

Environmental Assessment

Draft

*Apache Alaska Corporation 3D Seismic Survey
on Select Lands within the
Kenai National Wildlife Refuge, Alaska*

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Abbreviations, Acronyms, and Short Forms

Abbreviations, Acronyms, and Short Forms	
°F	degrees Fahrenheit
3D	three-dimensional
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADLWD	Alaska Department of Labor and Workforce Development
ANCSA	Alaska Native Claims Settlement Act
ANGDA	Alaska Natural Gas Development Authority
ANILCA	Alaska National Interest Land Conservation Act
AOGA	Alaska Oil and Gas Association
Apache	Apache Alaska Corporation
BGEPA	Bald and Golden Eagle Protection Act
BLM	U.S. Department of the Interior, Bureau of Land Management
CCP	Comprehensive Conservation Plan
CFR	Code of Federal Regulations
CIRI	Cook Inlet Region, Inc.
dBA	decibel
DCCED	Alaska Department of Commerce, Community, and Economic Development
DCRA	Alaska Department of Commerce Division of Community and Regional Affairs
DOI	United States Department of the Interior
EA	environmental assessment
e.g.	<i>exempli gratia</i> (for example)
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
et al.	<i>et alii</i> (and others)
et seq.	<i>et sequens</i> (and the following)
FONSI	finding of no significant impact
GIS	geographic information system
GMU	Game Management Unit
GPS	global positioning system
i.e.	<i>id est</i> (that is)
in.	inch

Abbreviations, Acronyms, and Short Forms	
KPB	Kenai Peninsula Borough
n.d.	no date
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
PL	Public Law
SSI	Species of Special Interest
SUP	Special Use Permit
TNC	Tyonek Native Corporation
USC	United States Code
USFWS	U.S. Department of the Interior, U.S. Fish and Wildlife Service

1.0 PURPOSE AND NEED FOR ACTION

The U.S. Fish and Wildlife Service (Service) has received an application for a special use permit (SUP) from Apache Alaska Corporation (Apache) to conduct a three-dimensional (3D) seismic survey on portions of the Kenai National Wildlife Refuge (NWR). The purpose of this survey is to develop high-quality imagery of subsurface geological features which may contain recoverable oil and gas, on selected lands within the Kenai NWR and adjacent leases. The proposed project area is shown on Map 1.

This evaluation will analyze the project as directed by the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321–4347) and the Council on Environmental Quality regulations set forth in 40 Code of Federal Regulations (CFR) 1500-1508, is required for consideration of the SUP.

1.1 Purpose of this Document

The need for this EA arises from the request for a SUP by Apache to conduct a 3D seismic survey of the Cook Inlet Region Incorporated (CIRI)-owned coal, oil and gas resources and subsurface estate within the Refuge. The Alaska National Interest Lands Conservation Act (ANILCA) Section 1110(b) requires that the Service provide for “adequate and feasible” access to the privately-owned mineral resources within the Refuge. Legal agreements between CIRI and the Department of the Interior also require the Service to allow access for exploration and development of CIRI-owned coal, oil and gas resources and other subsurface estate within the Refuge. The Service must decide on the SUP stipulations governing the seismic survey which will best protect Refuge resources and minimize conflicts with public uses of the Refuge.

In addition, the Tyonek Native Corporation (TNC) has proposed to allow use of their surface ownership within the Refuge by Apache for conducting seismic survey activities associated with imaging off-Refuge subsurface resources. TNC has surface ownership of lands within the Refuge conveyed to them under Section 22(g) of the Alaska Native Claims Settlement Act. The Service has determined that such a use of the TNC-owned surface estate within the Refuge is compatible with Refuge purposes (USDOJ 2013). Stipulations governing these activities will be included in the SUP.

The purpose of this EA is to gather information and analyze the probable impacts of the proposed alternatives. Consideration of these data will allow the Service to make an informed decision regarding the SUP application and evaluate the presence or absence of significant impacts to area resources, as well as establish stipulations to be applied to the SUP, as appropriate.

1.2 Apache 3D Seismic Survey

Apache has contractual agreements with CIRI and TNC to conduct oil and gas exploration and, potentially, development activities on CIRI and TNC surface and subsurface lands or interests in lands on the Kenai Peninsula.

Apache currently has additional oil and gas leases within the Cook Inlet Basin, including leases on the Kenai Peninsula outside of the Kenai NWR, in state waters of Cook Inlet, and on the western side of Cook Inlet. Apache is conducting a multiyear 3D seismic program on its leased land to target areas for exploration drilling and potential development. Apache’s leases are held

with the State of Alaska (general state leased lands and Mental Health Trust leases) and with private landholders such as CIRC and TNC. Approximately 135,474 acres, or 39 percent, of Apache's leases with CIRC occur within the Kenai NWR.

As part of their overall oil and gas exploration program in the Cook Inlet basin, Apache proposes to conduct a wireless, 3D seismic survey on lands within the Kenai NWR to image geologic features in areas of CIRC-owned coal, oil and gas and subsurface estate within the Refuge. These activities will occur on Refuge lands overlying CIRC-owned coal, oil and gas resources and subsurface estate. In addition, Apache will use TNC lands within the Refuge for seismic survey activities associated with imaging off-Refuge subsurface resources.

1.3 Planning Context

The Kenai NWR is part of a national system of more than 545 refuges and other lands. The Service manages individual refuges in a manner that reflects the NWR System mission and the purposes of each refuge.

The Service is the principal Federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats for the continuing benefits of the American people.

The mission of the Service is:

Working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

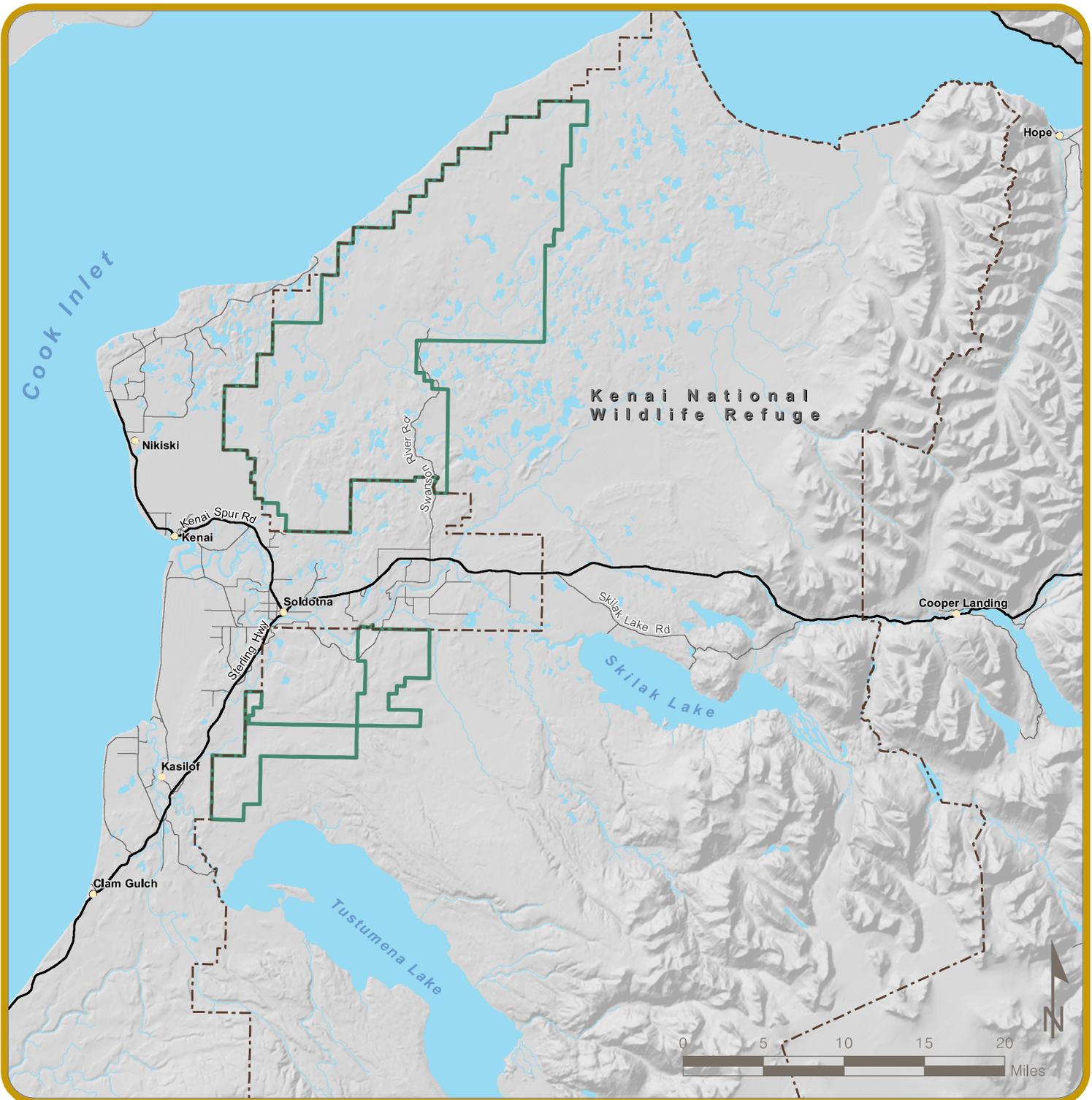
The NWR System comprises more than 96 million acres of Federal lands, encompassing national wildlife refuges, wetlands, and special management areas. The NWR System has units in each of the 50 states and in the territories of the United States.

