income populations. No significant adverse impacts have been identified for any of the resources addressed in this EA. Therefore, a finding of no environmental justice impacts is appropriate. However, there is recognition that there are unique resource characteristics and concerns with the subsistence lifestyle for both native and non-native communities. These concerns are addressed in the EA.

### 4.15.2 Alternative 2

Effects would be the same as those stated for the Proposed Action (Alternative 1) in Section 4.15.1 above.

### 4.15.3 No Action Alternative

Effects would be the same as those stated for the Proposed Action (Alternative 1) in Section 4.15.1 above.

### 4.15.4 Mitigation

There will be no impacts to minority or low-income populations, therefore, no mitigation is required.

## 4.16 CUMULATIVE EFFECTS

As defined by CEQ (40 CFR § 1508.7), cumulative effects are "impacts on the environment that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." In addition to oil and gas exploration, development, and production, the Cook Inlet basin is used for recreation and commercial uses. These uses include sportfishing and hunting, fish processing, guide services, timber harvesting, timber restoration, mining and reclamation, agriculture, aquaculture, recreation, tourism, and public works projects. The main industry in the Cook Inlet region, however, is oil and gas development.

The oil and gas industry is a major component of the Kenai Peninsula/Cook Inlet economy. The first exploration for oil in Cook Inlet Basin was in the early 1900s. In 1957, the first commercial oil field was discovered in the Swanson River Field in northern Kenai Peninsula. In the late 1950s and the 1960s, several commercial oil and gas fields were discovered, and many of them are still producing today. Discovered in 1965, the largest Cook Inlet oil field, McArthur River, had an estimated 1.5 billion barrels. The most recent oil discovery was in 1991 at Sunfish/Tyonek Deep (BC EMPR, 2004).

Oil production peaked in 1970 at 82 MMBO per year; in 2002, oil production was 11.5 MMBO per year. To date, the Cook Inlet region has produced 1.3 billion barrels of oil. Proven remaining oil reserves in the area are at 180 MMBO (BC EMPR, 2004). Cumulative production between 2004 and 2009 is an estimated 42.6 MMBO. Oil production in Cook Inlet is expected to continue to 2016 (MMS, 2003).

Natural gas production in Cook Inlet peaked at 331 bcf in 1994. Production has remained relatively stable from 1997 to 2001 at an average of 213 bcf per year. In 2003, gas production was at 208 bcf per year, and cumulative production for 2004 through 2009 is an estimated 1,131 bcf. To date, 9.124 tcf of natural gas has been produced, with remaining proven reserves at 2.241 tcf gas. Natural gas production in Cook Inlet is expected to continue beyond 2022 (BC EMPR, 2004).

The cumulative impact analysis considers the following:

- Past and current lease sale activities,
- Past oil and gas exploration and production activities,
- Oil and gas discoveries that have a reasonable chance of being developed during the next one to two decades, and

- Speculative exploration and development of additional undiscovered resources (onshore and offshore) that could occur over the next two decades.

USEPA (2006) reported that an estimated 20 new exploration wells are projected to be drilled, resulting in up to 60 new production wells drilled from as many as seven new platforms (based on lease-sale documents). Modeling conducted for the general permit reissuance determined that although the ratio of produced water to oil would increase from the existing Cook Inlet production facilities, discharges were not anticipated to have cumulative effects (USEPA, 2006); therefore, discharges from one sole platform (the Osprey Platform) are not anticipated to have cumulative effects on Cook Inlet. Many of the discharges from the Osprey Platform would likely be injected into the AOGCC-permitted Class I/II injection well, but even if discharged, the discharges would not be expected to degrade the quality of Cook Inlet water.

In general, within Cook Inlet, the amounts of pollutants in discharges from existing and projected facilities are expected to be relatively small and diluted with seawater several hundred to several thousand times before being discharged into the receiving waters. These routine discharges are not expected to cause any overall degradation of Cook Inlet water quality; therefore, no cumulative effects would be expected.

Cumulative impacts of discharges from the Osprey Platform should have negligible effects on Cook Inlet. The volumes of discharges are relatively minimal, as reported in the NPDES permit reissuance application (Forest Oil, 2006a). In addition, wastewater discharges of similar quality from other Cook Inlet oil and gas platforms and municipal waste streams from Anchorage, Homer, Kenai and other smaller cities are also discharged into Cook Inlet. Given the minimal nature of the Osprey Platform discharges, its contributions to the cumulative loading (volume and concentration of pollutants) in Cook Inlet are negligible. All contaminants of concern would be discharged at concentrations that must meet the Alaska WQS (with the exception of the sanitary waste discharges requiring a mixing zone) and the effluent limitation and monitoring requirements of the reissued NPDES permit. The strong tidal fluxes associated with Cook Inlet and the West Foreland area would aid in dispersing the discharges very rapidly. As a result, no cumulative effects are expected to occur from the discharges associated with the Osprey Platform.

## 4.17 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

NEPA regulations (40 CFR §1502.16(f)) require that environmental analyses include identification of ". . . any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species).

### 4.17.1 Irretrievable Commitment of Resources

The Osprey Platform is a fixed drilling platform constructed to support production-drilling operations for the Redoubt Shoal Unit. Production on the Osprey Platform does not commit to the future use of petroleum products, instead it facilitates the movement and processing of the resource. No new construction would be associated with the Proposed Action, and therefore, no additional associated irreversible or irretrievable commitment of resources would occur.

### 4.17.2 Irreversible Damage

With regard to irreversible damage, the potential exists for an accident associated with an oil spill (see Section 3.4.6). An oil spill could result in adverse impacts on various environmental resources. Resource impacts could include loss or damage to the marine environment and contamination of Cook Inlet. The potential risk and consequences of an oil spill are mitigable to some degree with the implementation of mitigation and safety measures, equipment, and emergency response plans already in place on the Osprey Platform (see Section 4.4.4). The risk cannot be completely eliminated, thus the potential for irreversible damage remains.

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# 5. CONCLUSIONS AND COMPARISON OF ALTERNATIVES

This EA has been prepared to evaluate the potential effects on the natural and human environment from activities associated with reissuing existing NPDES permit (AK-005330-9) for oil and gas production activities on the Osprey Platform in Cook Inlet, Alaska. This section provides the summary conclusions and a comparison of the alternatives against the resource areas potentially influenced by this action.

This EA evaluated potential effects on geology; climate, and air quality; physical oceanography; marine water quality; freshwater resources; marine biological resources; threatened and endangered species; terrestrial biological resources; socioeconomic conditions; subsistence harvesting; land and shoreline use and management; transportation systems; visual environment and aesthetics; recreation; cultural, historical and archaeological resources; environmental justice; and traditional ecological knowledge.

## 5.1 FINDINGS

### 5.1.1 Agency Preferred Alternative (Alternative 1)

The evaluation of the Proposed Action (Alternative 1) indicates that the physical and socioeconomic environment of Cook Inlet and the surrounding region is not expected to be significantly affected. Based on the analysis of impacts presented in Section 4 for the resource areas and summarized below, the Proposed Action (Alternative 1) is judged to be the agency-preferred alternative.

#### *5.1.1.1 Geology and Soils*

No effects would be expected.

#### *5.1.1.2 Climate and Air Quality*

No effects would be expected.

#### *5.1.1.3 Physical Oceanography*

No effects would be expected.

#### *5.1.1.4 Marine Water Quality*

No long-term adverse effects would be expected. The proposed permit reissuance contains water quality-based and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. There will be no authorized discharge of produced water, muds, cuttings, or cement at the seafloor. The majority of the discharges to Cook Inlet waters are expected to be injected into the AOGCC-permitted Class I/II injection well during production. Zero discharge through injection would reduce or eliminate the release of manmade contaminants from petroleum activities and any associated sedimentation and turbidity in Cook Inlet. ADEC prepared a draft Certificate of Reasonable Assurance for NPDES Permit AK-005330-9 (ADEC, 2008a) authorizing a mixing zone for sanitary waste approximately 0.12 acres in size based upon a dilution factor of 133:1. Compliance with Alaska WQS must be achieved at the edge of the mixing zone for TRC and FC. However, under the authority provided in Section 402(a)(1) of the CWA, EPA has established a technology-based effluent limit for FC,

which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

#### *5.1.1.5 Freshwater Resources*

No long-term adverse effects on freshwater resources would be expected. There would be no discharges to freshwater resources, and all marine discharges would be required to comply with the applicable water quality- and technology-based effluent limitations, special conditions, and monitoring and reporting requirements contained in the permit reissuance. Freshwater and anadromous species are typically mobile organisms that are not expected to spend extended periods of time within the vicinity of the Osprey Platform or its associated mixing zone. As discussed in Section 5.1.1.4, the proposed permit reissuance contains water quality- and technology-based effluent limitations and monitoring requirements necessary to ensure that the authorized discharges comply with Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. Additionally, discharges would not be permitted within the boundaries of coastal marsh, river delta, river mouth designated as AMSA, game refuge, game sanctuary or critical habitat areas.

#### *5.1.1.6 Marine Biological Resources*

No long-term adverse effects on marine biological resources would be expected. The proposed permit reissuance contains water quality-based and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and Federal water quality, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. Most species that use Cook Inlet waters are not likely to inhabit waters close to the Osprey Platform and are unlikely to be adversely affected by discharges from the platform. Additionally, discharges would not be permitted within the boundaries of coastal marsh, river delta, river mouth designated as AMSA, game refuge, game sanctuary or critical habitat areas.

#### *5.1.1.7 Threatened and Endangered Species*

No long-term adverse effects on threatened and endangered species would be expected. Steller's eiders and Kittlitz's murrelets may be present nearshore, however, they are unlikely to be affected by the permitted discharges due to the dilution of the waste streams. Although Steller sea lions and northern sea otters can occur in the project area, it is unlikely that the permitted discharges would disturb these species or their marine habitats. Humpback and beluga whales could occur within the project area covered by the reissued permit. However, these species are highly mobile and are not expected to spend substantial amounts of time within the discharge location. Wastewater discharges would not likely influence marine habitat for either species, and it is unlikely that these wastewater discharges would disturb them. In general, the threatened and endangered species that occur in Cook Inlet are not likely to inhabit waters close to the Osprey Platform and are therefore unlikely to be affected by discharges from the platform. The effects discussed under marine biological resources (Section 5.1.1.6) apply equally to threatened and endangered species.

#### *5.1.1.8 Terrestrial Biological Resources*

No long-term adverse effects on terrestrial biological resources would be expected. Most species that use Cook Inlet waters are unlikely to be affected by discharges from the Osprey Platform.

#### *5.1.1.9 Socioeconomic Conditions*

No long-term minor adverse or beneficial economic effects would be expected. The Proposed Action (Alternative 1) is similar to existing activities and is not expected to generate additional economic activity in the Kenai Peninsula Borough toward increased property taxes, employment, and personal income. Maintaining water quality and biological resources is integral to the region's fishing, recreation, and tourism industries, as well as subsistence harvesting. The permit would be designed to protect these resources from degradation and no loss to these industries would be anticipated.

#### *5.1.1.10 Subsistence Harvesting*

No effects would be expected.

#### *5.1.1.11 Land and Shoreline Use and Management*

No effects would be expected.

#### *5.1.1.12 Transportation Systems*

No effects would be expected.

#### *5.1.1.13 Recreation, Visual Environment, and Aesthetics*

No effects would be expected.

#### *5.1.1.14 Cultural, Historic, and Archaeological Resources*

No effects would be expected.

#### *5.1.1.15 Environmental Justice*

No effects would be expected.

#### *5.1.1.16 Cumulative Effects*

No cumulative effects would be expected.

#### *5.1.1.17 Mitigation*

The proposed permit reissuance contains water quality-based and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. Under the authority of Section 402(a)(1) of the CWA, USEPA has established a technology-based effluent limit for FC which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone.

The Osprey Platform C-Plan (including the SPCC plan and BMP) is designed to address major spill concerns, maximum worse case volumes, and major mitigation measures to assure that personnel operating the platform are trained to prevent releases and to respond when accidents occur. The C-Plan is periodically reviewed, drills conducted, and appropriate updates made to ensure the ongoing viability and usefulness of the plans' practices and procedures.

### 5.1.2 Environmentally-Preferred Alternative (Alternative 2)

The evaluation of Alternative 2 indicates that the physical and socioeconomic environment of Cook Inlet and the surrounding region would not be significantly affected. Based on the analysis

of impacts presented in Section 4 and summarized below, Alternative 2 is judged to be the environmentally-preferred alternative. Potential adverse impacts on water quality and the marine environment are not expected to be significant.

#### *5.1.2.1 Geology and Soils*

No effects would be expected.

#### *5.1.2.2 Climate and Air Quality*

No effects would be expected.

#### *5.1.2.3 Physical Oceanography*

No effects would be expected.

#### *5.1.2.4 Marine Water Quality*

No long-term adverse or beneficial effects on marine water quality would be expected. Similar to those under the Proposed Action (Alternative 1) in Section 5.1.1.4, no effects would be expected on marine water quality from the two discharges (excess cement slurry and fire control test water) under Alternative 2. Some improvement in water quality could result from allowing only the intermittent releases for these discharges. However, the water quality improvements would be minor and would be unlikely to be significantly beneficial to freshwater resources in Cook Inlet.

#### *5.1.2.5 Freshwater Resources*

No long-term adverse or beneficial effects would be expected. Effects would be largely the same as those stated for the Proposed Action (Alternative 1) in Section 5.1.1.5. Some improvement in water quality could result from allowing only the intermittent releases for excess cement slurry and fire control test water. However, the water quality improvements would be minor and would be unlikely to be significantly beneficial to freshwater resources in Cook Inlet.

#### *5.1.2.6 Marine Biological Resources*

No long-term adverse or beneficial effects would be expected. Effects would be largely the same as those stated for the Proposed Action (Alternative 1) in Section 5.1.1.6. Some improvement in water quality could result from allowing only the intermittent releases for excess cement slurry and fire control test water. However, the water quality improvements would be minor and would be unlikely to be significantly beneficial to marine biological resources in Cook Inlet.

#### *5.1.2.7 Threatened and Endangered Species*

No long-term minor adverse or beneficial effects would occur. Effects would be largely the same as those stated above for marine biological resources in Section 5.1.1.7. Some improvement in water quality could result from allowing only the intermittent releases for excess cement slurry and fire control test water, though it would be unlikely to be significantly beneficial to threatened and endangered species.

#### *5.1.2.8 Terrestrial Biological Resources*

No long-term adverse effects on terrestrial biological resources would be expected. Most species that use Cook Inlet waters are unlikely to be affected by discharges from the platform. Effects would be largely the same as those stated for the Proposed Action (Alternative 1) in Section 5.1.1.8. Some improvement in water quality could result from allowing only the intermittent

releases for excess cement slurry and fire control test water. However, the water quality improvements would be minor and would be unlikely to be significantly beneficial to terrestrial biological resources in Cook Inlet.

#### *5.1.2.9 Socioeconomic Conditions*

No long-term minor adverse or beneficial economic effects would be expected. Effects would be largely the same as those stated above for socioeconomic conditions in Section 5.1.1.9.

#### *5.1.2.10 Subsistence Harvesting*

No effects would be expected.

#### *5.1.2.11 Land and Shoreline Use and Management*

No effects would be expected.

#### *5.1.2.12 Transportation Systems*

No effects would be expected.

#### *5.1.2.13 Recreation, Visual Environment, and Aesthetics*

No effects would be expected.

#### *5.1.2.14 Cultural, Historic, and Archaeological Resources*

No effects would be expected.

#### *5.1.2.15 Environmental Justice*

No effects would be expected.

#### *5.1.2.16 Cumulative Effects*

No cumulative effects would be expected.

#### *5.1.2.17 Mitigation*

The proposed permit reissuance contains water quality-based and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. Under the authority of Section 402(a)(1) of the CWA, USEPA has established a technology-based effluent limit for FC which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone.

The Osprey Platform C-Plan (including the SPCC plan and BMP) are designed to address major spill concerns, maximum worse case volumes, and major mitigation measures to assure that personnel operating the platform are trained to prevent releases and to respond when accidents occur. The C-Plan is periodically reviewed, drills conducted, and appropriate updates made to ensure the ongoing viability and usefulness of the plans' practices and procedures.

### 5.1.3 No Action Alternative

The evaluation of the No Action Alternative indicates that the physical and socioeconomic environment of Cook Inlet and the surrounding region would not be significantly affected. The predicted consequences on resource areas are briefly described below.

#### *5.1.3.1 Geology and Soils*
No effects would be expected.

#### *5.1.3.2 Climate and Air Quality*
No effects would be expected.

#### *5.1.3.3 Physical Oceanography*
No effects would be expected.

#### *5.1.3.4 Marine Water Quality*
No long-term adverse effects would be expected. The provisions for existing discharges would be maintained as they are in the existing NPDES permit. The majority of the discharges to Cook Inlet waters are expected to be injected into the AOGCC-permitted Class I/II injection well during production. Zero discharge through injection would reduce or eliminate the release of manmade contaminants from petroleum activities and any associated sedimentation and turbidity in Cook Inlet. Water quality-based limits under the existing permit would remain the same and would contain the limitations and conditions that are necessary to attain Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent degradation of the marine environment.

#### *5.1.3.5 Freshwater Resources*
No long-term adverse effects on freshwater resources would be expected. The discharges covered under the existing NPDES permit would continue to operate under the limitations specified in the existing permit that are necessary to attain Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent degradation of the marine environment. In addition, most freshwater species (including anadromous species) are unlikely to be affected by discharges from the Osprey Platform.

#### *5.1.3.6 Marine Biological Resources*
No long-term adverse effects on marine biological resources would be expected. Most species that use Cook Inlet waters are not likely to inhabit waters close to the Osprey Platform and are therefore unlikely to be affected by discharges from the platform. No effects on biological resources would be attributable to the permitted discharges because water quality-based limits under the existing permit would remain the same and would contain the limitations and conditions that are necessary to attain Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent degradation of the marine environment.

#### *5.1.3.7 Threatened and Endangered Species*
No long-term adverse effects on threatened and endangered species would be expected. No effects on threatened and endangered species would be attributable to the permitted discharges because water quality-based limits under the existing permit would remain the same, and would contain the limitations and conditions that are necessary to attain Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent degradation of the marine environment.

#### *5.1.3.8 Terrestrial Biological Resources*
No long-term adverse effects on terrestrial biological resources would be expected. Most species that use Cook Inlet waters are unlikely to be affected by discharges from the Osprey Platform.

#### *5.1.3.9 Socioeconomic Conditions*
No long-term minor adverse or beneficial economic effects would be expected. Existing activities under the No Action Alternative are not expected to generate additional economic activity in the Kenai Peninsula Borough toward increased property taxes, employment, and personal income. Maintaining water quality and biological resources is integral to the region's fishing, recreation, and tourism industries, as well as subsistence harvesting. Water quality-based limits under the existing permit would remain the same and would contain the limitations and conditions that are necessary to attain Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent degradation of the marine environment. The existing permit limitations and conditions would continue to protect these resources from degradation with no loss to these industries.

#### *5.1.3.10 Subsistence Harvesting*
No effects would be expected.

#### *5.1.3.11 Land and Shoreline Use and Management*
No effects would be expected.

#### *5.1.3.12 Transportation Systems*
No effects would be expected.

#### *5.1.3.13 Recreation, Visual Environment, and Aesthetics*
No effects would be expected.

#### *5.1.3.14 Cultural, Historic, and Archaeological Resources*
No effects would be expected.

#### *5.1.3.15 Environmental Justice*
No effects would be expected.

#### *5.1.3.16 Cumulative Effects*
No cumulative effects would be expected.

#### *5.1.3.17 Mitigation*
The proposed permit reissuance contains water quality-based and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. Under the authority of Section 402(a)(1) of the CWA, USEPA has established a technology-based effluent limit for FC which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone.

The Osprey Platform C-Plan (including the SPCC plan and BMP) is designed to address major spill concerns, maximum worse-case volumes, and major mitigation measures to assure that personnel operating the platform are trained to prevent releases and to respond when accidents

occur. The C-Plan is periodically reviewed, drills conducted, and appropriate updates made to ensure the ongoing viability and usefulness of the plans' practices and procedures.

## 5.2 CONCLUSIONS

Based on the analysis performed in this EA, implementation of the Agency Preferred Alterative (Alternative 1) would provide the most operational flexibility and have no significant direct, indirect or cumulative effects on the quality of the natural or human environment. Table 5-1 provides a summary and comparison of the alternatives.

**Table 5-1. Summary of potential environmental and socioeconomic consequences of Osprey Platform NPDES permit reissuance alternatives**

| Environmental and Socioeconomic Consequences | | | |
|---|---|---|---|
| Resource | Proposed Action (Alternative 1) | Alternative 2 | No Action Alternative |
| Geology | No effects | No effects | No effects |
| Climate and Meteorology | No effects | No effects | No effects |
| Physical Oceanography | No effects | No effects | No effects |
| Marine Water Quality | No long-term adverse effects | No long-term adverse or beneficial effects | No long-term adverse effects |
| Biological Resources | No long-term adverse effects | No long-term adverse or beneficial effects | No long-term adverse effects |
| Freshwater Resources | No long-term adverse effects | No long-term adverse or beneficial effects | No long-term adverse effects |
| Threatened and Endangered Species | No long-term adverse effects | No long-term adverse or beneficial effects | No long-term adverse effects |
| Subsistence Harvesting | No effects | No effects | No effects |
| Socioeconomic Conditions | No long-term adverse effects | No long-term adverse or beneficial effects | No long-term adverse effects |
| Land and Shoreline Use Management | No effects | No effects | No effects |
| Transportation Systems | No effects | No effects | No effects |
| Recreation, Visual Environment, and Aesthetics | No effects | No effects | No effects |
| Cultural, Historic, and Archaeological Resources | No effects | No effects | No effects |
| Environmental Justice | No effects | No effects | No effects |

# 6. RELATIONSHIP WITH ENVIRONMENTAL LAWS AND EXECUTIVE ORDERS

Various Federal laws and Executive Orders address specific environmental concerns that must be addressed by the Proposed Action. This section provides a summary of those requirements that are applicable to the Proposed Action.

## 6.1 CLEAN WATER ACT (33 U.S.C. 1251 ET SEQ.)

The Clean Water Act (CWA) is the primary Federal law governing water pollution in the U.S. The CWA established the goals of eliminating releases to water of high amounts of toxic substances, eliminating additional water pollution, and ensuring that surface waters would meet standards necessary for human sports and recreation. The principal body of law currently in effect is based on the Federal Water Pollution Control Amendments of 1972, which set the basic structure for regulating discharges of pollutants to waters of the United States. The law gives USEPA the authority to set effluent standards on an industry basis (technology-based) and continues the requirements to establish WQS for all contaminants in surface waters. Major CWA amendments enacted in 1977 included making it unlawful for any person to discharge any pollutant from a point source into navigable waters unless an NPDES permit is obtained.

USEPA effluent limitation guidelines and new source performance standards for the oil and gas extraction point source category went into effect on December 16, 1996 (61 FR 66123). With promulgation of the new source performance standards for oil and gas extraction, those oil and gas extraction projects requiring NPDES permits, which are defined as “new sources” are subject to the provisions of NEPA. Section 403(c) of the CWA requires that NPDES permits for ocean discharges be issued in compliance with USEPA‘s Ocean Discharge Criteria for preventing degradation of ocean waters.

Forest Oil submitted a NPDES permit reissuance application for the Osprey Platform on December 28, 2006 (Attachment A). This EA has been prepared to support USEPA‘s review of the NPDES permit reissuance application.

## 6.2 CLEAN AIR ACT OF 1970 (42 U.S.C. 7401 ET SEQ.)

As the comprehensive Federal law regulating air emissions from area, stationary, and mobile sources, the CAA authorizes USEPA to establish NAAQS to protect public health and the environment. The goal of the CAA was to set and achieve NAAQS in every State by 1975. The setting of maximum pollutant standards was coupled with directing States to develop State Implementation Plans (SIPs) applicable to appropriate industrial sources. The CAA was amended in 1977 primarily to set new goals (dates) for achieving attainment of NAAQS since many areas of the country had failed to meet the deadlines. In 1990, CAA amendments were intended to meet unaddressed or insufficiently addressed problems such as acid rain, ground-level ozone, stratospheric ozone depletion, and air toxics.

USEPA has established NAAQS for $NO_2$, CO, $O_3$, $SO_2$, Pb, and PM10, which are applicable to the operations on the Osprey Platform. ADEC has not established additional or more stringent standards for these constituents. As described in Section 3.2.2, the operation of a major stationary source in an area in attainment for all NAAQS, such as the Cook Inlet area, is

governed by the PSD program of the CAA. Alaska areas are currently designated as PSD Class I or II. The Class I air quality designation is the most restrictive and applies to certain national parks, monuments, and wilderness areas. Tuxedni National Wildlife Refuge (about 50 miles from the project site) is designated as a National Wilderness Area and is the only Class I area in the general Cook Inlet area; remaining areas are classified as Class II. Therefore, the Osprey Platform is located in a PSD Class II area.

## 6.3 ENDANGERED SPECIES ACT (16 U.S.C. 1531 ET SEQ.)

The purpose of the ESA is to ensure that Federal agencies and departments use their authorities to protect and conserve endangered and threatened species. Section 7 of the ESA requires that Federal agencies prevent or modify any projects authorized, funded, or carried out by the agencies that are "likely to jeopardize the continued existence of any endangered species or threatened species, or result in the destruction or adverse modification of critical habitat of such species."

Federal agencies must review actions they undertake or support to determine whether they may affect protected species or their habitats. If such review reveals the potential for effects, the Federal agency must consult with the USFWS or NMFS, as appropriate. Consultation is carried out to identify whether a Federal action is likely to jeopardize the continued existence of the endangered or threatened species or adversely affect its critical habitat. If USFWS or NMFS determines that a proposed action would likely have a negative impact, the project must be stopped unless the consulting parties can agree on alternatives or mitigation measures to eliminate jeopardy.

As detailed in Section 3.7, a Biological Evaluation (Appendix D) was prepared to determine whether the wastewater discharges from the Osprey Platform will have an effect on protected species. Based on the Cook Inlet tidal flux, the anticipated volume of wastewater discharges, and the Osprey Platform's contribution to the cumulative loading of waste discharges in Cook Inlet, the Biological Evaluation concluded that the Osprey Platform's wastewater discharges will be rapidly diluted and will likely have no adverse effect on threatened or endangered species, or critical habitat associated with these species.

NMFS and USFWS have concurred with the findings of the Biological Evaluation; these concurrence letters are provided in Appendix E.

## 6.4 MARINE MAMMAL PROTECTION ACT OF 1972 (16 U.S.C. 1361 ET SEQ.)

The MMPA, as amended, establishes a national policy designed to protect and conserve marine mammals and their habitats. This policy is established to prevent the reduction of population stocks beyond the point at which they cease to be a functioning element in the ecosystem, or the reduction of species below their optimum sustainable population. The MMPA established a moratorium, with certain exceptions, on the taking of marine mammals in U.S. waters and by U.S. citizens on the high seas, and on the importing of marine mammals and marine mammal products into the Unites States. Under the MMPA, NMFS is responsible for the conservation and management of pinnipeds (other than walruses) and cetaceans, whereas USFWS is responsible for walruses, sea and marine otters, polar bears, manatees, and dugongs.

Under the MMPA, NMFS has a responsibility to monitor populations of marine mammals to make sure that they stay at optimum levels. If a population falls below its optimum level, it is designated as "depleted," and a conservation plan is developed to guide research and management actions to restore the population to healthy levels. The MMPA allows, U.S. citizens engaged in activities other than commercial fishing, to incidental (but not intentional) take small numbers of depleted as well as non-depleted marine mammals. A taking may only be permitted if, after notice and opportunity for public comment, the Secretary of Commerce finds there will only be a negligible impact on the affected species/stock, and there will not be an unmitigatable adverse impact on the availability of such species/stock for subsistence uses by Alaska Natives. If acceptable, then necessary regulations detailing methods of taking, monitoring, and reporting requirements are prescribed. However, the 1994 MMPA amendments provide that this regulation requirement may be waived if the proposed activity results in only harassment,[20] and no serious injury or mortality is anticipated.

The MMPA's moratorium on taking of any marine mammal does not apply to "taking by any Indian, Aleut, or Eskimo who resides in Alaska and who dwells on the coast of the North Pacific Ocean or the Arctic Ocean if such taking is for subsistence purposes . . . done for purpose of creating and selling authentic Native articles of handicrafts and clothing . . . and is not accomplished in a wasteful manner."

Humpback whales and Cook Inlet beluga whales are listed as "depleted" under the MMPA. NMFS has concurred with the findings of the BA; the concurrence letter is provided in Appendix E.

## 6.5 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT (PUBLIC LAW 104-267)

As described in Section 3.6.4, the MSFCMA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. The amendment created new requirements to describe and identify EFH in each fishery management plan. EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." All Federal agencies are required to consult with NMFS on all actions undertaken by the agency that may adversely affect EFH.

An EFH Assessment (Appendix C) was prepared to evaluate impacts of wastewater discharges from the Osprey Platform on EFH. The EFH Assessment concluded that wastewater discharges from the Osprey Platform will be rapidly diluted and will likely have no potential direct, indirect, or cumulative impacts on any of the EFH species or habitats of Cook Inlet. NMFS has concurred with the findings of the EFH Assessment; the concurrence letter is provided in Appendix E.

[20] Under the MMPA, two categories of harassment are defined: (a) the potential to injure a marine mammal species or stock in the wild (Level A harassment), and (b) disturbance to a marine mammal species or stock by causing disruption of natural behavioral patterns, e.g., migration, breathing, nursing, breeding, or feeding (Level B harassment).

## 6.6 COASTAL ZONE MANAGEMENT ACT (16 U.S.C. 1451 ET SEQ.)

The CZMA encourages the management of coastal zone areas, provides grants to be used in maintaining coastal zone areas, and requires that all Federal activities in coastal areas be consistent with approved State CMPs, to the maximum extent possible. As detailed in Section 3.11.2, the Alaska Coastal Management Act allows local coastal districts to develop CMPs and tailor statewide standards to reflect local concerns. The Kenai Peninsula Borough has established a local CMP, which was fully incorporated into the Alaska CMP in 1990.

If a Federal agency's action may affect a coastal zone area, the responsible official must assess the impact of the action on the coastal zone. If the action significantly affects the coastal zone area, a consistency determination shall be sought in accordance with procedures promulgated by the Office of Coastal Zone Management in 15 CFR Part 930. The Osprey Platform is located within the Alaska seaward coastal zone boundary.[21] However, the Proposed Action is not expected to significantly affect the coastal zone area.

## 6.7 EXECUTIVE ORDER 12898, ENVIRONMENTAL JUSTICE

As described in Section 3.16, on February 11, 1994, President Clinton issued EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," and an accompanying Presidential memorandum, that directs Federal agencies to focus attention on the environmental and human health conditions in minority communities and low-income communities. The EO, as amended, directs Federal agencies to develop, by March 24, 1995 an Environmental Justice Strategy that identifies and addresses disproportionately high and adverse human-health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. Under the authority of NEPA, and consistent with regulations and guidelines issued by CEQ, USEPA routinely reviews the environmental effects of major Federal actions significantly affecting the quality of the human environment. For such actions, USEPA reviewers are required to focus on the spatial distribution of human health, social, and economic effects to ensure that agency decisionmakers are aware of the extent to which those impacts fall disproportionately on covered communities.

No environmental justice communities other than Alaska Natives have been identified as potentially affected by the Proposed Action.

[21] The Alaska seaward coastal zone boundary is the "outer limit of the United States territorial sea" (15 CFR 923.32), which is the "three geographic mile line" (43 CFR 3301.1).

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# APPENDIX A
# OSPREY PLATFORM NPDES PERMIT REISSUANCE APPLICATION

To view the complete Osprey Platform NPDES Permit Reissuance Application or the Osprey Platform mixing zone application, please contact Mr. Jamey Stoddard (Stoddard.jamey@epa.gov, 206-553-6610) or Ms. Hanh Shaw (shaw.hana@epa.gov, 206-553-0171) at U.S. Environmental Protection Agency, Retion 10, 1200 6th Avenue, Suite 900, Seattle, WA 98101.

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FOREST OIL CORPORATION

310 K Street • Suite 700
Anchorage, Alaska 99501
(907) 258-8600 • (907) 258-8601 (Fax)

December 28, 2006

RECEIVED
DEC 2006
U.S. EPA REGION 10
OFFICE OF WATER AND WATERSHEDS

Mr. Brian Nickels
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Re: Renewal of Osprey Platform NPDES Permit No. AK0053309

Dear Mr. Nickels:

Forest Oil Corporation (Forest Oil) owns and operates the Osprey Platform in Cook Inlet, Alaska. Wastewater is discharged from the platform under NPDES Permit No. AK0053309. With this letter and attachments and in accordance with permit stipulation V.B., Forest Oil is applying for renewal of NPDES Permit No. AK0053309 and is requesting administrative extension of the existing permit if the new permit is not issued prior to the expiration date of June 30, 2007.

**Facility Description**

The Osprey Platform is a modern, state-of-the-art, four column, oil and gas production platform set in approximately 45 feet of water in Cook Inlet, Alaska. (See Attachment 1 for site location.) The Osprey was converted from exploration to production status in late 2002. Produced fluids from the Osprey are piped to the Kustatan Production facility for separation of water, gas and crude oil. This permit application applies only to the Osprey Platform. A schematic flow diagram is presented in Attachment 2.

The facility address is:

Osprey Platform
Upper Cook Inlet, Alaska
Approximately 2 miles east of the West Foreland
Latitude: 60° 41' 46.3" N, Longitude: 151° 40' 10.2" W

Forest Oil's address is:

Forest Oil Corporation
310 K Street, Suite 700

Anchorage, Alaska 99501

The State of Alaska is the surface owner. The leaser address is:

Department of Natural Resources,
Division of Oil and Gas
550 West 7th Avenue, Suite 800
Anchorage, AK 99501

**Current Permits and Lease**

The Department of Natural Resources, Division of Oil and Gas, manages the state lands for oil and gas development under lease ADL 381203.

The Alaska Department of Environmental Conservation (ADEC) issued the Air Quality Control Operating Permit #696TVP01 for the Osprey Platform. The permit became effective August 6, 2004. The Osprey Platform is not classified as a prevention of significant deterioration (PSD) major facility under 18 Alaska Administrative Code (AAC) 50.300(c).

A Class I injection Permit No. AK-1I007-A was issued in 2006 for the Osprey Platform.

The Osprey Platform is a conditionally exempt small-quantity generator of hazardous waste and thus is not required to apply for a RCRA permit number.

**Outfall 002 Deck Drainage**

Deck drainage is allowed to be discharged under the existing permit, and Forest Oil requests that it be retained as a permitted outfall in the new permit.

Deck drainage flows into a skim tank where it is treated by physical separation: oil floats to the top of the tank and water is discharged from the lower portion of the tank. Domestic wastewater is also treated in this skim tank.

As a result of the mixing of domestic wastewater and deck drainage, Forest Oil understands that monitoring requirements for either discharge will effectively apply to both discharges. However, if Forest Oil re-pipes domestic wastewater in the future, it retains the right to apply only the reporting requirements of deck drainage to deck drainage discharge monitoring reports.

Deck drainage daily average flow volume was calculated based upon historical records. The flow is held in a skim tank and batched discharge, resulting in days of no discharge between days of discharge. The maximum daily discharged volume was obtained from the 2000 mixing zone application and reflects a reasonable maximum flow volume.

A valve on the discharge line is locked. Deck drainage is currently injected, and Forest Oil has no immediate plans to initiate discharge to Cook Inlet on a routine basis. However, it wishes to retain the ability to discharge if it is needed in the future.

**Outfall 003 Sanitary Wastewater**

Sanitary Wastewater is allowed to be discharged under the existing permit, and Forest Oil requests that it be retained as a permitted outfall in the new permit.

Sanitary wastewater daily average flow volume was calculated based upon the equation of 60 gallons per person per day and an average of five people onboard. Typically, there are only two people onboard, but there could be as many as 59 people, based on the amount of room in the escape pods. An average population of five and a maximum population of 60 were used to calculate flow volumes.

Sanitary wastewater is treated in a marine sanitation device (MSD). A valve on the discharge line is locked. Sanitary wastewater is currently injected, and Forest Oil has no immediate plans to initiate discharge to Cook Inlet on a routine basis. However, it wishes to retain the ability to discharge if it is needed in the future.

A mixing zone application was submitted to the State of Alaska for chlorine and fecal coliform in sanitary wastewater. The sanitary wastewater would be discharged in the same discharge pipe as deck drainage and domestic wastewater.

**Outfall 004 Domestic Wastewater**

Domestic wastewater is allowed to be discharged under the existing permit, and Forest Oil requests that it be retained as a permitted outfall in the new permit.

The domestic wastewater daily average flow volume was calculated based upon the equation of 100 gallons per person per day. Typically, there are only two people onboard, but there could be as many as 59 people, based on the amount of room in the escape pods. An average population of five and a maximum population of 60 were used to calculate flow volumes.

For convenience, domestic wastewater is currently piped to the deck drainage skim tank. However, domestic wastewater is not required to be treated and Forest Oil retains the right to bypass domestic wastewater around the skim tank.

As a result of the mixing of domestic wastewater and deck drainage, Forest Oil understands that monitoring requirements for either discharge will effectively apply to both discharges. However, if Forest Oil re-pipes domestic wastewater in the future, it retains the right to apply only the reporting requirements of domestic wastewater to domestic wastewater discharge monitoring reports.

**Outfall 005 Desalination Backwash**
The discharge of desalination wastes was not included in the current permit. Forest Oil requests that desalination wastes be added as an allowed discharge under the new permit.

Water quality of desalination wastes was not analyzed on the Osprey Platform because it does not yet have a desalination plant. Water sample data was obtained from the Monopod Platform NPDES permit application that was submitted for the Cook Inlet General permit renewal. (Forest Oil is part owner of the Monopod Platform.)

**Outfall 007 Boiler Blowdown**
The discharge of boiler blowdown is allowed to be discharged under the existing permit, and Forest Oil requests that it be retained as a permitted outfall in the new permit.

Water quality was not analyzed on the Osprey Platform because the platform does not have boiler blowdown water to sample. Water sample data was obtained from the King Salmon Platform NPDES permit application that was submitted for the Cook Inlet General permit renewal. (Forest Oil is part owner of the King Salmon Platform.)

**Outfall 008 Fire Control Test Water**
Fire control test water is allowed to be discharged under the existing permit, and Forest Oil requests that it be retained as a permitted outfall in the new permit.

Fire control test water is typically discharged weekly for approximately thirty minutes. At the time of discharge, an operator turns the fire water pump on and runs it for a few minutes. The volume of discharge was calculated from historical data records.

**Outfall 009 Non-Contact Cooling Water**
Non-contact cooling water was in the current permit and Forest Oil requests that it be retained as a permitted outfall in the new permit.

Water quality was not analyzed on the Osprey Platform because the platform does not have non-contact cooling water to sample. Water sample data was obtained from the King Salmon Platform NPDES permit application that was submitted for the Cook Inlet General permit renewal.

**Outfall 012 Excess Cement Slurry**
Excess cement slurry is allowed to be discharged under the existing permit, and Forest Oil requests that it be retained as a permitted outfall in the new permit.

Water quality was not analyzed on the Osprey Platform because the platform has not had a recent discharge of excess cement slurry to sample. Flow volumes are estimated.

**Outfall 013 Muds, Cuttings and Cement at the Seafloor**

The discharge of drilling muds, cuttings and cement at the seafloor was not permitted in the current permit, and Forest Oil requests it be added as a permitted discharge under the new permit.

This outfall would be required in the new permit in order to properly abandon wells on the Osprey Platform. Forest Oil does not have any analytical or flow data available. Flow volumes referenced in the Cook Inlet General Permit were used for maximum and average flows.

**Outfall 021 Filter Backwash**

Outfall 021 is a new discharge for filter backwash that consists mainly of sea water and sediments entrained in seawater. The filtered water is used for various platform purposes and production purposes.

A schematic flow diagram is shown in Attachment 3. Filter Backwash would include any water between the point of water intake from Cook Inlet to the deaerated water pumps and includes discharge points # D1 through # D5. Forest Oil has conservatively designed the system such that production treatment chemicals would not be discharged to Cook Inlet. Chemical treatment for injection water occurs past the deaerated pumps, and chemicals could not travel backwards through check valves in the system. Consequently, there would be no discharge of production treatment chemicals.

The filter backwash will be injected with chlorine to remove bacterial growth in the filter, and will flow to a holding tank where it will be aerated to remove residual chlorine. A MSDS for chlorine is included in Attachment 4. A light treatment (either ultra-violet or natural) may be added to more thoroughly remove chlorine if needed. The chlorine is expected to be removed to such an extent that a mixing zone for chlorine is not needed for compliance with State of Alaska water quality standards. Forest Oil retains the right to apply for a mixing zone permit with the State of Alaska if the dechlorination treatment is not fully successful. Currently, the chlorine concentration in the discharge cannot be modeled because the filter treatment system has not been designed. The actual volumes and concentrations are not known.

Approximately every two to three weeks the filter may be treated with (tetrakis(hydroxymethyl)phosphonium sulfate [THPS]) to remove bacteria that is not significantly affected by chlorine. THPS is widely used in industrial systems that discharge to ecologically sensitive waters because it decomposes quickly to a simple salt. An ultra-violet light treatment may be added to accelerate decomposition. THPS

won the American Green Chemicals Award in 1997. The brand of THPS proposed to use at Osprey Platform is Alpha 160, and its MSDS is included in Attachment 5.

If you have any questions, please do not hesitate to contact Robert Elder at 907-868-2139 or JR Wilcox at 907-868-2166.

Sincerely,

Leonard C Gurule
Senior Vice President

Attachment 1. Site Location
Attachment 2. Flow Diagram
Attachment 3. Filter Backwash Flow Diagram
Attachment 4. MSDS Chlorine
Attachment 5. MSDS THPS
Attachment 6. NPDES Permit Application
Attachment 7. Sampling Data

CC: Alan Kukla / ADEC Anchorage
Kenwyn George / ADEC Juneau
Jacqueline Rose / Hoefler Consulting Group

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

Reply to
Attn Of: OWW-130

APR - 2 2007

Leonard C. Gurule
Senior Vice President
310 K Street Suite 700
Anchorage, AK 99501

Re: Renewal of National Pollutant Discharge Elimination System (NPDES) Permit
Forest Oil Osprey Platform, NPDES Permit No. AK-005330-9

Dear Mr. Gurule:

The Environmental Protection Agency (EPA) received the above referenced NPDES application materials on December 29, 2006. We have completed our review of the application and have determined that it is timely and complete. According to the federal regulation at 40 CFR 122.6(a), when a timely and complete application is received by EPA, and through no fault of the permittee, EPA does not reissue a new permit prior to the expiration date of the existing permit, then the permit remains fully effective and enforceable. Therefore, your existing permit will remain effective and enforceable until a new permit is issued to your facility.

Please note that EPA may request additional information during the development of the draft permit to clarify, modify, or supplement previously submitted material. If you have any questions, please contact Brian Nickel at (206) 553-6251, or via e-mail at Nickel.Brian@epa.gov.

Sincerely,

Michael J. Lidgard, Manager
NPDES Permits Unit

cc: Robert Elder, Forest Oil
J.R. Wilcox, Forest Oil
Jacqueline Rose, Hoefler Consulting Group
Alan Kukla, ADEC Anchorage
Kenwyn George, ADEC Juneau

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# APPENDIX B
# OSPREY PLATFORM WATER FLOW DIAGRAM

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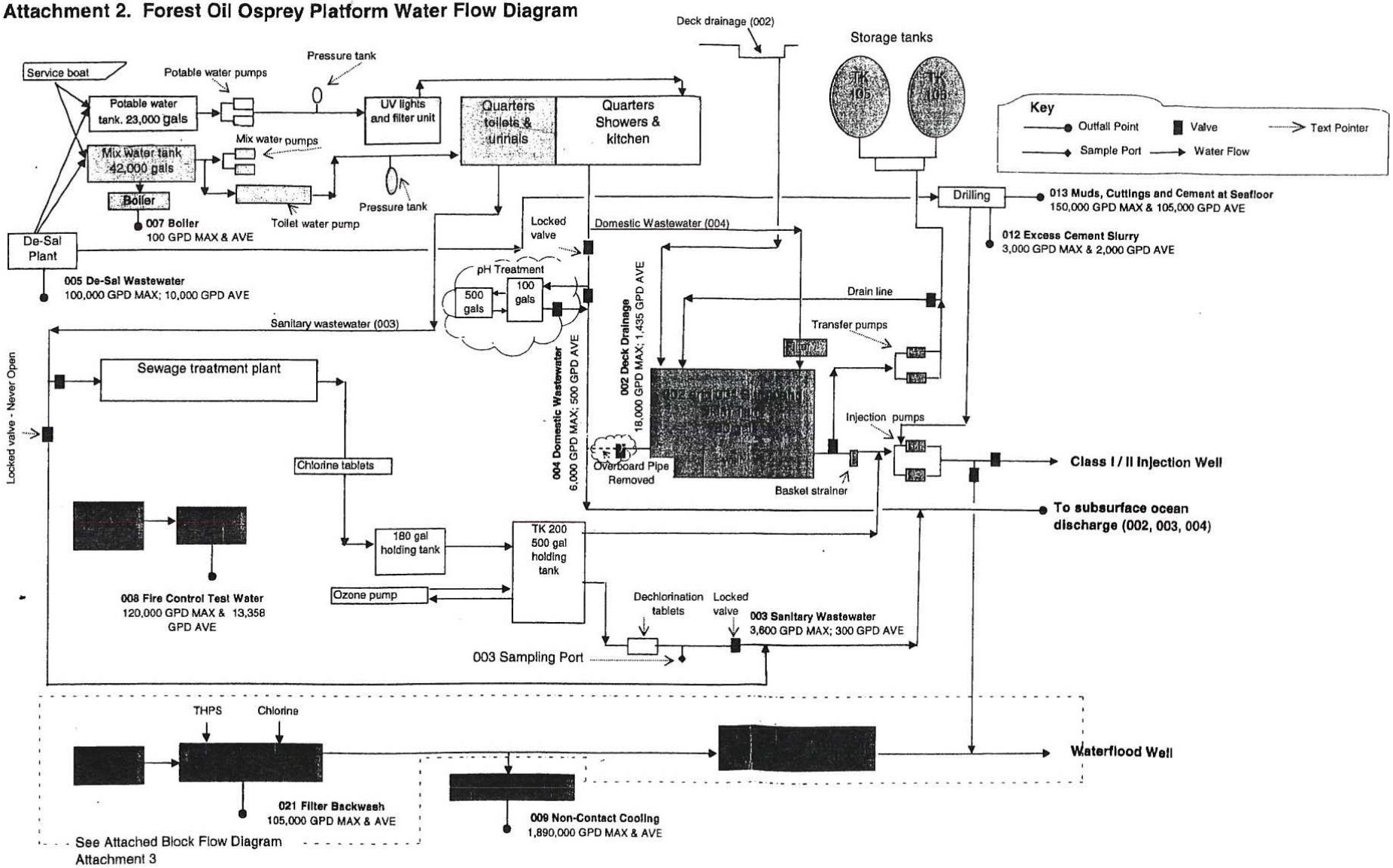
## Attachment 2. Forest Oil Osprey Platform Water Flow Diagram



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# APPENDIX C
# ESSENTIAL FISH HABITAT (EFH) ASSESSMENT FOR THE OSPREY PLATFORM NPDES PERMIT REISSUANCE

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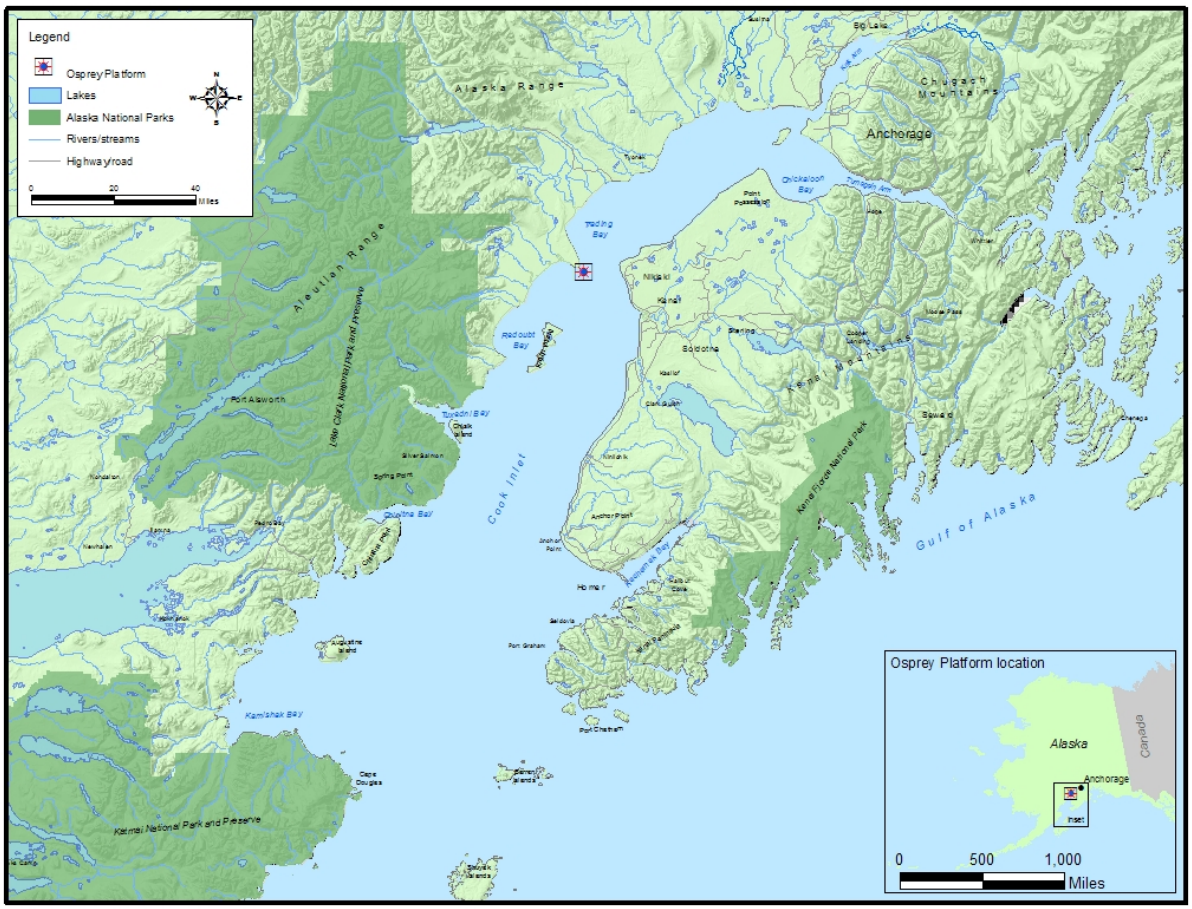
# FINAL

## ESSENTIAL FISH HABITAT ASSESSMENT FOR THE REISSUANCE OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR THE OSPREY PLATFORM




**Prepared for:**
U.S. Environmental Protection Agency
Region 10
1200 6th Avenue, Suite 900
Seattle, WA 98101

**Prepared by:**
Booz Allen Hamilton
1550 Crystal Drive
Arlington, VA 22202

**December 2008**

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AAC | Alaska Administrative Code |
| ADEC | The Alaska Department of Environmental Conservation |
| AML | Average Monthly Limit |
| AOGCC | Alaska Oil and Gas Conservation Commission |
| BC EMPR | British Columbia Ministry of Energy, Mines, and Petroleum Resources |
| BE | Biological Evaluation |
| BMP | Best Management Practices |
| BOD | Biochemical Oxygen Demand |
| BSAI | Bering Strait and Aleutian Islands |
| C | Celsius |
| CFR | Code of Federal Regulations |
| CWA | Clean Water Act |
| DO | Dissolved Oxygen |
| EEZ | Exclusive Economic Zone |
| EIS | Environmental Impact Statement |
| EFH | Essential Fish Habitat |
| EPA | U.S. Environmental Protection Agency |
| ESA | The Endangered Species Act |
| F | Fahrenheit |
| FC | Fecal Coliform |
| FMP | Fisheries Management Plan |
| ft | feet |
| GOA | Gulf of Alaska |
| gpd | gallons per day |
| gpm | gallons per minute |
| km | kilometer |
| L | liter |
| lb | pound |
| m | meter |
| MDL | Maximum Daily Limit |
| mgd | million gallons per day |
| mg/L | milligrams per liter |
| mL | milliliter |
| MMS | Minerals Management Service |
| MSD | Marine Sanitation Device |
| MSFCMA | Magnuson-Stevens Fishery Conservation and Management Act |
| NA | Not Applicable |
| nm | nautical mile |
| NMFS | National Marine Fisheries Service |
| NPDES | National Pollutant Discharge Elimination System |

| | |
|---|---|
| PSV | Platform Support Vessel |
| RO | Reverse Osmosis |
| SPCC | Spill Prevention Control and Countermeasure |
| THPS | Tetrakis (hydroxymethyl) phosphonium sulfate |
| TRC | Total Residual Chlorine |
| TSS | Total Suspended Solids |
| TUc | Toxic Units, chronic |
| U.S.C. | United States Code |
| WET | Whole Effluent Test |
| WQS | Water Quality Standards |

# 1. INTRODUCTION

Originally established in 1976, the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA; Public Law 94-265) established regional Fishery Management Councils and mandated that Fishery Management Plans (FMPs) be developed to responsibly manage exploited fish and invertebrate species in federal waters of the United States. MSFCMA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), charged the National Marine Fisheries Service (NMFS) with designating and conserving Essential Fish Habitat (EFH) for species managed under existing FMPs. This requirement is intended to minimize, to the extent practicable, any adverse effects on habitat caused by fishing or non-fishing activities, and to identify other actions to encourage the conservation and enhancement of such habitat.

"Essential Fish Habitat," as defined in MSFCMA, includes "…those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." The regulations promulgated by NMFS in 2002 (50 Code of Federal Regulations [CFR] 600.805 – 600.930) further clarify EFH: "waters" refers to aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" refers to sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" refers to the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding or growth to maturity" refers to stages representing a species' full life cycle.

The EFH regulations define an adverse effect at 50 CFR 600.810(a) as "…any impact which reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions."

This EFH assessment evaluates the potential for "adverse effect" on EFH resulting from the reissuance of a New Source National Pollutant Discharge Elimination System (NPDES) Permit (AK-0053309) for Osprey Platform for oil and gas production in Cook Inlet, Alaska. The U.S. Environmental Protection Agency (EPA) is the federal agency issuing the permit.

To satisfy the requirements of an EFH assessment, this document includes (1) a description of the proposed action, (2) list of EFH species and life history stages that may be affected by the proposed action, (3) an analysis of the effects, (4) mitigation measures, as applicable, and (5) the federal agency's determinations of effect.

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# 2. PROPOSED ACTION

This section of the EFH assessment describes the proposed action, geographical area (project area) covered by the permit, as well as the authorized discharge activities under the existing NPDES permit. In addition, this section provides a description of the additional discharge outfalls requested in the permit renewal application.

## 2.1 BACKGROUND

The Osprey Platform (Figure 2-1) is a fixed drilling platform that has been constructed to support exploration and production drilling operations for the Redoubt Shoal Unit. In June 2000, the platform was placed onsite approximately 1.8 miles (2.9 kilometers [km]) southeast of the end of the West Foreland (latitude 60º41′46.3″ N, longitude 151º40′10.2″ W) (see Figure 2-2). The platform is located approximately 12 miles (19 km) northwest of Kenai, Alaska, and 70 miles (113 km) southwest of Anchorage, Alaska. The water depth at the platform is approximately 45 feet (ft) (referenced to mean lower low water). The platform is designed to withstand the oceanographic, meteorological, and seismic conditions of the area.

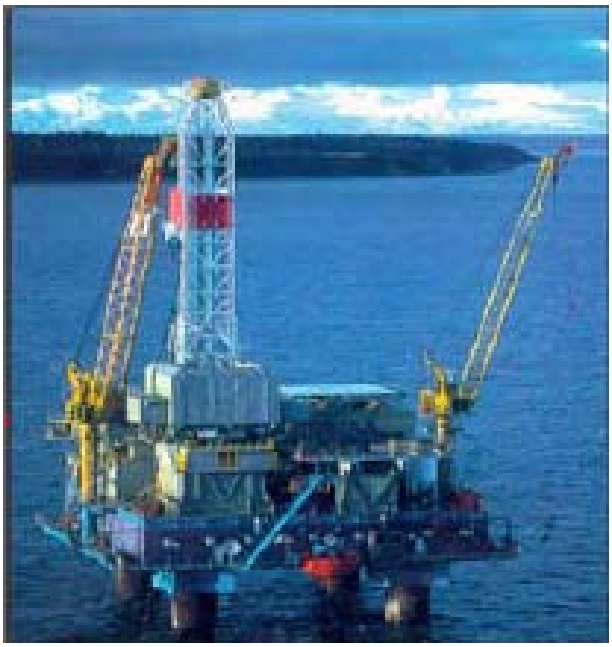

**Figure 2-1. Osprey Platform in Cook Inlet, Alaska.** (Source: BC EMPR, 2004)

The fluid that is produced from the oil reservoir consists of crude oil, natural gas, and connate or "produced" water. Production fluids flow to the surface through tubing inserted within the cased borehole using electric submersible pumps. As production fluids are extracted, the natural pressure in the reservoir decreases and additional pressure must be added to the reservoir to continue production. The additional pressure is provided artificially to the reservoir using waterflooding, which is the injection of water into the reservoir to maintain formation pressure that would otherwise drop as the withdrawal of the formation fluids continues. The injected water at the Osprey Platform presently includes the following three discharges: deck drainage (Discharge No. 002), sanitary waste (Discharge No. 003), and domestic waste (Discharge No. 004). Desalination backwash (Discharge No. 005) and filter backwash (Discharge No. 021) are also occasionally injected

As the produced fluids (natural gas, crude oil, and produced water) surface from the wells, the natural gas is separated from the liquids in a two-phase separator on the platform. The "wet" natural gas from the separator then passes through a glycol dehydrator to remove water. It is then used to support platform heating or is shipped by pipeline to the onshore production facility. The liquids (crude oil and produced water) are pumped to the Wet Oil Surge Vessel and then pumped to the Kustatan Production Facility for oil-water separation. There is no storage capacity onboard the Osprey Platform for separated liquids. The produced water separated from

the crude oil at the onshore production facility is pumped back to the Osprey Platform by pipeline for downhole injection to maintain formation pressures within the Redoubt Shoal Unit.

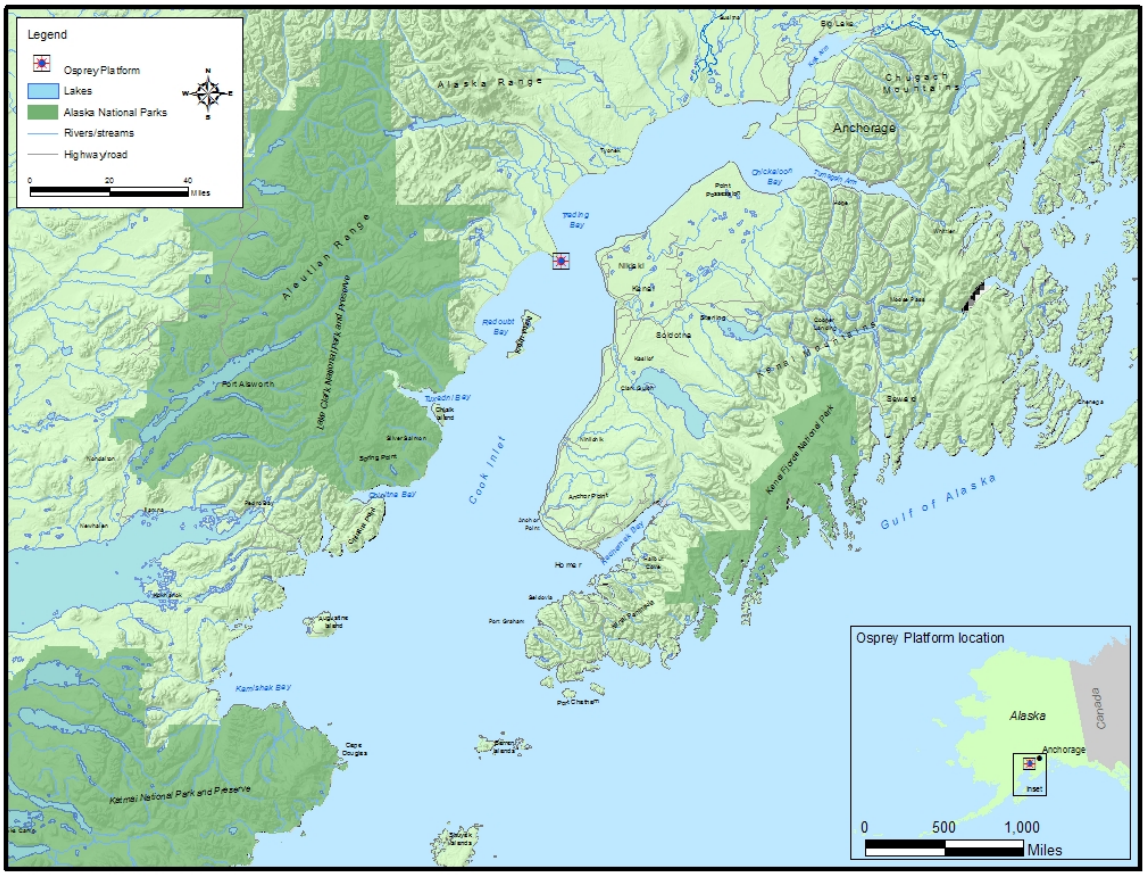


**Figure 2-2. Geographic Location of Osprey Platform in Cook Inlet, Alaska**
(Sources: NPS, 2007; ESRI, 2006; ADNR and BLM, 2006)

The Osprey Platform was converted from exploration to production status in late 2002. During the exploration phase of operations, water-based drilling muds and cuttings, and other wastewater related to platform activities, were discharged into Cook Inlet in accordance with the Cook Inlet Oil and Gas Exploration General NPDES Permit (AKG-285024). When the platform was converted from exploration to production status, the platform became ineligible for coverage under the Cook Inlet Oil and Gas General Exploration Permit and was granted coverage under an individual NPDES "new source" permit (AK-0053309).

Before the permit expired on June 30, 2007, the permittee submitted an application for permit renewal (Forest Oil, 2006a). EPA deemed the application complete on April 2, 2007, and provided an administrative extension until the permit is reissued. On August 27, 2007, ownership of the Osprey Platform changed from Forest Oil Corporation to Pacific Energy Resources, Ltd. (hereafter referred to as PERL or "permittee").

## 2.2 RECEIVING WATER

Cook Inlet is a shallow tidal estuary approximately 220 miles (350 km) long and 30 miles (50 km) wide that flows into the Gulf of Alaska. Mountain ranges surround Cook Inlet, including the Alaska, Aleutian, Chugach, Kenai, and Talkeetna ranges. Upper Cook Inlet has a maritime climate that becomes a continental climate in the lower reaches of Cook Inlet. There are five active volcanoes along the mountain ranges bordering the west side of Cook Inlet (USEPA, 2006). The region is the major population center in Alaska and the State's most agriculturally developed area (MMS, 2003).

The Inlet experiences extreme tidal fluctuations of up to 39 ft with strong currents. The upper Inlet receives high currents and large volumes of seasonally dependent freshwater inflows. These high tidal currents allow for a well mixed water column; little vertical stratification is present except near the mouths of major rivers. Freshwater and suspended sediments are received from glacier-fed rivers such as the Suistna and Knik rivers. Cook Inlet waters tend to moderate ambient air temperatures in the area (USEPA, 2006).

## 2.3 DISCHARGE DESCRIPTIONS

The potential waste streams created by typical offshore oil and gas platform activities on the Osprey Platform are described below in order of the discharge number. Table 1-1 provides a summary of the discharges proposed under the Osprey Platform NPDES permit reissuance.

### Drilling Muds and Cuttings (Discharge No. 001)

Drilling muds and cuttings are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of circulating fluids (muds) used in the rotary drilling of wells to clean and condition the hole, to counterbalance formation pressure, and to transport drill cuttings to the surface. A water-based drilling fluid is the conventional drilling mud in which water is the continuous phase and the suspending medium for solids, whether or not oil is present. An oil-based drilling fluid has diesel, mineral oil, or some other oil as its continuous phase with water as the dispersed phase. Production drilling operations on the Osprey Platform use a combination of freshwater-based and oil-based drilling fluids. The freshwater-based drilling muds are typically used for the upper 2,500 ft of the well, and the oil-based drilling fluids are used for depths below 2,500 ft (USEPA, 2006). Drill cuttings are the particles generated by drilling into subsurface geologic formations and are carried to the surface with the drilling fluid. The drilling muds are separated from the drill cuttings on the platform for use as make-up drilling fluids. The separated drill cuttings are disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Deck Drainage (Discharge No. 002)

Deck drainage is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of wastewater resulting from platform and deck washings; spillage; rainwater; and runoff from curbs, gutters, and drains on the Osprey Platform. Deck drainage flows into an overflow tank and then to a skim tank where it is treated by physical separation. Oil floats to the top of the tank, and water is discharged from the lower portion of the tank. The oil fraction from the skim tank is added to the produced oil and sent by pipeline to the shore

storage facility. Although not required under this existing permit, domestic waste (Discharge No. 004) is also treated in this skim tank.

The average daily flow of deck drainage from the platform is approximately 1,435 gallons per day (gpd), with a maximum daily flow of 18,000 gpd depending on precipitation (Forest Oil, 2006a). According to the permit application (Forest Oil, 2006a), deck drainage is currently injected into the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Sanitary Waste (Discharge No. 003)

Sanitary waste from toilets and urinals is an authorized discharge under the existing permit. According to Forest Oil's permit application (Forest Oil, 2006a), sanitary waste is aerated and treated in a Coast Guard certified marine sanitation device (MSD), chlorinated and held in a tank, dechlorinated, and injected into the Osprey Platform's AOGCC-permitted Class I/II injection well commingled with deck drainage (Discharge No. 002) and domestic waste (Discharge No. 004). The pollutants associated with this discharge include suspended solids, 5-day biochemical oxygen demand (BOD), fecal coliform (FC), and total residual chlorine (TRC). Although PERL has no plans to initiate discharge of sanitary waste to Cook Inlet, it has requested authorization to retain the ability to discharge sanitary waste in the future, if needed. The Alaska Department of Environmental Conservation's (ADEC) prepared a draft Certificate of Reasonable Assurance for NPDES Permit AK-005330-9 (ADEC, 2008a) authorizing a mixing zone for sanitary waste approximately 0.12 acres in size based upon a dilution factor of 133:1. Compliance with Alaska WQS must be achieved at the edge of the mixing zone for TRC and FC bacteria. However, under the authority provided in Section 402(a)(1) of the Clean Water Act (CWA), USEPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone.

### Domestic Waste (Discharge No. 004)

Domestic waste is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge, also referred to as graywater, is composed of wastewater from sinks, showers, laundries, safety showers, eyewash stations, and galleys. Graywater originating from Platform's galley includes kitchen solids, detergents, cleansers, and oil and grease. Treating domestic waste before discharge is not required, but for operational convenience on the Osprey Platform, domestic waste is currently piped to the skim tank and treated along with deck drainage. The applicant has requested permission to modify its operational procedures to bypass domestic waste around the skim tank so that it can be discharged directly to Cook Inlet.

Domestic waste was calculated as a daily average flow volume of 500 gpd (with a maximum daily flow of 6,000 gpd) using an equation of 100 gallons per person daily and an average of five people on the platform (with a maximum population of 60) (Forest Oil, 2006a). According to the permit application (Forest Oil, 2006a), domestic waste is currently injected into the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Desalination Backwash (Discharge No. 005)

Desalination backwash is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of wastewater created from the process of making

fresh (potable) water from seawater through a packaged treatment plant using pretreatment and reverse osmosis (RO) filtration. The Osprey Platform does not currently have a desalination plant, and therefore, this discharge was not included in the existing permit. However, the applicant has requested that this discharge be authorized under the reissued permit enabling the applicant to add a desalination plant in the future (Forest Oil, 2006a).

The anticipated maximum daily flow of desalination backwash is 100,000 gpd with a long-term average flow of 10,000 gpd (Forest Oil, 2006a). This discharge volume and sample data were obtained from the Monopod Platform NPDES permit application that was submitted for the Cook Inlet general permit reissuance. (Forest Oil was part owner of the Monopod Platform; however, all of Forest Oil's Alaska assets are now owned by PERL.)

### Blowout Preventer Fluid (Discharge No. 006)

Blowout preventer fluid is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of the fluid used to actuate hydraulic equipment on the blowout preventer stacks during well drilling. Blowout preventer fluid would be released only by catastrophic failure of the blowout preventer. It would not be a regularly released fluid; therefore, blowout preventer fluid will not be considered as a discharge from the Osprey Platform.

### Boiler Blowdown (Discharge No. 007)

Boiler blowdown waste is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of water and minerals drained from boiler drums. The Osprey Platform does not presently produce boiler blowdown water. If produced, boiler blowdown would be treated through an oil-water separator prior to discharge (USEPA, 2002b).

Water sample data were obtained from the King Salmon Platform NPDES permit application that was submitted for the Cook Inlet general permit reissuance. (Forest Oil was part owner of the King Salmon Platform; however, all of Forest Oil's Alaska assets are now owned by PERL.) The average and maximum anticipated daily flow of boiler blowdown from the King Salmon Platform is approximately 100 gpd (Forest Oil, 2006a).

### Fire Control Test Water (Discharge No. 008)

Fire control test water is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge, composed largely of seawater, is generated during the training of personnel in fire protection and when maintaining fire protection equipment. The discharge is intermittent and is expected to occur approximately 52 times per year for about 30 minutes. The average daily flow of fire control test water is approximately 13,400 gpd, with a maximum daily flow of 120,000 gpd (Forest Oil, 2006a).

### Non-Contact Cooling Water (Discharge No. 009)

Non-contact cooling water is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is seawater that is used for non-contact, once-through cooling of crude oil, produced water, power generators, and various pieces of machinery on the platform. The Osprey Platform does not presently produce this discharge but discharge to Cook Inlet is allowed under the existing NPDES permit.

Water sample data were obtained from the King Salmon Platform NPDES permit application that was submitted for the Cook Inlet general permit reissuance. (Forest Oil was part owner of the King Salmon Platform; however, all of Forest Oil's Alaska assets are now owned by PERL.) Potential average daily flow and maximum daily flow of non-contact cooling water is 1,890,000 gpd (Forest Oil, 2006a).

### Uncontaminated Ballast Water (Discharge No. 010)

Uncontaminated ballast water is not an authorized discharge under the existing Osprey Platform NPDES permit. Deepsea platforms are floating devices that require ballast water to keep the underwater portions of the structure submerged and the structure stable. Ballast water is occasionally discharged from and replaced in such structures. The Osprey Platform is a fixed platform (not floating) and does not produce or release this discharge.