The mission of the NWR System is:

To administer a national network of lands and waters for the conservation, management, and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (National Wildlife Refuge System Administration Act, as amended).

1.4 Legal and Policy Guidance

The NWR System Administration Act, as amended, states that each refuge shall be managed to fulfill both the mission of the Refuge System and the purposes for which the individual refuge was established. Refuges throughout the System are influenced by a wide array of laws, treaties, and executive orders. Among the most important are the NWR System Administration Act of 1966, as amended by the NWR System Improvement Act of 1997, the Refuge Recreation Act, the Endangered Species Act, and the Wilderness Act. For national wildlife refuges in Alaska, the Alaska National Interest Lands Conservation Act (ANILCA) of 1980, as amended, provides key management direction. ANILCA sets forth purposes of the refuge, defines provisions for planning and management, and authorizes studies and programs related to wildlife and wildland resources, subsistence opportunities, and recreation and economic uses. NEPA as amended, guides planning efforts on refuges.



Legend

-  KNWR Boundary
-  Project Area
- Roads**
-  Major
-  Secondary
-  Rivers



Apache Alaska Corporation Cook Inlet Seismic Exploration

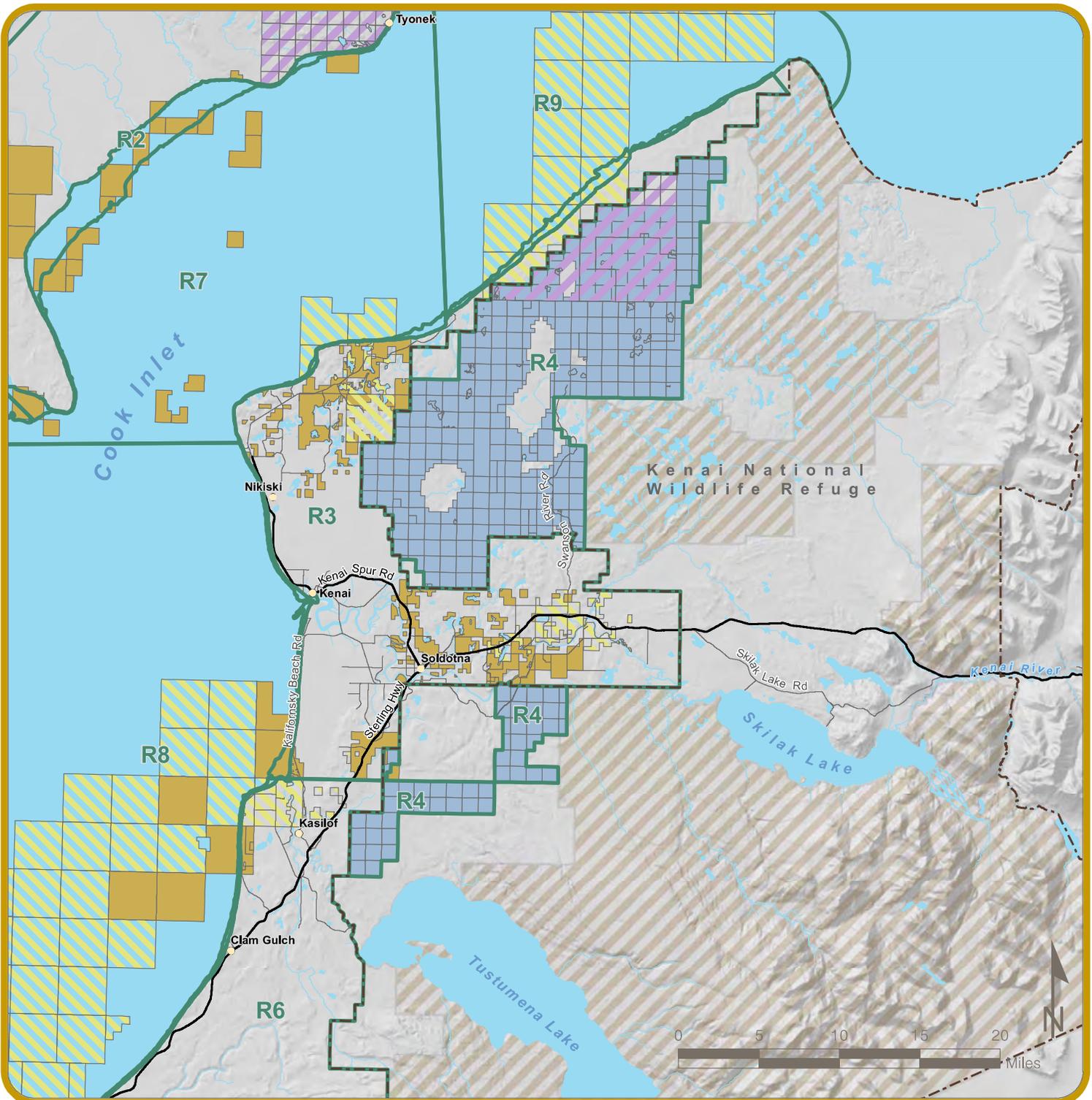
KNWR EA – Map 1 Apache Project Area In The KNWR

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: Apache, KNWR, DOT, HDR 2012
Map Created By HDR 2/6/2013



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Legend

-  KNWR Boundary
-  Tyonek Native Corporation Land
-  Major Roads
-  Secondary Roads
-  Rivers
-  KNWR Designated Wilderness Areas
-  Subsurface Conveyed to CIRI
-  Cook Inlet O&G Lease Boundaries
-  Leased to Apache, Active
-  Apache Bids, Not Yet Issued

Apache Alaska Corporation Cook Inlet Seismic Exploration

KNWR EA – Map 2 Area of proposed Drilling Operations in the KNWR

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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1.5 Kenai National Wildlife Refuge

The Kenai NWR encompasses 1.98-million acres in southcentral Alaska. The Refuge is located on the 5-million acre Kenai Peninsula and is bordered on the north by Chickaloon Bay; on the east by the Chugach National Forest and Kenai Fjords National Park; on the south by Kachemak Bay; and on the west by Cook Inlet. The Refuge is bordered by a number of communities, including Hope to the northeast; Cooper Landing to the east; Seward to the southeast, Homer to the southwest; Ninilchik, Soldotna, and Kenai to the east; and Sterling in the center.

Franklin D. Roosevelt established the Kenai National Moose Range (Moose Range) on December 16, 1941 in Executive Order 8979, for the purpose of "...protecting the natural breeding and feeding range of the giant Kenai moose on the Kenai Peninsula, Alaska, which in this area presents a unique wildlife feature and an unusual opportunity for the study, in its natural environment, of the practical management of a big-game species that has considerable local economic value...".

ANILCA substantially affected the Moose Range by altering its boundaries and broadening its purposes from moose conservation to protection and conservation of a broad array of fish, wildlife, habitats, other resources, and educational and recreational opportunities. ANILCA also redesignated the Moose Range as the Kenai NWR, added nearly a quarter of a million acres of land, and established the 1.32-million acre Kenai Wilderness.

The Kenai NWR is considered by many to be Alaska in miniature. It consists of the western slopes of the Kenai Mountains and forested lowlands bordering Cook Inlet. Treeless alpine and subalpine habitats are home to mountain goats, Dall sheep, caribou, wolverine, marmots, and ptarmigan. Most of the lower elevations on the Refuge are covered by boreal forests composed of spruce and birch forests intermingled with hundreds of lakes. These boreal forests are home to moose, wolves, black and brown bears, lynx, snowshoe hares, and numerous species of neotropical birds such as olive-sided flycatchers, myrtle warblers, and ruby-crowned kinglets. At sea level, the Refuge encompasses the largest estuary on the Peninsula—the Chickaloon River Flats. The Flats provides a major migratory staging area for thousands of shorebirds and waterfowl, and provides a haul-out area for harbor seals and feeding areas for beluga whales.

1.6 Refuge Purposes, Vision, and Management

Individual refuges are managed to meet refuge-specific purposes while adhering to the purposes and mission of the NWR System mission. The Kenai NWR Comprehensive Conservation Plan (CCP) (USFWS 2010) provides detailed information on purposes, vision, and management specific to the Refuge.

Kenai NWR Purposes

The Alaska National Interest Lands Conservation Act (ANILCA) established purposes for each refuge in Alaska as described in Section 303(4)(B) of the act. ANILCA purposes for the Kenai NWR are:

ANILCA purposes:

- i. to conserve fish and wildlife populations and habitats in their natural diversity, including but not limited to moose, bears, mountain goats, Dall sheep, wolves and other furbearers, salmonoids and other fish, waterfowl and other migratory and

- nonmigratory birds;
- ii. to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- iii. to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the Refuge;
- iv. to provide, in a manner consistent with subparagraphs (i) and (ii), opportunities for scientific research, interpretation, environmental education, and land management training; and
- v. to provide, in a manner compatible with these purposes, opportunities for fish and wildlife-oriented recreation.

The Wilderness Act of 1964 (Public Law 88-577) purposes are to secure an enduring resource of wilderness, to protect and preserve the wilderness character of areas within the National Wilderness Preservation System, and to administer this wilderness system for the use and enjoyment of the American people in a way that will leave them unimpaired for future use and enjoyment as wilderness. Under ANILCA, these purposes are applied to the approximately 1.35 million acres of Congressionally-designated Wilderness within the Refuge.