### Bilge Water (Discharge No. 011)

Bilge water is not an authorized discharge under the existing Osprey Platform NPDES permit. Bilge water is water that collects in the lower internal parts of the drilling vessel hull. The Osprey Platform is a fixed structure and has no such discharge.

### Excess Cement Slurry (Discharge No. 012)

Excess cement slurry is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of excess mixed cement and equipment washdown wastewater from cementing operations. This waste stream is discharged intermittently while drilling, depending on drilling, casing, and testing program/problems (USEPA, 2006). Approximately 78 discharge events are anticipated per year, with an average daily flow of 2,000 gpd and a maximum daily flow of 3,000 gpd (Forest Oil, 2006a). Excess cement slurry is not treated prior to discharge.

### Muds, Cuttings, and Cement at the Seafloor (Discharge No. 013)

Muds, cuttings, and cement at the seafloor is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of the circulating fluids (muds) used in the rotary drilling of wells to clean and condition the hole, to counterbalance formation pressure, and to transport drill cuttings to the surface. When reconditioning a well bore, cement that previously lined the well bore might be ground up and entrained with the rock and mud particles. Drill cuttings are the particles generated by drilling into subsurface geologic formations and are carried to the surface with the drilling fluid. The drilling muds are separated from the drill cuttings on the platform for use as make-up drilling fluids.

The applicant initially requested that muds, cuttings, and cement at the seafloor be added as a permitted discharge under the permit reissuance. According to the permit application, this outfall would be required in the new permit so that wells associated with the Osprey Platform could be properly abandoned. In a letter to USEPA dated January 23, 2008, PERL withdrew the request. Muds, cuttings, and cement at the seafloor will not be an authorized discharge. Correspondingly, Discharge No. 013 is not analyzed in this assessment (PERL, 2008).

### Waterflooding Discharges (Discharge No. 014)

Waterflooding discharges are not authorized under the existing Osprey Platform NPDES permit. This discharge is created during the process of treating seawater and other appropriate fluids before they are injected into a hydrocarbon-bearing formation to improve the flow of hydrocarbons from production wells, and prior to use in operating physical/chemical treatment units for sanitary waste. These discharges include strainer and filter backwash water. All waterflooding discharges will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Produced Water and Solids (Discharge No. 015)

Produced water and solids is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of water brought up from the hydrocarbon-bearing strata during the extraction of oil and gas. It includes formation water, injection water, and any chemicals added downhole or during the oil/water separation process. Produced solids are sands and other solids that collect in vessels and lines, and must be removed to maintain adequate vessel and line capacities. The produced water and solids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Completion Fluids (Discharge No. 016)

Completion fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of salt solutions, weighted brines, polymers, and various additives used to prevent damage to the well bore during production well completion. The completion fluids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Workover Fluids (Discharge No. 017)

Workover fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of salt solutions, weighted brines, polymers or other specialty additives used in a producing well to allow safe repair and maintenance or abandonment procedures. The workover fluids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Well Treatment Fluids (Discharge No. 018)

Well treatment fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of acid solutions, polymers, or hot water/brine fluids used to restore or improve well productivity by chemically or physically altering hydrocarbon-bearing strata. The well treatment fluids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Test Fluids (Discharge No. 019)

Test fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge can include oils, weighted brines, polymers, and assorted additives used to assist the various measuring instruments that are inserted downhole when evaluating wells during exploration activities. The Osprey Platform is now a production facility; therefore, it will not be

discharging test fluids. If test fluids were to be generated in future exploration activities, they would be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Filter Backwash (Discharge No. 021)

Filter backwash is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is generated when filters are cleaned and maintained for various platform and production purposes. Filter backwash is primarily composed of seawater, with low levels of contaminants from platform equipment and from biofouling treatment chemicals such as tetrakis (hydroxymethyl) phosphonium sulfate (THPS). The anticipated maximum daily and long-term average discharge of filter backwash at the Osprey Platform is 105,000 gpd (Forest Oil, 2006a). This discharge is usually injected in the Osprey Platform's AOGCC-permitted Class I/II injection well. The applicant has requested that this discharge be authorized under the reissued permit (Forest Oil, 2006a).

**Table 2-1. Proposed Discharges under the Osprey Platform NPDES Permit Reissuance**

| Discharge No. | Discharge | Description of Release | Included in Permit Reissuance |
|---|---|---|---|
| 001 | Drilling Muds and Cuttings | Disposal to AOGCC-permitted Class I/II injection well. | |
| 002 | Deck Drainage | Commingled with sanitary waste (003) and domestic waste (004) discharges and injected into AOGCC-permitted Class I/II injection well. | √ |
| 003 | Sanitary Waste | Commingled with deck drainage (002) and domestic waste (004) discharges and injected into AOGCC-permitted Class I/II injection well. ADEC is authorizing a mixing zone for future discharge of sanitary waste to Cook Inlet. | √ |
| 004 | Domestic Waste | Commingled with deck drainage (002) and sanitary waste (003) discharges and injected into AOGCC-permitted Class I/II injection well. | √ |
| 005 | Desalination Backwash | Discharge was not included in the existing permit, because the platform did not have a desalination plant at the time the original permit was issued. Applicant has requested this discharge under the reissued permit. | √ |
| 006 | Blowout Preventer Fluid | Discharge is not produced on the Osprey Platform. | |
| 007 | Boiler Blowdown | Not presently produced on Osprey Platform, but discharge to Cook Inlet is allowed under the existing NPDES permit. Applicant has requested this discharge under the reissued permit. | √ |
| 008 | Fire Control Test Water | Weekly discharge to Cook Inlet. | √ |

## Table 2-1 (cont). Proposed Discharges under the Osprey Platform NPDES Permit Reissuance

| Discharge No. | Discharge | Description of Release | Included in Permit Reissuance |
|---|---|---|---|
| 009 | Non-contact Cooling Water | Not presently produced on Osprey Platform, but discharge to Cook Inlet is allowed under the existing NPDES permit. Applicant has requested this discharge under the reissued permit. | √ |
| 010 | Uncontaminated Ballast Water | Not produced on the Osprey Platform. | |
| 011 | Bilge Water | Not produced on the Osprey Platform. | |
| 012 | Excess Cement Slurry | Discharged to Cook Inlet intermittently during well workover. Discharge is allowed under the existing permit; applicant has requested this discharge under the reissued permit. | √ |
| 013 | Mud, Cuttings, and Cement at Seafloor | Discharge was not permitted under the existing permit. In the application letter dated December 12, 2006, that applicant requested this discharge under the reissued permit. However, in a letter to EPA dated January 23, 2008, the applicant withdrew the discharge request. | |
| 014 | Waterflooding Discharges | Disposal to AOGCC-permitted Class I/II injection well. | |
| 015 | Produced Water and Solids | Disposal to AOGCC-permitted Class I/II injection well. | |
| 016 | Completion Fluids | Disposal to AOGCC-permitted Class I/II injection well. | |
| 017 | Workover Fluids | Disposal to AOGCC-permitted Class I/II injection well. | |
| 018 | Well Treatment Fluids | Disposal to AOGCC-permitted Class I/II injection well. | |
| 019 | Test Fluids | Disposal to AOGCC-permitted Class I/II injection well. | |
| 021 | Filter Backwash | Disposal to AOGCC-permitted Class I/II injection well. Applicant has requested discharge under the reissued permit. | √ |

## Table 2-2. Osprey Platform NPDES Permit Reissuance Proposed Effluent Limitations and Monitoring Requirements

| Discharge | Discharge Description | Effluent Parameter | Units | Effluent Limitations | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|
| | | | | AML | MDL | Sample Frequency | Sample Type |
| 001 | Drilling Muds and Cuttings | No discharge | | | | | |
| 002 | Deck Drainage | Free oil[3] | Visual[1] | No discharge[1] | | Daily | Visual[1] |
| | | WET, chronic[4] | $TU_c$ | Report | Report | Annually | Grab |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| 003 | Sanitary Wastes | BOD | mg/L | 30 | 60 | Monthly | Grab |
| | | | lbs/day | 0.9 | 1.8 | Monthly | Calculated |
| | | TSS | mg/L | 30 | 60 | Monthly | Grab |
| | | | lbs/day | 0.9 | 1.8 | Monthly | Calculated |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| | | FC Bacteria[3] | colonies/ 100 mL | 137 | 200 | Monthly | Grab |
| | | Enterococci[3] | Number per 100 mL | 35[2] | 276[5] | Monthly | Grab |
| | | TRC[3] | mg/L | 0.8 | 1.6 | Monthly | Grab |
| | | | lbs/day | 0.01 | 0.03 | Monthly | Calculated |
| 004 | Domestic Wastes | Floating solids, garbage, or foam | Visual | No discharge | | Daily | Visual |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| 005 | Desalination Unit Wastes | Salinity (intake & effluent) | PPT | Report | Report | Monthly | Grab |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| | | WET, chronic[4] | $TU_c$ | Report | Report | Quarterly | Grab |
| | | Temperature (intake & effluent) | ºC | Report | Report | Monthly | Grab |
| 006 | Blowout Preventer Fluid | No discharge | | | | | |
| 007 | Boiler Blowdown | Flow | mgd | Report | Report | Monthly | Estimated |
| | | Temperature | ºC | Report | Report | Monthly | Grab |
| 008 | Fire Control System Test Water | Flow | mgd | Report | Report | Monthly | Estimated |

## Table 2-2 (cont.). Osprey Platform NPDES Permit Reissuance Proposed Effluent Limitations and Monitoring Requirements

| Discharge | Discharge Description | Effluent Parameter | Units | Effluent Limitations | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|
| | | | | AML | MDL | Sample Frequency | Sample Type |
| 009 | Non-contact Cooling Water | Flow | mgd | Report | Report | Monthly | Estimated |
| | | Temperature (intake & effluent) | ºC | Report | Report | Monthly | Grab |
| 010 | Uncontaminated Ballast Water | No discharge | | | | | |
| 011 | Bilge Water | No discharge | | | | | |
| 012 | Excess Cement Slurry | Free oil[3] | Visual[1] | No discharge[1] | | Daily when discharging | Visual[1] |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| 013 | Mud, Cuttings, Cement at Seafloor | No discharge | | | | | |
| 014 | Waterflooding Discharges | No discharge | | | | | |
| 015 | Produced Water and Solids | No discharge | | | | | |
| 016 | Completion Fluids | No discharge | | | | | |
| 017 | Workover Fluids | No discharge | | | | | |
| 018 | Well Treatment Fluids | No discharge | | | | | |
| 019 | Test Fluids | No discharge | | | | | |
| 021 | Filter Backwash | Flow | mgd | Report | Report | Monthly | Estimated |
| | | TRC[3] | µg/L | Report | 13 | Monthly | Grab |
| | | | lb/day | Report | 0.011 | Monthly | Calculated |
| | | TSS (intake & effluent) | mg/L | Report | Report | Monthly | Grab |
| | | Turbidity (intake & effluent) | NTU | Report | Report | Monthly | Grab |

Acronyms:
FC = Fecal Coliform
mg/L = milligrams per liter
TRC = Total Residual Chlorine
mgd = millions of gallons per day
NTU = turbidity units
TSS = Total Suspended Solids

Footnotes:
1. As determined by the presence of a film or sheen upon or a discoloration of the surface of the receiving water (visual sheen) using the static sheen test defined in appendix 1 to 40 CFR part 435, subpart A.
2. Average monthly enterococci results must be reported as the geometric mean of the samples. See Section VI for a definition of the geometric mean.
3. Reporting is required within 24 hours of a maximum daily limit violation (see I.B.14).
4. For a complete discussion of the WET monitoring requirements and WET trigger limits, please refer to the draft NPDES permit and fact sheet.
5. Instantaneous maximum limit.

### 2.3.1 Discharge With an Associated Mixing Zone – Sanitary Waste

Mixing zones are established by States in coastal or State waters to specify a limited portion of a water body in which otherwise applicable water quality criteria may be exceeded. The State WQS do not allow mixing zones unless authorized by the Alaska Department of Environmental Conservation (ADEC). Within a mixing zone, State WQS allow water quality criteria for chronic aquatic life and human-health protection to be exceeded as long as water quality criteria are met outside the mixing zone. Alaska WQS, however, require that acute aquatic life criteria are met at a boundary of a smaller zone of initial dilution, established within the mixing zone (18 AAC 70.255).

In the fact sheet for the 2002 permit, EPA determined that the discharge of sanitary wastes had the reasonable potential to cause or contribute to excursions above WQS for TRC and FC bacterial colony counts. Thus, EPA established water quality-based effluent limits for these parameters in the 2002 permit. In December 2006, Parametrix evaluated mixing zones for the Osprey Platform sanitary (003) discharge in support of the pending application for renewal of its NPDES permit [AK-005330-9]. In that evaluation, Parametrix calculated mixing zones needed for the 003 discharge to meet WQS for FC and TRC by using the CORMIX dilution model to evaluate a comprehensive range of ambient and effluent conditions.

Based upon this modeling, the applicant initially requested a mixing zone for chlorine in the sanitary wastes discharge, which would have provided a chronic dilution factor of 1,800:1 and an acute dilution factor of 1,038:1. Because these dilution factors are larger than the dilution factor used to calculate effluent limits in the previous permit (500:1 for chlorine, with no mixing zone for fecal coliform), and because the applicable water quality criteria for chlorine have become less stringent since the time the previous permit was issued, chlorine effluent limits based solely on the applicant's initial mixing zone request and the applicable water quality criteria would be considerably less stringent than those in the previous permit.

Section 402(o) of the Clean Water Act generally prohibits reissuing an NPDES permit with a less-stringent water quality-based effluent limit than the corresponding limit in the previous permit, though some exceptions are provided in Sections 402(o)(2) and 303(d)(4). The less stringent chlorine effluent limits that would have resulted from the dilution factors in the applicant's initial mixing zone request may not have complied with Section 402(o) of the Clean Water Act. Following discussions with EPA and ADEC, the applicant requested a smaller mixing zone, providing a dilution factor of 133:1, which would allow the facility to discharge chlorine at the effluent limits in the previous permit and meet all applicable water quality criteria (both acute and chronic) at the edge of that mixing zone. Because these effluent limits are not less stringent than those in the previous permit, the effluent limits also comply with Section 402(o) of the Clean Water Act.

ADEC prepared a draft Certificate of Reasonable Assurance for NPDES Permit AK-005330-9 (ADEC, 2008a) authorizing a mixing zone for sanitary waste approximately 0.12 acres in size based upon a dilution factor of 133:1. Compliance with Alaska WQS must be achieved at the edge of the mixing zone for TRC and FC. However, under the authority provided in Section 402(a)(1) of the CWA, EPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the

authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

Under most conditions, chlorine in the sanitary waste (Discharge No. 003) should meet Alaska WQS well before the diluted discharge reaches the edge of the mixing zone. Although deck drainage (Discharge No. 002) and domestic waste (Discharge No. 004) discharge through the same outfall as the sanitary waste discharge, the authorized mixing zone is for the sanitary waste discharge alone. The comingled discharges require less dilution to meet WQS and dilute faster in shorter distances than sanitary waste alone. Therefore, the approved mixing zone is representative of reasonable worst-case conditions and is protective for any combination of deck drainage, domestic waste and sanitary waste.

### 2.3.2 Discharges to Surface Waters Would Not Occur

The NPDES permit reissuance application included additional activities for which no discharges are anticipated. While none of these waste streams will be discharged from the Osprey Platform, for completeness, they are described in Section 2.2. Because these discharges will not occur and will not be authorized under the reissued NPDES permit, USEPA assumed no environmental impacts would occur. These discharges, therefore, are not analyzed further in this assessment.

The discharges to surface water that would not occur are the following.

- Drilling Muds and Cuttings (Discharge No. 001)
- Blowout Preventer Fluid (Discharge No. 006)
- Uncontaminated Ballast Water (Discharge No. 010)
- Bilge Water (Discharge No. 011)
- Muds, Cuttings, and Cement at the Seafloor (Discharge No. 013)
- Waterflooding Discharges (Discharge No. 014)
- Produced Water and Solids (Discharge No. 015)
- Completion Fluids (Discharge No. 016)
- Workover Fluids (Discharge No. 017)
- Well Treatment Fluids (Discharge No. 018)
- Test Fluids (Discharge No. 019)

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# 3. ESSENTIAL FISH HABITAT WITHIN THE PROJECT AREA

Section 305(b)(2) of the MSFCMA requires a federal agency to consult with NMFS regarding any action that may adversely affect EFH. To initiate the preparation of the EFH Assessment, in a letter dated July 31, 2007, EPA contacted NMFS to identify those species whose habitat may be affected by the proposed action (USEPA, 2007a). The action under consideration in this assessment is the reissuance of an NPDES permit to discharge wastewater to Cook Inlet from the Osprey Platform during production operations. In a letter dated September 5, 2007, NMFS notified EPA of those species that EFH has been designated for in Cook Inlet (NMFS, 2007).

The North Pacific Fishery Management Council has prepared and implemented five FMPs for fisheries in Alaska. The five FMPs and areas covered are: (1) Bering Sea and Aleutian Islands (BSAI) Groundfish FMP; (2) Gulf of Alaska (GOA) Groundfish FMP; (3) Scallop Fisheries off the Coast of Alaska FMP; (4) BSAI King and Tanner Crab FMP; and (5) Salmon Fisheries in the Exclusive Economic Zone (EEZ) Off the Coast of Alaska FMP. In 2005, NMFS completed an environmental impact statement (EIS) for EFH in the Alaskan region affected by these FMPs. The *Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska* (NMFS, 2005) contains the most recent FMPs for fisheries in Alaska. Of these, the GOA Groundfish FMP, the Scallop Fisheries off the Coast of Alaska FMP, and the Salmon Fisheries in the EEZ off the Coast of Alaska FMP were the primary documents used for fishery resources information in this EFH assessment.

Federally managed fish species and important forage fishes known to be distributed within Cook Inlet and the Gulf of Alaska are listed in Table 3-1. A total of 31 species were identified as EFH species: five species of salmon, three groundfish, two shallow water flatfish, 13 other fish species, and eight species from the forage fish complex. Of the salmonids, only late juvenile and adult stages utilize the habitat of Cook Inlet, and then predominantly during migration. Many of the EFH species identified in Table 3-1 are not distributed in the project area. Of the 31 species, several are associated with soft muddy or sandy bottoms, unlike the sea floor found at the Osprey Platform. Only nine EFH species exhibit distributions near the project area during at least one life stage. Many of the species are benthic or demersal inhabiting waters of substantially greater depths than the 45 ft in which the Osprey Platform is located.

The *Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska* (NMFS, 2005) provides text descriptions and maps depicting the areas of EFH for each life stage of fish managed under a FMP for the GOA and BSAI. Tables 3-2 and 3-3 identify those groundfish and salmonid EFH species, respectively, with life stages present in the project area. Section 3.1 describes the EFH species with at least one life stage in Cook Inlet. Maps of EFH species' life stage distributions for the GOA, including Cook Inlet, can be found in Appendix D of the Final EIS (NMFS, 2005), and are not included here.

The Osprey Platform is located in upper Cook Inlet, near the West Foreland area (Figure 2-2). Most of the EFH species are not likely to be exposed to the Osprey Platform discharges. Prey of these EFH species are identified in Table 3-4. The wastewater discharges are not anticipated to have any direct or indirect adverse impacts on prey near the Osprey Platform (see Section 5.0).

**Table 3-1. EFH Species within Cook Inlet** (Source: NMFS, 2005)

| Common Name | Habitat | | | | Notes |
|---|---|---|---|---|---|
| | Eggs | Larvae | Juvenile | Adult | |
| **Salmon** | | | | | |
| Pink, Chum, Sockeye Coho, Chinook | freshwater, fine gravel | < 15% fines | IT to P < 165 ft | P < 660 ft | Eggs/larvae in freshwater only; juvenile and adult habitats in marine areas only. |
| **Groundfish** | | | | | |
| Walleye Pollock | P | EP | P | P 230-660 ft | Adults associated with fronts and upwelling. |
| Pacific cod | D 140-550 ft | EP | MC | MC up to 1,650 ft | Juveniles and adults in areas of mud, sandy mud, muddy sand, and lower portion of water column. |
| Dover sole | EP | P, EP | P | P | Move to deeper waters as they age. |
| **Shallow Water Flatfish** | | | | | |
| Rock sole | D 410-825 ft | P, top 100 ft | D < 825 ft | D < 825 ft | All stages, except larval, found in areas of pebbles and sand. |
| Alaska plaice | D 0-1,650 ft | D 0-1,650 ft | D < 825 ft | D < 825 ft | Associated over gravel, sand, and mud substrates. |
| **Other Fish Species** | | | | | |
| Rex sole | P | P offshore | D > 985 ft | D > 985 ft | Juveniles and adults in areas of gravel, sand, and mud in the lower portion of the water column. |
| Flathead sole | P | P | D < 985 ft | D < 985 ft | Juveniles and adults in areas of sand and mud in the lower portion of the water column. |
| Arrowtooth flounder | P | P | D 165-1,650 ft | D 165-1,650 ft | Juveniles and adults in areas of gravel, sand, and mud in the lower portion of the water column. |
| Shortraker rockfish | V | P | Shallower than adults | D 660-1,650 ft | Adults associated with mud, sand, rock, sandy mud, cobble, muddy sand, and gravel. |
| Rougheye rockfish | V | P | Shallower than adults | D 660-1,650 ft | Adults associated with mud, sand, rock, sandy mud, cobble, muddy sand, and gravel. |
| Northern rockfish | V | P | P | MC to D | Juveniles and adults in areas of cobble and rock. |
| Dusky rockfish | V | P | P | MC to D | Juveniles and adults in areas of cobble, gravel, and rock. |
| Yelloweye rockfish | V | EP | D | D | Juveniles and adults associated with areas of coral and rock nearshore bays and island passages. |
| Thornyhead rockfish | P gel coated egg sac floats to surface | P | D | D | Juveniles and adults associated with areas of mud, sand, rock, sandy mud, cobble, muddy sand, and gravel. |

**B** – Benthic
**D** – Demersal
**EP** – Epipelagic
**IT** – Intertidal or tidepools
**KEB** – Associated with kelp or eelgrass beds
**m** – meters
**MB** – Mesobenthal (just above the sea floor)
**MC** – Midcolumn
**P** – Pelagic
**NA** – Not Applicable
**NI** – No Information
**V** – Viviparous, young released as larvae

**Table 3-1 (cont.). EFH Species within Cook Inlet** (Source: NMFS, 2005)

| Common Name | Habitat | | | | Notes |
|---|---|---|---|---|---|
| | Eggs | Larvae | Juvenile | Adult | |
| Atka mackerel | Shallow water | EP | NI | Entire water column | Perform diurnal/tidal movements between D and P areas. Prefer areas of gravel, rock, and kelp. |
| Sablefish | Deep water | P surface, nearshore | P nearshore | D | Juveniles live in surface and nearshore waters; adults live on mud bottoms. |
| Sculpins | All substrates, rocky, shallow waters | P | D | D | Juveniles/adults associated with a broad range of demersal habitats from intertidal pools, all shelf substrates, and rocky areas. |
| Skates | Egg cases on seafloor | NA | D | D | Juveniles/adults associated with a broad range of substrate types (mud, sand, gravel, and rock). |
| Red squid | B | NA | P | P | Eggs associated with areas of mud and sand. |
| **Forage Fish Complex** | | | | | |
| Eulachon | Eggs deposited in river | P | P | P | Eggs on bottom substrates of sand, gravel, and cobble in rivers during April-June; adults in rivers for spawning. |
| Sand lance | B | P and surface | Entire water column | Entire water column | Adults associated with soft bottom substrates (sand, mud). |
| Myctophids | NI | NI | P | P | Juveniles/adults associated with pelagic waters ranging from near surface to lower portion of the water column. |
| Bathylagids | NI | NI | P | P | Juveniles/adults associated with pelagic waters ranging from near surface to lower portion of water column. |
| Sandfish | B nearshore | NI | B | B | Juveniles/adults associated with bottom substrates of mud and sand. |
| Euphausiids | Surface | EP | P | P | Juveniles/adults associated with upwelling, or nutrient-rich areas. |
| Pholids | NI | NI | IT to D, KEB | IT to D, KEB | Associated with vegetation such as eelgrass and kelp. |
| Stichaeids | NI | NI | IT to D, KEB | IT to D, KEB | Associated with vegetation such as eelgrass and kelp. |

**B** – Benthic
**D** – Demersal
**EP** – Epipelagic
**IT** – Intertidal or tidepools
**KEB** – Associated with kelp or eelgrass beds
**m** – meters
**MB** – Mesobenthal (just above the sea floor)
**MC** – Midcolumn
**P** – Pelagic
**NA** – Not Applicable
**NI** – No Information
**V** – Viviparous, young released as larvae

**Table 3-2. Groundfish EFH Species Life Stages in Project Area** (Source: NMFS, 2005)

| EFH Species | Eggs | Larvae | Early Juvenile | Late Juvenile | Adult |
|---|---|---|---|---|---|
| Walleye pollock | 2 | 2 | – | 1 | 1 |
| Pacific cod | 2 | 2 | – | 1 | 1 |
| Dover sole | 2 | 2 | – | 2 | 2 |
| Rock sole | – | 2 | – | 2 | 2 |
| Alaska plaice | 2 | 2 | – | 2 | 2 |
| Rex sole | 2 | 2 | – | 2 | 2 |
| Flathead sole | 2 | 2 | – | 2 | 2 |
| Arrowtooth flounder | – | 2 | – | 2 | 2 |
| Shortraker rockfish | – | 2 | – | – | 2 |
| Rougheye rockfish | – | 2 | – | – | 2 |
| Northern rockfish | – | 2 | – | – | 2 |
| Dusky rockfish | – | 2 | – | – | 2 |
| Yelloweye rockfish | – | 2 | – | 2 | 2 |
| Thornyhead rockfish | – | 2 | – | 2 | 2 |
| Atka mackerel | – | 2 | – | – | 2 |
| Sablefish | 2 | 2 | – | 2 | 2 |
| Sculpins | – | – | – | 1 | 1 |
| Skates | – | – | – | – | 1 |
| Red squid | – | – | – | 2 | 2 |
| Forage fish complex | – | – | – | – | – |

– = no information available to define EFH in the GOA
1 = life stage with defined EFH in project area
2 = life stage with defined EFH, but none in project area

**Table 3-3. Salmon EFH Species Life Stages in Project Area (Source: NMFS, 2005)**

| Salmon Species | Freshwater | | Estuarine | Marine | | Freshwater |
|---|---|---|---|---|---|---|
| | Eggs | Larvae & Juveniles | Juveniles | Juveniles | Immature & Maturing Adults | Adults |
| Pink salmon | 2 | 2 | 1 | 1 | 1 | 2 |
| Chum salmon | 2 | 2 | 1 | 1 | 1 | 2 |
| Sockeye salmon | 2 | 2 | 1 | 1 | 1 | 2 |
| Chinook salmon | 2 | 2 | 1 | 1 | 1 | 2 |
| Coho salmon | 2 | 2 | 1 | 1 | 1 | 2 |

**Key:** Same as Table 3-2.

## Table 3-4. Prey Species Associated with EFH Species (Source: NMFS, 2005)

| Common Name | Prey Species |
|---|---|
| **Salmon** | |
| Pink, Chum, Sockeye, Chinook, and Coho | J: planktivore; A: piscivore (herring, anchovy, sand lance, surf smelt) |
| **Groundfish** | |
| Walleye Pollock | J and A: crustaceans, copepods, euphausiids |
| Pacific cod | J: mysids, euphausiids, shrimp; A: Pollock, flatfish, crab |
| Dover sole | J: copepods, eggs, planktivore; A: polychaetes, bivalves, brittlestars, crustaceans |
| **Shallow Water Flatfish** | |
| Rock sole | J and A: polychaetes, bivalves, amphipods, crustaceans |
| Alaska plaice | J: zooplankton, crustaceans; A: forage fish, crustaceans |
| **Other Fish Species** | |
| Rex sole | J and A: polychaetes, amphipods, euphausiids, Tanner crab |
| Flathead sole | J: polychaetes, bivalves, orphiuroids, pollock, small Tanner crab; A: same as J plus other small invertebrates |
| Arrowtooth flounder | J and A: euphausiids, crustaceans, amphipods, pollock |
| Shortraker rockfish | J: NI; A: shrimp, squid, myctophids |
| Rougheye rockfish | J: NI; A: shrimp, squid, myctophids |
| Northern rockfish | NI |
| Dusky rockfish | A: euphausiids |
| Yelloweye rockfish | A: fish, shrimp, crab |
| Thornyhead rockfish | A: shrimp, fish (cottids), small crabs |
| Atka mackerel | A: copepods, euphausiids, meso-pelagic fish (myctophids) |
| Sablefish | J: zooplankton; A: forage fish |
| Sculpins | NI |
| Skates | NI |
| Red squid | J and A: euphausiids, shrimp, forage fish, other cephalopods |
| **Forage Fish Complex** | |
| Eulachon | A: euphausiids and copepods |
| Sand lance | J and A: zooplankton, calanoid copepods, mysid shrimps, crustacean larvae, gammarid amphipods, and chaetognaths |
| Myctophids | NI |
| Bathylagids | NI |
| Sandfish | NI |
| Euphausiids | NI |
| Pholids | NI |
| Stichaeids | NI |

A = Adult
J = Juvenile
NI = No information

## 3.1 SPECIES EFH DESCRIPTIONS

This section presents information on EFH characteristics and general life history for those species with defined EFH in Cook Inlet (see Tables 3-1 and 3-2).

### 3.1.1 Walleye Pollock

Walleye pollock occur throughout the area covered by the GOA Groundfish FMP (NMFS, 2005). In the project area, EFH for the late juvenile and adult life stages is designated; however, the eggs and larval adult life stages of Walleye pollock have EFH in southern portions of Cook Inlet and the GOA. With the exception of the adult life stage, which extends into Kachemak Bay, all others are restricted to extending slightly inside the Cook Inlet entrance. Spawning occurs in the pelagic zone in early spring, with eggs hatching in 10 to 20 days (depending on water temperatures) throughout the water column at depths from 0 to 3,300 ft. Larvae spend 20 to 30 days in the upper 130 ft of the water column. Juveniles and adults are most often in the lower and middle portions of the water column, at depths less than 660 ft for juveniles and less than 3,300 ft for adults. These life stages have no substrate preference. Seasonal migrations occur from the outer continental shelf to shallow waters (300 to 460 ft) for spawning (NMFS, 2005).

### 3.1.2 Pacific Cod

Pacific cod is a demersal fish species that occurs on the continental shelf and upper continental slope. EFH for late juveniles and adults has been designated in the project area; however, only the adult stage EFH extends well into Cook inlet, while the other EFH life stages are restricted closer to the entrance of Cook Inlet. Adults are demersal and form aggregations during the peak spawning season (January to May) along the continental shelf and slope from about 130 to 950 ft. Pacific cod eggs are demersal and somewhat adhesive. Spawning occurs in the sublittoral-bathyal zone (130 to 950 ft) near the ocean floor. Eggs hatch in about 15 to 20 days. Little is known about the distribution of Pacific cod larvae. The larvae are epipelagic, occurring primarily in the upper 150 ft of the water column shortly after hatching. Juvenile and adult EFH occur in the lower portion of the water column from 0 to 660 ft, where their preferred substrate is soft sediment primarily from mud and gravel (NMFS, 2005).

### 3.1.3 Dover Sole

Throughout the GOA, dover sole exhibit a widespread distribution. In the project area, EFH has not been designated for any of the life stages; however, EFH has been designated in southern portions of Cook Inlet and the GOA. Adults are demersal and are mostly located in water deeper than 985 ft in the winter months, in the 330 to 660 ft depth range during summer months. This species is a batch spawner. Spawning in the GOA has been observed from January through August, with a peak period in May (NMFS, 2005).

### 3.1.4 Rock Sole

EFH for rock sole larvae occurs near the Cook Inlet entrance; juvenile and adult EFH for rock sole extends beyond the Kachemak Bay entrance. EFH has not been designated near the project area for any of the life stages. With the exception of the egg life stage, all other rock sole life stages occur in the inner continental shelf regions. Spawning occurs during late winter/early

spring near the edge of the continental shelf at depths from 410 to 820 ft. Eggs are demersal and adhesive. Larvae are planktonic occurring in pelagic waters along the entire shelf (0 to 660 ft) and upper slope (660 to 3,300 ft) throughout the GOA. For the first year, juveniles inhabit shallow waters. Juveniles and adults may be found predominantly over moderate to soft substrates of sand, gravel, and cobble at depths from 0 to 660 ft (NMFS, 2005).

### 3.1.5 Alaska Plaice

Designated EFH for Alaska plaice including eggs, larvae, late juveniles, and adult life stages is designated at the entrance of Cook Inlet and throughout the GOA. In the project area, EFH has not been designated for any of the life stages. Alaska plaice is considered a "deep water" species in the GOA. Eggs and larvae are present in pelagic waters over a range of depths (0 to 1,650 ft) in the spring. Late juvenile and adult EFH is in the lower portion of the water column (0 to 660 ft), predominantly over softer substrates such as sand and mud (NMFS, 2005).

### 3.1.6 Rex Sole

EFH for eggs, larval, late juvenile, and adult life stages of rex sole is designated at the entrance of Cook Inlet. In the project area, EFH has not been designated for any of the life stages. Eggs and larvae are located in pelagic waters over a range of depths (0 to 1,650 ft) in the spring. EFH of late juveniles and adults for rex sole is in the lower portion of the water column at depths of 0 to 660 ft, over substrates consisting of gravel, sand, and mud (NMFS 2005).

### 3.1.7 Flathead Sole

The flathead sole EFH for eggs and larvae extends inside the Cook Inlet entrance, while late juvenile and adult habitat extends into Kachemak Bay. In the project area, EFH has not been designated for any of the life stages. Eggs and larvae are located in pelagic waters over a range of depth (0 to 9,850 ft). Adults are benthic and have separate winter spawning and summer feeding distributions. Flathead sole over-winter near the continental shelf margin and migrate onto the mid and outer continental shelf in the spring to spawn in deepwater areas. Larvae are planktonic, and usually inhabit shallow water areas. Late juveniles' and adults' EFH is shallower (0 to 660 ft) than egg and larvae distribution, with adults found over softer substrates such as sand and mud. Like all flatfish, flathead sole occur in the lower portion of the water column (NMFS, 2005).

### 3.1.8 Arrowtooth Flounder

Larval arrowtooth flounder EFH is designated near the entrance of Cook Inlet with late juveniles and adults EFH extending into Cook Inlet as far as Kachemak Bay. EFH has not been designated for any of the life stages within the project area. All life stages of Arrowtooth flounder occur in the inner continental shelf regions at depths ranging from 3 to 165 ft. Larvae are planktonic for a few months until metamorphosis occurs; juveniles usually inhabit shallow water areas. Adults are found in continental shelf waters until age 4. As they age, they occupy both shelf and deeper slope waters at older ages with highest concentrations at 330 to 660 ft. Both adults and juveniles are often found over soft substrate, predominantly of gravel, mud, and sand, in the lower portion of the water column (NMFS, 2005).

### 3.1.9 Shortraker Rockfish

Shortraker rockfish larvae are present only near the Cook Inlet entrance. No juvenile or adult EFH for shortraker rockfish is designated in the project area because all habitat for these life stages is present in deeper water, often near the continental shelf, or in other nearshore areas of the GOA. The EFH for shortraker rockfish larvae is characterized along the entire shelf (0 to 660 ft) and slope areas (660 to 9,850 ft). Shortraker rockfish are associated with substrates consisting of mud, sand, sandy mud, muddy sand, rock, cobble, and gravel. Rockfish have internal fertilization and release live young in the spring (NMFS, 2005).