Kenai NWR Vision

The Refuge vision is presented in the CCP (USFWS 2010, 1-11) and states:

The Kenai National Wildlife Refuge will serve as an anchor for biodiversity on the Kenai Peninsula despite global climate change, increasing development, and competing demands for Refuge resources. Native wildlife and their habitats will find a secure place here, where Refuge staff and partners work together, using the best science and technology available, to ensure that biological health is maximized and human impacts are minimized.

Visitors will feel welcomed and safe by means of a wide variety of wildlife-dependent recreation opportunities, facilities, and interpretive and educational programs that encourage informed and ethical use of the Refuge's natural resources. The Refuge will achieve excellence in land, water, and Wilderness stewardship; and—with careful planning, forethought, and human determination—an enduring legacy of abundant plant, fish, and wildlife populations will be ensured for people to enjoy today and into the future for this phenomenal land we call "The Kenai."

Kenai NWR Management

Refuge management, direction, goals, and objectives are detailed in Chapter 2 of the CCP (USFWS 2010). Management categories and specific management directions that pertain to the proposed project are summarized here. Management categories include the following: (1) intensive management which includes active oil and gas operations areas, major roads within the refuge, and refuge headquarters; (2) wilderness management which includes

areas within the refuge designated as wilderness under the Wilderness Act; and (3) minimal management which includes area not included in intensive or wilderness designations. In addition, there are private and state inholdings within the refuge that the refuge must take into account during management activities (USFWS 2010, 2-2).

Specific management direction that pertains to the proposed project includes existing oil and gas units and subsurface entitlements to minerals. Management direction under existing oil and gas units describes requirements under which industrial facilities must operate within the Kenai NWR including compliance with state and Federal regulations, maintenance of required permitting and planning documents, and prevention, sampling, and remediation of contaminated sites. New developments where subsurface entitlements exist will be managed for the least negative environmental impact possible and all industrial facilities will need to be completely removed and the area restored when oil and gas activities cease (USFWS 2010, 2-14, 2-21).

1.7 Legal and Regulatory Context

Federal regulations relevant to the project are included as Appendix A. Refuge, state, and local plans that pertain to this project are presented in Sections 3.2 and 4.2. The following sections provide project-specific context for these regulations.

1.7.1 NEPA Requirements

NEPA is the United States' basic national charter for protection of the environment. It establishes procedures for how federal agencies make decisions. NEPA procedures insure that environmental information is available to the public and officials before decisions are made and before actions are taken. The information must be of the highest quality practical. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. Most importantly, NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail.

The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences and take actions that protect, restore, and enhance the environment (40 CFR 1500.1). This EA relies in part on data included in the Service's 2010 Revised Comprehensive Conservation Plan (CCP).

The Service was the lead agency for preparing this EA with the role of technical analysis and decision-making under NEPA and its implementing regulations (40 CFR 1500–1508). The Service will develop a Decision Notice and may determine that a Finding of No Significant Impact (FONSI) is justified for this EA.

In addition to NEPA, the Service will evaluate the proposed project's SUP based on compliance with the CCP (USFWS 2010) and numerous Federal, State, and local regulations and plans. Federal regulations that pertain to the project are presented in Appendix A. Refuge, state, and local plans that pertain to this project are presented in Sections 3.2 and 4.2. This section provides the project-specific context for these regulations.

1.7.2 ANCSA and ANILCA

The Alaska Native Claims Settlement Act of 1971 (ANCSA) settled land claims of Alaska Natives, created 12 land-based regional corporations and more than 200 village corporations and

provided for the conveyance of federal land to the newly established corporations. CIRI is one of the Alaska Native regional corporations. ANCSA did not convey lands directly to village or regional corporations, but provided a process for the selection and transfer of federal lands to the corporations. The Cook Inlet region lies along Alaska's southcentral coast and is one of the most heavily populated areas of the state. Considerable areas and acreages of the lands within the Cook Inlet region from which ANCSA directed the corporations to select their land entitlement were in private and non-federal public ownership and therefore not available. The remaining acreages of land available for selection by the corporations were not sufficient to fulfill the corporations' land entitlement (including CIRI). As a result, the Department of Interior, the State of Alaska, and CIRI entered into a series of negotiations that resulted in an agreement entitled "Terms and Conditions for Land Consolidation and Management in the Cook Inlet Area" ("Terms and Conditions").

On August 31, 1976, the "Terms and Conditions" agreement was executed by the United States, State of Alaska, and CIRI. This agreement was essentially a large land exchange. Provisions of the agreement allowed CIRI to select approximately 82,000 acres of the coal, oil and gas rights and 138,000 acres of the mineral estate within the Kenai National Moose Range, which became the Kenai NWR in 1980 with the passage of the ANILCA. It also defined the terms and conditions under which CIRI could access this subsurface ownership. These terms and conditions include the requirement that all activities related to the extraction of oil, gas, and coal that affect the surface of the Kenai National Moose Range shall be conducted in accordance with a surface use plan approved by the Secretary of the Interior.

In March 1980, CIRI released a general surface use plan for Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate entitlement in the Kenai National Moose Range that was subsequently approved by the Secretary of the Interior. This plan identifies general stipulations with which CIRI will comply. For example, the plan recognizes that surface damage must be reclaimed as rapidly as practicable without unreasonable interference with the rights of extraction and that a surety bond shall be filed (Huhndorf and Schraimer 1980). In addition, it provides that implementation of the stipulations by the Secretary of the Interior or his designee would not unduly burden CIRI's property rights of access. Furthermore, the plan provides that the Secretary of the Interior recognizes that CIRI's property rights, as owner, are greater than those of a lessee. Finally, the plan notes that a certain amount of flexibility will be needed in order to address development and conservation goals (Huhndorf and Schraimer 1980).

The following legal history is excerpted from the CCP (USFWS 2010, 3-1):

Several actions have altered the land ownership patterns and management of Kenai Refuge, including litigation over ownership of submerged lands, settlement of aboriginal claims with Native organizations, and legislatively directed land exchanges.

On March 20, 1970, the Ninth Circuit Court overturned a lower court decision that had entered a summary judgment to quiet title to the submerged land in Tustumena Lake to the State of Alaska. The Ninth Circuit Court found that the intent of Executive Order 8979 was to reserve both land and water of Lake Tustumena within the boundary of the Kenai National Moose Range to the United States. The court found that the submerged land in Tustumena Lake belonged to the United States and was managed by the Service.

On January 2, 1976, section 12(b) of PL 94-204 (amendment to the ANCSA) ratified “Terms and Conditions for Land Consolidation and Management in the Cook Inlet Area” (Terms and Conditions) (December 10, 1975). The land agreement was between the Department of the Interior (DOI), the State of Alaska, and CIRI, and it authorized the Secretary of Interior to convey 10,240 acres of surface land and 218,880 of subsurface interests within the Range (Kenai Refuge) to CIRI.

On August 17, 1979, the Salamatof Agreement (among DOI, Salamatof Native Association, Inc., and CIRI) terminated the eligibility review of Salamatof as a Native village under section 11(b)(1) of ANCSA. This agreement was ratified with ANILCA (section 1432 [a]), which ended the dispute between the United States and the Salamatof Native Association. In this agreement, Salamatof Native Association, Inc., received 16,535 acres of surface entitlement, and CIRI received subsurface entitlement within the Range (Kenai Refuge). The agreement directed that the surface estate of lands conveyed to Salamatof Native Association be removed from the Range (section 1432 [c]); however, the subsurface estate remained in the Range so the land could not be removed from the Range (U.S. Fish and Wildlife Service Solicitor’s Opinion, May 13, 1993, Alaska Region).

On May 18, 1981, the Beaver Creek Settlement Agreement (between the DOI and CIRI) settled a dispute between the United States and CIRI. In this agreement, which modified the CIRI “Terms and Conditions,” CIRI agreed to relinquish, exchange, and convey title or interests in 13,000 acres to the United States, and the United States conveyed 9,600 acres of subsurface estate and 7,954 acres of coal, oil, and gas to CIRI. This agreement also reduced the original “Terms and Conditions” surface selection at Tustumena Lake to 6,900 acres from 10,240 acres. The implementing legislation authorized the removal of lands from the Kenai Refuge. The agreement provides that if the United States re-acquires such lands, they shall become part of the Kenai Refuge.

Through ANCSA, CIRI has been conveyed 187,647 acres of land with potential for coal, oil, and gas resources, and 16,106 acres of subsurface estate within the Kenai NWR. CIRI also has selected an additional 26,241 acres with potential for coal, oil, and gas resources that have not yet been conveyed. This entitlement provides CIRI the opportunity to explore, develop, and transport these resources in, on, or from the Refuge subject to reasonable regulations (USFWS 2010, 3-4).

TNC is one of six villages that selected land within the Kenai NWR under ANCSA. All TNC land within the Refuge is subject to Section 22(g) of ANCSA, which means that this land remains subject to laws and regulations governing use and development of the refuge (USFWS 2010, 3-3).

The Kenai NWR is a conservation system unit defined and established by ANILCA. Section 1110(n) of Title XI of ANILCA, *Transportation and Utility Systems In and Across, and Access Into, Conservation System Units in Alaska*, addresses access to inholdings and the procedure for obtaining a right-of-way permit. ANILCA ensures adequate and feasible access, for economic or other purposes, across conservation system units for persons or entities with valid inholdings. An inholding is defined as state-owned or privately owned land, including subsurface rights underlying public land, valid mining claims, or other valid occupancy that is within or effectively surrounded by one or more conservation system units. Access to inholdings is subject to

regulations needed to protect natural and other values of the Kenai NWR, as defined in ANILCA Section 1107(a).

1.7.3 Other Legal Requirements

Apache's overall seismic exploration program in the Cook Inlet Basin is subject to the regulations and requirements of various surface property owners. The overall program is subject to various other federal, state, and borough regulations and requirements. For example, the Project must meet the requirements of the federal Clean Water Act, Clean Air Act, National Historic Preservation Act (NHPA), and Endangered Species Act of 1973 (ESA). It also must meet the requirements of the Alaska Historic Preservation Act, other various statutes in the Alaska Administrative Code, and Kenai Peninsula Borough (KPB) local ordinances.

1.7.4 Compatibility with Kenai NWR Purposes

The Refuge Manager is charged with evaluating the compatibility of certain activities in the Kenai NWR and preparation of a compatibility determination to document whether the activity will materially interfere with or detract from the purposes for which the refuge was established. For the proposed project, a compatibility determination will be required for the TNC lands and a compatibility determination has been completed for oil and gas activities in the Refuge. Each of these is described below.

1.7.4.1 Tyonek Native Corporation ANCSA 22(g) land

50 Code of Federal Regulations (CFR) 25.21(b)(1) states that compatibility determinations will be completed for uses on ANCSA 22(g) land. These compatibility determinations include only evaluations of how the proposed use would affect the ability of the refuge to meet its mandated purposes [50 CFR 25.21(b)(1)(iii)] and only evaluate the effects of the use on the adjacent refuge land and the ability of the refuge to achieve its purposes, not on the effects of the proposed use to the 22(g) land [50 CFR 25.21(b)(1)(v)].

The process for the compatibility determination includes TNC formally requesting access for Apache to conduct seismic survey activities on their inholdings, Apache providing a detailed plan of operations for activities that will occur on TNC lands, and the Refuge Manager preparing the compatibility determination. This process was completed with issuance of the compatibility determination on April 15, 2013 (USDOI 2013).

1.7.4.2 Compatibility of Oil and Gas Exploration and Development on the Kenai NWR

In 1999, the Service signed a compatibility determination regarding oil and gas exploration and development (USFWS 1999). The compatibility determination pertains to approximately 473,000 acres of Refuge "that has not been specifically opened or closed to oil and gas exploration and development by law and other legally binding agreements."

The compatibility determination states: "[a] use may be determined compatible if it will not materially interfere with or detract from the purposes for which the refuge was established. The use does not have to contribute to achieving purposes, but it may not significantly conflict with them." Additionally, "[u]ses that are granted by law, or that are included as part of a legal property right, are not subject to the compatibility requirement. On the Kenai National Wildlife Refuge, this exception applies to oil and gas exploration and development activities within the Swanson River, Beaver Creek, and Birch Hill lease areas ... and where subsurface ownership and associated rights have been granted for coal, oil, and gas provisions of the Alaska Native

Claims Settlement Act of 1971 and associated agreements.” Further, oil and gas development is precluded from the Kenai Wilderness through the Wilderness Act, so these lands are not part of the compatibility determination. Map 3 shows land associated with the proposed project that is subject to and excluded from the compatibility determination.

The Service determined, for those lands on which it pertains, that oil and gas exploration and development are not compatible with the purposes of the Kenai NWR. This determination was made because of documented “measurable, and often significant, impacts to wildlife and wildlife habitats have resulted from [oil and gas] activities.” Because of the determination, “[o]il and gas exploration and development activities cannot lawfully be permitted within the Kenai National Wildlife Refuge except within currently held Federal lease areas and areas where subsurface rights to coal, oil and gas are not within Federal ownership.”

1.7.5 Other Federal, State, and Local Regulations

The applicability of other federal, state, and local regulations to the proposed project in the Kenai NWR are described in Table 1-1. Section 8.0 provides information on consultation and coordination with regulatory agencies, Alaska Native tribes and corporations, and private individuals. Section 8.0 includes a table with a list of permits that are required for the seismic program throughout the Cook Inlet basin.

Table 1-1: Other federal, state, and local regulations pertinent to the proposed action

Regulation	Agency/ Organization/ Entity	Additional Information
<i>Federal</i>		
Clean Water Act, Section 404	U.S. Army Corps of Engineers (USACE)	Nationwide Permit 6 for survey activities in wetlands and waters of the United States that result in placement of fill (i.e., drilling shot holes). For work within the Kenai NWR, if the Service ensures compliance with the NHPA and ESA this permit does not require USACE notification
National Historic Preservation Act	USFWS and State Historic Preservation Officer (SHPO)	Consultation and letter of concurrence required to ensure archaeological, cultural, and historic resources are avoided
Archaeological Resources Protection Act	USFWS	A permit is required to conduct ground-based cultural resources surveys. This permit likely will not be required for work within the Refuge
Endangered Species Act	USFWS	There are no federally listed species within the Kenai NWR. Determination of no potential to affect federally-listed species made following verbal consultation with USFWS Endangered Species division.
Bald and Golden Eagle Protection Act	USFWS	Consultation regarding disturbance setbacks from active bald eagle nests for seismic survey activities that occur during periods when bald eagles will be attending nests

Regulation	Agency/ Organization/ Entity	Additional Information
<i>State</i>		
Alaska Statute Title 16	Alaska Department of Fish and Game (ADF&G)	Permits required for water withdrawal from fish bearing waters, blasting near fish bearing waters, and/or fish stream crossings by wheeled or tracked vehicles. For the proposed project, water withdrawal for drill rigs would be from sources outside the Refuge, blasting would be performed outside of stream and water body setbacks to avoid fish impacts, and no tracked or wheeled vehicles would be used in the Refuge aside from seasonally-authorized snowmachine use.
11 Alaska Administrative Code 20	Alaska Department of Natural Resources Division of Parks and Outdoor Recreation (ADNR DPOR)	Activities within certain setbacks of the Kenai River Special Management Area require a permit. For the proposed project this would apply to drilling shot holes and blasting. Permit required for seismic survey activities in Captain Cook State Park.
<i>Local</i>		
Anadromous Streams Protection Ordinance	KPB	Activities within certain setbacks of designated anadromous streams (including the Kenai River) require a permit. This permit would not be required for the proposed project because work would be performed outside of the setbacks.
Floodplain Ordinance	KPB	Consultation regarding work in mapped floodplains. May apply to the Kenai River floodplain.

1.8 Decisions to be Made

The federal action being evaluated in this EA is the issuance of a SUP for the proposed seismic activities on lands within the Kenai NWR. As such, data analyses, assessment of potential impact, and decision-making authority are the responsibility of the Service and the implementing regulations of NEPA (40 CFR 1500-1508). Table 1-2 presents decisions regarding the proposed project that are the responsibility of the Service.

The Service will use this EA to evaluate the potential impacts of the proposed project. As part of the evaluation, the Service will consult with potentially affected parties by making the Draft EA available to the public and by gathering public comments. Based on the level of impacts and comments received from the public, the Service will determine whether project impacts may or may not be significant.

If impacts from the proposed project are not significant, the Service will issue a Finding of No Significant Impact (FONSI). If impacts are found to be significant, an environmental impact statement and Record of Decision (ROD) will be required. The Service will use the findings from the NEPA process to inform the SUP decision.