### 3.1.10 Rougheye Rockfish

Rougheye rockfish larvae are present only near the Cook Inlet entrance. No juvenile or adult EFH for rougheye rockfish is designated in the project area because all habitat for these life stages is present in deeper water, often near the continental shelf, or in other nearshore areas of the GOA. The EFH for rougheye rockfish larvae is characterized along the entire shelf (0 to 660 ft) and slope areas (660 to 9,850 ft). Rougheye rockfish are associated with substrates consisting of mud, sand, sandy mud, muddy sand, rock, cobble, and gravel. Rockfish have internal fertilization and release live young in the spring (NMFS, 2005).

### 3.1.11 Northern Rockfish

Northern rockfish larvae are present only near the Cook Inlet entrance. No juvenile or adult EFH for northern rockfish is designated in the project area because all habitat for these life stages is present in deeper water, often near the continental shelf, or in other nearshore areas of the GOA. The EFH for northern rockfish larvae is located in pelagic waters along the entire shelf (0 to 660 ft) and slope areas (660 to 9,850 ft). Adult northern rockfish are associated with substrates consisting of rock and cobble found in the middle to lower portions of the water column at depths (330 to 1,640 ft). Rockfish have internal fertilization and release live young in the spring (NMFS, 2005).

### 3.1.12 Dusky Rockfish

Dusky rockfish larvae are present only near the Cook Inlet entrance. No juvenile or adult EFH for dusky rockfish is designated in the project area because all habitat for these life stages is present in deeper water, often near the continental shelf, or in other nearshore areas of the GOA. Dusky rockfish EFH for larvae is located in pelagic waters along the entire shelf (0 to 660 ft) and slope areas (660 to 9,850 ft). Adult dusky rockfish are found in the middle to lower portions of the water column at depths (330 to 1,650 ft) over substrates consisting of rock, gravel, and cobble. Rockfish have internal fertilization and release live young in the spring (NMFS, 2005).

### 3.1.13 Yelloweye Rockfish

Yelloweye rockfish larvae are present only near the Cook Inlet entrance. EFH for juvenile or adult yelloweye rockfish is not designated in the project area because all habitat for these life stages is present in deeper water, often near the continental shelf, or in other nearshore areas of the GOA. The EFH for yelloweye rockfish larvae is located in pelagic waters along the entire shelf (0 to 660 ft) and slope areas (660 to 9,850 ft). Adult northern rockfish are associated with substrates consisting of rock and in areas of vertical relief (e.g., crevices, overhangs, vertical walls, coral, and larger sponges) located in the lower portion of the water column within bays

and island passages and along the inner (165 ft), middle (165 to 330 ft), and outer shelf (330 to 660 ft). Rockfish have internal fertilization and release live young in the spring (NMFS, 2005).

### 3.1.14 Thornyhead Rockfish

Thornyhead rockfish larvae are present only near the Cook Inlet entrance. No juvenile or adult EFH for thornyhead rockfish is designated in the project area because all habitat for these life stages is present in deeper water, often near the continental shelf, or in other nearshore areas of the GOA. Thornyhead rockfish larvae EFH is located in pelagic waters along the entire shelf (0 to 660 ft) and slope areas (660 to 9,850 ft) throughout the GOA. Late juveniles and adult northern rockfish are associated with substrates predominantly of mud, sand, rock, sandy mud, muddy sand, cobble, and gravel found in the middle and outer shelf (165 to 660 ft) and upper to lower slope (660 to 9,850 ft). Rockfish have internal fertilization and release live young in the spring (NMFS, 2005).

### 3.1.15 Atka Mackerel

In the project area, EFH has not been designated for any of the Atka mackerel's life stages. The EFH for larval Atka mackerel is located in epipelagic waters along the shelf (0 to 660 ft), upper slope (660 to 1,650 ft), and intermediate slope (1,650 to 3,300) throughout the GOA. Adults can be found within the entire water column, from sea surface to the sea floor, along the inner (0 to 165 ft), middle (165 to 330 ft), and outer shelf (330 to 660 ft). Atka mackerel are often associated with substrates of gravel and rock and in vegetated areas of kelp (NMFS, 2005).

### 3.1.16 Sablefish

EFH for larval, juvenile, and adult sablefish is present only at the entrance of the Cook Inlet. In the project area, EFH has not been designated for any of the sablefish's life stages. EFH for sablefish eggs are located in deeper waters along the slope (660 to 9,859 ft). EFH for sablefish larvae is located within epipelagic waters along the middle shelf (165 to 330 ft) and slope. First- to second-year juveniles are found primarily in nearshore bays; they move to deeper offshore waters as they age, with EFH habitat in the lower water column along the slope (660 to 3,300 ft). Adult sablefish are predominantly found on the outer continental shelf mainly on the slope and in deep gullies at typical depths of 660 to 3,300 ft, over varied habitat, usually in soft substrate (NMFS 2005).

### 3.1.17 Sculpins

Late juvenile and adult sculpins designated EFH is present in the project area. Both late juveniles and adults are present in the lower portion of the water column in the inner, middle, and outer shelf (0 to 660 ft) and portions of the upper slope (660 to 1,650 ft) in the GOA, over varied substrates of rock, sand, mud, cobble, and sandy mud. Typically eggs are laid in rocks, where males guard them. Larvae often have diel migration (near the surface at night) and might be present year-round (NMFS, 2005).

### 3.1.18 Skates

The only designated EFH for skates is for adults, which extends well into Cook Inlet and is present in the project area. Adult EFH is found in waters of 0 to 1,650 ft on shelf and upper slope areas throughout the GOA. Adult skates are present in the lower portion of the water

column over substrates such as mud, sand, gravel, and rock. Skates are oviparous, fertilization is internal, and eggs are deposited in a case for incubation. After hatching, juveniles likely remain in shelf and slope waters, but their distribution is unknown. No data on habitat requirements or movement are available for juveniles (NMFS, 2005).

### 3.1.19 Red Squid

EFH has not been designated for the late juvenile or adult life stages for the red squid in the project area. The EFH for juvenile and adult squid is located in the entire water column from sea surface to sea floor along over the shelf (0 to 1,650 ft) and entire slope (up to 3,300 ft) regions. Reproduction is poorly known, but fertilization is internal. Squid lay eggs in gelatinous masses at water depths ranging from 660 to 2,625 ft deep (NMFS, 2005).

### 3.1.20 Forage Fish Complex

The GOA forage fish complex—eulachon, capelin, sand lance, sand fish, euphausiids, myctophids, pholids, etc.—does not have any EFH determinations in the GOA. There is insufficient information available for all life stages to allow NMFS to designate EFH for these species. These species are commonly found in the Gulf of Alaska and within Cook Inlet. The species within the forage fish complex are the common prey for many of the groundfish species present in the GOA and Cook Inlet (NMFS, 2005).

### 3.1.21 Pink Salmon

Designated EFH for pink salmon within the project area includes estuarine juvenile, marine juvenile, and marine immature and maturing adults. The EFH for the estuarine environment is the mouth areas of streams from the mean high tide line to the salinity transition zone. All other marine life stage EFH are outside the project area because EFH for this species extends from the mean higher tide line to the 230 miles (375 km) limit of the U.S. EEZ. This species is pelagic to a depth of about 660 ft. Pink salmon adults spawn in freshwater streams within a few miles from shore within the intertidal zone or at the mouths of the streams. Eggs are laid in substrates of medium to coarse gravel. After hatching, salmon fry leave streams within 15 days migrating downstream towards the open ocean. At about one year of age, pink salmon move offshore to ocean feeding areas (NMFS, 2005).

### 3.1.22 Chum Salmon

Similar to pink salmon, designated EFH for chum salmon within the project area includes estuarine juveniles, marine juveniles, and marine immature and maturing adults. The EFH for the estuarine environment is the mouth areas of streams from the mean high tide line to the salinity transition zone. All other marine life stage EFH are outside the project area because EFH for this species extends from the mean higher tide line to the 230 miles (375 km) limit of the U.S. EEZ. Chum salmon are pelagic to a depth of about 660 ft. Most chum salmon spawn in small streams within a few miles of the shore, or within the intertidal zone, but some travel great distances up large rivers. The generally migrate in darkness in the upper water column. Chum salmon fry leave streams within 15 days and migrate towards the open ocean for up to two months. Eggs are laid in medium to course stream gravel (NMFS, 2005).

### 3.1.23 Sockeye Salmon

Designated EFH for sockeye salmon within the project area includes estuarine juveniles, marine juveniles, and marine immature and maturing adults. The EFH for the estuarine environment is the mouth areas of streams from the mean high tide line to the salinity transition zone. All other marine life stage EFH are located outside the project area because EFH for this species extends from the mean higher tide line to the 230 miles (375 km) limit of the U.S. EEZ. This species is pelagic to a depth of about 660 ft. Sockeye spawn in stream systems with lakes. Juvenile sockeye salmon require year-round rearing habitat. After one to three years in fresh water lakes, the fry migrate downstream to the open ocean. Under-yearling, yearling, and older smolts occupy estuaries from March through early August. Adults often spawn in lake and stream substrates consisting of medium to course gravel (NMFS, 2005).

### 3.1.24 Chinook Salmon

Designated EFH for Chinook salmon within the project area includes estuarine juveniles, marine juveniles, and marine immature and maturing adults. The EFH for the estuarine environment is the mouth areas of streams from the mean high tide line to the salinity transition zone. All other marine life stage EFH are located outside the entire project area because EFH for this species extends from the mean higher tide line to the 230 miles (375 km) limit of the U.S. EEZ. This species is pelagic to a depth of about 660 ft. Chinook spawn in small and large streams, and the eggs are laid in stream gravels. After hatching, salmon fry move downstream to the open ocean. Juvenile Chinook salmon migrate from freshwater areas in April toward the open ocean and may spend up to a year in major tributaries or rivers, such as the Kenai, Yukon, Taku, and Copper Rivers. Chinook salmon smolts and post-smolt juveniles may be found in estuarine habitats from April through September. Adult Chinook salmon spawn in substrates consisting of gravels from April through September (NMFS, 2005).

### 3.1.25 Coho Salmon

Similar to the other salmonid species, designated EFH for Coho salmon within the project area includes estuarine juveniles, marine juveniles, and marine immature and maturing adults. The EFH for the estuarine environment is the mouth areas of streams from the mean high tide line to the salinity transition zone. All other marine life stage EFH for Coho salmon are outside the project area because EFH for this species extends from the mean higher tide line to the 230 miles (375 km) limit of the U.S. EEZ. Coho salmon are a pelagic species to a water depth of about 660 ft. Coho salmon spawn in small streams with gravel substrates for the eggs. Fry tend to migrate to freshwater areas such as ponds, lakes, and stream pools for up to two years. Juvenile Coho salmon require year-round rearing habitat and also migration habitat from April to November to provide access to and from the estuary (NMFS, 2005).

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# 4. EFFECTS OF THE PROPOSED ACTION ON EFH

This section describes potential effects on EFH resulting from the proposed action, which is the Osprey Platform NPDES permit reissuance, including authorization to discharge the two additional requested wastestreams (desalination backwash and filter backwash), for oil and gas production in Cook Inlet, Alaska. The direct and indirect effects of activities associated with the permit reissuance have been assessed in documents related to this EFH. The Biological Evaluation (BE) addresses the potential effects of the nine discharges, proposed to be authorized by EPA under the reissued NPDES permit, to endangered, threatened, and proposed species and their critical habitat as required by the Endangered Species Act (ESA) (USEPA, in progress). Correspondingly, portions of the BE are incorporated within this EFH.

Three previous documents—the *Environmental Assessment for the Redoubt Shoal Unit Development Project*, including the Essential Fish Habitat appendix (USEPA, 2002); the *Final Environmental Impact Statement for the Cook Inlet Planning Area Oil and Gas Lease Sales 191 and 199* (MMS, 2003); the *Environmental Assessment for the Reissuance of the NPDES General Permit for Oil and Gas Exploration, Development and Production Facilities Located in State and Federal Waters in Cook Inlet, Alaska*, including its Essential Fish Habitat Assessment (USEPA, 2006)—addressed effects of the same or similar discharges. The documents also evaluated the potential effects of boat traffic associated with oil platform operations and potential spills. In addition, the *Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska* (NMFS, 2005) provides text descriptions and maps depicting the areas of EFH for each life stage of fish managed under FMPs for the GOA and BSAI. These documents were used extensively in assessing potential effects on EFH in the project area.

The following sections address the potential effects on EFH in the project area.

## 4.1 DISCHARGE WITH AN ASSOCIATED MIXING ZONE

As described earlier, mixing zones are established by States in coastal (or State) waters to specify a limited portion of a water body in which otherwise applicable water quality criteria may be exceeded. Alaska's WQS require that when mixing zones are authorized, the mixing zones should be as small as practicable. Within the mixing zone, numeric criteria for chronic aquatic life and human-health protection may be exceeded; however, the numeric criteria must be met at the mixing zone boundary. Alaska's WQS (18 AAC 70.255) also mandate that no lethality occurs to organisms passing through mixing zones. In addition, acute aquatic life criteria must be met at the boundary of a smaller zone of initial dilution established within the mixing zone.

According to the Alaska WQS, ADEC cannot authorize mixing zones if the pollutants could bioaccumulate, persist in concentrations above natural levels in the environment, or can be expected to cause a carcinogenic or other human health risk. Potential exposure pathways are considered by ADEC when determining whether to authorize a mixing zone. ADEC determined that the discharges authorized by the previous permit were not likely to persist in the environment. Therefore, in the previous permit, ADEC authorized mixing zones for deck drainage (Discharge No. 002) which allowed for water quality criteria for chronic toxicity unit to

be exceeded within the mixing zone; and for sanitary wastes (Discharge No. 003) which allowed for water quality criteria for total residual chlorine to be exceeded within the mixing zone.

ADEC prepared a draft Certificate of Reasonable Assurance for NPDES Permit AK-005330-9 (ADEC, 2008a) authorizing a mixing zone for sanitary waste approximately 0.12 acres in size based upon a dilution factor of 133:1. Compliance with Alaska WQS must be achieved at the edge of the mixing zone for TRC and FC. However, under the authority provided in Section 402(a)(1) of the CWA, EPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

Several factors are considered in determining the size of a mixing zone to meet WQS. The size of the mixing zone depends on the concentration of the parameter in the discharge water, how the water is discharged to receiving waters, and the characteristics of the receiving water. The permittee used the CORMIX dispersion model to calculate the dilution that the effluent plume receives and determined the distance from the point of discharge for which WQS must be met (Forest Oil, 2006b; Parametrix, 2008).

Dispersion in the receiving waters would decrease the concentration of the pollutants associated with the sanitary waste discharge. Treated freshwater (actually seawater that has been desalinated for use on the Osprey Platform's water supply and then discharged as sanitary waste) is the principal component needing disposal. The sanitary waste discharge would be subject to the effluent limitations and monitoring requirements of the permit reissuance.

To evaluate potential effects to designated EFH and those species within the designated EFH, this assessment focuses on two primary concerns: (1) whether adverse effects would occur as a result of exposure to contaminant concentrations above WQS within the mixing zone boundaries, and (2) whether the WQS are protective of EFH species.

As presently discharged to Cook Inlet from the Osprey Platform and under the permit reissuance, the effects of the sanitary waste discharge on the environment and EFH species are not significant. The impacts to ambient dissolved oxygen (DO) concentrations in the receiving water should be considered (USEPA, 2002). Sanitary waste is treated with an MSD that provides a minimum of 2,100 $ft^3$ of air per pound of BOD. Additionally, EPA has established a technology-based effluent limit for BOD necessary to attain Alaska WQS for DO. Therefore, DO in the effluent is anticipated to meet Alaska WQS. No direct impacts to EFH would be anticipated.

When sanitary waste is discharged, total suspended solids (TSS) are anticipated to have a concentration less than 60 mg/L, which is less than the daily maximum concentration permitted for sanitary discharges under the Cook Inlet NPDES General Permit AKG-31-5000 (USEPA, 2007b; Forest Oil, 2006a). Operated properly, TSS from this discharge would be less than the ambient TSS in Cook Inlet.

When discharged, the sanitary waste would be chlorinated to remove FC bacteria. Under the authority provided in Section 402(a)(1) of the CWA, EPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that

would result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

When sanitary waste is discharged it enters into a section of Cook Inlet which has been demonstrated to be a non-depositional, high-energy environment characterized by a seafloor of cobble and sand. Tidal currents and mixing produce rapid dispersion of the relatively low constituent concentrations of the discharge, as demonstrated by the mixing zone model analysis (Forest Oil, 2008).

Most of the EFH species evaluated in the EFH assessment are mobile organisms with extended geographic ranges that include areas outside the project area for the permit reissuance. These organisms are unlikely to spend extended periods within the mixing zone boundaries. However, some forage fish (e.g., benthic and epibenthic prey organisms) are less mobile and may spend extended periods in the mixing zone areas. When released, the discharge of sanitary waste from the Osprey Platform will not have an adverse effect on EFH.

### 4.1.1 Additional Wastewater Discharges to be Authorized

In addition to the sanitary waste discharge that would be covered under the proposed mixing zone, the permit reissuance would also authorize other previously permitted wastewater discharges (deck drainage, domestic waste, boiler blowdown, fire control test water, non-contact cooling water, and excess cement slurry) as well as two new additional discharges (desalination backwash and filter backwash) into Cook Inlet. These permitted discharges are typically low volumes of clean freshwater or seawater, which contain small amounts of added substances.

As detailed in Section 2.3.2, the Osprey Platform does not have boiler blowdown water or non-contact cooling water. Fire control system test water will be treated through an oil-water separator to remove oil and grease prior to discharge. Excess cement slurry is not treated prior to discharge. Although the exact composition of the cement is not documented, given the small waste volume and intermittent nature of the discharge, it is not expected to represent a significant pollution source and will not have an adverse effect on EFH. Discharges will be diluted by the strong tidal flux of Cook Inlet.

The permit reissuance also authorizes the discharge of two additional discharges – filter backwash and desalination backwash. Filter backwash is wastewater generated when filters are cleaned and maintained for various platform and production purposes. Desalination backwash is water associated with the process of creating fresh water from seawater and is directly discharged. These discharges will be subject to the appropriate WQS for the state of Alaska (18 AAC 70) and NPDES permit conditions.

These currently permitted wastewater discharges, and proposed discharges to be authorized under the permit reissuance, from the Osprey Platform will not have an adverse effect on EFH.

### 4.1.2 Effects to EFH

Several factors indicate that the discharges proposed to be authorized under the Osprey Platform NPDES permit reissuance will not have an adverse effect on EFH in the project area. The criteria used for the sanitary waste mixing zone indicates that other than individual organisms near the discharge outfall (such as epiphytes on the platform legs), no organisms, including

protected or managed species, would be adversely affected. The Osprey Platform BE analyzes the potential effects from the discharges to endangered, threatened, or proposed species in the project area and concluded that the project discharges would not adversely affect any of the species evaluated (USEPA, 2008 in progress).

The low concentrations of BOD and nutrients in the wastewater discharges may stimulate primary productivity to a negligible extent and enhance zooplankton macrophyte production to an even more negligible extent. Although the sanitary waste mixing zone allows for the release of TRC greater than Alaska WQS within the defined boundaries, EPA has determined that EFH will not be adversely affected. There is the potential that sublethal effects on EFH may occur within the mixing zone, as well as the potential for indirect effects on EFH species resulting from potential adverse effects on epibenthic and benthic prey species within the mixing zone. However, the authorized mixing zone area (0.12 acres) is minuscule in comparison to Cook Inlet and Alaska WQS for TRC must be achieved at the edge of the mixing zone. Under the authority provided in Section 402(a)(1) of the CWA, EPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

Additionally, when sanitary waste is discharged in enters into a section of Cook Inlet that has been demonstrated to be a non-depositional, high-energy environment characterized by a seafloor of cobble and sand. Tidal currents and mixing produce rapid dispersion of the relatively low constituent concentrations of the sanitary waste discharge (Forest Oil, 2006b).

All contaminants of concern, excluding those discharges requiring a mixing zone, will be discharged at concentrations that meet Alaska WQS (18 AAC 70) and Federal water quality criteria. There will be no authorized discharge of produced water, muds, cuttings, or cement at the seafloor. Strong tidal fluxes associated with Cook Inlet and the West Foreland area will disperse discharges very rapidly (USEPA, 2002). Several existing oil and gas platforms discharge wastestreams into Cook Inlet similar to those proposed in the permit reissuance for the Osprey Platform on a routine basis. Additionally, the proposed permit contains water quality- and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. Given the Osprey Platform's waste discharges, its small contributions to the cumulative loading in Cook Inlet, both in volume and concentration, as well as the effluent limitations contained in the proposed permit reissuance, the discharges will not have an adverse effect on EFH.

## 4.2 BOAT TRAFFIC

Noise emitted from boat traffic may have an impact on EFH species. Boat traffic noise impacts to individual animals range from mild behavioral changes to adverse physical effects on hearing organs (National Research Council, 2005). The types and degree of adverse effects would be dependent on the type, magnitude, and frequency of the noise, as well as the proximity of the EFH species to the source of the noise.

Fish response to noise is often characterized by their reaction to boats. Many fish species dive away from the water's surface upon hearing the noise from a boat. One species studied extensively is Pacific herring. Pacific herring have been noted to dive as a school away from passing boats, and they often return shortly thereafter (within seconds or minutes) to their original depth after boats pass (USEPA, 2006).

Fish behavior affected by boat traffic serving the Osprey Platform would be on a short-term basis. Only a small amount of platform support vessel (PSV) boat traffic is expected to support normal operations at the Osprey Platform. In comparison to other boat traffic in Cook Inlet, it is less than commercial fishing boat activity in the region. Boat traffic serving the Osprey Platform would result in short-term (minutes) displacement of fish and would be limited to fish closer to the surface, with less effect on demersal species. Boat traffic associated with the Osprey Platform is insignificant compared to the quantity of boat traffic from fishing, tourism, and shipping occurring in Cook Inlet. Boat traffic serving the Osprey Platform will not have an adverse effect on EFH.

## 4.3 POTENTIAL FOR ACCIDENTAL OIL SPILLS

The permit reissuance would prohibit the discharge of free oil. However, platform activities have the potential to result in oil spills. Oil spills and releases are generally the result of chance casualty. The Osprey Platform Spill Prevention Control and Countermeasure (SPCC) plan (Forest Oil, 2007) specifically lists potential major spill sources, maximum worst case volumes, and major mitigation measures. Permit AK0053309 and the SPCC refer to a Best Management Practices Plan (BMP) for the Cook Inlet Area Production Facilities and the Osprey Platform. The SPCC and BMP plan are designed to address potential spill considerations and to assure that personnel operating the Osprey Platform are trained to prevent releases and to respond when accidents occur.

MMS (2003) extensively modeled the impacts of oil spills to Cook Inlet. Small spills (less than 1,000 barrels) were not expected to affect the overall water quality of Cook Inlet. However, as oil is toxic to many species life stages, even at low concentrations, effects in intertidal areas could persist for generations and could affect more than one life stage for some prey species (e.g., pink salmon, Pacific herring). Given the size of the area that would be anticipated under a small spill scenario from the Osprey Platform, no adverse effect on EFH is expected.

Large oil spills would be likely to have a worse effect on marine species than smaller spills. Intertidal beach and bay habitats (primarily in Cook Inlet) are most likely to suffer long-term impacts if a major oil spill were to occur (MMS, 2003). A large oil spill in the project area would adversely affect prey fish from lethal and nonlethal effects. Organisms that rely most heavily on these environments, such as Pacific herring that spawn in intertidal and shallow subtidal habitat, would be most affected because they are very sensitive to oil. In addition, many eggs and larvae of other species would be more easily affected because of their sensitivity to, and inability to avoid, oil. In turn, species that prey upon these species (and others) would be indirectly affected for a period of time from reduced forage which could be locally significant depending on the time of year and area impacted.

Species and life stages that might be most affected in the intertidal habitats would include Pacific herring eggs, Pacific sand lance and capelin eggs and adults, yellowfin sole, pink salmon eggs, adult squid, juvenile sablefish, Walleye pollock larvae and adults, Pacific cod larvae and adults, and eulachon juveniles (MMS, 2003). Some of these species are primary prey species (e.g. herring, Walleye pollock) for other EFH species, which could reduce production at least in the short term. As demonstrated by studies of the *Exxon Valdez* spill in nearby Prince William Sound, very large oil spills negatively influence the intertidal habitats for decades (MMS, 2003).

Based on past history of oil and gas extraction activities in Cook Inlet, the risk of a large spill (>1,000 barrels) from the Osprey Platform is extremely low (USEPA, 2006). The likelihood of a spill of greater than 50 barrels of oil from the Osprey Platform in any year is 0.014 or about one spill every 80 years. Overall adverse effects on EFH species from oil spills would likely be low to moderate in magnitude and possibly of long duration. A large oil spill would primarily affect beach and intertidal habitats because it would persist in those areas, possibly for 10 years or more. Other marine habitat would likely experience limited effects with a rapid (months to a few years) recovery (USEPA, 2006).

## 4.4 EFFECT ON PREY RESOURCES

EFH species rely on a variety of prey resources such as zooplankton, euphausiids, and various forage fish species. As noted in Section 4.3, the primary risk to EFH from the permit reissuance is from the potential for accidental oil spills related to operation of the project. Acute oil spills can affect nearshore habitat (e.g., marshes). Direct and indirect impacts from oil spills may effect the overall production and survival of organisms. When organisms—such as marine zooplankton and euphausiids—are exposed to hydrocarbon constituents, including those that are several orders of magnitude less than direct acute levels, feeding, growth rates, development, and other factors can be affected. These organisms are important food components to many EFH species, especially during egg and larval life stages (MMS, 2003).

Forage fish are the major prey resources for many of the EFH species. Some life stages of EFH fish, such as for Walleye Pollock, are also major forage fish resources. Walleye pollock was the dominant prey fish of groundfish and Steller sea lions in the Gulf of Alaska during the 1990s (Yang and Nelson, 2000). Walleye pollock juveniles are often associated with eddies, which tend to retain oil. Therefore, there is the potential for oil spills to have both direct effects on these important forage fish and indirect effects on the predators that rely on them.

# 5. PROPOSED MITIGATION

The proposed permit reissuance contains water quality-based and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. Unless otherwise indicated, the permittee must comply with all applicable effluent limitations, special conditions, and monitoring and reporting requirements contained in the proposed permit reissuance.

Under the authority of Section 402(a)(1) of the CWA, USEPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone.

In addition, the Osprey Platform has developed and implemented an ADEC-approved Oil Discharge Prevention and Contingency Plan (C-Plan) with specific methods to prevent, detect, and respond to oil spills, in the event they occur. The C-Plan includes a Spill Prevention Control and Countermeasure (SPCC plan) (Forest Oil, 2007) and a Best Management Plan (BMP) that specifically lists potential major spill sources, maximum worst-case volumes, and major mitigation measures. The SPCC plan and BMP include practices and procedures for training personnel operating the Osprey Platform to minimize the risk of spills and appropriately respond when accidents occur. The C-Plan is periodically reviewed, drills conducted, and appropriate updates made to ensure the ongoing viability and usefulness of the plans' practices and procedures. Lastly, per USEPA (2002), the owner of the Osprey Platform should maintain membership in the Cook Inlet Spill Prevention and Response, Inc. (CISPRI), a Federally-approved Oil Spill Removal Organization that maintains a response capability to handle in excess of a 50,000-barrel spill in Cook Inlet waters.

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# 6. ACTION AGENCY'S DETERMINATIONS OF EFFECT OF THE PROPOSED ACTION ON EFH

Other than effects from an accidental oil spill, the wastewater discharges resulting from the Osprey Platform in Cook Inlet near the project area are primarily short-term based on the limited magnitude and extent of the effects, and therefore, will not have an adverse effect on EFH and life stages of EFH species. The WQS for TRC administered at the edge of the mixing zone for sanitary waste would protect most organisms and EFH habitat. Overall effects on EFH would be inconsequential because of the small area of receiving waters directly affected. There will be no adverse effects on EFH or EFH species and their prey as a result of the reissuance of the proposed permit.

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# APPENDIX D
# BIOLOGICAL EVALUATION (BE)
# FOR THE OSPREY PLATFORM NPDES PERMIT REISSUANCE

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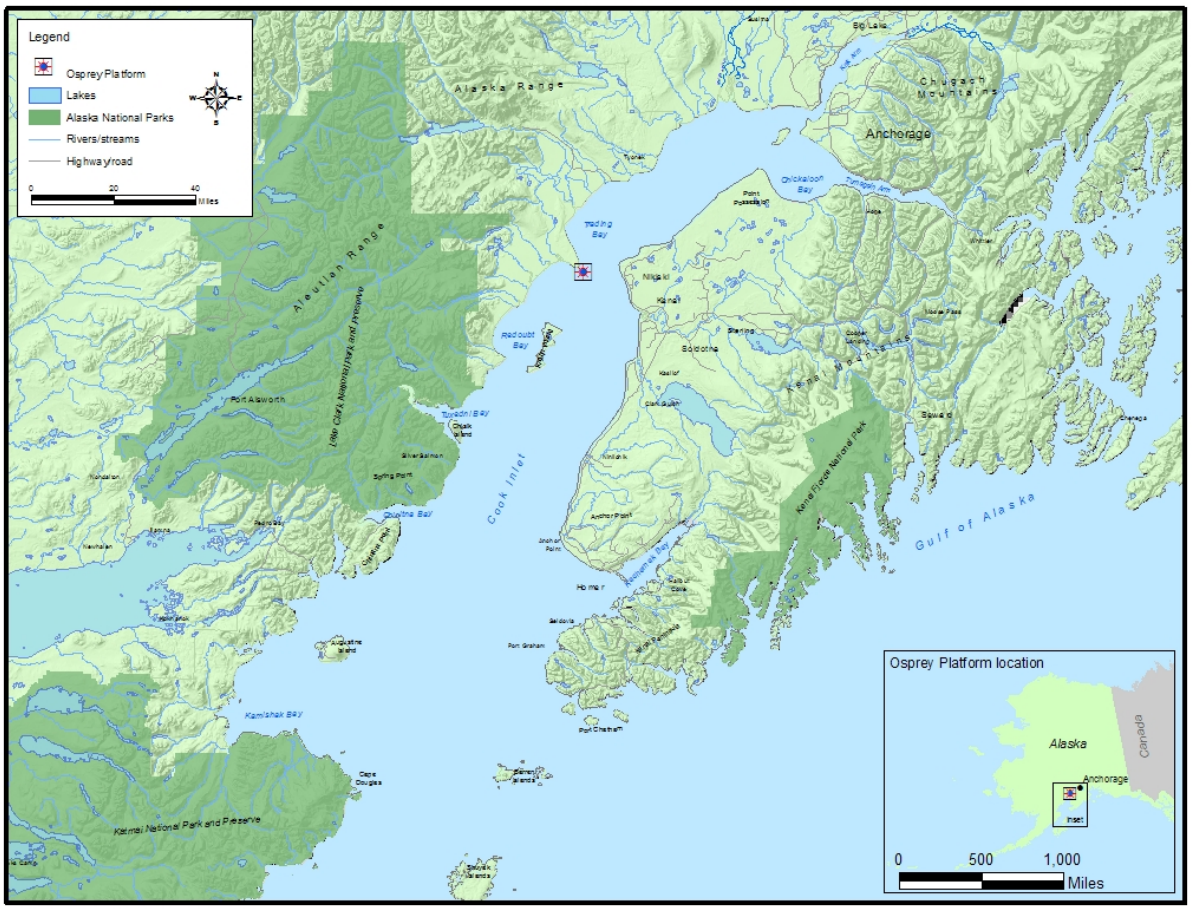
# FINAL

## BIOLOGICAL EVALUATION
## FOR THE REISSUANCE
## OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
## PERMIT FOR THE OSPREY PLATFORM

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## List of Acronyms and Abbreviations

| | |
|---|---|
| AAC | Alaska Administrative Code |
| ADEC | The Alaska Department of Environmental Conservation |
| ADF&G | Alaska Department of Fish and Game |
| ADNR | Alaska Department of Natural Resources |
| AML | Average Monthly Limit |
| AOGCC | Alaska Oil and Gas Conservation Commission |
| BC EMPR | British Columbia Ministry of Energy, Mines, and Petroleum Resources |
| bcf | billion cubic feet |
| BE | Biological Evaluation |
| BLM | Bureau of Land Management |
| BMP | Best Management Practices |
| BOD | Biochemical Oxygen Demand |
| C | Celsius |
| CFR | Code of Federal Regulations |
| CWA | Clean Water Act |
| EA | Environmental Assessment |
| ESA | The Endangered Species Act of 1973 |
| ESRI | Environmental Systems Research Institute |
| F | Fahrenheit |
| FC | Fecal Coliform |
| FR | Federal Register |
| ft | Feet |
| g | gram |
| gpd | gallons per day |
| gpm | gallons per minute |
| kHz | Kilohertz |
| km | Kilometer |
| L | Liter |
| lb | Pound |
| m | meter |
| MDL | Maximum Daily Limit |
| mgd | million gallons per day |
| mg/L | milligrams per liter |
| mL | Milliliter |
| MMBO | million barrels of oil |
| MMPA | Marine Mammal Protection Act of 1972 |
| MMS | Minerals Management Service |
| NA | Not Applicable |
| NMFS | National Marine Fisheries Service |
| NPDES | National Pollutant Discharge Elimination System |

| | |
|---|---|
| NPS | National Park Service |
| PAH | Polynuclear Aromatic Hydrocarbons |
| PCB | Polychlorinated biphenyls |
| PER | Pacific Energy Resources |
| RO | Reverse Osmosis |
| SPCC | Spill Prevention Control and Countermeasure |
| tcf | trillion cubic feet |
| THPS | Tetrakis (hydroxymethyl) phosphonium sulfate |
| TRC | Total Residual Chlorine |
| TRC-a | Total Residual Chlorine (acute) |
| TRC-c | Total Residual Chlorine (chronic) |
| TSS | Total Suspended Solids |
| TUc | Toxic Units – chronic |
| U.S. | United States |
| U.S.C. | United States Code |
| USEPA | U.S. Environmental Protection Agency |
| USFWS | United States Fish and Wildlife Service |
| WET | Whole Effluent Toxicity |
| WQS | Water Quality Standards |

# 1. INTRODUCTION

As mandated by Section 7 of the Endangered Species Act (ESA) of 1973, Federal agencies must consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) to ensure that any action authorized is not likely to jeopardize the continued existence of any ESA-listed species or result in the destruction or adverse modification of critical habitat required by a listed species (16 United States Code [U.S.C.] §1532 et seq.). This Biological Evaluation (BE) assesses the potential effects to endangered, threatened, and proposed listed species or their critical habitats as a result of the National Pollutant Discharge Elimination System (NPDES) permit reissuance for the Osprey Platform for oil and gas production in Cook Inlet, Alaska.

On December 28, 2006, Forest Oil Corporation submitted an NPDES permit renewal application to the U.S. Environmental Protection Agency (USEPA), Region 10, requesting the reissuance of the New Source NPDES permit (AK-005330-9) for the Osprey Platform to continue oil and gas production in Cook Inlet, Alaska (Forest Oil, 2006a). The NPDES permit expired on June 30, 2007; however, because Forest Oil submitted the application for permit renewal in a timely manner, USEPA administratively extended the existing permit.

Discharges from the Osprey Platform are regulated under the Coastal and Offshore Subcategory of the Oil and Gas Extraction Point Source Category (Title 40 of the Code of Federal Regulations [CFR], Part 435, Subparts A and D). Since submitting the NPDES permit renewal application, Osprey Platform ownership has changed. On August 27, 2007, Forest Oil's Alaskan assets, including the Osprey Platform, were acquired by Pacific Energy Resources Ltd. (hereafter referred to as PERL or "permittee").