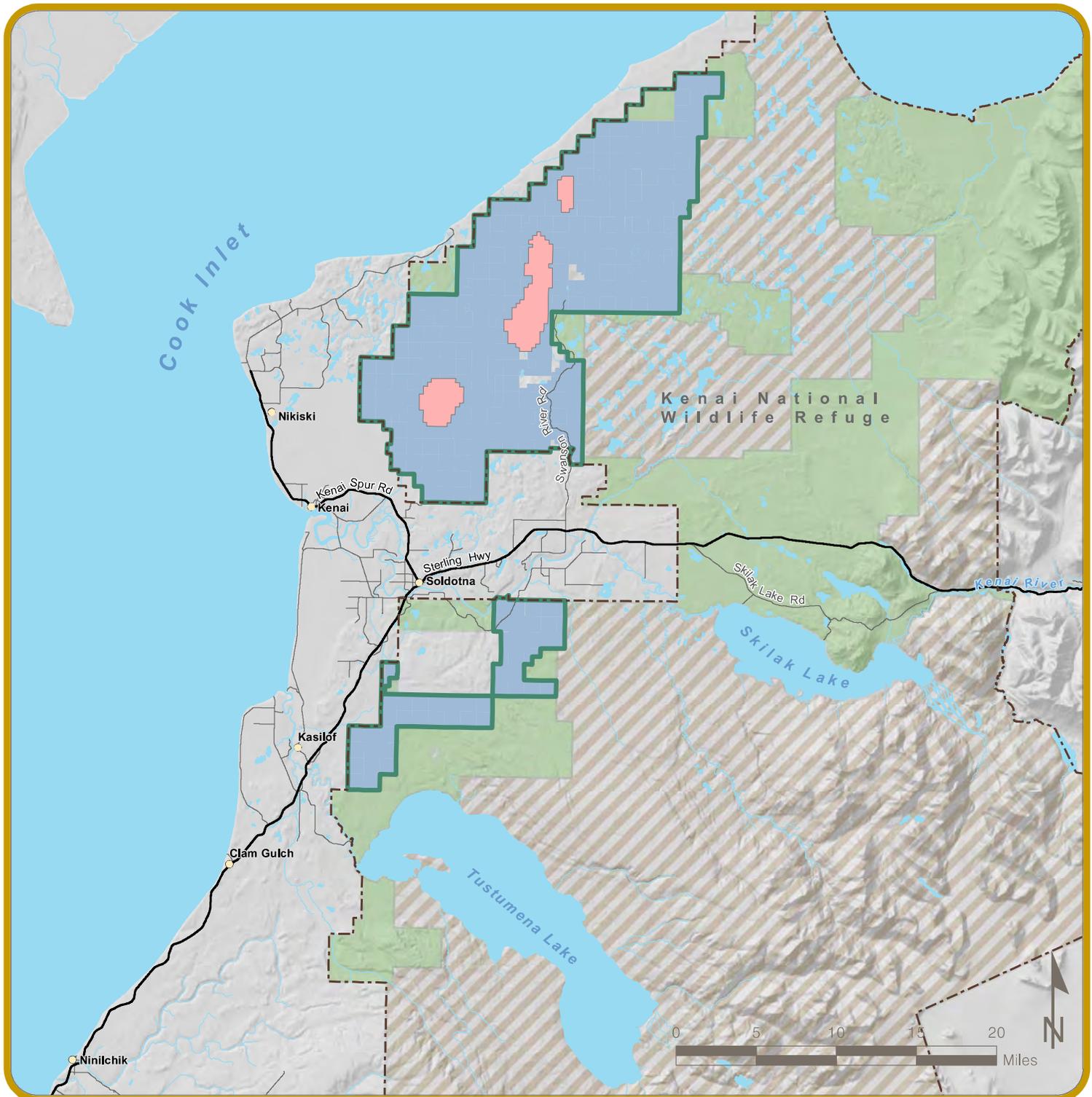
The SUP would contain stipulations governing Apache’s 3D seismic survey operations on Refuge lands for imaging subsurface geologic features in areas of CIRI-owned coal, oil and gas resources and subsurface estate, and on TNC 22(g) lands within the Refuge for activities associated with imaging off-Refuge subsurface resources. The SUP would include stipulations,

avoidance, minimization, and mitigation measures that must be adhered to during seismic survey activities conducted within the Kenai NWR. Typical stipulations for seismic survey projects on the Refuge are included in Appendix B.

Table 1-2: Kenai NWR decision matrix for proposed project

Decision	Regulatory Context	Explanation
Compatibility determination for TNC ANCSA 22(g) lands	50 CFR 25.21(b)(1) and ANCSA	Kenai NWR must determine the compatibility of proposed seismic survey activities to be conducted on TNC 22(g) lands within the Refuge (land surveying, deployment of receivers) associated with imaging off-Refuge subsurface resources.
Level of project impacts	NEPA	The NEPA analysis will evaluate whether to issue a FONSI or whether potential significant impacts would occur, requiring an EIS
Issuance of SUP	Kenai NWR CCP	Based on decisions above and implementation of avoidance, minimization, and mitigation measures and permit stipulations, the Refuge Manager will issue a SUP to Apache for the proposed project

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Legend

-  KNWR Boundary
-  Project Area
-  Major Roads
-  Secondary Roads
-  Rivers
-  KNWR Designated Wilderness Areas
-  Subsurface Conveyed to CIRI
-  Federal Oil & Gas Lease Units
-  Refuge Areas Subject to Compatibility Determination

Apache Alaska Corporation Cook Inlet Seismic Exploration

KNWR EA – Map 3 Lands in the KNWR Subject to Compatibility Determination

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, CIRI, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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2.0 ALTERNATIVES

This EA analyzes one action alternative (Proposed Action) and the No Action Alternative.

2.1 Proposed Action

The federal action being evaluated in this EA is the issuance of a SUP for the proposed seismic activities on lands within the Kenai NWR.

The components of Apache’s overall seismic program in the Cook Inlet Basin which are the subject of this EA and will be authorized under the Service SUP are:

1. Use of Refuge lands underlain by CIRI-owned coal, oil and gas resources and subsurface estate to conduct seismic operations to image subsurface geology containing the CIRI-owned interests; and
2. Use of TNC 22(g) lands within the Refuge to conduct seismic operations associated with imaging off-Refuge subsurface resources.

2.1.1 Project Context and Background

The proposed seismic project area includes approximately 142,810 acres and is shown on Map 1. The seismic project would involve four phases: land surveying, source point drilling, receiver deployment and data collection, and clean-up. Phases are implemented in succession or in tandem, as shown in Table 2-1.

Land survey activities (described in Section 2.1.4.1) on Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate within the Refuge would commence in October 2013, and would establish field locations for receiver nodes and source points. Subsequent drilling of source point holes, deployment of receivers, and source point detonation would occur in winter, ending by April 30. The proposed timeframe for operations on TNC 22(g) lands in support of imaging off-Refuge subsurface resources is August 15 to December 15 during either 2013 or 2014 (USDOI 2013). Subsequent years’ activities will take place on Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate between October 1 and April 30.

Table 2-1: Proposed Three-Year Project Schedule

2013 Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Land surveys												
Source point drilling												
Recording operations												
Cleanup operations												

2014 Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Land surveys												
Source point drilling												
Recording operations												
Cleanup operations												

2015 Activities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Land surveys												
Source point drilling												
Recording operations												
Cleanup operations												

Note: Recording operations includes placement of receiver nodes, detonation of source points and moving receiver nodes.

2.1.2 Technology Test History

Apache conducted a two-dimensional “technology test” in 2011 to determine if the nodal seismic recording system proposed as part of this project could image the subsurface across land, tidal flats, and marine environments, thus producing a continuous subsurface image. Dynamite shots were used as source points on land, and marine air guns for the marine source points. The tidal, or transition zone, recorded both land and marine shots. The line was 18 miles long, and located in Redoubt Bay. Survey activities began February 18, 2011 and final demobilization occurred by April 5, 2011. Recording operations took place between March 25 and April 1, 2011.

The purpose of the technology test was to test the geometry of the source and receiver node spacing and offset distribution for modeling in other locations, including that which is proposed for the Kenai NWR project. The test included a variety of source depths and charge sizes in order to determine the optimal source energy need to accurately image the targeted geologic features as much as 20,000 feet below the ground surface. The specifications presented here as part of the proposed action were determined to be the ideal configuration and source charge for imaging the targeted geologic features of Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate. Additional source depths, charge strengths, and node/source point spacing is not considered ideal for imaging the targeted depths, and so are not included as alternatives to the proposed project.

2.1.3 3D Seismic Primer

Seismic surveys are conducted by transmitting an energy wave into the ground and receiving the reflected energy waves at a different location. The source point, or origin of the energy wave, is typically an explosive device. The energy wave created by the explosion travels into the earth, where it comes into contact with rock layers, or formations. Multiple rock layers are called stratigraphy, and the stratigraphy creates formations in which oil and gas collects into deposits. The seismic waves are reflected by the stratigraphy and directed back up toward the surface of the earth, where they are recorded by receivers placed on the ground surface at a set distance from the source point. By analyzing the time and qualities of the energy wave as it is reflected by the stratigraphy, geophysicists can get an understanding of the geologic structures where oil and gas deposits may be located. This understanding is used to inform a plan of development. More detailed information allows engineers to target their production drilling and minimize the development footprint at the surface.

A single line of source points and receivers produce a two-dimensional image of the subsurface. A grid of source points and receiver nodes can produce a 3D image of the subsurface. The goal of Apache's 3D seismic program is to develop detailed images of the subsurface features to identify likely oil and gas structures. Apache is targeting geologic features at depths up to 20,000 feet below the ground surface.

The area covered by the source point and receiver node grid on the surface must generally be twice as long as the depth to the subsurface feature being imaged. For imaging depths of 20,000 feet (3.8 miles), a receiving grid must extend 20,000 feet on either side of the source point. The large survey area is necessary, due to the complex seismic geometries required to produce data of sufficient quality to allow for accurate interpretation of the subsurface geology.

2.1.4 Project Phases

The first phase of the program consists of office-based planning and preliminary grid design to establish pre-plots. Field survey crews then confirm receiver and source point locations and establish the grids on the ground. Phase two consists of drilling the source point holes along the established source point lines, confirming depths, and setting the source point charges. The third phase includes deployment of nodes along the receiver node lines, detonating charges, recording data, and recovering the nodes. The final phase consists of a clean-up of the grid and recovery of debris from earlier phases. This sequential process requires coordination, communication, and safe operation of helicopters, drill, and ground crews. Safety is the primary component of any field program.

The basic geometry for the proposed action is a grid of source points and receiver nodes, laid out in lines perpendicular to each other. Receiver node lines will be 1,320 feet (0.25 mile) apart, and nodes will be placed 165 feet apart on the node lines. Source point lines will be 1,650 feet (0.31 mile) apart, with source points placed 165 feet apart on the point lines. The recording template is approximately 24 lines of 182 nodes (4,368 active nodes). Denotation of source points will take place at a rate of approximately one square mile per day.