The Osprey Platform is a modern, four-column, oil and gas production platform set in approximately 45 feet of water in Cook Inlet, Alaska. The Osprey Platform was converted to production status in late 2002. Produced fluids from the platform are piped to the Kustatan Production facility for separation of water, gas, and crude oil. The produced water separated from the crude oil is piped back to the Osprey Platform where, together with drilling muds and cuttings, it is injected into an Alaska Oil and Gas Conservation Commission (AOGCC)-permitted Class I/II injection well that is located beneath the Osprey Platform. The NPDES permit renewal application only applies to the Osprey Platform.

The potential waste streams created by typical offshore oil and gas platform activities on the Osprey Platform are described below in order of the discharge number. Table 1-1 provides a summary of the discharges proposed under the Osprey Platform NPDES permit reissuance.

## Drilling Muds and Cuttings (Discharge No. 001)

Drilling muds and cuttings are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of circulating fluids (muds) used in the rotary drilling of wells to clean and condition the hole, to counterbalance formation pressure, and to transport drill cuttings to the surface. A water-based drilling fluid is the conventional drilling mud in which water is the continuous phase and the suspending medium for solids, whether or not oil is present. An oil-based drilling fluid has diesel, mineral oil, or some other oil as its continuous phase with water as the dispersed phase. Production drilling operations on the

Osprey Platform use a combination of freshwater-based and oil-based drilling fluids. The freshwater-based drilling muds are typically used for the upper 2,500 ft of the well, and the oil-based drilling fluids are used for depths below 2,500 ft (USEPA, 2006). Drill cuttings are the particles generated by drilling into subsurface geologic formations and are carried to the surface with the drilling fluid. The drilling muds are separated from the drill cuttings on the platform for use as make-up drilling fluids. The separated drill cuttings are disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Deck Drainage (Discharge No. 002)

Deck drainage is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of wastewater resulting from platform and deck washings; spillage; rainwater; and runoff from curbs, gutters, and drains on the Osprey Platform. Deck drainage flows into an overflow tank and then to a skim tank where it is treated by physical separation. Oil floats to the top of the tank, and water is discharged from the lower portion of the tank. The oil fraction from the skim tank is added to the produced oil and sent by pipeline to the shore storage facility. Although not required under this existing permit, domestic waste (Discharge No. 004) is also treated in this skim tank.

The average daily flow of deck drainage from the platform is approximately 1,435 gallons per day (gpd), with a maximum daily flow of 18,000 gpd depending on precipitation (Forest Oil, 2006a). According to the permit application (Forest Oil, 2006a), deck drainage is currently injected into the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Sanitary Waste (Discharge No. 003)

Sanitary waste from toilets and urinals is an authorized discharge under the existing permit. According to Forest Oil's permit application (Forest Oil, 2006a), sanitary waste is aerated and treated in a Coast Guard certified marine sanitation device (MSD), chlorinated and held in a tank, dechlorinated, and injected into the Osprey Platform's AOGCC-permitted Class I/II injection well commingled with deck drainage (Discharge No. 002) and domestic waste (Discharge No. 004). The pollutants associated with this discharge include suspended solids, 5-day biochemical oxygen demand (BOD), fecal coliform (FC), and total residual chlorine (TRC). Although PERL has no plans to initiate discharge of sanitary waste to Cook Inlet, it has requested authorization to retain the ability to discharge sanitary waste in the future, if needed. The Alaska Department of Environmental Conservation's (ADEC) prepared a draft Certificate of Reasonable Assurance for NPDES Permit AK-005330-9 (ADEC, 2008a) authorizing a mixing zone for sanitary waste approximately 0.12 acres in size based upon a dilution factor of 133:1. Compliance with Alaska WQS must be achieved at the edge of the mixing zone for TRC and FC bacteria. However, under the authority provided in Section 402(a)(1) of the Clean Water Act (CWA), USEPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone.

### Domestic Waste (Discharge No. 004)

Domestic waste is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge, also referred to as graywater, is composed of wastewater from sinks, showers, laundries, safety showers, eyewash stations, and galleys. Graywater originating from Platform's

galley includes kitchen solids, detergents, cleansers, and oil and grease. Treating domestic waste before discharge is not required, but for operational convenience on the Osprey Platform, domestic waste is currently piped to the skim tank and treated along with deck drainage. The applicant has requested permission to modify its operational procedures to bypass domestic waste around the skim tank so that it can be discharged directly to Cook Inlet.

Domestic waste was calculated as a daily average flow volume of 500 gpd (with a maximum daily flow of 6,000 gpd) using an equation of 100 gallons per person daily and an average of five people on the platform (with a maximum population of 60) (Forest Oil, 2006a). According to the permit application (Forest Oil, 2006a), domestic waste is currently injected into the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Desalination Backwash (Discharge No. 005)

Desalination backwash is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of wastewater created from the process of making fresh (potable) water from seawater through a packaged treatment plant using pretreatment and reverse osmosis (RO) filtration. The Osprey Platform does not currently have a desalination plant, and therefore, this discharge was not included in the existing permit. However, the applicant has requested that this discharge be authorized under the reissued permit enabling the applicant to add a desalination plant in the future (Forest Oil, 2006a).

The anticipated maximum daily flow of desalination backwash is 100,000 gpd with a long-term average flow of 10,000 gpd (Forest Oil, 2006a). This discharge volume and sample data were obtained from the Monopod Platform NPDES permit application that was submitted for the Cook Inlet general permit reissuance. (Forest Oil was part owner of the Monopod Platform; however, all of Forest Oil's Alaska assets are now owned by PERL.)

### Blowout Preventer Fluid (Discharge No. 006)

Blowout preventer fluid is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of the fluid used to actuate hydraulic equipment on the blowout preventer stacks during well drilling. Blowout preventer fluid would be released only by catastrophic failure of the blowout preventer. It would not be a regularly released fluid; therefore, blowout preventer fluid will not be considered as a discharge from the Osprey Platform.

### Boiler Blowdown (Discharge No. 007)

Boiler blowdown waste is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of water and minerals drained from boiler drums. The Osprey Platform does not presently produce boiler blowdown water. If produced, boiler blowdown would be treated through an oil-water separator prior to discharge (USEPA, 2002b).

Water sample data were obtained from the King Salmon Platform NPDES permit application that was submitted for the Cook Inlet general permit reissuance. (Forest Oil was part owner of the King Salmon Platform; however, all of Forest Oil's Alaska assets are now owned by PERL.) The average and maximum anticipated daily flow of boiler blowdown from the King Salmon Platform is approximately 100 gpd (Forest Oil, 2006a).

### Fire Control Test Water (Discharge No. 008)

Fire control test water is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge, composed largely of seawater, is generated during the training of personnel in fire protection and when maintaining fire protection equipment. The discharge is intermittent and is expected to occur approximately 52 times per year for about 30 minutes. The average daily flow of fire control test water is approximately 13,400 gpd, with a maximum daily flow of 120,000 gpd (Forest Oil, 2006a).

### Non-Contact Cooling Water (Discharge No. 009)

Non-contact cooling water is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is seawater that is used for non-contact, once-through cooling of crude oil, produced water, power generators, and various pieces of machinery on the platform. The Osprey Platform does not presently produce this discharge but discharge to Cook Inlet is allowed under the existing NPDES permit.

Water sample data were obtained from the King Salmon Platform NPDES permit application that was submitted for the Cook Inlet general permit reissuance. (Forest Oil was part owner of the King Salmon Platform; however, all of Forest Oil's Alaska assets are now owned by PERL.) Potential average daily flow and maximum daily flow of non-contact cooling water is 1,890,000 gpd (Forest Oil, 2006a).

### Uncontaminated Ballast Water (Discharge No. 010)

Uncontaminated ballast water is not an authorized discharge under the existing Osprey Platform NPDES permit. Deepsea platforms are floating devices that require ballast water to keep the underwater portions of the structure submerged and the structure stable. Ballast water is occasionally discharged from and replaced in such structures. The Osprey Platform is a fixed platform (not floating) and does not produce or release this discharge.

### Bilge Water (Discharge No. 011)

Bilge water is not an authorized discharge under the existing Osprey Platform NPDES permit. Bilge water is water that collects in the lower internal parts of the drilling vessel hull. The Osprey Platform is a fixed structure and has no such discharge.

### Excess Cement Slurry (Discharge No. 012)

Excess cement slurry is an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of excess mixed cement and equipment washdown wastewater from cementing operations. This waste stream is discharged intermittently while drilling, depending on drilling, casing, and testing program/problems (USEPA, 2006). Approximately 78 discharge events are anticipated per year, with an average daily flow of 2,000 gpd and a maximum daily flow of 3,000 gpd (Forest Oil, 2006a). Excess cement slurry is not treated prior to discharge.

### Muds, Cuttings, and Cement at the Seafloor (Discharge No. 013)

Muds, cuttings, and cement at the seafloor is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of the circulating fluids (muds)

used in the rotary drilling of wells to clean and condition the hole, to counterbalance formation pressure, and to transport drill cuttings to the surface. When reconditioning a well bore, cement that previously lined the well bore might be ground up and entrained with the rock and mud particles. Drill cuttings are the particles generated by drilling into subsurface geologic formations and are carried to the surface with the drilling fluid. The drilling muds are separated from the drill cuttings on the platform for use as make-up drilling fluids.

The applicant initially requested that muds, cuttings, and cement at the seafloor be added as a permitted discharge under the permit reissuance. According to the permit application, this outfall would be required in the new permit so that wells associated with the Osprey Platform could be properly abandoned. In a letter to USEPA dated January 23, 2008, PERL withdrew the request. Muds, cuttings, and cement at the seafloor will not be an authorized discharge. Correspondingly, Discharge No. 013 is not analyzed in this BE (PERL, 2008).

### Waterflooding Discharges (Discharge No. 014)

Waterflooding discharges are not authorized under the existing Osprey Platform NPDES permit. This discharge is created during the process of treating seawater and other appropriate fluids before they are injected into a hydrocarbon-bearing formation to improve the flow of hydrocarbons from production wells, and prior to use in operating physical/chemical treatment units for sanitary waste. These discharges include strainer and filter backwash water. All waterflooding discharges will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Produced Water and Solids (Discharge No. 015)

Produced water and solids is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of water brought up from the hydrocarbon-bearing strata during the extraction of oil and gas. It includes formation water, injection water, and any chemicals added downhole or during the oil/water separation process. Produced solids are sands and other solids that collect in vessels and lines, and must be removed to maintain adequate vessel and line capacities. The produced water and solids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Completion Fluids (Discharge No. 016)

Completion fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of salt solutions, weighted brines, polymers, and various additives used to prevent damage to the well bore during production well completion. The completion fluids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Workover Fluids (Discharge No. 017)

Workover fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of salt solutions, weighted brines, polymers or other specialty additives used in a producing well to allow safe repair and maintenance or abandonment procedures. The workover fluids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Well Treatment Fluids (Discharge No. 018)

Well treatment fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is composed of acid solutions, polymers, or hot water/brine fluids used to restore or improve well productivity by chemically or physically altering hydrocarbon-bearing strata. The well treatment fluids will be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Test Fluids (Discharge No. 019)

Test fluids are not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge can include oils, weighted brines, polymers, and assorted additives used to assist the various measuring instruments that are inserted downhole when evaluating wells during exploration activities. The Osprey Platform is now a production facility; therefore, it will not be discharging test fluids. If test fluids were to be generated in future exploration activities, they would be disposed of in the Osprey Platform's AOGCC-permitted Class I/II injection well.

### Filter Backwash (Discharge No. 021)

Filter backwash is not an authorized discharge under the existing Osprey Platform NPDES permit. This discharge is generated when filters are cleaned and maintained for various platform and production purposes. Filter backwash is primarily composed of seawater, with low levels of contaminants from platform equipment and from biofouling treatment chemicals such as tetrakis (hydroxymethyl) phosphonium sulfate (THPS). The anticipated maximum daily and long-term average discharge of filter backwash at the Osprey Platform is 105,000 gpd (Forest Oil, 2006a). This discharge is usually injected in the Osprey Platform's AOGCC-permitted Class I/II injection well. The applicant has requested that this discharge be authorized under the reissued permit (Forest Oil, 2006a).

**Table 1-1. Proposed Discharges under the Osprey Platform NPDES Permit Reissuance**

| Discharge No. | Discharge | Description of Release | Included in Permit Reissuance |
|---|---|---|---|
| 001 | Drilling Muds and Cuttings | Disposal to AOGCC-permitted Class I/II injection well. | |
| 002 | Deck Drainage | Commingled with sanitary waste (003) and domestic waste (004) discharges and injected into AOGCC-permitted Class I/II injection well. | √ |
| 003 | Sanitary Waste | Commingled with deck drainage (002) and domestic waste (004) discharges and injected into AOGCC-permitted Class I/II injection well. ADEC is authorizing a mixing zone for future discharge of sanitary waste to Cook Inlet. | √ |
| 004 | Domestic Waste | Commingled with deck drainage (002) and sanitary waste (003) discharges and injected into AOGCC-permitted Class I/II injection well. | √ |
| 005 | Desalination Backwash | Discharge was not included in the existing permit, because the platform did not have a desalination plant at the time the original permit was issued. | √ |

**Table 1-1 (cont.). Proposed Discharges under the Osprey Platform NPDES Permit Reissuance**

| Discharge No. | Discharge | Description of Release | Included in Permit Reissuance |
|---|---|---|---|
| 006 | Blowout Preventer Fluid | Discharge is not produced on the Osprey Platform. | |
| 007 | Boiler Blowdown | Discharge is not presently produced on the Osprey Platform, but discharge to Cook Inlet is allowed under the existing NPDES permit. | √ |
| 008 | Fire Control Test Water | Weekly discharge to Cook Inlet. | √ |
| 009 | Non-contact Cooling Water | Discharge is not presently produced on Osprey Platform, but discharge to Cook Inlet is allowed under the existing NPDES permit. | √ |
| 010 | Uncontaminated Ballast Water | Discharge is not produced on the Osprey Platform. | |
| 011 | Bilge Water | Discharge is not produced on the Osprey Platform. | |
| 012 | Excess Cement Slurry | Discharged to Cook Inlet intermittently during well workover. Discharge is allowed under the existing permit. | √ |
| 013 | Mud, Cuttings, and Cement at Seafloor | Discharge was not permitted under the existing permit. In the application letter dated December 12, 2006, that applicant requested this discharge under the reissued permit. However, in a letter to USEPA dated January 23, 2008, the applicant withdrew the discharge request. | |
| 014 | Waterflooding Discharges | Disposal to AOGCC-permitted Class I/II injection well. | |
| 015 | Produced Water and Solids | Disposal to AOGCC-permitted Class I/II injection well. | |
| 016 | Completion Fluids | Disposal to AOGCC-permitted Class I/II injection well. | |
| 017 | Workover Fluids | Disposal to AOGCC-permitted Class I/II injection well. | |
| 018 | Well Treatment Fluids | Disposal to AOGCC-permitted Class I/II injection well. | |
| 019 | Test Fluids | Disposal to AOGCC-permitted Class I/II injection well. | |
| 021 | Filter Backwash | Disposal to AOGCC-permitted Class I/II injection well. Applicant has requested discharge under the reissued permit. | √ |

The following sections provide a description of the proposed action (Section 2.0), summarize the species status and life history for each ESA-listed species potentially present in or near the project area (Section 3.0), and assess the potential effects to listed species and critical habitats from the discharges (Section 4.0).

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# 2. PROPOSED ACTION

Consistent with 40 CFR §122.6(a)(1), the permittee submitted a timely and complete NPDES permit renewal application (AK-005330-9) for the Osprey Oil Platform in Cook Inlet, Alaska (Forest Oil, 2006a). This section describes the Osprey Platform activities, discusses the currently authorized and the proposed to be reauthorized NPDES discharges, and addresses additional discharge outfalls requested in the permit renewal application.

## 2.1 OSPREY PLATFORM

The Osprey Platform, shown in Figure 2-1, is a fixed drilling platform that has been constructed to support exploration and production drilling operations for the Redoubt Shoal Unit. In June 2000, the platform was placed onsite approximately 1.8 miles (2.9 kilometers [km]) southeast of the end of the West Foreland (latitude 60º41′46.3″ N, longitude 151º40′10.2″ W) (see Figure 2-2). The platform is located approximately 12 miles (19 km) northwest of Kenai, Alaska, and 70 miles (113 km) southwest of Anchorage, Alaska. The water depth at the platform is approximately 45 feet (ft) (referenced to mean lower low water). The platform is designed to withstand the oceanographic, meteorological, and seismic conditions of the area.

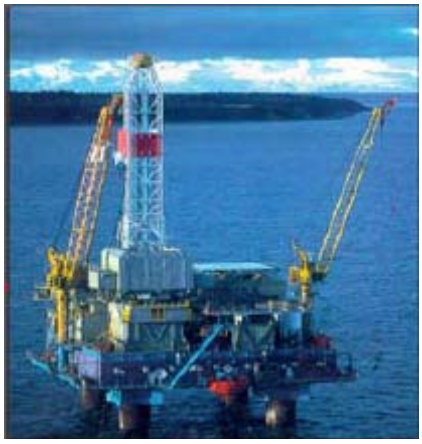

**Figure 2-1. Osprey Platform in Cook Inlet, Alaska.**
(Source: BC EMPR, 2004)

The fluid produced from the oil reservoir consists of crude oil, natural gas, and connate or "produced" water. Production fluids flow to the surface through tubing inserted within the cased borehole using electric submersible pumps. As production fluids are extracted, the natural pressure in the reservoir decreases and additional pressure must be added to the reservoir to continue production. The additional pressure is provided artificially to the reservoir using waterflooding, which is the injection of water into the reservoir to maintain formation pressure that would otherwise drop as the withdrawal of the formation fluids continues. The injected water at the Osprey Platform presently includes the following three discharges: deck drainage (Discharge No. 002), sanitary waste (Discharge No. 003), and domestic waste (Discharge No. 004). Desalination backwash (Discharge No. 005) and filter backwash (Discharge No. 021) are also occasionally injected.

As the produced fluids (natural gas, crude oil, and produced water) surface from the wells, the natural gas is separated from the liquids in a two-phase separator on the platform. The "wet" natural gas from the separator then passes through a glycol dehydrator to remove water. It is then used to support platform heating or shipped by pipeline to the onshore production facility. The liquids (crude oil and produced water) are pumped to the Wet Oil Surge Vessel and then pumped to the Kustatan Production Facility for oil-water separation. There is no storage capacity onboard the Osprey Platform for separated liquids. The produced water separated from the crude oil at the onshore production facility is pumped back to the Osprey Platform by pipeline for downhole injection to maintain formation pressures within the Redoubt Shoal Unit.

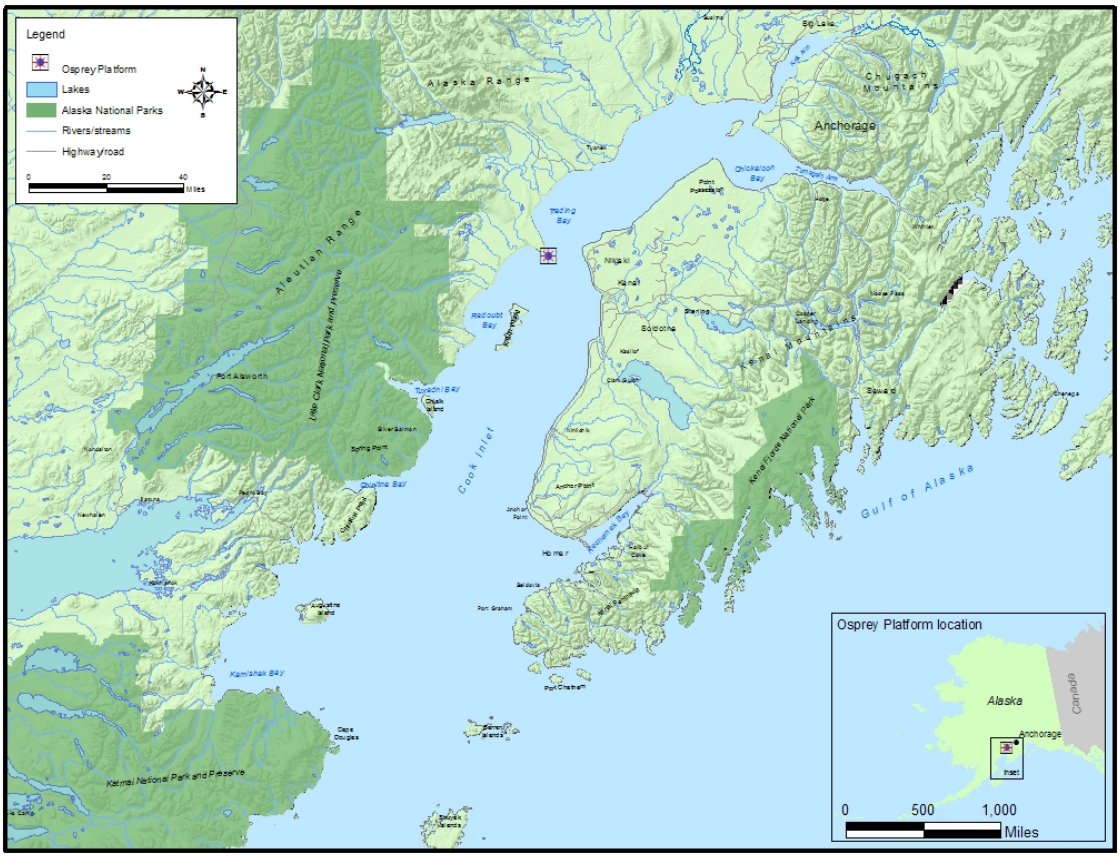


**Figure 2-2. Geographic Location of Osprey Platform in Cook Inlet, Alaska.**
(Sources: NPS, 2007; ESRI, 2006; ADNR and BLM, 2006)

## 2.2 HISTORY OF NPDES PERMITTING ACTIONS AT THE OSPREY PLATFORM

The Osprey Platform was converted from exploration to production status in late 2002. During the exploration phase of operations, water-based drilling muds and cuttings were discharged into Cook Inlet in accordance with the Cook Inlet Oil and Gas Exploration General NPDES Permit (AKG285024). When the platform was converted from exploration to production status, the platform became ineligible for coverage under the Cook Inlet Oil and Gas General Exploration Permit and was granted coverage under an individual NPDES "new source" permit (AK-005330-9). Before the permit expired on June 30, 2007, the permittee submitted an application for permit renewal. USEPA deemed the application complete on April 2, 2007, and provided an administrative extension until the permit is reissued. On August 27, 2007, ownership of the Osprey Platform changed from Forest Oil Corporation to PERL.

## 2.3 AUTHORIZED ACTIVITIES UNDER THE EXISTING NPDES PERMIT AND PROPOSED TO BE REAUTHORIZED BY USEPA UNDER THE PERMIT REISSUANCE

There are seven authorized discharges under the existing NPDES discharge permit (AK-005330-9). USEPA proposes to reauthorize these discharges under the reissued NPDES permit.

These discharges are:

- Discharge No. 002 Deck Drainage
- Discharge No. 003 Sanitary Waste
- Discharge No. 004 Domestic Waste
- Discharge No. 007 Boiler Blowdown
- Discharge No. 008 Fire Control Test Water
- Discharge No. 009 Non-Contact Cooling Water
- Discharge No. 012 Excess Cement Slurry

In addition, as part of the permit renewal application, certain discharges not currently included in the existing permit were requested to be added as permitted discharges under the reissued permit.

These discharges are:

- Discharge No. 005 Desalination Backwash
- Discharge No. 021 Filter Backwash

The proposed permit reissuance contains water quality-based and technology-based effluent limitations and monitoring requirements necessary to meet Alaska WQS and Federal water quality criteria, maintain the water quality of Cook Inlet, and prevent the degradation of the marine environment. Table 2-1 details the proposed effluent limitation and sampling requirements for the authorized and proposed to be authorized discharges.

### 2.3.1 Discharge with an Associated Mixing Zone – Sanitary Waste

Mixing zones are established by States in coastal or State waters to specify a limited portion of a water body in which otherwise applicable water quality criteria may be exceeded. Only ADEC can authorize mixing zones in Alaskan surface waters (18 AAC 70.055). Where mixing zones are established, water quality criteria for acute or chronic effects to aquatic life and human health can be exceeded as long as water quality criteria are met outside the mixing zone. Usually, mixing zones that allow exceedance of acute aquatic life criteria are smaller than mixing zones that allow exceedance of chronic aquatic life criteria.

In the fact sheet for the 2002 permit, USEPA determined that the discharge of sanitary wastes had the reasonable potential to cause or contribute to excursions above WQS for TRC and FC bacterial colony counts. Thus, USEPA established water quality-based effluent limits for these parameters in the 2002 permit. In December 2006, Parametrix evaluated mixing zones for the Osprey Platform Sanitary Waste (Discharge No. 003) discharge in support of the pending application for renewal of its NPDES permit (AK-005330-9). In that evaluation, Parametrix calculated mixing zones needed for the sanitary waste discharge to meet WQS for FC and TRC by using the CORMIX dilution model to evaluate a comprehensive range of ambient and effluent conditions.

Based upon this modeling, the applicant initially requested a mixing zone for chlorine in the sanitary waste discharge, which would have provided a chronic dilution factor of 1,800:1 and an acute dilution factor of 1,038:1. Because these dilution factors are larger than the dilution factor used to calculate effluent limits in the previous permit (500:1 for chlorine, with no mixing zone for FC), and because the applicable water quality criteria for chlorine have become less stringent

since the time the previous permit was issued, chlorine effluent limits based solely on the applicant's initial mixing zone request and the applicable water quality criteria would be considerably less stringent than those in the previous permit.

Section 402(o) of the CWA generally prohibits reissuing an NPDES permit with a less-stringent water quality-based effluent limit than the corresponding limit in the previous permit, though some exceptions are provided in Sections 402(o)(2) and 303(d)(4). The less stringent chlorine effluent limits that would have resulted from the dilution factors in the applicant's initial mixing zone request may not have complied with Section 402(o) of the CWA. Following discussions with USEPA and ADEC, the applicant requested a smaller mixing zone, providing a dilution factor of 133:1, which would allow the facility to discharge chlorine at the effluent limits in the previous permit and meet all applicable water quality criteria (both acute and chronic) at the edge of that mixing zone. Because these effluent limits are not less stringent than those in the previous permit, the effluent limits also comply with Section 402(o) of the CWA.

ADEC prepared a draft Certificate of Reasonable Assurance for NPDES Permit AK-005330-9 (ADEC, 2008a) authorizing a mixing zone for sanitary waste approximately 0.12 acres in size based upon a dilution factor of 133:1. Compliance with Alaska WQS must be achieved at the edge of the mixing zone for TRC and FC. However, under the authority provided in Section 402(a)(1) of the CWA, USEPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

Under most conditions, chlorine in the sanitary waste (Discharge No. 003) should meet Alaska WQS well before the diluted discharge reaches the edge of the mixing zone. Although deck drainage (Discharge No. 002) and domestic waste (Discharge No. 004) discharge through the same outfall as the sanitary waste discharge, the authorized mixing zone is for the sanitary waste discharge alone. The commingled discharges require less dilution to meet WQS and dilute faster in shorter distances than the sanitary waste discharge alone. Therefore, the approved mixing zone is representative of reasonable worst-case conditions and is protective for any combination of deck drainage, domestic waste, and sanitary waste.

**Table 2-1. Osprey Platform NPDES Permit Reissuance Proposed Effluent Limitations and Monitoring Requirements**

| Discharge | Discharge Description | Effluent Parameter | Units | Effluent Limitations | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|
| | | | | AML | MDL | Sample Frequency | Sample Type |
| 001 | Drilling Muds and Cuttings | No discharge | | | | | |
| 002 | Deck Drainage | Free oil[3] | Visual[1] | No discharge[1] | | Daily | Visual[1] |
| | | WET, chronic[4] | $TU_c$ | Report | Report | Annually | Grab |
| | | Flow | mgd | Report | Report | Monthly | Estimated |

**Table 2-1 (cont). Osprey Platform NPDES Permit Reissuance Proposed Effluent Limitations and Monitoring Requirements**

| Discharge | Discharge Description | Effluent Parameter | Units | Effluent Limitations | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|
| | | | | AML | MDL | Sample Frequency | Sample Type |
| 003 | Sanitary Wastes | BOD | mg/L | 30 | 60 | Monthly | Grab |
| | | | lbs/day | 0.9 | 1.8 | Monthly | Calculated |
| | | TSS | mg/L | 30 | 60 | Monthly | Grab |
| | | | lbs/day | 0.9 | 1.8 | Monthly | Calculated |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| | | Fecal Coliform (FC) Bacteria[3] | colonies/100 mL | 137 | 200 | Monthly | Grab |
| | | Enterococci[3] | Number per 100 mL | 35[2] | 276[5] | Monthly | Grab |
| | | Total Residual Chlorine (TRC)[3] | mg/L | 0.8 | 1.6 | Monthly | Grab |
| | | | lbs/day | 0.01 | 0.03 | Monthly | Calculated |
| 004 | Domestic Wastes | Floating solids, garbage, or foam | Visual | No discharge | | Daily | Visual |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| 005 | Desalination Unit Wastes | Salinity (intake and effluent) | PPT | Report | Report | Monthly | Grab |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| | | WET, chronic[4] | $TU_c$ | Report | Report | Quarterly | Grab |
| | | Temperature (intake and effluent) | ºC | Report | Report | Monthly | Grab |
| 006 | Blowout Preventer Fluid | No discharge | | | | | |
| 007 | Boiler Blowdown | Flow | mgd | Report | Report | Monthly | Estimated |
| | | Temperature | ºC | Report | Report | Monthly | Grab |
| 008 | Fire Control System Test Water | Flow | mgd | Report | Report | Monthly | Estimated |

**Table 2-1 (cont.). Osprey Platform NPDES Permit Reissuance Proposed Effluent Limitations and Monitoring Requirements**

| Discharge | Discharge Description | Effluent Parameter | Units | Effluent Limitations | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|
| | | | | AML | MDL | Sample Frequency | Sample Type |
| 009 | Non-contact Cooling Water | Flow | mgd | Report | Report | Monthly | Estimated |
| | | Temperature (intake and effluent) | ºC | Report | Report | Monthly | Grab |
| 010 | Uncontaminated Ballast Water | No discharge | | | | | |
| 011 | Bilge Water | No discharge | | | | | |
| 012 | Excess Cement Slurry | Free oil[3] | Visual[1] | No discharge[1] | | Daily when discharging | Visual[1] |
| | | Flow | mgd | Report | Report | Monthly | Estimated |
| 013 | Mud, Cuttings, Cement at Seafloor | No discharge | | | | | |
| 014 | Waterflooding Discharges | No discharge | | | | | |
| 015 | Produced Water and Solids | No discharge | | | | | |
| 016 | Completion Fluids | No discharge | | | | | |
| 017 | Workover Fluids | No discharge | | | | | |
| 018 | Well Treatment Fluids | No discharge | | | | | |
| 019 | Test Fluids | No discharge | | | | | |
| 021 | Filter Backwash | Flow | mgd | Report | Report | Monthly | Estimated |
| | | TRC[3] | µg/L | Report | 13 | Monthly | Grab |
| | | | lb/day | Report | 0.011 | Monthly | Calculated |
| | | TSS (intake and effluent) | mg/L | Report | Report | Monthly | Grab |
| | | Turbidity (intake and effluent) | NTU | Report | Report | Monthly | Grab |

**Table 2-1 (cont.). Osprey Platform NPDES Permit Reissuance Proposed Effluent Limitations and Monitoring Requirements**

| Discharge | Discharge Description | Effluent Parameter | Units | Effluent Limitations | | Monitoring Requirements | |
|---|---|---|---|---|---|---|---|
| | | | | AML | MDL | Sample Frequency | Sample Type |

Acronyms:

FC = Fecal Coliform
mg/L = milligrams per liter
TRC = Total Residual Chlorine
mgd = millions of gallons per day
NTU = turbidity units
TSS = Total Suspended Solids

Footnotes:

1. As determined by the presence of a film or sheen upon or a discoloration of the surface of the receiving water (visual sheen) using the static sheen test defined in appendix 1 to 40 CFR part 435, subpart A.
2. Average monthly enterococci results must be reported as the geometric mean of the samples. See Section VI for a definition of the geometric mean.
3. Reporting is required within 24 hours of a maximum daily limit violation (see I.B.14).
4. For a complete discussion of Whole Effluent Toxicity (WET) monitoring requirements and WET trigger limits, please refer to the draft NPDES permit and fact sheet.
5. Instantaneous maximum limit.

## 2.4 ACTIVITIES FOR WHICH DISCHARGES TO SURFACE WATER WOULD NOT OCCUR

The NPDES permit renewal application included additional activities for which no discharges are anticipated. None of these wastestreams will be discharged from the Osprey Platform; these discharges will not occur and will not be authorized under the reissued NPDES permit, USEPA assumed no environmental impacts to threatened or endangered species or critical habitat would occur. These discharges, therefore, are not analyzed further in the document.

The discharges to surface water that would not occur are the following.

- Drilling Muds and Cuttings (Discharge No. 001)
- Blowout Preventer Fluid (Discharge No. 006)
- Uncontaminated Ballast Water (Discharge No. 010)
- Bilge Water (Discharge No. 011)
- Muds, Cuttings, and Cement at the Seafloor (Discharge No. 013)
- Waterflooding Discharges (Discharge No. 014)
- Produced Water and Solids (Discharge No. 015)
- Completion Fluids (Discharge No. 016)
- Workover Fluids (Discharge No. 017)
- Well Treatment Fluids (Discharge No. 018)
- Test Fluids (Discharge No. 019)

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# 3. GEOGRAPHICAL AREA

As described in Section 2.1, the Osprey Platform is a fixed, four-column oil and gas production platform sitting in approximately 45 ft of water (referenced to mean lower low water). The platform is located 1.8 miles (2.9 km) southeast of the tip of the West Foreland in central Cook Inlet, Alaska (latitude 60º 41′ 46.3″ N, longitude 151º 40′ 10.2″ W) (see Figure 2-2). The platform is approximately 12 miles (19 km) northwest of Kenai, Alaska, and 70 miles (115 km) southwest of Anchorage, Alaska. Thick sedimentary deposits underlie the Cook Inlet basin, exceeding 30,000 ft in places (USEPA, 2002).

Cook Inlet is a shallow tidal estuary approximately 220 miles (350 km) long and 30 miles (50 km) wide that flows into the Gulf of Alaska. Mountain ranges surround Cook Inlet, including the Alaska, Aleutian, Chugach, Kenai, and Talkeetna ranges. Upper Cook Inlet has a maritime climate that becomes a continental climate in the lower reaches of Cook Inlet. There are five active volcanoes along the mountain ranges bordering the west side of Cook Inlet (USEPA, 2006). The region is the major population center in Alaska and is the State's most agriculturally developed area (Minerals Management Service [MMS], 2003).

The inlet experiences extreme tidal fluctuations of up to 39 ft with strong currents. The upper Inlet receives high currents and large volumes of seasonally dependent freshwater inflows. These high tidal currents allow for a well-mixed water column; little vertical stratification is present except near the mouths of major rivers. Freshwater and suspended sediments are received from glacier-fed rivers such as the Suistna and Knik rivers. Cook Inlet waters tend to moderate the atmospheric temperatures in the area (USEPA, 2006).

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# 4. STATUS OF PROTECTED SPECIES AND CRITICAL HABITAT IN PROJECT AREA

The Osprey Platform is located in upper Cook Inlet, near the West Foreland area (see Figure 2-2). NMFS and USFWS identified several threatened, endangered, or candidate species for consideration in this Biological Evaluation (BE). This BE evaluates two major animal groups: birds and marine mammals.