Recording operations will be conducted using a geometric arrangement of two receiver lines ("strokes") and perpendicular source lines ("racks"). During acquisition of one stroke (two receiver lines), the recording equipment of the prior stroke will be retrieved, the data downloaded from each node, and recharged prior to redeployment to the next stroke.

The proposed operations include drilling a 3-inch source point hole to a depth of 35 feet below ground surface. A 9.7-pound source charge is placed at the bottom of the hole and backfilled prior to detonation. Receivers are autonomous nodes that are placed on the ground surface and use wireless technology to record time and seismic data. Locations are logged when nodes are set in place.

The sections below provide general information on 3D seismic surveying, and specific details of the activities associated with each of the four stages of seismic surveying.

2.1.4.1 Land Survey Operations

The initial grid of source and receiver locations is referred to as a “pre-plot” and is developed using office-based geographic information system (GIS) mapping techniques and incorporating available physical and environmental data. Avoidance areas—including buffers around known cultural resources, structures, anadromous streams, and bald eagle or owl nests—are incorporated into the pre-plot and the grid lines are modified accordingly. Buffers for particular resources are presented in Table 2-2 and were established through conversations between Apache and various management agencies with jurisdiction, including the State of Alaska DNR, Division of Mining, Land and Water; the State of Alaska Office of History and Archaeology, Alaska Department of Fish and Game, and the Service. Land survey crews then use the pre-plot and associated global positioning system (GPS) coordinates to mark locations in the field where recording nodes and source point drill holes will be placed.

Survey crews will mobilize to a staging area, which will be a preselected location outside of the proposed project area where fuel, helicopters, equipment, and supplies (including explosives) will be kept. Explosive materials will be stored in appropriate containers outside the Refuge in containments that meet the Bureau of Alcohol, Tobacco, and Firearms required setback distances for stored explosives (27 CFR 555.218). The storage location will be locked, fenced, and have a patrolled security system. Eight survey crews of two, typically one surveyor and one wilderness guide, would be transported by two helicopters from the staging area. Transport helicopters will transport crews to safe areas for landing drop offs. Survey crews would traverse the lines to be surveyed for the day on foot, and will call by radio for pickup. Helicopters would be used primarily for initial drop off and end-of-day pick ups. Helicopter time will be logged each day by ship, and is expected to be approximately 4 hours per ship per day.

Crew camps would be sited outside the Refuge and personnel would transit in and out of the project area daily. Wilderness guides would be used as necessary to identify safe and, wherever possible, existing (unobscured) routes of travel on land for the crews to follow. Helicopter sling loads would be transported to the project area using lines up to 100 feet long in order to not require helicopter landings or touch downs. Using pre-determined and approved landing zones to be determined in coordination with the Refuge managers, helicopters would drop daily supply packs of wood lath, receiver nodes, and safety gear. Wheeled or tracked vehicles other than snowmachines would not be used in off-road locations within the Kenai NWR. Snowmachines may be used to transport personnel within the Refuge during seasons as authorized by the Refuge Manager. Snowmachines and sleds towed by snowmachines will not exceed weight limits established by Kenai NWR policy or as otherwise specified in the SUP.

2.1.4.2 Drilling Operations

Following the land survey and within the timing windows established by the SUP, Apache would mobilize the drill crews. Drill units consist of two pieces: one compressor package and one drill, and would be transported by helicopter sling load only. Tracked or wheeled vehicles would not be used to transport drill units within the Refuge. A helicopter with a load capacity of at least 2,250 pounds will be used for transport of drill units. An example of a heli-portable drill rig is shown in Figure 2.1) Two crews will be operating simultaneously, with one helicopter supporting each drill crew. With 6 drill units per crew, a total of 12 drill units are planned for the proposed project.

Drill crews will be dropped off in the morning at pre-established line start locations and drills will then be transported by sling load to and from source points while crew members traverse between points on foot or by snowmachine to lathe markers left by the land survey described in Section 2.5.1. Explosives will be loaded into the helicopters from off-Refuge staging areas for transport to the field. Crews will be picked up and returned to the staging area at the end of the day. Helicopter activities are expected to begin after sunrise and end at 6:00 pm or at dark; helicopters will not operate more than 8 hours per day.

Crews will drill the 3-inch diameter hole to a depth of 35 feet and load a 9.7-pound charge at the bottom of the hole. A loading pole would be run down the hole prior to charge placement to confirm that the hole is open and to measure depth. If the hole is not open or if the depth is not optimal for loading charges, the driller will re-run the drill pipe down the hole to open it farther, and will again use the loading pole to verify that the hole is clear and drilled to the target depth. If a shot hole cannot be drilled beyond 15 feet, a charge will not be placed in the hole. The hole will be backfilled with cuttings and the crew will move to an alternate location. If a shot hole can be drilled to a depth between 16 and 25 feet, a half charge of 4.85 pounds will be used. A full charge of 9.7 pounds will be used in holes drilled to 26 feet or greater. In either case, the hole is backfilled with bentonite and cuttings and tamped to be flush with the ground surface. Detonator leads would be tied off to a piece of wood lath and the lath flagged to a tree if possible, or as high as possible to avoid snow coverage. The modification of source charge strength based on depth minimizes shot point error and ground disturbances. A minimum of two drilling attempts are made before moving to the next hole location.

Source charges will be placed in the drilled hole aiming downward into the ground. Correct placement of the source charge minimizes the potential for ground disturbances, including blowouts. If the charge is placed incorrectly and detonates in an upward direction, the ground disturbance will be documented and remediated. Ground disturbances typically occur when a charge cannot be placed at depth, such as when a drilled hole caves in or soil sloughs into the annulus.

Explosive material loaded into the drilled hole will not be activated until the data recording stage, as described in Section 2.2.3.3. Explosives are detonated through digital activation of a secure code, minimizing detonation from vandalism or misfire. Charges that fail to detonate will be revisited following recording operations and monumented in place. Monumenting includes manually digging 3 to 4 feet into the original hole, cutting and shunting the detonator lead wires, cementing a bundle of rebar in the hole, and placing an identifier on top of the hole at the ground surface. The explosives will biodegrade over time and will become inert within 5 years, depending on environmental conditions. A report will be prepared identifying all monumented

holes, and the locations identified on included maps. All attempted drilling activities at source point locations will be logged by the drill crews. Ground disturbances or blowouts will be documented, and holes will be backfilled with drill cuttings, blown-out material, or bentonite. Exposed mineral soil will be minimized either by use as backfill or transported off site as waste.



Figure 2.1: Heli-portable drill rig

Source: Apache Alaska Corporation

Upon completion of the day's work, the drilling supervisor would download the testing device information and verify it in a central database. The drill supervisor will conduct a quality control review of logged hole data. Drill logs will include the following data:

- Deviation from pre-plotted lath location, with distance and location from original staked location
- Charge size and hole depth
- Dead caps, multiple caps, and excess leakage
- Poor tamps, foreign materials loaded into holes
- Formations drilled by depth

While the drilling location may demonstrate some evidence of foot traffic and the footprint of the drill itself, it would not demonstrate permanent impairment of the area. Placed charges cannot be detonated without a secure code, securing the source points from unintended activation. Less than 6 months would elapse between source point drilling and commencement of data collection operations.

2.1.4.3 Receiver Deployment and Data Collection Operations

Prior to detonating source points, Apache would deploy recording crews to walk along the staked receiver transect lines and place wireless receiver nodes at locations established by the ground survey. The nodes, approximately 5 inches in diameter and 6 inches high (see Figure 2.2), would be placed at identified locations along the pre-plot lines. The receiver nodes have a 4-inch spike at their base to hold their position in the soil. Helicopters would be used daily to transport sling loads of receiver nodes to pre-determined sites in the field; helicopters would not land to deposit sling loads. Helicopter flight time will be logged by ship; four to five hours per day is expected

per ship. Crews of five people, including a wilderness guide when necessary, would be transported by helicopter to pre-established start line locations, then walk along the transect lines to the markers left by the land survey crew to place receiver nodes and pick up nodes after recording. Wilderness guides are trained field personnel who are familiar with bear and moose habitat and behavior, whose primary responsibility is to be aware of potentially unsafe wildlife situations and advise the ground crews when leaving an area is necessary for general safety of the crew and wildlife. Crews will be picked up and returned to the staging area at the end of the day. Snowmachines, as permitted by NWR regulations and stipulations, will be the only type of land-based vehicle authorized to support this project within the Kenai NWR. Snowmachines may be used to transport personnel and gear within the Kenai NWR during the winter season as authorized by the Refuge Manager.

Receiver nodes would be placed and used to collect data in a continuous process, moving inland from the coastal areas. Areas of seismic survey outside the Kenai NWR will tie into receiver patches laid in the Refuge; as the seismic survey progresses into the Refuge, receivers on the trailing side of the patch would be retrieved, recharged, data downloaded, and redeployed to the leading side of the patch. This rotation of receiver nodes would allow collection of data across regional boundaries and in multiple physical environments.



Figure 2.2: Wireless receiver nodes, viewed from underneath

As the seismic program would progress from marine operations west of the Refuge and onto land, receiver nodes would change from the type placed on the sea floor to the land-based receiver nodes described previously. Marine seismic operations must be conducted when the Cook Inlet is ice-free, typically May through November. To collect the data being transmitted during the marine seismic survey, recording nodes would be placed on land in the Kenai NWR, according to the geometry of the patch, during months needed to correspond with marine survey activities. The USACE and the National Marine Fisheries Service are charged with authorizing

marine operations; those activities are evaluated under separate authorizations and are not addressed in this EA.

2.1.4.4 Clean-up Operations

Recording nodes are retrieved in a continuous process during progression of the recording activities. Following source point detonation, recording activities, and node recovery, clean-up crews would walk each line of the grid and remove all debris associated with the seismic survey, primarily wood laths and survey flagging. All debris that is collected would be disposed of at an approved waste facility.

Using the same access methods described for placement of receiver nodes, crews of 2 to 5 people, including a wilderness guide when necessary, would conduct the clean-up operations. Crews would be transported by helicopter from the staging area to a pre-determined location in the project area for drop off. Crews would walk along each source and receiver line, recovering all man-made debris from the seismic operations. Personnel, equipment, and collected debris would be transported in and out of the Kenai NWR using the same helicopter landing zones as approved for other field operations. A helicopter capable of transporting passengers would be used for clean-up operations, and are expected to require three to five hours per day up to 5 days for completion of the clean-up phase.

2.1.5 Fuel Storage, Handling, and Waste Management

Survey crews will mobilize to a staging area, which will be a preselected location outside of the proposed project area where fuel, helicopters, equipment, and supplies (including explosives) will be kept. Fuel will be stored within a containment bladder. Explosives will be stored in a secure, locked container in accordance with Alcohol Tobacco and Firearms Service requirements for public protection. Staging areas will be located on private land outside the Refuge or on existing private infrastructure within the Refuge (e.g.: Swanson River field pads), if permission can be obtained.

Based on Apache's Plan of Operations for areas outside the Refuge, fuel storage and refueling activities will be conducted at least 100 feet away from all waterways. Fuel and hazardous substance storage containers will not be placed within a KPB- or USACE-mapped floodplain. Equipment or vehicles will not be fueled, serviced, or repaired within 100 feet of any waterway (Apache Alaska Corporation 2012).

Fuel storage will be placed within approved secondary containment enclosures with at least 110 percent capacity of the fuel bladders' total volume. Containment systems will be placed under all vehicle fuel tank inlet and outlet points, hose connections and hose ends during transfer operations. Fluid transfer operations will be attended at all times by trained personnel. Containment systems will be regularly inspected and maintained and will be cleared of storm water, snow and debris.

Fuel storage will not exceed 1,320 gallons or more in 55-gallon or greater containers, and thus are not subject to the Spill Prevention, Control, and Countermeasure (SPCC) Rule (40 CFR 112) requiring preparation of an SPCC Plan. Fuel tanks used to power aircraft are exempted from the SPCC Rule through the motive power amendment to the SPCC Rule (40 CFR 112) and tank capacity does not count toward the storage capacity of a facility.

2.1.5.1 General Health, Safety, and Environment Issues

All personnel will be provided, at a minimum, with the following project-specific orientation:

- Project hazards
- Permit stipulations
- Mitigation measures
- Emergency response plans
- Wildlife/bear awareness

Apache personnel and contractors will adhere to Apache safety protocol, which will be developed specifically for use in this project area. The safety protocol will include direction to adhere to all Federal and State regulations regarding safe operation and handling of materials and equipment at staging areas, during transport, and during operations. Apache personnel will adhere to stipulations specified in the SUP. To protect the field crews from potentially dangerous wildlife encounters, wilderness guides will conduct a thorough review of the project area to identify bear dens before onshore operations begin. While operating onshore and in the transition zone (within three miles of the coast), a wilderness guide will be assigned to each crew. Wilderness guides are responsible for evaluating potential wildlife habitat for recent or present wildlife use, evaluating potential risk and danger to the crew, and protecting the crew if a dangerous wildlife encounter occurs. Crews will be required to use personal protective equipment as stipulated by State, local, and Refuge regulations. The types of equipment utilized will be dependent upon the specific task and area deployed for each employee.

2.1.5.2 Waste Management Plan

All refuse and debris will be disposed of at approved disposal facilities. If there is not an approved disposal facility at the staging area, refuse and debris will be transported to an approved site in the KPB. The ultimate disposal site will depend on the location of seismic operations and most appropriate site available. At the completion of seismic survey operations, Apache will conduct a thorough inspection of the project area to ensure that all debris has been picked up and properly disposed of.

2.1.5.3 Spill Response Procedures

Apache and their seismic contractor SAE are committed to protecting the environment where operations are conducted. SAE will prepare a Spill Prevention, Control, and Countermeasure Plan for review and approval by the Alaska Department of Environmental Conservation (ADEC) for hydrocarbon storage at equipment and refueling yards outside of the Kenai NWR, if required. During operations within the Refuge, efforts to prevent leaks and spills will be made through the strict use of secondary containment, drip pads/pans and daily equipment inspections. In an event of human error or failure of engineering controls, the following procedures will be followed:

Immediate Actions

- Stop source of the spill, if safe to do so.
- Contact the field supervisor immediately.
- Use absorbent pads/spill response kits to contain the spill.
- Contact Health, Safety, and Environment field coordinator for appropriate spill reporting which will include reporting to Kenai NWR point of contact.

- Fill out spill report form and submit to supervisor as soon as is practicable.
- In the event of a spill which requires National Response Center or ADEC involvement, or a spill of any size in water, immediately contact the Project Manager and the Permit Coordinator.
- The Permit Coordinator will contact local, state and federal agencies as required, and will determine if the contaminated material should be managed as a hazardous or non-hazardous waste.

Collection

Contaminated snow, dirt, gravel, ice and all other contaminated material will be collected in plastic oily waste bags. Contaminated substances shall be collected and contained with as little disturbance of the remaining natural resource as possible. The first oily waste bag is then placed inside another oily waste bag (double bagged).

Inner and outer bags are securely closed using duct tape (or similar), labeled, and placed in designated waste accumulation areas, such as drums, fish totes, or secondary containment for the fuel bladders until the oily waste bags can be stored properly. The contents of the bags will be clearly marked with a permanent marker to ensure proper handling.

Storage

The top of the bags will be tied shut, checked, and placed in a secondary containment or a barrel with a sealable top at the staging area. Dissimilar wastes shall be segregated and stored independently. Hazardous wastes shall be stored separately from non-hazardous wastes.

Disposal

All wastes will be removed from the Kenai NWR at the earliest moment practicable and disposed of in accordance with pertinent regulations.

2.1.6 Measures to Avoid, Minimize, and Mitigate Impacts on the Environment

The 3D seismic survey technology proposed as part of this project requires a less permanent footprint than traditional survey techniques.

Impacts to the environment would be avoided through modification of the pre-plot to avoid and buffer cultural resources, structures, anadromous streams, bald eagle and trumpeter swan nests, and other identified sensitive areas. An environmental field monitor will be a part of the field team to assist in identifying eagle and swan nests not previously identified; these locations will be noted and avoidance buffers applied. The environmental monitor will assist the field crews with identifying and avoiding sensitive areas that were not identified in the pre-plot. The Refuge staff and Apache will work to develop a plan for the duties of this environmental monitor, who will report directly to Refuge staff regarding the field survey program and adherence to the SUP stipulations. Inadvertent discovery protocol for cultural resources is outlined in the Cultural Resources Survey Plan for the Refuge (HDR 2013a).

The land survey, helicopter, drill, recording, and clean up crews would all use the same pre-plot while in the field to ensure that these identified areas are avoided. Additionally, no clearing of vegetation would be required for the survey. Drill rigs and sling loads of receiver nodes can be lowered to the ground using 100 foot cables, and personnel would be dispatched to the ground at pre-determined landing zones. In areas where vegetation is too thick to allow for placement of

drill rigs, the pre-plot would be adjusted to avoid the area. Additionally, personnel camps and equipment storage would be sited outside the Refuge.

Helicopter pilots would avoid sensitive areas previously identified and logged on the pre-plot by coordinating their GPS with the pre-plot prior to mobilization to the field. Helicopter pilots would not enter airspace or land inside established buffer zones for bald eagle or trumpeter swan nests, cultural resources, anadromous streams, or other sensitive areas identified in the pre-plot. Continuous flight location data would be recorded during flight operations to confirm that buffers and sensitive areas were avoided. In areas where vegetation is too thick to land, the pre-plot would be adjusted to avoid these areas. Avoidance areas or buffers are presented in Table 2-2.

The proposed action would cause temporary impacts, but due to the limited duration of the survey, the impacts would not be permanent. Discrete sections of the Refuge may experience impacts from helicopter noise and transport, but no structures would be erected, no vehicles other than snowmachines (during the authorized seasons) used, and no wires laid to facilitate the survey.

Table 2-2: Avoidance Areas

Resource (source)	Avoidance area or buffer
Cultural resources (HDR 2013a)	300 feet from established boundary of resource
Anadromous streams (ADF&G 1991)	116 feet setback from stream bank
Waterbodies that may support fisheries resources (HDR 2013b)	100 foot setback from waterbody
Swanson River (HDR 2013b)	200 feet setback from river bank
Bald eagle nests (nesting season only) (USFWS 2013)	1,000 feet
Trumpeter swan nests and nesting lakes (J. Morton 2012)	1,000 feet
Owl nests (nesting season only) (based on bald eagle nest buffer distances)	660 feet

Waste and hazardous material handling would be relegated to areas outside the Refuge. All fuel storage and fueling activities will occur outside the Refuge, and appropriate agencies would be consulted with to ensure best management practices for fire and spill prevention are in place.