For this evaluation, information on avian (bird) species was primarily obtained from the USFWS and Alaska Natural Heritage Program, and included recovery plans (as applicable) and species information. These data sources were found to be current and comprehensive for evaluating Cook Inlet bird species. For the marine mammal species, reviews were conducted using the most recent Alaska Marine Mammal Stock Assessment reports. The results of this review provided detailed and up-to-date information on the status, distribution and abundance, population trends, factors affecting survival, history, and current habitat concerns for the marine mammal stocks. USFWS and NMFS are required to prepare stock assessments for all marine mammal stocks under their jurisdiction, pursuant to the 1994 amendments to the Marine Mammal Protection Act (MMPA). These assessment reports use the best scientific information available and are reviewed and updated annually (16 U.S.C. §1361 et seq.).

This section provides information for those species that may be present in the project area, including stock assessments and descriptions of critical habitat, as appropriate.

## 4.1 BIRDS

In a letter to USEPA on August 24, 2007, the USFWS reported two protected bird species may be found in the proposed action area of the offshore Osprey Platform (USFWS 2007a):

1. Steller's Eider (Polysticta stelleri)
2. Kittlitz's Murrelet (Brachyramphus brevirostris)

### 4.1.1 Steller's Eider (*Polysticta stelleri*) – Threatened Species

The Alaska breeding population of the Steller's eider was listed as threatened under ESA on June 11, 1997 (62 FR 31748-31757). The USFWS recognizes three breeding populations of Steller's eider, two in the Russian Arctic and one in the Alaskan Arctic. Steller's eiders from the Alaska breeding population and those from the Russian breeding populations are visually indistinguishable. The breeding populations in the Russian Artic are not part of the ESA listing in the United States and are not addressed in this evaluation.

The Steller's eider is the smallest of the eider species, with both sexes averaging about 1.8 pounds (lb) at adult maturity. The Steller's eider has a unique, colorful plumage pattern. When in breeding plumage (early winter to midsummer), adult males assume a black back, white shoulders and sides, chestnut to black breast, and a white head with black eye patches and a green tuft. Males assume a non-breeding plumage (late summer and fall) of dark brown except for a white-bordered bluish patch on the wing. Females and juveniles are mottled dark brown year-round (USFWS, 2002). Adults of both sexes have a blue patch with a white border on their

upper wings, similar to mallards (USFWS, 2006). Juveniles and subadults lack (or show less distinctly) these wing markings (USFWS, 2002).

### Range and Population Level

The USFWS (2002) reports that information on Steller's eiders prior to 1970 is largely anecdotal. The breeding range may have extended intermittently from the eastern Aleutian Islands to the western and northern Alaska coasts, and possibly as far east as the Canadian border (66 FR 8850-8884). In western Alaska, pre-1970 data suggests that the birds formerly nested on the Yukon-Kuskokwim River Delta and occasionally at other western Alaska sites, such as the Seward Peninsula, St. Lawrence Island, eastern Aleutian Islands, and Alaska Peninsula.

The Steller's eider occurs infrequently in Alaska and at such low densities during the breeding season that accurate quantification of the population is impossible (66 FR 8850-8884). Historical and recent records indicate that breeding has occurred in two general areas: the Arctic Coastal Plain on the Alaskan North Slope and on the Yukon-Kuskokwim River Delta in western Alaska (USFWS, 2001; 2006). The number of birds found on the North Slope breeding grounds is uncertain, with current estimates ranging from the hundreds to the low thousands. Population size on the Yukon-Kuskokwim Delta is also difficult to estimate. Currently, the birds are extremely scarce on the Yukon-Kuskokwim Delta and have not been found breeding elsewhere in western Alaska for several decades (USFWS, 2006). Only seven nests were found on the Yukon-Kuskokwim River Delta from 1994 to 2002 (USFWS, 2002).

Steller's eiders nest in the terrestrial environment but spend the majority of the year in shallow, near-shore marine waters. These birds tend to reside in areas with waters less than 30 ft deep and are usually found close to shore, except where shallows extend further offshore in bays and lagoons. Steller's eiders move to the marine waters of Southwest and Southcentral Alaska after breeding, where they mix with the more numerous Russian Pacific populations (USFWS, 2006). The birds are numerous on their molting and wintering grounds in Alaska, but these birds are likely from the Russia breeding population, which is not an ESA-protected population (66 FR 8850-8884). Adults experience a flightless autumn; during molting, they simultaneously replace their flight feathers and remain flightless for about 3 weeks. The birds primarily molt outside of the Osprey Platform area, with the largest numbers of birds molting along the north side of the Alaska Peninsula in Izembek Lagoon, Nelson Lagoon, Port Heiden, and Seal Islands. After molting, the birds disperse and venture to the coastal waters of the Aleutian Islands, the south side of the Alaska Peninsula, Kodiak Archipelago, and southern Cook Inlet (USFWS, 2006). About 4.2 percent of the Steller's eider population in or near the Cook Inlet area is assumed to be from ESA-listed Alaskan breeding population (MMS, 2003). Figure 4-1 illustrates the molting and wintering range of the Steller's eider. The Osprey Platform is located within the northern-most portion of their wintering range.

### Diet

Available literature on the diet of the Steller's eider suggests that they forage near shore, diving to consume a variety of marine organisms (marine worms such as polychaetes, sea dollars, and other echinoderms; small fish; shrimp-like crustaceans or amphipods; blue mussels; and macoma clams) (Fredrickson, 2001).

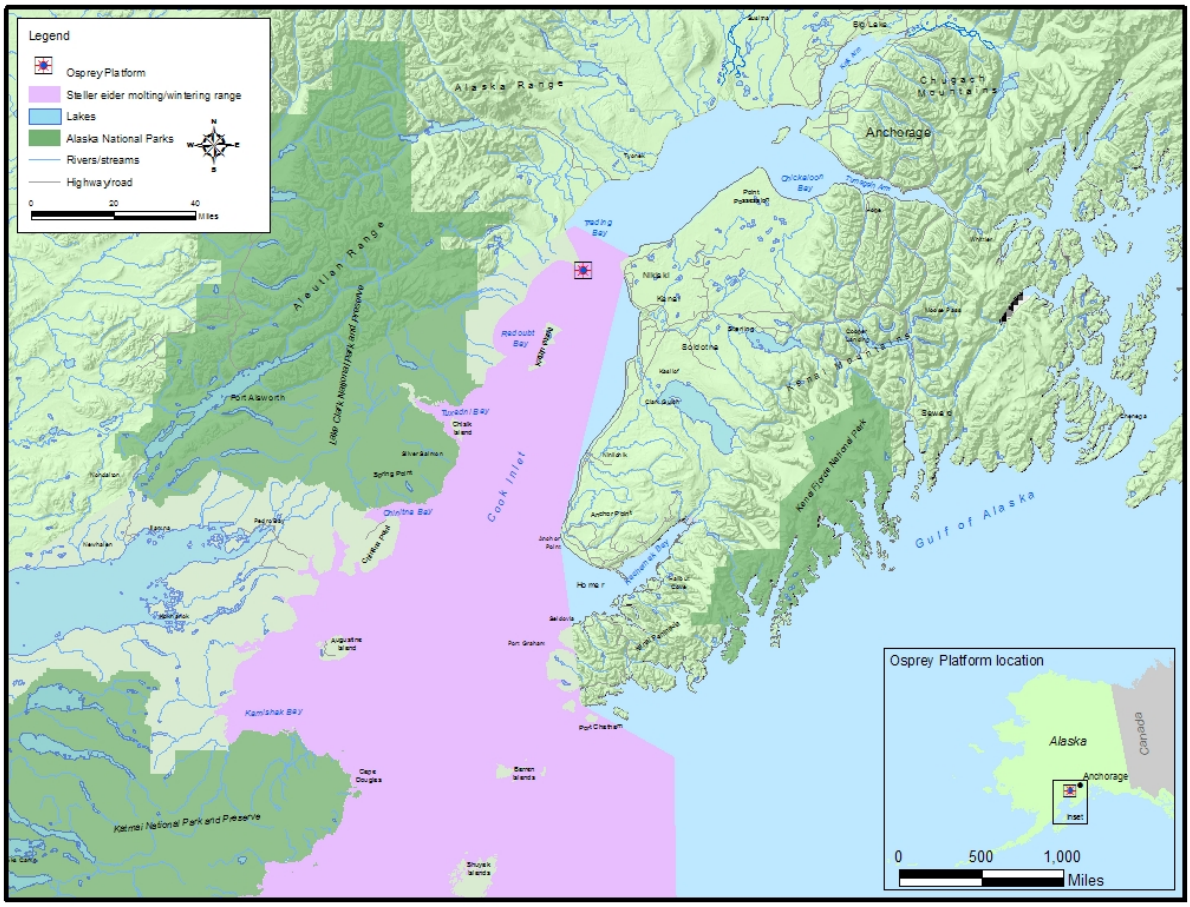


**Figure 4-1. Steller's Eider Molting and Wintering Range in Cook Inlet.**
(Source: NPS, 2007; ESRI, 2006; ADNR and BLM, 2006; USFWS; 2001)

## Critical Habitat

On January 12, 2001, the USFWS designated approximately 2,830 miles$^2$ (7,330 km$^2$) as critical habitat for the Steller's eider in Alaska. This critical habitat is segregated (or organized) into five units:

1 Kuskokwim Shoals in northern Kuskokwim Bay
2 Seal Islands
3. Nelson Lagoon (including portions of Port Moller and Herendeen Bay)
4. Izembek Lagoon on the north side of the Alaska Peninsula
5. Intertidal zone lands between the Askinuk Mountains and Nelson Island in the Yukon-Kuskokwim Delta

Approximately 65 percent of this area consists of Federal lands or waters, 25 percent consists of State waters, and the remaining 10 percent consists of Native lands (66 FR 8850-8884).

## Factors Affecting Survival

The precise causes of the decline for the Steller's eider populations in Alaska are uncertain. On the Yukon-Kuskokwim Delta, the USFWS (2006) has identified lead poisoning caused by

Steller's eiders ingesting spent lead shot as one possible contributing factor. In addition, breeding grounds may experience predation by ravens, large gulls, and foxes; the populations of these predators may be increasing because humans may be providing food and shelter. Oil spills and disturbances from marine shipping and commercial fishing may negatively affect the Steller's eider. Other possible threats include disease, marine contaminants, and ecosystem changes in the Bering Sea and North Pacific that may affect food availability (USFWS, 2006).

### 4.1.2 Kittlitz's Murrelet (*Brachyramphus brevirostris*) – Candidate Species

The Kittlitz's murrelet (*Brachyramphus brevirostris*) was designated a candidate species in 2004 (69 FR 24875). The Kittlitz's murrelet is a small diving seabird often associated with glaciers, The species entire North American population, and most of the world's population, inhabited Alaska coastal waters intermittently from Point Lay south to northern portions of Southwest Alaska. Similar in appearance to the marbled murrelet (*B. marmoratus*), the Kittlitz's murrelet is known for its cryptic plumage; however, the Kittlitz's murrelet has a heavier body mass, with a larger head and a short pointy dark-colored bill in comparison to the marbled murrelet (USFWS, 2007b).

The Kittlitz's murrelet has distinct breeding and winter plumages. Adults in breeding plumage exhibit predominantly dark gray feathers with irregular edges of light tan or gold on all areas except their wings and tail. During their winter plumage, the upper breast is a slate gray that forms a nearly complete dark gray band across the breast with back feathers narrowly edged in white. The head is gray above the eye and forms a narrow, dark gray crescent in front of their eyes. The remainder of the head is a clean white, as is the throat and remaining underparts. The most distinguishing characteristic to identify the marbled murrelet from the Kittlitz's murrelet is the presence of the Kittlitz's outer white tail feathers (Alaska Natural Heritage Program [AKNHP], 2005a). During nesting, Kittlitz's murrelets are non-vocal, whereas marbled murrelets frequently vocalize during nesting (USFWS, 2007b).

#### Range and Population Level

Kittlitz's murrelets are typically found in association with marine tidewater glaciers and glacial-influenced waters, near protected fjords or among islands. USFWS (2004) reports these birds nest highly clumped in:

- Remote mountainous areas with extensive ice sheets (Glacier Bay, outer coast of Wrangell-St. Elias National Park, including Yakutat Bay, Prince William Sound, Kenai Fjords National Park, and Kachemak Bay)
- Remnant high-elevation glaciers (Kodiak Island, Katmai National Park, Alaska Peninsula, a few Aleutian Islands)
- Recently deglaciated coastal mountains (Seward Peninsula, Cape Lisburne)

Detailed information on foraging home ranges is not known but is thought to be approximately a few square kilometers. All of the North American and a majority of the world population of Kittlitz's murrelets breed, molt, and winter in Alaska (USFWS, 2004). In summer, Kittlitz's murrelets generally are observed in large, sheltered waters such as Prince William Sound, Glacier Bay, and Cook Inlet and associated bays (MMS, 2003). The winter range of this species is not well known, but the birds are assumed to winter at sea and return to protected bays in

spring. In Alaska, Kittlitz's murrelets primarily occur in four regions: Southeast Alaska, Southcentral Alaska, the Aleutian Islands, and the Alaska Peninsula (USFWS, 2004). The Kittlitz's murrelet has been documented in lower Cook Inlet and found nesting on the southern end of the Kenai Peninsula and Kodiak Island (USFWS, 2007a).

In Alaska, the current population estimate for Kittlitz's murrelets is approximately 16,700 birds. This is a decline ranging from 74 to 84 percent in the past 10 to 20 years. Recent surveys support the negative population trend estimates (50 FR 69034). Additionally, USFWS (2004) reports a 13 percent decline of this species in lower Cook Inlet from 1984 to 2004.

Available information indicates the largest populations of Kittlitz's murrelets are in Southeast and Southcentral Alaska, although a relatively high percentage of nests have been located on the Seward Peninsula. Prince William Sound is believed to represent one of two population centers for the Kittlitz's murrelet; the northern Gulf of Alaska is where most of the world's population nests. In Cook Inlet, current summer population estimates are 3,330 to 5,000 birds; the winter population estimate is zero (MMS, 2003).

### Diet

Kittlitz's murrelets are typically found feeding on small fish and invertebrates in turbid glacial waters where glacial rivers carry high silt loads into the ocean (United States Geological Survey [USGS], 2008). When feeding off the face of a glacier, Kittlitz's murrelets pursue their prey by diving and capturing them underwater. During the breeding season, they often feed on high energy forage fishes such as Pacific caplin (*Mallotus villosus*), Pacific sand lance (*Ammodytes hexapterus*), Pacific herring (*Clupea pallasi*), and Walleye pollock (*Theragra chalcoramma*) (USFWS, 2007b).

### Critical Habitat

The Kittlitz's murrelet does not have any designated critical habitat in the United States.

### Factors Affecting Survival

The cause for the population decline of Kittlitz's murrelet is unknown. Major threats to Kittlitz's murrelets appear to be habitat-based, including impacts to forage fish quality and availability caused by glacial recession and anthropogenic stressors such as contamination from petroleum hydrocarbons. Other causes may include mortality from incidental bycatch in commercial fisheries, disturbances from recreational boating, and predation of eggs and chicks in nesting grounds (USFWS, 2004).

## 4.2 MARINE MAMMALS

In a letter to USEPA dated September 5, 2007, NMFS reported that four species of protected marine mammals may be found in Cook Inlet within the project area (NMFS 2007a):

1. Steller Sea Lion (*Eumetopias jubatus*), Western U.S. stock
2. Northern Sea Otter (*Enhydra lutris kenyoni*), Southwest Alaska population
3. Humpback Whale (*Megaptera novaeangliae*)
4. Beluga Whale (*Delphinapterus leucas*), Cook Inlet stock

### 4.2.1 Steller Sea Lion (*Eumetopias jubatus*), Western U.S. stock – Endangered Species

The Steller sea lion (*Eumetopias jubatus)* was listed as a threatened species on April 5, 1990, because of substantial declines in the western portion of its range (55 FR 12645). In 1997, populations were determined to consist of two distinct population segments: an eastern U.S. stock, which includes animals east of Cape Suckling, Alaska (144$^{o}$W); and a western U.S. stock, which includes animals at and west of Cape Suckling (62 FR 30772, 62 FR 24345). The western U.S. stock for Steller sea lions was reclassified as endangered in 1997 because of persistent decline (62 FR 24345). The eastern U.S. stock is not applicable to the project area and is not addressed in this evaluation.

#### Range and Population Level

Steller sea lions range from northern Japan to California along the North Pacific Rim. Within Alaska, Stellar sea lions are most abundant in the Gulf of Alaska and most distributed within the Aleutian Islands. The species is non-migratory, but individuals disperse and intermingle with animals from other areas outside of the breeding season (late May to early July) (Angliss and Outlaw, 2007). Steller sea lions inhabit marine and terrestrial areas. They breed, pup, and seek rest and refuge on relatively remote islands and points of land along the Alaskan coastline (62 FR 24345). Sites where sea lion adults congregate for pupping and breeding are referred to as rookeries. The western U.S. stock of Steller sea lion breeds on rookeries in Alaska from Prince William Sound (144°W) west through the Aleutian Islands and in Russia on the Kamchatka peninsula, Kuril Islands, and the Sea of Okhotsk (NMFS, 2007b).

Rookeries are usually located on beaches exposed to wind and waves on relatively remote islands, where access by humans and other predators is difficult. During times other than the breeding season, sea lion adults use haul-out areas. Non-breeding adults and subadults use haul-outs year-round and often occupy haul-outs adjacent to rookeries because they are unable to hold territories. During the non-breeding season, rookeries are often used as haul-outs. Even though juveniles and adult males disperse widely, exchange between rookeries by breeding adult females and males (other than between adjoining rookeries) appears low (Angliss and Outlaw, 2007). Figure 4-2 illustrates the major rookery and haul-out sites for Steller sea lions near Cook Inlet. No rookeries or haul-outs are located near the Osprey Platform or within Cook Inlet.

From 1956 to 1960, counts of Steller sea lions in Alaska indicated at least 140,000 sea lions resided in the Gulf of Alaska and Aleutian Islands. Population declines were observed from 1976 to 1998, but the rate of the declines has been slowing in recent years. The 2006 NMFS stock assessment report for the western stock of the Steller sea lion details the most recent, comprehensive estimate of abundance in Alaska as 44,800 sea lions. This estimate is based on aerial surveys of non-pups in June 2004 and on actual pup counts from all rookeries and major haul-out sites in June and July of 2004 and 2005. These counts have not been corrected to account for animals that were at sea during the surveys (Angliss and Outlaw, 2007).

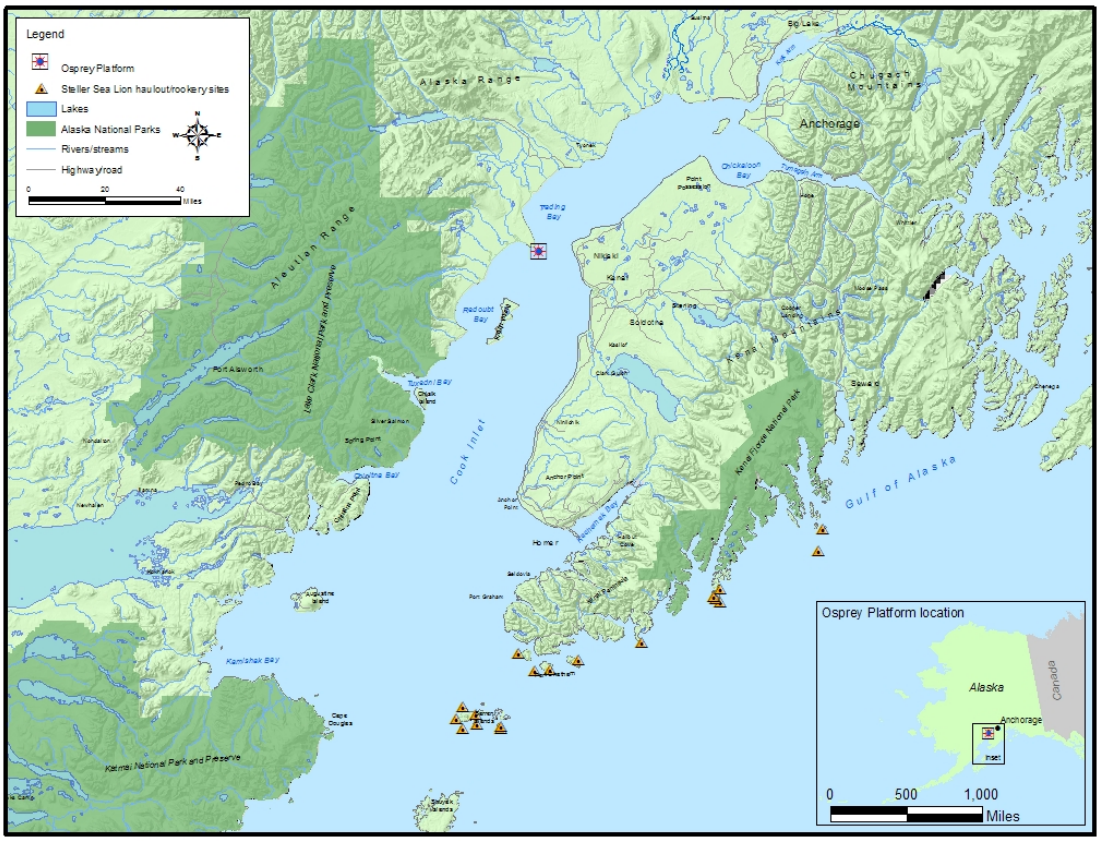


**Figure 4-2. Rookery and Haul-out Sites for Steller sea lions near Cook Inlet.**
(Sources: 50 CFR 226.202; NPS, 1995, 2007; ESRI, 2006; ADNR, 2006)

## Diet

The diet of the Steller sea lion consists mainly of fishes, cephalopods, and occasionally other marine mammals and sea birds. In Southeast Alaska, the most commonly identified prey items were Walleye pollock, Pacific cod, flatfishes, rockfishes, herring, salmon, sand lance, skates, squid, and octopus. Scat data[1] (food remnants) analyzed from rookeries and haul-outs suggest that pollock is a dominant prey species for sea lions in the Gulf of Alaska. Atka mackerel was the most frequently occurring prey in central and western Aleutian Islands scats. In the winter, Pacific cod has been an important prey source in the Gulf of Alaska, with salmon more frequently eaten in the summer months (NMFS, 2007b).

## Critical Habitat

Critical habitat for the Steller sea lion was designated on August 27, 1993 (58 FR 45269), based on the location of terrestrial rookery and haul-out sites, spatial extent of foraging trips, and prey availability. Adult males and females use rookeries for pupping, nursing, and mating during the mating season (late May to early July).

[1] Scat data, like stomach contents, may be biased as some prey species may have hard body parts that are more or less likely to make it though the digestive tract.

Designated critical habitat is located at Cape Douglas, the Barren Islands, and marine areas adjacent to the Southwestern Kenai Peninsula. Designations are also at the extreme southern end of Cook Inlet. Critical habitat for Steller sea lions includes:

- A terrestrial zone that extends 3,000 ft landward from the baseline or base point of each major rookery and major haul-out
- An air zone that extends 3,000 ft above the terrestrial zone, measured vertically from sea level
- An aquatic zone that extends 3,000 ft seaward in State and Federally-managed waters from the baseline or base point of each major haul-out in Alaska that is east of 144º W longitude
- An aquatic zone that extends approximately 121,400 ft seaward in State and Federally-managed waters from the baseline or base point of each major rookery and major haul-out in Alaska that is west of 144º W longitude

NMFS administers a complex plan of fishery management measures designed to minimize competition between commercial fishing activities and the endangered population of Steller sea lions in critical habitat areas (NMFS, 2007b).

#### Factors Affecting Survival

Over the past decade, research efforts have generated an extensive amount of information about the Steller sea lions and the North Pacific ecosystem. For the western U.S. Steller sea lion stock, population decline has been attributed to many factors, including commercial fishing of prey species, predation, and environmental change. However, this attribution is inconclusive about which single or combination of these factors is most important in causing the decline (Angliss and Outlaw, 2007). Known predators of Steller sea lions include sharks and killer whales (*Orcinus orca*). The most recent recovery plan for the species outlines several threats that are considered relatively minor, including subsistence harvesting, illegal shooting, entanglement in marine debris, disease, and disturbance from vessel traffic and scientific research (NMFS, 2007b).

There is no evidence that the availability of rookery or haul-out space is a limiting factor. As the number of sea lions continues to decline, some rookeries and haul-outs have been abandoned, providing an increase in the availability of suitable terrestrial habitat. Terrestrial habitat destruction and modification do not appear to have a significant role in this species' population decline. However, indications in the Steller sea lion population decline may be related to changes in the availability or quality of sea lion prey as a result of environmental changes or human activities (e.g., commercial fisheries) (62 FR 24345).

### 4.2.2 Northern Sea Otter (*Enhydra lutris kenyoni*), Southwest Alaska – Threatened Species

Sea otters (*Enhydra lutris*) generally occur in nearshore coastal waters along the North Pacific Rim from the Aleutian Islands to California (USFWS, 2002). Sea otters are the smallest marine mammal and are most closely related to river otters (USFWS, 2005). In Alaska, sea otters are not migratory and do not usually disperse over long distances, although movements of up to 328,000 ft (100 km) are normal. However, sea otter movements are likely limited by geographic

barriers, high energy requirements of the species, and their social behavior. Sea otters are most commonly observed within the 130 ft (40 m) depth contour as they require frequent access to foraging habitat in subtidal and intertidal zones (USFWS, 2002). Based on evidence indicating that sea otter numbers in this area are declining, USFWS designated the Southwest Alaska Distinct Population Segment of the Northern sea otter *(Enhydra lutris kenyoni)* as threatened on August 9, 2005 (70 FR 46366).

### Range and Population Level

Historically, sea otters were found across the North Pacific Rim, ranging from Japan to the Aleutian Islands, to the peninsular and Southcoastal Alaska, and as far south as California and Mexico. In the early 1700s, estimates for the worldwide population were between 150,000 and 300,000 individuals. The Northern sea otters remained abundant, even with subsistence hunting throughout their range until the mid-1700s. Extensive commercial harvesting of sea otters—to the point of near extinction—occurred over the next 150 years with the arrival of Russian explorers to Alaska in 1741. By 1900, commercial harvesting practically ceased as the sea otter populations were reduced to 13 remnant populations totaling a few hundred for each colony. Fewer than 2,000 sea otters remained by the time the International Fur Seal Treaty halted commercial hunting of sea otters in 1911. Population regrowth began following protection by the International Fur Seal Treaty; sea otters have since recolonized much of their historic range in Alaska (USFWS, 2002).

Today, there are three sea otter stocks in Alaska: Southeast, Southcentral, and Southwest. For this evaluation, the Southwest stock (which occupies waters of the Alaska Peninsula and Bristol Bay coasts, the Aleutian, Barren, Kodiak, and Pribilof Islands) is applicable to the project area (USFWS, 2002). The Southeast and Southcentral stocks are not addressed in this evaluation, as indicated in the September 5, 2007 letter from NMFS (2007a).

Otters are year-round residents within portions of Cook Inlet. Estimates indicate that there are 41,474 Northern sea otters for the Southwest Alaska Distinct Population Segment (USFWS, 2002). In comments on the Draft Environmental Impact Statement (EIS) for MMS lease sales within Cook Inlet, USFWS reported sea otter observation records show the area presence was minimal (MMS, 2003). The Osprey Platform is located within the same area that was covered for the proposed lease sale. USFWS also reported that the majority of sea otter sightings occurred southwest of Augustine Island in the southwestern portion of Cook Inlet (MMS, 2003). A recent precipitous decline in Northern sea otter populations in Southwest Alaska (from Kodiak Island to the western Aleutian Islands) has become a significant conservation issue. The reasons for the decline are unknown (USFWS, 2002).

### Diet

The Northern sea otter is a generalist predator, with more than 150 different prey species often dominated by benthic invertebrates. Sea urchins, crabs, and a variety of mollusks are principal prey. In the Aleutian Islands, fish are an important prey in areas with high population densities. Rocks or other hard objects are often used as tools to open exoskeletons of invertebrate prey. However, individual sea otters have varying diets and foraging behaviors (AKNHP, 2005b).

### Critical Habitat

The Southwest Alaska Distinct Population Segment of the Northern sea otter does not have any designated critical habitat.

### Factors Affecting Survival

Potential threats to sea otter populations include disease or predation and indirect effects resulting from human activities. In the Aleutian Islands, sea otter population studies suggest recent declines are the result of increased adult mortality. One other factor being researched as a leading potential cause of the population decline is the effect of predation by transient killer whales (USFWS, 2005). Other studies of sea otters in the Aleutian Islands suggest that disease, starvation, and contaminants may also be threats (USFWS, 2002). In areas with greater human activities, sea otter survival is potentially threatened by exposure to persistent and bioaccumulative contaminants (including polychlorinated biphenyls [PCBs], polyaromatic hydrocarbons [PAHs], and dioxins), fishing equipment (e.g., set nets or gill nets), seafood processing plant wastes, and competition from commercial fishing activities (USFWS, 2005).

## 4.2.3 Humpback Whale (*Megaptera novaeangliae*) – Endangered Species

The humpback whale (*Megaptera novaeangliae*) was listed as an endangered species on December 2, 1970 (35 FR 18319) and was designated as depleted under the MMPA. Found worldwide, the humpback whale often resides in temperate and tropical waters in the Northern and Southern hemispheres during winter. In the North Pacific, however, the humpback whale does not occur in Arctic waters (Angliss and Outlaw, 2007). The humpback whale is the baleen whale most frequently observed close to shore along the southern Alaskan coast. When beginning to dive, animals often lift their tails (flukes) out of the water exposing individual patterns of black and white on the ventral side (ADF&G, 1994). The unique patterns on the humpback's tail flukes can be used to identify individuals within a population, making the humpback whale one of the most studied cetacean species. Humpback whale songs are considered an important general communication tool for the species (Richardson et al., 1995). Humpback whales in the North Pacific are seasonal migrants that feed on euphausiids and small schooling fishes in the coastal and inland waters of the western United States, Canada, and the Russian far east (Angliss and Outlaw, 2007).

### Range and Population Level

Generally, humpback whale distribution has been largely correlated to prey species and abundance (Angliss and Outlaw, 2007). Humpback whale summer feeding grounds extend from central California and Washington State through Southeast Alaska and the Aleutian Islands to the Bering Sea. In the Gulf of Alaska, areas of concentration include the Portlock and Albatross Banks and the eastern Aleutian Islands, Prince William Sound, and the inland waters of Southeast Alaska. Breeding and calving occur on the wintering grounds and most births occur between January and March (Angliss and Outlaw, 2007). Sightings of humpback whales in Cook Inlet are rare, although humpbacks are observed near the Barren Islands, south of Cook Inlet, in the summer months (ADF&G, 1994).

Humpback whales in the North Pacific are from three separate stocks that migrate between winter/spring calving and mating areas and summer/fall feeding grounds (ADF&G, 1994). The

three stocks of humpback whales, as recognized within the U.S. Exclusive Economic Zone (EEZ) of the North Pacific, are the eastern North Pacific (the California/Oregon/Washington – Mexico stock), the central North Pacific, and the western North Pacific (Angliss and Outlaw, 2007). When in Alaska, humpback whales tend to concentrate in several specific areas, primarily in Southeast Alaska, Prince William Sound, the area near Kodiak and the Barren Islands, the area between the Semidi and Shumagin Islands, the eastern Aleutian Islands, and the southern Bering Sea (ADF&G, 1994). Survey efforts using photographic identification suggest humpbacks that feed in the Gulf of Alaska region migrate to the Hawaiian Islands for the winter. For humpback whales that summer in the Kodiak region, uncertainty remains on what location(s) they typically migrate to in the winter to calve and to breed (MMS, 2003).

An estimated 15,000 humpback whales inhabited the north Pacific prior to commercial whaling. During the 20$^{th}$ century, humpbacks were subjected to severe harvest pressure from commercial whaling before being granted protection from whaling in 1966. Photograph surveys from 1991 to 1993, designed to estimate abundance throughout the entire North Pacific, were the largest and most complete during this period. These surveys calculated an abundance estimate of 394 individuals for the Western North Pacific humpback whale stock. However, this population estimate is believed to be an underestimate of the population's true size (Angliss and Outlaw, 2007). More recent studies, including those following the Exxon Valdez oil spill, indicate that more than 500 humpbacks may be found in Southeast Alaska in the summer months, with more than 100 within Prince William Sound (ADF&G, 1994). No reliable estimates are available for the abundance of humpbacks at feeding grounds for this stock because some feeding grounds are unknown, and known feeding grounds have not been comprehensively surveyed (Angliss and Outlaw, 2007).

### Diet

Humpback whales feed largely on swarms of euphausiids (krill) and small schooling fish (e.g., herring, capelin, and sand lance) (Angliss and Outlaw, 200). Humpback whales use a variety of feeding behaviors to catch their prey, including bubble columns (underwater exhalation of columns of bubbles that concentrate prey in one area), formation feeding, prey herding, and lunge feeding. As a baleen whale species, the humpback whale has ventral grooves to allow its throat to widely expand and take in large volumes of water, which are then forced out across baleen plates acting as a filter to retain the food (NMFS, 2005).

### Critical Habitat

No critical habitat in Alaska has been designated for the humpback whale.

### Factors Affecting Survival

Quantitative abundance trends for the Western North Pacific humpback whales are unavailable. Humpback whale populations were depleted throughout their range by commercial whaling from the 1800s to 1966. No other factors are known to have contributed to their decline. Subsistence hunting for humpbacks in Alaska has not been reported. No commercial fishery-related mortalities have been observed during 1990 to 1997 monitoring (Angliss and Outlaw, 2007). No habitat concerns have been identified for the Western North Pacific humpback whale stock (NMFS, 1991); however, Angliss and Outlaw (2007) noted that underwater noise from sonar and shipping is a potential concern.

### 4.2.4 Beluga Whale (*Delphinapterus leucas*), Cook Inlet stock – Endangered Species

In Alaskan waters, there are five stocks of recognized beluga whales (*Delphinapterus leucas*): Cook Inlet, Bristol Bay, Eastern Bering Sea, Eastern Chukchi Sea, and Beaufort Sea. In 2000, NMFS designated the Cook Inlet stock of beluga whales as depleted under the MMPA, as amended (65 FR 34590). In 2008, NMFS issued a final determination listing a Distinct Population Segment of the beluga whale, found in Cook Inlet, Alaska, as endangered under the ESA, as amended (73 FR 62919).

#### Range and Population Level

The beluga whale is often seasonally dispersed within ice-covered arctic and subarctic waters of the Northern Hemisphere. Belugas are social animals that travel, hunt, and interact together, often in close, dense groups (Hobbs et al., 2006). Cook Inlet beluga whales are a stock genetically and geographically isolated from the other four Alaska beluga whale populations. The majority of observed Cook Inlet beluga whales congregate, particularly from June to October, in the upper Cook Inlet in or near the Susitna Delta, Knik Arm, and Point Possession within shallow areas near river mouths. Belugas are occasionally observed in the central or southern portions of Cook Inlet during these warmer temperature months. Outside of the summer months, beluga whales in Cook Inlet are often more dispersed and sightings are fewer.

A 2006 review of this species, based on data from tagged belugas (14 tags from 2000 to 2003), concluded the whales are found predominately in the upper inlet between summer and late autumn and are dispersed to mid-inlet offshore waters during winter months (Hobbs et al., 2006). Figure 4-3 illustrates habitat usage for beluga whales within Cook Inlet. Belugas disperse throughout much of the upper inlet by the end of June, and dispersal of large groups of belugas is generally not observed until later in the summer. By mid to late October, the whales travel south from the upper inlet; however, belugas have been observed in the upper inlet well into November (Hobbs et al., 2005). There have been sightings of belugas in central Cook Inlet in winter (MMS, 2003).

The 2006 NMFS Marine Mammal Stock Assessment Report notes that the exact winter distribution of this stock of beluga whales is not well known; however, evidence has shown that much of the Cook Inlet stock of belugas inhabit Cook Inlet year-round (Angliss and Outlaw, 2007; Hobbs et al., 2005). Seasonal migrations in and out of Cook Inlet are not likely based on data from tagged whales and surveys within Cook Inlet and in the Gulf of Alaska. The only area outside of Cook Inlet with a known beluga population is Yakutat Bay (Hobbs et al., 2006).

Since 1993, NMFS has conducted annual, comprehensive, systematic aerial surveys of the Cook Inlet beluga whale population. Between 1994 and 1998, nearly 50 percent of the population was reduced (653 whales to 347 whales sighted), which correlated to increased Alaska Natives subsistence harvesting. Although subsistence harvests have been limited to one to two belugas per year since 1999, the expected 2 to 6 percent population growth has not occurred (NMFS, 2007c; Hobbs et al., 2006). The 2006 aerial survey recorded only 302 whales (Angliss and Outlaw, 2007). The 2008 surveys found the abundance unchanged from 2007, with a total population of 375 whales recorded. NMFS determined that the annualized population growth of beluga whales between 1999 to 2008 was -1.45 percent. This number is significantly less than the expected growth of 2 to 4 percent annually for an un-harvested population (73 FR 62919).

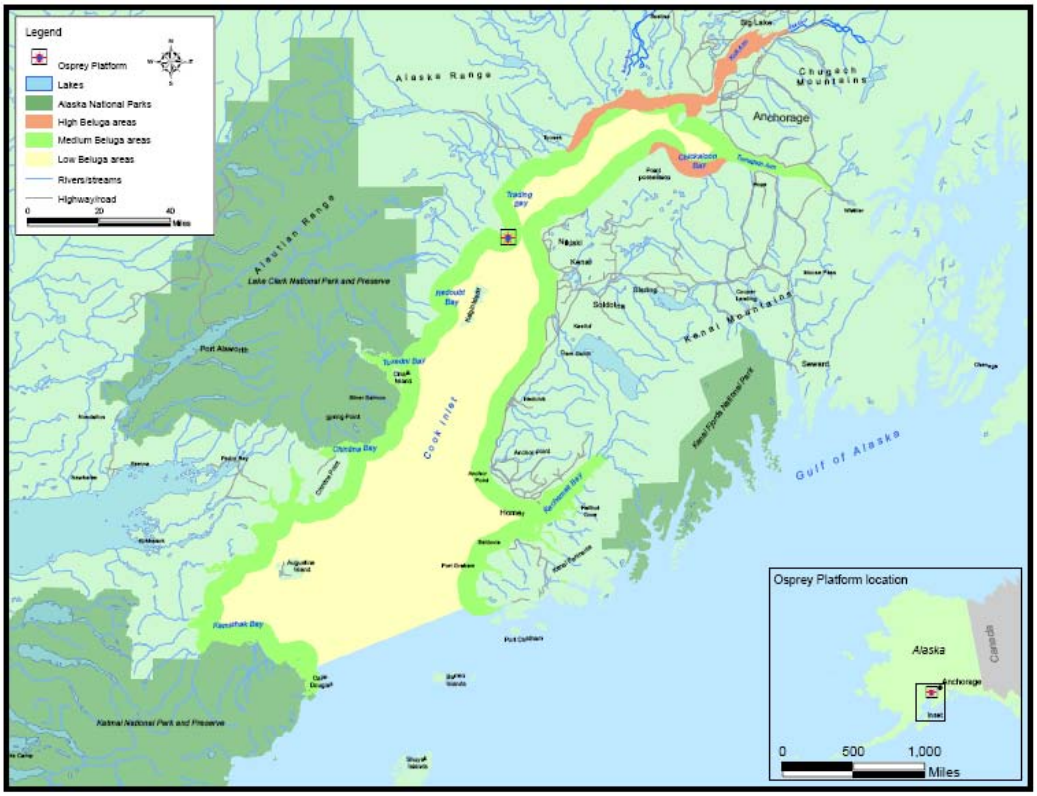


**Figure 4-3. Beluga whale habitat use within Cook Inlet (Hobbs et al., 2005).**

## Diet

Beluga whales feed on a variety of prey species following the patterns of seasonal abundance of the different types of forage. In the spring, preferred prey are eulachon (*Thaleichthys pacificus*), Saffron cod (*Eleginus gracilis*), and Pacific cod (*Gadus macrocephalus*). From late spring and through the summer, belugas prey on eulachon and Pacific salmon (*Oncorhynchus* spp.). In the fall, as these anadromous fish runs begin to decline, beluga whales return to consuming their spring season cod species in addition to bottom-dwelling prey such as Pacific staghorn sculpin (*Leptocottus armatus*), starry flounder (*Platichthys stellatus*), and yellowfin sole (*Limanda aspera*). The precise type of prey belugas consume in the winter months (November through March) is unknown. Researchers believe that belugas feed in deeper waters in the winter on prey species such as flatfish, cod, sculpin, and Pollock (Hobbs et al., 2006).

## Critical Habitat

The Cook Inlet beluga whale stock does not have any designated critical habitat.

## Factors Affecting Survival

The decline of Cook Inlet beluga whales has been generally attributed to subsistence harvest by Alaska Natives. In the 1980s, Cook Inlet beluga whales were primarily hunted by a small group of Alaska Natives from Tyonek (of Dena'ina Athabascan descent) and by hunters living in or visiting the area from northern and western Alaska tribes and villages (of Inupiat and Yup'ik Eskimo descent). Although an exact number does not exist, the number of Eskimo hunters (or non-area hunters) in the 1980s and 1990s was greater than that of Cook Inlet tribal hunters

(NMFS, 2007c). During 1995 to 1998, annual subsistence takes averaged 77 beluga whales, with the harvest as high as 20 percent of the population in 1996 (73 FR 62919). With the decline of the Cook Inlet beluga whale stock, in 1999 NMFS placed a moratorium on beluga harvest in Cook Inlet until the Service developed a cooperative plan for harvest management with the local Alaska Native organizations. No subsistence takes occurred in 1999 and 2000 (Angliss and Outlaw, 2007; NMFS, 2007c).

A harvest management plan developed between the Alaska Native organizations and NMFS (interim plan through 2004) allowed for a total take[2]—from 2001 to 2004—of six whales. A subsequent ruling in 2005 for a long-term harvest management plan resulted in a proposed total subsistence take (harvest) allowance of one take for 2006, two takes for 2007, one take for 2008, and two takes for 2009. This harvest management strategy was proposed and adopted by motion by Cook Inlet Treaty Tribes, Native Village of Tyonek, and Native hunters (NOAA, 2004). Harvests in the following 5-year periods will depend on the average abundance in the previous 5-year period and the observed population growth rate. No subsistence harvesting would be allowed if the average population size dropped below 350 whales (Angliss and Outlaw, 2007).

Because of the limited range of the Cook Inlet beluga whale population, this stock is assumed sensitive to human-induced or natural disturbances. Contaminants, underwater noise, onshore or offshore development, and construction are potential impacts for the recovery of the Cook Inlet beluga stock or their habitat (Angliss and Outlaw, 2007). The killer whale is the only natural predator of the beluga whale. Killer whales are common visitors to Cook Inlet and have been known to pursue belugas in the inlet (NMFS, 2007c). Killer whales are believed to take at least one Cook Inlet beluga whale annually (73 FR 62919). No mortalities or injuries have been observed or reported for fishery-related activities such as trawling or drift gillnets in Cook Inlet (Angliss and Outlaw, 2007).

Individual and groups of Cook Inlet beluga whale strandings have been found along mudflats in upper Cook Inlet. The cause of these strandings is unknown but may be attributed to extreme tidal fluctuations, predator avoidance, or pursuit of prey. NMFS records report more than 200 Cook Inlet beluga whale stranding events, with most events resulting in animal mortality (73 FR 62919).

[2] The term "take" is defined under ESA to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 U.S.C. §1532 (19)). The term "harass" is defined as "an intentional or negligent act that creates the likelihood of injuring wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns such as breeding, feeding, or sheltering" (50 CFR § 17.3). "Harm" is defined by USFWS to include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, and sheltering (50 CFR 17.3). NMFS' definition of "harm" includes significant habitat modification or degradation where it actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, spawning, migrating, rearing, and sheltering (64 FR 60727).

# 5. EFFECTS ON LISTED SPECIES

This section explains the potential effects on listed species resulting from reissuing the NPDES permit, including authorization to discharge the two additional requested wastestreams (desalination backwash and filter backwash) and for oil and gas production on the Osprey Platform in Cook Inlet, Alaska. For this proposed action, no direct effects or consequences to listed species exist; reissuance of the NPDES permit will not alter the environmental baseline or directly affect ESA-listed species. However, indirect effects may result with the reissuance of the permit.

All potential direct, indirect, and cumulative impacts were evaluated for wastewater discharges to be authorized under the permit reissuance on listed species or their critical habitats. The following analysis assumes that the species of concern are exposed to the maximum discharge conditions allowed by the NPDES permit. Violations of permit conditions and corresponding potential effects are not evaluated.

For each species, there are three possible determinations of effects, as defined by ESA:

- **No Effect** – determination that the proposed action will not affect (positively or negatively) listed species or critical habitat.
- **May affect, not likely to adversely affect** – determination of effects on listed species that are expected to be insignificant, discountable, or entirely beneficial. *Insignificant effects* relate to the size of the impact and should never reach the scale where a "take" would occur. *Discountable effects* are those that are extremely unlikely to occur. Based on best judgment, one would not (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur. *Beneficial effects* are contemporaneous positive effects with no adverse effects to listed species or critical habitat.
- **May affect, likely to adversely affect** – determination of measurable or significant effect to listed species as a direct or indirect result of the proposed action or interrelated or interdependent actions. Such a determination requires formal Section 7 ESA consultation.

For critical habitat, two possible determinations are:

- **Not Likely to Destroy or Adversely Modify** – determination that effects on critical habitat are expected to be insignificant, discountable, or entirely beneficial.
- **Likely to Destroy or Adversely Modify** – determination of measurable or significant effects to critical habitat as a direct or indirect result of the proposed action or interrelated or interdependent actions.

In addition, ESA states that any action that is reasonably certain to result in a "take" is likely to adversely affect an ESA-protected species.

## 5.1 DESCRIPTION OF DISCHARGES AND DETERMINATIONS

The NPDES permit reissuance for the Osprey Platform would authorize the activities and discharges described in Section 2.3. The permit establishes water quality-based limitations and monitoring requirements necessary to ensure that the authorized discharges comply with the Alaska WQS.

The *Draft Environmental Assessment (EA) for the NPDES Permit Reissuance for the Osprey Platform, Cook Inlet, Alaska* (USEPA, in progress) analyzes the authorized discharges under the reissued permit, including the two new wastestreams requested in the permit renewal application. The *EA for the Redoubt Shoal Unit Development project* (USEPA, 2002); the *EA for the Reissuance of the NPDES General Permit for Oil and Gas Exploration, Development and Production Facilities Located in State and Federal Waters in Cook Inlet, Alaska* (USEPA, 2006); and the *Final Environmental Impact Statement for the Cook Inlet Planning Area Oil and Gas Lease Sales 191 and 199* (MMS, 2003) provide additional details on the project area and related activities such as boat traffic and potential oil spills. The most recent NMFS stock assessment reports also were reviewed. These documents were used extensively in assessing potential effects on threatened, endangered, and proposed species found in or adjacent to the project area.

The potential effects of the currently authorized wastewater discharges (i.e., deck drainage, sanitary waste, domestic waste, boiler blowdown, fire control test water, non-contact cooling water, and excess cement slurry) and the additional requested discharges on threatened, endangered, and proposed species are discussed below. Other factors, such as noise and other disturbances associated with oil and gas production activities and the potential for oil spills, are included in this evaluation. Each subsection includes a description of the wastestream, followed by an assessment and determination of the effects of the wastestreams on listed species. The effects determination summary is grouped by species into avian and marine mammals (cetaceans, pinnipeds, and carnivores).

### 5.1.1 Authorized Activities under the Existing NPDES Permit and Proposed to be Reauthorized by USEPA under the Permit Reissuance

The NPDES permit reissuance would authorize all previously permitted wastewater discharges (deck drainage, sanitary waste, domestic waste, boiler blowdown, fire control test water, non-contact cooling water, and excess cement slurry) as well as two new additional discharges (desalination backwash and filter backwash).

***Effects Determination for Listed Species and Designated Critical Habitat***

#### Birds

The Osprey Platform will discharge the previously authorized and additional proposed wastewater discharges on site, outside of any critical habitat for Steller's eiders or near preferred habitat for Kittlitz's murrelets. Kittlitz's murrelets are typically found in marine tidewater glaciers and glacial-influenced waters, near protected fjords, or among islands. No concentrations of Steller's eiders or Kittlitz's murrelets are expected in the project area. Steller's eiders are only occasional winter visitors around the western side of Cook Inlet. Although the Kittlitz's murrelet has been documented in lower Cook Inlet, this species is seldom observed in

the area near Osprey Platform (USFWS, 2007a). The birds most likely winter at sea and return to protected bays (including Cook Inlet) in spring. During the winter months when Steller's eiders may occasionally be in the area and exposed to the Osprey Platform discharges, the amount of discharge from the Osprey Platform should be minimal and no displacement of, or direct impacts to, eiders is expected. Based on the above analysis, and the geographic distribution of these species, the discharge of these wastewaters is **not likely to adversely affect** Steller's eiders or Kittlitz's murrelets.

#### Marine Mammals

Although Steller sea lions and Northern sea otters can occur in the project area, it is unlikely that the proposed permitted discharges would disturb these species. The proposed permitted wastewater discharges from the Osprey Platform will be discharged outside of designated Steller sea lion critical habitat and should not impact Steller sea lion marine habitat in the West Foreland area (see Figure 4-2). Some individual Northern sea otters may occur near the Osprey Platform and could potentially be exposed to these wastewater discharges. Discharges will be diluted by the strong tidal flux of Cook Inlet.

Humpback whales could occur within the project area covered by the reissued permit. However, humpbacks are highly mobile; they are not expected to spend substantial amounts of time within the discharge location. Wastewater discharges would not likely influence marine habitat for humpback whales in Cook Inlet. In the event that individual humpbacks may migrate into Cook Inlet waters, it is unlikely that these wastewater discharges would disturb them.

Impacts on beluga whales associated with production activities at the Osprey Platform will be limited to increased exposure to these wastewater discharges. Discharges will be diluted by the strong tidal flux of Cook Inlet. Wastewater will be discharged from the Osprey Platform outside areas in Cook Inlet where large concentrations of belugas are present during the summer months (65 FR 34590). While the West Foreland area is located in an area of habitat usage for beluga whales (see Figure 4-3), the West Foreland area is not heavily used by beluga whales (USEPA, 2006; Hobbs et al., 2005). It is unlikely that these discharges would affect beluga whales or their marine habitat.

The discharge of these wastewater discharges is **not likely to adversely affect** Steller sea lions, Northern sea otters, humpback whales, and beluga whales.

### 5.1.2 Discharge with an Associated Mixing Zone – Sanitary Waste

As described in Section 2.3.1, mixing zones are established by States in coastal (or State) waters to specify a limited portion of a water body in which otherwise applicable water quality criteria may be exceeded. Alaska's WQS require that when mixing zones are authorized, the mixing zones should be as small as practicable. Within the mixing zone, numeric criteria for chronic aquatic life and human-health protection may be exceeded; however, the numeric criteria must be met at the mixing zone boundary. Alaska's WQS (18 AAC 70.255) also mandate that no lethality to organisms passing through mixing zones. In addition, acute aquatic life criteria must be met at the boundary of a smaller zone of initial dilution established within the mixing zone.

According to the Alaska WQS, ADEC cannot authorize mixing zones if the pollutants could bioaccumulate, persist in concentrations above natural levels in the environment, or can be expected to cause a carcinogenic or other human health risk. Potential exposure pathways are considered by ADEC when determining whether to authorize a mixing zone. ADEC determined that the discharges authorized by the previous permit were not likely to persist in the environment. Therefore, in the previous permit, ADEC authorized mixing zones for deck drainage (Discharge No. 002) which allowed for water quality criteria for chronic toxicity unit to be exceeded within the mixing zone; and for sanitary wastes (Discharge No. 003) which allowed for water quality criteria for total residual chlorine to be exceeded within the mixing zone.

ADEC prepared a draft Certificate of Reasonable Assurance for NPDES Permit AK-005330-9 (ADEC, 2008a) authorizing a mixing zone for sanitary waste approximately 0.12 acres in size based upon a dilution factor of 133:1. Compliance with Alaska WQS must be achieved at the edge of the mixing zone for TRC and FC. However, under the authority provided in Section 402(a)(1) of the CWA, USEPA has established a technology-based effluent limit for FC, which is more stringent than the water quality-based effluent limits that would result from the use of the authorized mixing zone. Therefore, water quality criteria for FC bacteria will be achieved well within the boundaries of the authorized mixing zone.

Several factors are considered in determining the size of a mixing zone to meet WQS. The size of the mixing zone depends on the concentration of the parameter in the discharge water, how the water is discharged to receiving waters, and the characteristics of the receiving water. The permittee used the CORMIX dispersion model to calculate the dilution that the effluent plume receives and determined the distance from the point of discharge for which WQS must be met (Forest Oil, 2006b; Parametrix, 2008).

Dispersion in the receiving waters would decrease the concentration of the pollutants associated with the sanitary waste discharge. Treated freshwater (actually seawater that has been desalinated for use on the Osprey Platform's water supply and then discharged as sanitary waste) is the principal component needing disposal. The sanitary waste discharge would be subject to the effluent limitations and monitoring requirements of the permit reissuance. As presently discharged to Cook Inlet from the Osprey Platform and under the permit reissuance, the effects of the discharges on the environment and listed species are insignificant. This assessment is based on the facts that ESA-listed species evaluated in this document are mobile organisms with extended geographic ranges covering areas outside the project area. These species are unlikely to spend extended periods within the mixing zone boundaries.

### *Effects Determination for Listed Species and Designated Critical Habitat*

#### Birds

Based on its geographic distribution, the Steller's eider may potentially occur within the project area. Potential impacts may result from impacts to the distribution and abundance of prey species. The Osprey Platform is located in the northern portions of the mapped wintering range for this species (see Figure 4-1). Steller's eiders prefer nearshore, shallow foraging habitat and would not be expected to occupy areas within the proposed designated mixing zone. Similarly, Kittlitz's murrelets are unlikely to be found near the Osprey Platform or its proposed mixing zone as this species is most often found in marine tidewater glaciers and glacial-influenced

waters, near protected fjords, or among islands. These birds nest in highly clumped groups in remote mountainous areas with extensive ice sheets. Kittlitz's murrelets are not expected to occur within the project area considering their geographic distribution. Exposure of Steller's eiders or Kittlitz's murrelets to (or consumption of prey species exposed to) discharge waters that exceed WQS is unlikely. The discharge of sanitary waste, and potential exposure to TRC concentrations exceeding WQS in the authorized mixing zone, is **not likely to adversely affect** Steller's eiders or Kittlitz's murrelets.

#### Marine Mammals

Anticipated impacts to marine mammals resulting from exposure to sanitary waste constituents in the proposed mixing zone (for TRC and FC) are expected to be limited because of the small size of the mixing zone and the rapid dilution of these discharges by the strong tidal flux of Cook Inlet. Some individual Northern sea otters and Steller sea lions may occur near the Osprey Platform and could be exposed to pollutant concentrations that exceed Alaska WQS (i.e., within the proposed mixing zone). The small size of the proposed mixing zone associated with the sanitary waste discharge would result in low probabilities of exposure. The sanitary waste discharge from the Osprey Platform is outside of designated Steller sea lion critical habitat and should not affect Steller sea lion marine habitat in the West Foreland area (see Figure 4-2). Outside the proposed mixing zone, exposure to discharge pollutant concentrations are less than Alaska WQS, which are assumed to provide adequate protection for sea lions and sea otters.

Humpback and beluga whales could occur within the project area covered by the permit reissuance. However, humpbacks are highly mobile and are not expected to spend substantial amounts of time within the small area encompassed by the proposed mixing zones. Likewise, the discharges occur outside areas in Cook Inlet where large concentrations of belugas are present during the summer (65 FR 34590). While the West Foreland area is located in an area of habitat usage for beluga whales in late autumn and winter months (see Figure 4-3) (USEPA, 2006; Hobbs et al, 2005), it is unlikely that these discharges would affect beluga whales or their marine habitat as the West Foreland area is not heavily used by beluga whales (USEPA, 2006). Outside the proposed mixing zone, previous studies indicate that exposure to discharge pollutant concentrations equal to Alaska WQS are not likely to result in adverse affects (MMS, 2003), indicating that these standards provide adequate protection for humpback and beluga whales.

The discharge of sanitary waste, and potential exposure to TRC concentrations exceeding WQS in the authorized mixing zone, is **not likely to adversely affect** Steller sea lions, Northern sea otters, humpback whales, or beluga whales.

### 5.1.3 Noise, Disturbance, and other Impacts

Noise and other disturbances to the environment would occur during oil and gas production activities. Noise would be generated through boat and ship transit, helicopters, general machinery use, drilling, and other human activity. These sounds would be propagated into an environment that experiences noise and activity from other ongoing activities. Cook Inlet contains numerous sources of human-caused sound from fishing and tour boats, tankers, barges, airplanes and helicopters, human settlements, and marine development (such as harbor construction).

Whether carried through the air or under water, noise may cause some species to alter their feeding routines, movement, and reproductive cycles. The impact of anthropogenic sound on marine mammal behavior may alter navigation capabilities, communication, and hearing. The long-term effects of oil- and gas-related noise on marine mammals are unknown (MMS, 2003).

***Effects Determination for Listed Species and Designated Critical Habitat***

## Birds

Birds in the area could be affected by low-flying aircraft, boat traffic, and noise and movement associated with drilling and production activities. Groups of birds in the area experiencing repeated disturbances, such as Steller's eiders in the winter, could increase their movements or stress, potentially resulting in reduced over-winter survival due to extra expended energy. In addition, birds may abandon their foraging areas. It is possible that individual birds could be killed or injured from colliding into the Osprey Platform. The risk of this type of mortality or injury is likely to be highest during migration or poor weather conditions such as fog.

The Osprey Platform is located within the northern portion of the Steller's eiders' wintering range in Cook Inlet (see Figure 4-1). The Osprey Platform is located outside of any preferred habitat for Kittlitz's murrelets. Kittlitz's murrelets are typically found in association with marine tidewater glaciers and glacial-influenced waters, near protected fjords or among islands. No concentrations of Steller's eiders or Kittlitz's murrelets are expected in the project area. Steller's eiders are rare winter visitors around the western side of Cook Inlet. Although the Kittlitz's murrelet has been documented in lower Cook Inlet, this species is seldom observed in the area near Osprey Platform (USFWS, 2007a). The birds most likely winter at sea and return to protected bays (including Cook Inlet) in spring. Because of the localized and short-term nature of noise and other disturbances associated with oil and gas activities and the current level of ongoing human activity in Cook Inlet, these activities are **not likely to adversely affect** Steller's eiders or Kittlitz's murrelets.

## Marine Mammals

Sound exposure may affect multiple biological traits of a marine mammal. In recent years, impacts to marine mammals resulting from underwater anthropogenic noise has been extensively researched. Marine mammals may experience a "physiological effect" in which the "normal" physiological function of the mammal is altered in response to sound exposure. Depending on the intensity and duration of the noise, a physiological effect may range from the most significant of impacts (e.g., serious injury, mortality) to lesser impacts (i.e., non-injurious distortion of auditory tissues). A "behavioral effect" is one in which the "normal" behavior of a marine mammal, or patterns of behavior, are overtly disrupted in response to underwater noise exposure(National Research Council, 2005).

The severity of a physiological effect generally diminishes with decreasing exposure and/or increasing distance from the sound source. The same generalization does not consistently hold for behavioral effects because they do not depend solely on received sound levels. Behavioral responses also depend on an mammal's learned responses, innate response tendencies, motivational state, the pattern of the sound exposure, and the context in which sounds are presented. However, it is assumed that the severity of behavioral effects also diminishes with decreasing sound exposure and/or increasing distance from the sound source (National Research Council, 2005). Figure 5-1 depicts the relationships between severity of effects, source distance, and sound exposure.

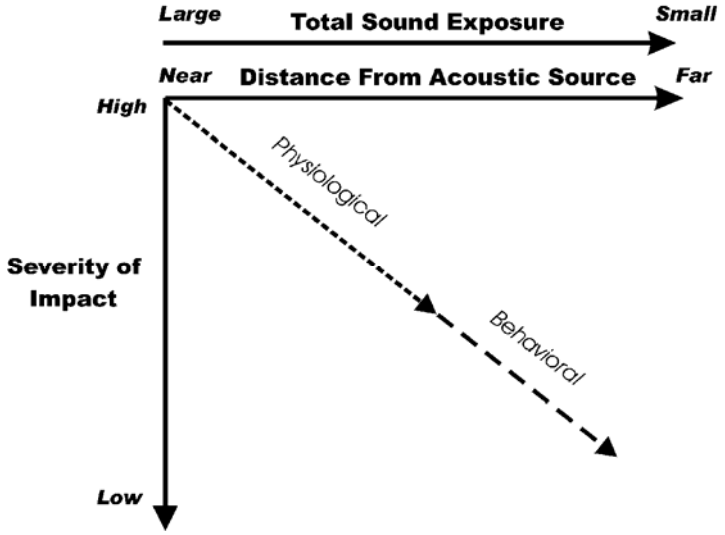


**Figure 5-1. Relationships between severity of effects, source distance, and exposure level**
(Adapted from: Department of Navy, 2001)

Beluga whales reportedly have a wide frequency range of hearing. Richardson et al. (1995) reported that beluga whales can hear from about 40 to 75 hertz (Hz) (poor sensitivity at these low frequencies) with some individuals hearing at 80 to 150 kilohertz (kHz). Alternatively, humpbacks are low frequency cetaceans hearing in the range of 12 Hz to 22 kHz. Humpback whales could occur within the project area covered by the reissued permit. Sightings of these larger whales in Cook Inlet and the Gulf of Alaska waters generally happen during the summer months. NMFS (2003) reported that at low frequencies, beluga whales' hearing is limited by their hearing threshold and not by ambient noise. Belugas are typically found outside the area where the Osprey Platform is located in Cook Inlet. The West Foreland area is not heavily used by beluga whales (USEPA, 2006). Humpback and beluga whales that may be in the area are not expected to experience any physiological or behavioral impacts from noise-related disturbances at the Osprey Platform. However, if marine mammals were to experience noise from oil and gas operations at the Osprey Platform, these effects are expected to be very localized and relatively short-term in duration.

Ship strikes due to boat traffic associated with the support and operation of oil and gas facilities also pose a risk to whales in the area. Ship strikes are a significant cause of mortality in humpbacks in the California/Oregon/Washington stock (MMS, 2003). Little information is available on mortality rates from ship strikes for humpback whales in Alaska; however, a pregnant humpback whale was killed by a cruise ship in Glacier Bay in 2001 (Richardson, 2003). Mortalities or injuries to whales from other ship strike incidents may not always be reported. However, boat traffic for oil and gas production activities at Osprey Platform is expected to be limited and operating at relatively low speeds. In addition to the geographic location of the Osprey Platform, the range of these whale species and because of the short-term nature of ship transit time in the area, noise and related boat traffic disturbances are **not likely to adversely affect** humpback or beluga whales.

Although Steller sea lions and Northern sea otters can occur in the project area, it is unlikely that the noise from oil and gas production operations would disturb them. Aircraft, particularly helicopters, could disturb sea lions on rookeries and haul-outs, causing potential mortality if stampeding occurred. Adults may trample sea lion pups if adults are panicked by low-flying aircraft noise. This type of disturbance would be avoided by complying with NMFS-specified flight practices and other aerial and aquatic critical habitat distance restrictions that ensure such noise does not affect sea lions. The Osprey Platform is located outside of designated Steller sea lion critical habitat and overflights from aircraft or helicopters should not affect Steller sea lion marine habitat in the West Foreland area (see Figure 4-2). Some individual Northern sea otters may occur near the Osprey Platform and could be exposed to overflights. Impacts to sea otters would be to those individuals that are hauled out, causing the displacement of females and pups. Vessel traffic associated with the Osprey Platform is likely to be insignificant compared to the quantity of boat traffic from fishing, tourism, and shipping occurring in Cook Inlet.

All activities would be subject to approval of platform operation plans, including best management practices, and conservation and mitigation measures designed to reduce potential air and underwater noise impacts. Based on the above discussion, noise and disturbance associated with oil and gas production activities on the Osprey Platform are **not likely to adversely affect** marine mammals.

### 5.1.4 Potential for Accidental Oil Spills

The reissued NPDES permit would prohibit the discharge of free oil. However, oil production activities such as those that occur on the Osprey Platform have the potential to result in oil spills. Oil spills and releases are generally the result of chance casualty. ADEC's Prevention and Emergency Response Program conducted a 10-year (July 1, 1995 to June 30, 2005) statewide oil and hazardous substance spill evaluation, and reported that approximately 5.6 million gallons of oil, hazardous substances, and process water were spilled. As reported by ADEC, 85 percent of the spills during this 10-year period were cleaned up or removed from the environment. The report notes that spills from State-regulated facilities (i.e., tank vessels, oil barges, and pipelines) occur much less frequently (26 percent) than spills from unregulated facilities (74 percent), which were responsible for two-thirds of the total volume spilled statewide (ADEC, 2007).

ADEC reported 50 spills of 10,000 gallons or greater in size (eight spills >100,000 gallons), with 4 percent (12 percent by volume) of these spills being composed of crude oil, such as extracted during Osprey Platform activities. From the last five years of ADEC's study period, the number of crude oil spills decreased by 25 percent. Tank vessels shipping crude oil from Prince William Sound and Cook Inlet accounted for 1 percent of the spills reported and less than 1 percent of volume released (ADEC, 2007). Table 5-1 summarizes available information on large oil spills in Cook Inlet.

**Table 5-1. Recent Oil Spills in Cook Inlet (ADEC, 2008b)**

| Year | Name | Type | Gallons |
|---|---|---|---|
| 1987 | T/V Glacier Bay | Crude oil | 207,000 |
| 1989 | Marathon Spark Platform | Crude oil | 46,000 |
| 1989 | Tug Boat *Lorna B* | Diesel | 80,000 |
| 1992 | Pipeline rupture, Port Nikiski | Crude oil | 9,500 |
| 1995 | Tesoro Refinery, tank overfill | Crude oil | 5,700 |
| 1997 | Steelhead Platform | Diesel | 9,000 |

The crude oil tanker transportation system in Alaska received a great deal of attention following the T/V *Exxon Valdez* oil spill in 1989, which had a large impact on the Cook Inlet area. Specifically, Cook Inlet fish health suffered, as many fish displayed sores and other signs of injury attributable to oil contact (USEPA, 2006). USEPA (2006) reported that traditional ecological knowledge (TEK) interviewees stated that the *Exxon Valdez* oil spill had impacts on the local environment and on the social structure of local communities. According to TEK interviewees, before the oil spill, the only concerns for subsistence harvesting of fish centered on red tides. Tribal members had been very traditional in social practices, such as subsistence production and sharing (Stephen R. Braund & Associates, 2005). A major shift to cash and a wage economy occurred during the *Exxon Valdez* oil spill cleanup, as Exxon employed local residents for cleanup activities and disproportionately affected the Native Alaska population with temporary, high-wage employment.

The Osprey Platform has a Spill Prevention Control and Countermeasure (SPCC) plan that outlines best management practices to prevent oil spills and leaks, and details oil-spill response protocols if an accident occurs. The Osprey Platform SPCC (Forest Oil, 2007) lists potential major spill sources, maximum worst-case volumes, and major mitigation measures. Permit AK0053309 and the SPCC refer to a Best Management Practices (BMP) Plan for the Cook Inlet Area Production Facilities and the Osprey Platform. The SPCC and BMP are designed to address these spills and to ensure that personnel operating the Osprey Platform are trained to prevent releases and to respond when accidents occur.

MMS (2003) reports the results of Agency modeling of oil spills in Cook Inlet. MMS found that small spills (less than 1,000 barrels) are not expected to affect the overall water quality of Cook Inlet. However, because oil is toxic to several life stages of prey species (e.g., pink salmon, Pacific herring), low concentrations of oil in intertidal areas could persist and cause impacts for several years after a spill. Given the size of the area that could potentially be affected under a small spill scenario from the Osprey Platform, the effects to the protected species in the project area would be small.

Large oil spills would likely have a greater adverse effect on marine species than smaller spills. Intertidal beach and bay habitats (primarily in Cook Inlet) are most likely to suffer long-term effects if a major oil spill occurred (MMS, 2003). A large oil spill in the project area would cause lethal and sublethal affects on prey fish and other organisms, particularly those that spawn or reside in intertidal and shallow subtidal habitat. Eggs and larvae are especially sensitive to spills due to their susceptibility to oil constituents and inability to avoid oil. Correspondingly,

predator species are indirectly affected by spills from reduced forage, which could be locally significant depending on the time of year and area impacted.

Based on past history of oil and gas extraction activities in Cook Inlet, the risk of a large spill (greater than 1,000 barrels) from the Osprey Platform is extremely low (USEPA, 2006). The likelihood of a spill of greater than 50 barrels of oil from the Osprey Platform in any year is 0.014 or about one spill every 80 years. Overall adverse effects on listed species from oil spills would likely be low to moderate in magnitude and possibly of long duration. A large oil spill would primarily affect beach and intertidal habitat because it could persist in interstitial voids for 10 years or more. Other marine habitat would likely experience limited effects with a rapid (months to a few years) recovery (USEPA, 2006).

Additionally, oil spills can lead to habitat disruption and organism displacement caused by cleanup activities. Clean-up work is an industrial process that can contribute to short- and mid-term changes to previously natural environments. Barges, skimmers, water/steam hoses, and the associated human workforce on shore and waterborne are inherently noisy, present risks of equipment malfunction and losses (including additional spills), and are equivalent to harassment from the perspective of listed species.

### *Effects Determination for Listed Species and Critical Habitat*

#### Birds

Seabirds are particularly susceptible to oil spill impacts because floating oil readily adheres to feathers, which causes the feathers to mat, separate, and reduce their waterproofing and thermal regulation properties. Oiled birds often succumb to hypothermia (cold) or hyperthermia (overheating). Furthermore, oiled birds instinctively try to remove the oil from their feathers by preening, which leads to oil ingestion and damage of internal organs. Excessive preening supplants other essential natural behaviors, such as foraging and evading predators. The International Bird Rescue Research Center (2008) reports that birds rescued from oil spills are often frightened, cold, emaciated, dehydrated, exhausted, and suffering from the internal effects of oil.

Based on its geographic distribution and life history, only the Steller's eider may potentially occur within the project area. The Osprey Platform is located within the northern portion of the Steller's eiders wintering range in Cook Inlet (see Figure 4-1) and outside of any preferred habitat for Kittlitz's murrelets. Steller's eiders are considered occasional visitors around the western side of Cook Inlet in the winter, whereas the Kittlitz's murrelet has been documented in lower Cook Inlet during the late autumn, winter, and early spring (USFWS, 2007a). Kittlitz's murrelets are typically found in association with marine tidewater glaciers and glacial-influenced waters, near protected fjords or among islands. No concentrations of Steller's eiders or Kittlitz's murrelets are expected in the project area.

Although the potential for adverse effects exists for Steller's eider and Kittlitz's murrelets (and other marine birds), the unlikely event of a large oil spill occurring during the critical wintering period for Steller's eiders, the low probability of a spill reaching high use areas, and the low Steller's eiders population in the area would limit the likelihood, and reduce the severity of effect, of a large oil spill. Also, efforts to further reduce the possibility of an oil spill through

approved platform operation plans, best management practices, SPCC plans, and conservation and mitigation plans will limit the potential for a spill and reduce the severity of effect. Based on these factors, an oil spill is **not likely to adversely affect** Steller's eiders or Kittlitz's murrelets in Cook Inlet. Table 5-2 summarizes the effects determinations.

**Table 5-2. Summary of Effects Determinations**

| Species | Effects Determination | Rationale |
|---|---|---|
| Steller's eider, Alaska breeding population | Not likely to adversely affect | Discharges are localized and occur outside of mapped winter range; species typically occur outside platform area in nearshore, shallow foraging habitats that are far from the discharges; noise and disturbances are short-term and localized; Alaska WQS protect birds. |
| Kittlitz's murrelet | Not likely to adversely affect | Discharges are localized; species typically found outside platform area in association with marine tidewater glaciers and glacial-influenced waters near fjords or islands that are far from the discharges; noise and disturbances are short-term and localized; Alaska WQS protect birds. |
| Steller sea lion, Western U.S. stock | Not likely to adversely affect | Discharges are not located near or within critical habitat; Alaska WQS protect marine mammals. |
| Northern sea otter, Southwest Alaska population | Not likely to adversely affect | Discharges are localized, mixing zone is small; NMFS restrictions limit noise and disturbance; Alaska WQS protect marine mammals. |
| Humpback whale | Not likely to adversely affect | High mobility of species limits time in mixing zone; disturbance and noise impacts short-term and localized; Alaska WQS protect marine mammals; no population level impacts. |
| Beluga whale, Cook Inlet stock | Not likely to adversely affect | High mobility of species limits time in mixing zones; disturbance and noise impacts short-term and localized; Alaska WQS protect marine mammals; no population level impacts. |

## Marine Mammals

If an oil spill occurs, Steller sea lions and Northern sea otters located within the spill area would likely experience physical contact with oil because they spend considerable time at the surface swimming, breathing, feeding, or resting. Minimal research has been conducted on the behavior of sea lions or sea otters in the presence of oil. Sea otter fur loses its insulating proprieties when exposed to oil. Sea otters exposed to oil commonly die from hypothermia or from the toxic effects of ingesting oil while grooming themselves as an instinctive mechanism to remove the oil from their fur (National Research Council, 1992).

At nearshore locations, sea lion haul-outs and nursery areas could become fouled by an oil spill. Several Steller sea lion critical habitat sites—including the Shelikof Strait foraging area, the Sugerloaf Island rookery, and major haul-outs at Nagahut Rocks, Ushagat Island, Sud Island, Latax Rocks, and Shakun Rocks—are located well "downstream" of the Osprey Platform. During feeding, sea lions and sea otters could ingest or become exposed to oil or vapor concentrations while at sea. Fresh oil from limited surface fouling does not appear to cause significant distress to sea lions (MMS, 2003).

It is difficult to accurately predict the effects of oil on humpback or beluga whales because of a lack of data on the metabolism of these species and inconclusive results of examinations of baleen whales found dead after major oil releases (USEPA, 2006). Impacts to whales resulting from oil spills can include skin contact with the oil, baleen fouling (humpbacks), oil ingestion, respiratory distress from hydrocarbon vapors, contaminated food sources, and displacement from feeding areas (USEPA, 2006). The extent and duration of contact, in addition to the characteristics (age) of the oil, would determine the effect to humpback and beluga whales that may be present in the area. Most likely, the effects of oil would be irritation to the respiratory membranes and absorption of hydrocarbons into the bloodstream. If a marine mammal were present in the immediate area of fresh oil, it is possible that it could inhale enough vapors to affect its health.

Humpback whales could occur within the project area covered by the reissued permit. Sightings of these larger whales in Cook Inlet and the Gulf of Alaska waters generally occur during the summer months. Belugas are often found outside areas where the Osprey Platform is located in Cook Inlet.

The potential for adverse effects from a large oil spill appear to be remote to the protected marine mammals in the area (humpback whales, beluga whales, Northern sea otters, and Steller sea lions) and their designated critical habitat. If an oil spill occurs, humpback and beluga whales—as highly mobile species—are not expected to spend substantial amounts of time within an oiled area. Previous studies suggest that exposure to oil is unlikely to result in adverse effects on these species (MMS, 2003). In the SPCC (Forest Oil, 2007), Tables 2.3-1 through 2.3-4 detail the potential for spills and responses based on industry statistics. An oil spill is **not likely to adversely affect** Steller sea lions or their critical habitat, humpback whales, or beluga whales, given (1) the unlikely event of a large oil spill occurring during the critical foraging periods for the whales and pupping periods for Steller seal lions; (2) the low probability of a spill having sufficient volume to spread and reach high use areas or designated critical habitat; and (3) efforts to further reduce the possibility through approved operation plans, best management practices, SPCC plans, and conservation and mitigation plans. Furthermore, for all the reasons outlined above and the limited numbers of sea otters currently known to be present within the project area, an oil spill is **not likely to adversely affect** Northern sea otters. See Table 5-1 for a summary of effects determinations.

### 5.1.5 Cumulative Effects

Under ESA, cumulative effects are future State, tribal, local, or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action considered in this BE (50 CFR 402.02). In addition to oil and gas exploration, development, and production, the Cook Inlet basin is used for recreation and commercial uses. These uses include sportfishing and hunting, fish processing, guide services, timber harvesting, timber restoration, mining and reclamation, agriculture, aquaculture, recreation, tourism, and public works projects. The main industry in the Cook Inlet region, however, is oil and gas development.

The oil and gas industry is a major component of the Kenai Peninsula/Cook Inlet economy. The first exploration for oil in Cook Inlet Basin was in the early 1900s. In 1957, the first commercial oil field was discovered in the Swanson River Field in northern Kenai Peninsula. In the late 1950s and the 1960s, several commercial oil and gas fields were discovered. Many of the

commercial-sized fields discovered during that time are still producing today. The largest Cook Inlet oil field, McArthur River, was discovered in 1965 with an estimated 1.5 billion barrels. The most recent oil discovery was in 1991 at Sunfish/Tyonek Deep (BC EMPR, 2004).

Oil production peaked in 1970 at 82 million barrels of oil (MMBO) per year; in 2002, oil production was 11.5 MMBO per year. To date, the Cook Inlet region has produced 1.3 billion barrels of oil. Proven remaining oil reserves in the area are at 180 MMBO (BC EMPR, 2004). Cumulative production between 2004 and 2009 is an estimated 42.6 MMBO. Oil production in Cook Inlet is expected to continue to 2016 (MMS, 2003).

Natural gas production in Cook Inlet peaked at 331 billion cubic feet (bcf) in 1994 and has remained relatively stable at an average of 213 bcf per year from 1997 to 2001. In 2003, gas production was at 208 bcf per year, and cumulative production for 2004 through 2009 is an estimated 1,131 bcf. To date, 9.124 trillion cubic feet (tcf) of natural gas has been produced, with remaining proven reserves at 2.241 tcf gas. Natural gas production in Cook Inlet is expected to continue beyond 2022 (BC EMPR, 2004).

The cumulative impact analysis considers the following:

- The past and current lease sale activities
- Past oil and gas exploration and production activities
- Oil and gas discoveries that have a reasonable chance of being developed during the next one to two decades
- Speculative exploration and development of additional undiscovered resources (onshore and offshore) that could occur over the next two decades

Cumulative impacts of discharges from the Osprey Platform should have negligible effects to Cook Inlet. The volumes of discharges are relatively minimal, as reported in the NPDES permit renewal application (Forest Oil, 2006a). In addition, wastewater discharges of similar quality from other Cook Inlet oil and gas platforms, and municipal wastestreams from Anchorage, Homer, Kenai, and other smaller cities are also discharged into Cook Inlet. Given the minimal nature of the Osprey Platform discharges, its contributions to the cumulative loading (volume and concentration of pollutants) in Cook Inlet are negligible. All contaminants of concern will be discharged at concentrations that must meet the Alaska WQS and the effluent limitation and monitoring requirements of the reissued NPDES permit. The strong tidal fluxes associated with Cook Inlet and the West Foreland area will aid in dispersing the discharges very rapidly (USEPA, 2002). As a result, no cumulative effects to threatened or endangered species and their critical habitat are expected to occur from the discharges associated with the Osprey Platform.

### 5.1.6 Interdependent/Interrelated Actions

Interdependent actions are actions with no independent use apart from the proposed action. Interrelated actions are defined as actions that are a part of a larger action and depend on the larger action for justification. No interdependent or interrelated actions are expected as a result of the Osprey Platform NPDES permit reissuance.

## 5.2 SUMMARY FINDING

The Osprey Platform NPDES permit reissuance is the subject of this BE. An assumption for this evaluation and its analysis of effects is that the species of interest are exposed to conditions that will exist if the NPDES permit conditions are met. Other than effects from potential large accidental oil spills, overall effects on threatened and endangered species near the project area within Cook Inlet would be low and short-term because of the limited magnitude and extent of the effects. The WQS administered at the edge of the mixing zone for sanitary waste would protect most species, their prey, and habitat. Because of the small receiving water area of the Osprey Platform discharges, overall effects would be negligible.

This BE concludes that wastewater discharges from the Osprey Platform will be rapidly dispersed, are not likely to adversely affect threatened and endangered marine mammal and avian species identified in this evaluation, and will not likely destroy or adversely modify critical habitat associated with these species.

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# APPENDIX E
# NPDES PERMIT REISSUANCE

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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
1200 Sixth Avenue
Seattle, WA 98101

Reply To
Attn Of: OWW-130

JUL 3 1 2007

Barbara Mahoney
U.S. Department of Commerce
National Oceanic & Atmospheric Administration
NOAA Fisheries
222 West Seventh Avenue, Suite 43
Anchorage, Alaska 99513-7577

Jeanne Hanson
U.S. Department of Commerce
National Oceanic & Atmospheric Administration
NOAA Fisheries
222 West Seventh Avenue, Suite 43
Anchorage, Alaska 99513-7577

RE: Request for Species List for the Forest Oil NPDES Permit Re-issuance

Dear Ms. Mahoney and Ms. Hanson:

The U.S. Environmental Protection Agency is currently reviewing an application for the re-issuance of an NPDES permit for Forest Oil's Osprey Platform located in Cook Inlet, Alaska. The U.S. EPA will be developing an Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) for Forest Oil's Osprey Platform NPDES permit re-issuance.

Section 7 of the 1973 Endangered Species Act (ESA) requires that every federal agency consult with the National Oceanic & Atmospheric Administration (NOAA) Fisheries and the U.S. Fish and Wildlife Service (USFWS) to ensure that any action it authorizes is not likely to jeopardize the continued existence of any species listed under the ESA, or result in the destruction or adverse modification of critical habitat required by a listed species. Additionally, the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires federal agencies to consult with NOAA Fisheries on all actions, proposed actions, authorized, funded, or undertaken by the agency that might adversely affect Essential Fish Habitat (EFH).

As part of the EA development process, EPA would like to determine whether there are endangered species that could be affected by the proposed NPDES permit re-issuance. To assist us with developing the NEPA documentation and drafting of the permits/public notices, we are requesting a list of threatened and endangered species, or any species of special concern under your jurisdiction in the vicinity of the Osprey Platform. A map showing the facility location is enclosed for your information.

We would appreciate a written response from NMFS by August 31, 2007. Thank you in advance for your help in this matter. Please do not hesitate to contact me at (206) 553-6110 or by email at stoddard.jamey@epa.gov.

Sincerely,

Jamey L. Stoddard
Project Manager

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

September 5, 2007

RECEIVED
U.S. EPA REGION 10
OFFICE OF WATER AND WATERSHEDS

Jamey L. Stoddard
Project Manager
U.S. EPA, Region 10
1200 Sixth Avenue
Seattle, WA 98101

Re: Request for Species List
for the Forest Oil NPDES
Permit Re-Issuance

Dear Mr. Stoddard:

The National Marine Fisheries Service (NMFS) has received your letter requesting information on threatened or endangered species and Essential Fish Habitat (EFH). The Environmental Protection Agency (EPA) intends to reissue the National Pollutant Discharge Elimination System (NPDES) permit for Forest Oil's Osprey Platform located in Cook Inlet, Alaska. EPA will be developing an Environmental Assessment (EA) pursuant to the National Environmental Policy Act for this permit re-issuance. NMFS offers the following information under the Endangered Species Act (ESA) and the Magnuson-Stevens Fishery Conservation Management Act.

**Essential Fish Habitat**

Under Section 305(b)(2) of the Magnuson-Stevens Act, federal agencies are required to consult with NMFS regarding any action that may adversely affect EFH. EFH has been designated in Cook Inlet for Alaska plaice, Pacific cod, Atka mackerel, walleye pollock, Dover sole, arrowtooth flounder, flathead sole, rockfish, rex sole, rock sole, sablefish, sculpins, skates, squid, and salmon. If EPA determines that the proposed action may adversely affect EFH, your EA should include the information necessary for an EFH Assessment. Please visit our web site at www.fakr.noaa.gov/habitat/ for information on the areas identified as EFH, the habitat requirements of managed species, and the contents of an EFH Assessment.

**Threatened and Endangered Species**

Section 7(a)(2) of the ESA directs federal interagency cooperation "to insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species" or result in the destruction or adverse modification of critical habitat. NMFS is responsible for the administration of the ESA as it applies to listed cetaceans and pinnipeds in Alaska. Endangered Steller sea lions and humpback whales may be found in this region of Cook Inlet, and their presence would be considered seasonal or occasional occurrences. Additionally, NMFS has proposed listing Cook Inlet beluga whales under the ESA. We encourage EPA to consider any effects of this action to Cook Inlet beluga whales. Additional information regarding protected species and the ESA is available on our web site at www.fakr.noaa.gov/protectedresources/.

We hope this information is useful in fulfilling your requirements under Section 7 of the ESA and Section 305(b) of the Magnuson-Stevens Act. Please direct any questions regarding endangered species to Mr. Brad Smith at (907) 271-3023 and questions regarding EFH to Ms. Jeanne Hanson at (907) 271-3029.

Sincerely,

Robert D. Mecum
FR Acting Administrator, Alaska Region

cc: Records File
Stoddard.jamey@epa.gov

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
1200 Sixth Avenue
Seattle, WA 98101

Reply To
Attn Of: OWW-130

JUL 31 2007

Ann Rappoport
U.S. Fish and Wildlife Service
605 West 4th Avenue
Anchorage, AK 99501-2249

RE: Request for Species List for the Forest Oil NPDES Permit Re-issuance

Dear Ms. Rappoport:

The U.S. Environmental Protection Agency is currently reviewing an application for the re-issuance of an NPDES permit for Forest Oil's Osprey Platform located in Cook Inlet, Alaska. The U.S. EPA will be developing an Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) for Forest Oil's Osprey Platform NPDES permit re-issuance.

Section 7 of the 1973 Endangered Species Act (ESA) requires that every federal agency consult with USFWS and the National Oceanic & Atmospheric Administration (NOAA) Fisheries, and to ensure that any action it authorizes is not likely to jeopardize the continued existence of any species listed under the ESA, or result in the destruction or adverse modification of critical habitat required by a listed species.

As part of the EA development process, EPA would like to determine whether there are endangered species that could be affected by the proposed NPDES permit re-issuance. To assist us with developing the NEPA documentation and drafting of the permits/public notices, we are requesting a list of threatened and endangered species, or any species of special concern under your jurisdiction in the vicinity of the Osprey Platform. A map showing the facility location is enclosed for your information.

We would appreciate a written response from USFWS by August 31, 2007. Thank you in advance for your help in this matter. Please do not hesitate to contact me at (206) 553-6110 or by email at stoddard.jamey@epa.gov.

Sincerely,

Jamey L. Stoddard
Project Manager

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

September 5, 2007

RECEIVED
U.S. EPA REGION 10
OFFICE OF WATER AND WATERSHEDS

Jamey L. Stoddard
Project Manager
U.S. EPA, Region 10
1200 Sixth Avenue
Seattle, WA 98101

Re: Request for Species List
for the Forest Oil NPDES
Permit Re-Issuance

Dear Mr. Stoddard:

The National Marine Fisheries Service (NMFS) has received your letter requesting information on threatened or endangered species and Essential Fish Habitat (EFH). The Environmental Protection Agency (EPA) intends to reissue the National Pollutant Discharge Elimination System (NPDES) permit for Forest Oil's Osprey Platform located in Cook Inlet, Alaska. EPA will be developing an Environmental Assessment (EA) pursuant to the National Environmental Policy Act for this permit re-issuance. NMFS offers the following information under the Endangered Species Act (ESA) and the Magnuson-Stevens Fishery Conservation Management Act.

**Essential Fish Habitat**

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We hope this information is useful in fulfilling your requirements under Section 7 of the ESA and Section 305(b) of the Magnuson-Stevens Act. Please direct any questions regarding endangered species to Mr. Brad Smith at (907) 271-3023 and questions regarding EFH to Ms. Jeanne Hanson at (907) 271-3029.

Sincerely,

Robert D. Mecum
FR Acting Administrator, Alaska Region

cc: Records File
Stoddard.jamey@epa.gov

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
1200 Sixth Avenue
Seattle, WA 98101

Reply to
Attn Of: OWW-130

AUG 0 9 2007

**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

TO: Cook Inlet Tribal Governments

RE: Request for Tribal Consultation on Re-issuance of the NPDES Permit for Forest Oil's Osprey Platform in Cook Inlet, Alaska

The U.S. Environmental Protection Agency (EPA) is preparing to re-issue the National Pollutant Discharge Elimination System (NPDES) permit for Forest Oil's Osprey Platform located in Cook Inlet, Alaska. The permit would authorize Forest Oil to discharge wastewater, resulting from oil and gas production activities, into the waters of Cook Inlet. The current permit expired on June 30, 2006. EPA has administratively extended permit coverage until it can be re-issued. A map showing the facility location is enclosed for your information (Enclosure 1). A copy of the current NPDES permit (AK0053309) and Fact Sheet can be viewed from EPA's website: http://yosemite.epa.gov/r10/water.nsf/NPDES+Permits/CurrentAK822

As part of our Tribal trust responsibilities, EPA would like to invite Cook Inlet Tribes to initiate consultation with our Agency regarding the re-issuance of the NPDES Permit for Forest Oil's Osprey Platform in Cook Inlet, Alaska. Please provide EPA with your response to initiate Tribal Consultation, and how we can provide the opportunity for meaningful dialogue with you and your Tribe throughout the permitting process.

EPA has developed a proposed schedule for re-issuance of the permit. A preliminary draft of the permit and Environmental Assessment (EA) will be completed by the end of 2007 and the draft permit, Fact Sheet, and EA will be issued for public comment in early spring 2008. EPA plans to issue the final permit in summer 2008. Please keep in mind that substantive issues and comments received during the permitting process may result in changes to the schedule. EPA is providing several opportunities for Tribal Consultation:

(1) EPA will send a preliminary draft permit, Fact Sheet, and EA to Tribal Leaders who have requested formal consultation on this action three weeks prior to public notice in spring 2008. EPA may make changes to a draft permit prior to public notice based on that consultation.

(2) The Tribes which were involved in consultation with EPA will be notified, by EPA, of changes made to the draft permit as a result of public comments; and EPA will afford the Tribes an opportunity to consult on additional issues prior to final agency action.

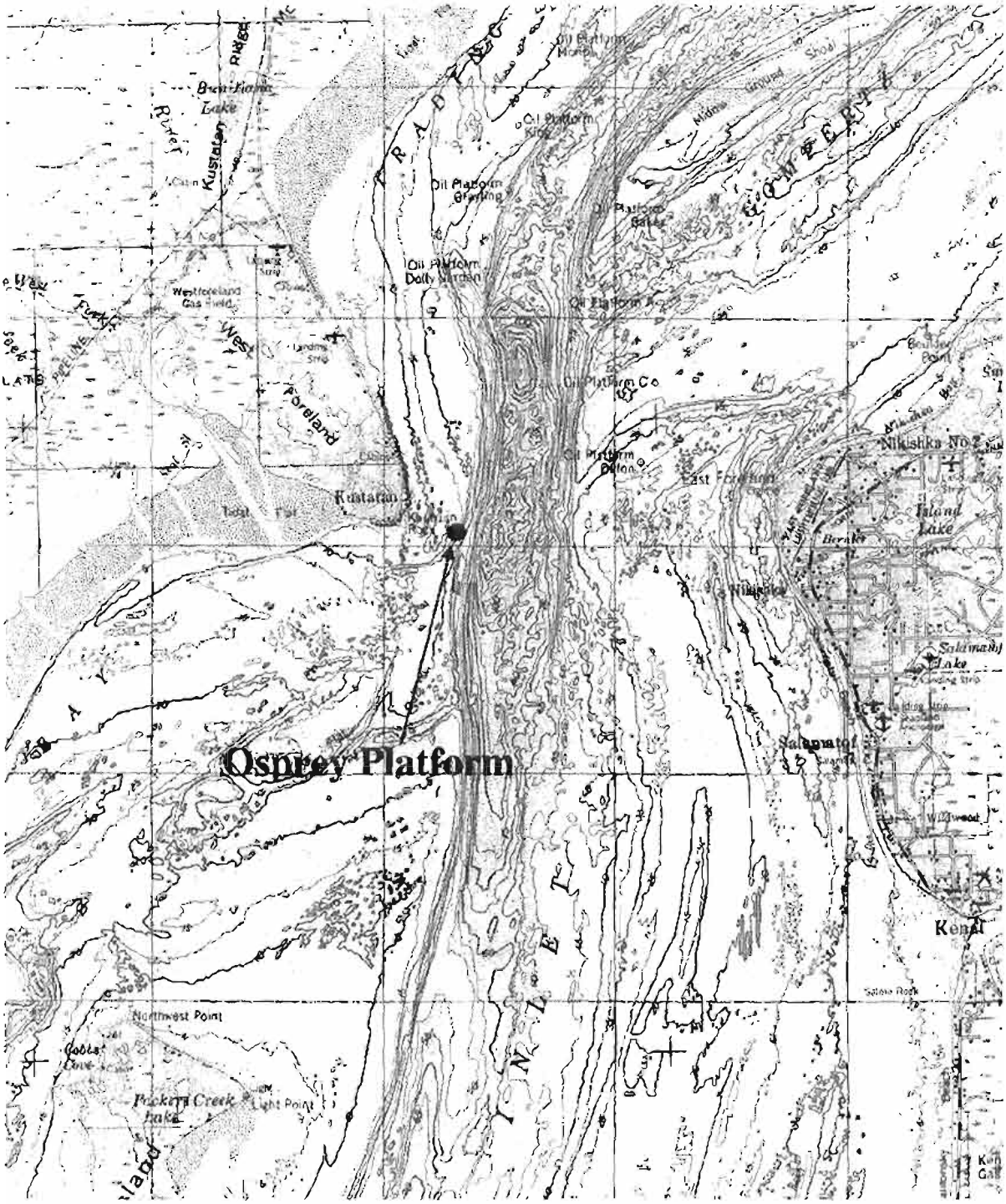
We would like to thank you in advance for your interest and participation in the re-issuance of the NPDES Permit for Forest Oil's Osprey Platform. If your tribe wishes to initiate Tribal Consultation, please respond to Jamey Stoddard, of my staff, with the name and telephone number of a tribal person EPA should contact during this process no later than September 4, 2007. Please feel free to contact Jamey by telephone at (206) 553-6110 or by E-mail at stoddard.jamey@epa.gov should you or your Tribal Government have any questions or concerns regarding this process.

Sincerely,

Michael F. Gearheard, Director
Office of Water and Watersheds

Enclosures

cc: Mark Jen, USEPA-Anchorage




Attachment 1. Site Location Map

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"Brenda Trefon"
<btrefon@kenaitze.org>
09/01/2007 10:55 AM

To Jamey Stoddard/R10/USEPA/US@EPA
cc Mark Jen/R10/USEPA/US@EPA
bcc
Subject Tribal Consultation for Osprey Platform

Jamey,

The Kenaitze Indian Tribe formally requests Tribal Consultation for the re-issuance of the NPDES Permit for Forest Oil's Osprey Platform.

You may contact me for this process.

thank you,

Brenda Trefon
Tribal Environmental Protection Officer
Kenaitze Indian Tribe
P.O. Box 988
Kenai, AK 99611

(907) 283-3633 #247

cell (907) 398-7933

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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

Reply To
Attn Of: OWW-130

APR 0 2 2008

Jeanne Hanson
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
NOAA Fisheries
222 West Seventh Avenue, Suite 43
Anchorage, Alaska 99513-7577

RE: **Draft Essential Fish Habitat (EFH) Assessment for the Reissuance of the National Pollutant Discharge Elimination System (NPDES) Permit for the Osprey Platform**

Dear Ms. Hanson:

The U.S. Environmental Protection Agency (EPA) is currently reviewing an application for the reissuance of an NPDES permit for the Osprey Platform located in Cook Inlet, Alaska. Pursuant to 40 CFR Part 6, EPA is developing an Environmental Assessment (EA) to evaluate the potential environmental effects of permit reissuance. As part of this evaluation, a draft Biological Evaluation (BE) and draft Essential Fish Habitat (EFH) Assessment have been developed.

Section 7 of the 1973 Endangered Species Act (ESA) requires that every federal agency consult with the National Oceanic & Atmospheric Administration (NOAA) Fisheries and the U.S. Fish and Wildlife Service (USFWS) to ensure that any action it authorizes is not likely to jeopardize the continued existence of any species listed under the ESA, or result in the destruction or adverse modification of critical habitat required by a listed species. Additionally, the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires federal agencies to consult with NOAA Fisheries on all actions, proposed actions, authorized, funded, or undertaken by the agency that might adversely affect EFH.

In a letter dated July 31, 2007, EPA requested a list of endangered species which may be affected by EPA's proposal to reissue the Osprey Platform's NPDES permit from NOAA Fisheries. In a letter dated September 5, 2007, NOAA Fisheries provided a list of designated essential fish habitat and threatened and endangered species which may be found in Cook Inlet, Alaska.

Enclosed for you review and comment is the draft *Essential Fish Habitat Assessment for the Reissuance of the NPDES Permit for the Osprey Platform,* prepared for EPA by Booz Allen Hamilton, dated April 1, 2008. EPA's preliminary effects

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determination for EFH is incorporated within the EFH Assessment. Although EPA has not made a final effects determination, and at this time is not requesting concurrence from NOAA Fisheries on our preliminary effects determination, we would appreciate your review and comments on this draft EFH Assessment.

EPA would appreciate a written response from NOAA Fisheries by May 2, 2008. Thank you in advance for your help in this matter and please do not hesitate to contact me at (206) 553-6110 or by email at stoddard.jamey@epa.gov.

Sincerely,

Jamey L. Stoddard
NEPA Compliance

Enclosure: *Draft Essential Fish Habitat Assessment for the Reissuance of the NPDES Permit for the Osprey Platform,* dated April 1, 2008.

Printed on Recycled Paper

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

Reply To
Attn Of: OWW-130

APR 0 2 2008

Brad Smith
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
NOAA Fisheries
222 West Seventh Avenue, Suite 43
Anchorage, Alaska 99513-7577

RE: **Draft Biological Evaluation (BE) for the Reissuance of the National Pollutant Discharge Elimination System (NPDES) Permit for the Osprey Platform**

Dear Mr. Smith:

The U.S. Environmental Protection Agency (EPA) is currently reviewing an application for the reissuance of an NPDES permit for the Osprey Platform located in Cook Inlet, Alaska. Pursuant to 40 CFR Part 6, EPA is developing an Environmental Assessment (EA) to evaluate the potential environmental effects of permit reissuance. As part of this evaluation, a draft Biological Evaluation (BE) and draft Essential Fish Habitat (EFH) Assessment have been developed.

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Enclosed for you review and comment is the draft *Biological Evaluation for the Reissuance of the NPDES Permit for the Osprey Platform*, prepared for EPA by Booz Allen Hamilton, dated April 1, 2008. EPA's preliminary effects determinations for ESA-listed species are incorporated within the BE. Although EPA has not made a final effects

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determination, and at this time is not requesting concurrence from NOAA Fisheries on our preliminary effects determination, we would appreciate your review and comments on this draft BE.

EPA would appreciate a written response from NOAA Fisheries by May 2, 2008. Thank you in advance for your help in this matter and please do not hesitate to contact me at (206) 553-6110 or by email at stoddard.jamey@epa.gov.

Sincerely,

Jamey L. Stoddard
NEPA Compliance

Enclosure: *Draft Biological Evaluation for the Reissuance of the NPDES Permit for the Osprey Platform*, dated April 1, 2008.

Printed on Recycled Paper

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101-3140

Reply To
Attn Of: OWW-130

APR 0 2 2008

Ann Rappoport
U.S. Fish and Wildlife Service
605 West 4th Avenue
Anchorage, AK 99501-2249

RE: **Draft Biological Evaluation (BE) for the Reissuance of the National Pollutant Discharge Elimination System (NPDES) Permit for the Osprey Platform (consultation number: 2007-SL-0257)**

Dear Ms. Rappoport:

The U.S. Environmental Protection Agency (EPA) is currently reviewing an application for the reissuance of an NPDES permit for the Osprey Platform located in Cook Inlet, Alaska. Pursuant to 40 CFR Part 6, EPA is developing an Environmental Assessment (EA) to evaluate the potential environmental effects of permit reissuance. As part of this evaluation, a draft Biological Evaluation (BE) and draft Essential Fish Habitat (EFH) Assessment have been developed.

Section 7 of the 1973 Endangered Species Act (ESA) requires that every federal agency consult with the U.S. Fish and Wildlife Service (USFWS) and National Oceanic & Atmospheric Administration (NOAA) Fisheries to ensure that any action it authorizes is not likely to jeopardize the continued existence of any species listed under the ESA, or result in the destruction or adverse modification of critical habitat required by a listed species. Additionally, the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires federal agencies to consult with NOAA Fisheries on all actions, proposed actions, authorized, funded, or undertaken by the agency that might adversely affect EFH.

In a letter dated July 31, 2007, EPA requested a list of endangered species which may be affected by EPA's proposal to reissue the Osprey Platform's NPDES permit from USFWS. In a letter dated August 24, 2007, USFWS provided a list of ESA-listed and candidate species which may be found in Cook Inlet, Alaska.

Enclosed for you review and comment is the draft *Biological Evaluation for the Reissuance of the NPDES Permit for the Osprey Platform*, prepared for EPA by Booz Allen Hamilton, dated April 1, 2008. EPA's preliminary effects determination for ESA-listed and candidate species are incorporated within the BE. Although EPA has not made a final effects determination, and at this time is not requesting concurrence from USFWS

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on our preliminary effects determination, we would appreciate your review and comments on this draft BE.

EPA would appreciate a written response from USFWS by May 2, 2008. Thank you in advance for your help in this matter and please do not hesitate to contact me at (206) 553-6110 or by email at stoddard.jamey@epa.gov.

Sincerely,

Jamey L. Stoddard
NEPA Compliance

Enclosure: *Draft Biological Evaluation for the Reissuance of the NPDES Permit for the Osprey Platform*, dated April 1, 2008.

cc: Gregory R. Balogh, USFWS (w/o enclosure)

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**U.S. ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

Reply to
Attn. Of: OWW-130

JUN 0 9 2008

TO: Cook Inlet Tribal Governments

RE: Draft Environmental Assessment (EA) for the Re-issuance of the Osprey Platform NPDES Permit

On May 29th, 2008, the U.S. Environmental Protection Agency (EPA) sent out a draft Environmental Assessment (EA); titled *Draft Environmental Assessment for the Reissuance of the NPDES Permit for the Osprey Platform*, to the ten (10) Cook Inlet Tribal Governments. Due to a mistake with our mailing services several of the intended recipients did not receive the draft EA. With this letter EPA is re-submitting the draft EA, along with the original cover letter to the May 29th mailing, to those Tribal Governments that did not receive the aforementioned draft EA.

We would like to thank you in advance for you interest and participation in the re-issuance of the NPDES permit for PERL's Osprey Platform. If your Tribe wished to submit comments on the draft EA, draft EFH assessment, or draft BE, please submit your comments in writing to Jamey L. Stoddard using the contact information provided below by July 1st, 2008. If you or your Tribal Government would like to request additional time to review the documents, or if you have any questions or concerns regarding this process or the enclosed documents, please contact Jamey L. Stoddard using the contact information below.

Jamey L. Stoddard
U.S. Environmental Protection Agency
1200 Sixth Avenue, Suite 900, OWW-130
Seattle, WA 98101-3140
Telephone: (206) 553-6110
Fax: (206) 553-0165
Email: stoddard.jamey@epa.gov

Sincerely,

Jamey L. Stoddard
Project Coordinator

Enclosure(s): 1) *Draft Environmental Assessment for the Reissuance of the National Pollutant Discharge Elimination System (NPDES) Permit for the Osprey Platform*, dated May 13, 2008.

cc: Katherine Brown, EPA-Seattle
Tami Fordham, EPA-Anchorage

**U.S. ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

Reply to
Attn. Of: OWW-130

MAY 2 0 2008

**CERTIFIED MAIL - RETURN RECEIPT REQUESTED**

TO: Cook Inlet Tribal Governments

RE: Draft Environmental Assessment (EA) for the Re-issuance of the Osprey Platform NPDES Permit

The U.S. Environmental Protection Agency (EPA) is preparing to re-issue the individual National Pollutant Discharge Elimination System (NPDES) permit for the Osprey Platform, currently operated by Pacific Energy Resources Limited (PERL, formerly Forest Oil Corporation) and located in Cook Inlet, Alaska. The NPDES permit for the Osprey Platform was issued in 2002 and expired on June 30, 2007. The permit has been administratively extended, pursuant to 40 CFR 122.6, and remains fully effective and enforceable until a new permit is re-issued.

On August 9, 2007, EPA sent a request for formal government-to-government consultation to the 10 Cook Inlet Tribal Governments. On September 1, 2007, EPA received a formal request for government-to-government Tribal Consultation from the Kenaitze Indian Tribe.

Enclosed for your review and comment is the draft Environmental Assessment (EA). The draft EA addresses the potential environmental effects as a result of the re-issuance of the Osprey Platform NPDES permit. The draft EA includes the draft Essential Fish Habitat (EFH) assessment, which evaluates the potential for adverse effects to EFH from the platform discharges, and the draft Biological Evaluation (BE), which evaluates the potential effects to Endangered Species Act-listed species. The draft EFH assessment and draft BE are included in the draft EA as appendices C and D, respectively.

EPA proposes to reauthorize the discharges currently covered under the administratively extended NPDES permit and authorize two additional discharges not currently included in the current permit. The additional discharges are filter backwash and desalination backwash.

We would like to thank you in advance for your interest and participation in the re-issuance of the NPDES permit for PERL's Osprey Platform. If your Tribe wishes to submit comments on the draft EA, draft EFH assessment, or draft BE, please submit your comments in writing to Jamey L. Stoddard of my staff using the contact information provided below no later

than June 23, 2008. Please feel free to contact Jamey by telephone or email, should you or your Tribal Government have any questions or concerns regarding this process or the enclosed documents.

Jamey L. Stoddard
U.S. Environmental Protection Agency
1200 Sixth Avenue, Suite 900, OWW-130
Seattle, WA 98101-3140
Telephone: (206) 553-6110
Fax: (206) 553-0165
Email: stoddard.jamey@epa.gov

Sincerely,

Michael F. Gearheard, Director
Office of Water and Watersheds

Enclosure(s): 1) *Draft Environmental Assessment for the Reissuance of the National Pollutant Discharge Elimination System (NPDES) Permit for the Osprey Platform*, dated May 13, 2008.