2.1.7 On-Site Coordination with Service Staff

Apache will provide a single point of contact for coordination between field crews and Service staff during all phases of the seismic survey operations. This point of contact will be responsible for adherence to the SUP stipulations, checking avoidance buffers, holding pre-project meetings with key operations staff, answering Service questions regarding the project, providing written or verbal daily reports of field operations, and reporting all spills in accordance with SUP stipulations and state and federal regulations. The point of contact will coordinate with the Service for transportation to the project area for routine inspections, and will report directly to the Refuge Manager or their designee.

2.2 No Action Alternative

NEPA requires that a No Action Alternative be considered in evaluation documents. Selection of the No Action Alternative would result in Service denial of a SUP application, which would not allow a seismic survey in the Kenai NWR. Denial of a SUP would preclude Apache's intent to image the subsurface of CIRI and TNC lands within the Refuge and would not support imaging of state lands adjacent to Refuge lands.

Under the No Action Alternative, the environmental and social context of the project area would remain unchanged from the existing conditions. As such, the No Action Alternative is useful as a baseline from which to evaluate potential impacts associated with the proposed action. Baseline conditions are presented in Section 3.0, Affected Environment.

While NEPA requires presentation of a No Action Alternative, the existing legal framework presented in Section 1.0 precludes the Service from selecting an alternative that would deny reasonable access to Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate.

3.0 AFFECTED ENVIRONMENT

3.1 General Setting

The Kenai NWR CCP was published in 2010 to guide refuge management until 2025. The information presented in this section is summarized from the CCP (USFWS 2010).

The proposed 3D seismic exploration project would occur in the northwestern region of the Refuge, north and south of the Kenai River, on the Kenai Peninsula in Southcentral Alaska and within the Cook Inlet watershed. Surface lands are managed by the Service, and the areas to be imaged through the proposed project have subsurface rights owned by CIRI. The area features major landcover types of black spruce and shrub wetlands on rolling lowlands. The project area includes half of the designated Lowland Lakes System, the Canoe Trail System, existing federal oil and gas units, and five tributaries of the Kenai River. The southern project area includes a portion of the Tustumena Lake watershed (see Map 1). Special values and special designated areas, acreage represented, and percentage of coverage found in the project area are presented in Table 3-1 and shown on Map 4.

Table 3-1: Special values and special designated areas occurring in the project area in the Kenai NWR

Special Values and Special Designated Areas	Acres	Percentage of Project Area
Lowland Lakes System ^a	34,860	24
Canoe Trail System ^b	5,782	4
Kenai River and Tributaries ^a	1,978	1
Tustumena Lake and Tributaries ^a	15,879	11
Total	58,499	40

Source: Acreage analysis with ArcGIS analysis of Kenai NWR data (USFWS 2010) and Apache-provided project area

^a special values

^b special designated areas

The climate on the Kenai Peninsula is subarctic, characterized by long, cold winters and short, mild summers. Specific climate data averaged from the last 28 years for the Kenai NWR is summarized in Table 3-2.

Table 3-2: Kenai NWR climate averages, 1984 to 2012

Month	Temperature (°F)	High/Low Temperature (°F)	Snowfall (inches)	Precipitation (inches)	Days <32°F
January	18.8	26.7/10.9	35.1	6.9	29.0
February	21.7	30.9/12.5	27.6	5.7	28.4
March	35.8	45.7/25.1	26.2	4.7	25.4
April	44.1	55.7/31.9	6.7	4.0	25.3
May	51.3	63.3/39.2	0.3	3.3	17.0
June	55.3	66.4/44.2	— ^a	2.6	3.7
July	52.8	64.7/41.3	—	2.6	0.1
August	46.1	56.6/35.5	—	6.3	2.4
September	34.7	43.8/25.7	—	9.1	10.1
October	23.4	31.4/15.5	7.6	10.5	22.7
November	19.0	27.0/11.0	22.8	6.0	26.7
December	35.9	45.9/25.8	43.6	8.8	28.5

Source: Weatherbase.com (2012)

^a Not applicable

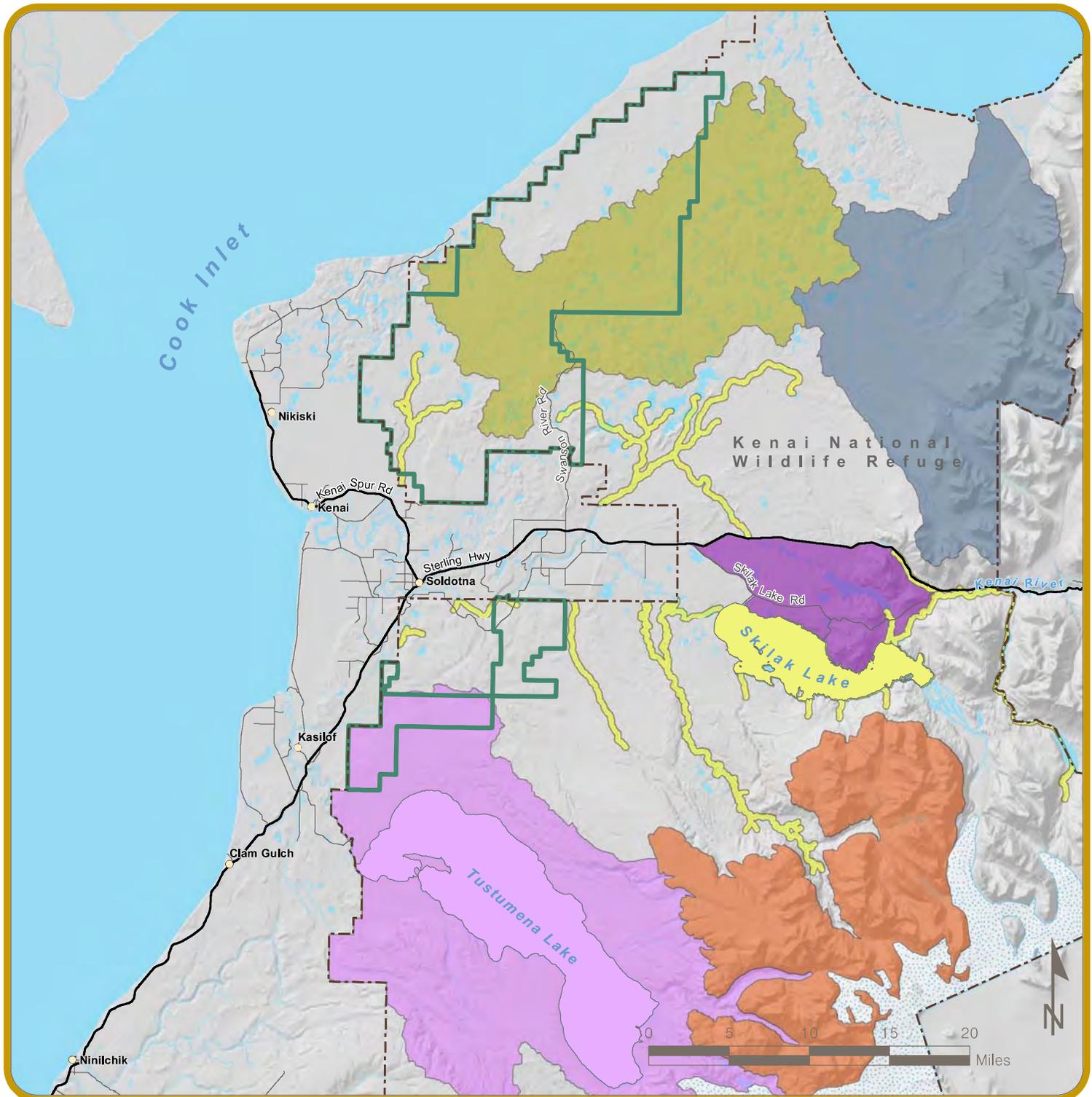
3.2 Pertinent Refuge Plans and Regulations

General management designations for the Kenai NWR are discussed in Section 1.4 and in the CCP (USFWS 2010). Implementation of the Refuge CCP was planned to take place through various step-down management plans. Refuge and other agency plans and special designations that pertain to the proposed project include the following:

2010 Kenai National Wildlife Refuge Comprehensive Conservation Plan. This plan was created to guide the management direction of the Refuge through 2025. Much of the management direction described in the CCP is influenced by various federal guidance and regulations.

The Kenai NWR is currently managed under five management categories: intensive, moderate, traditional, minimal, and wilderness. Management categories define the level of human activity appropriate to a specific area of the refuge. The project area is located within areas of intensive, moderate, and traditional management. The CCP states that geophysical exploration and seismic studies may only be authorized where existing federal leases are held or where private subsurface ownership of oil, gas, or coal exists within the Refuge (USFWS 2010).

In addition to refuge status, the “special” status of lands within individual refuges may be recognized by additional administrative or legislative designations. Special designation may also occur through the actions of other agencies or organizations. The influence that special designations may have on the management of lands and waters within refuges varies considerably. The CCP identifies three special designated areas that occur within the proposed project area (Map 5 – Special Designated Areas of Kenai National Wildlife Refuge).



Legend

- | | | | |
|---|---------------|---|--------------------------------|
|  | KNWR Boundary |  | Special Values Areas |
|  | Project Area |  | Chickaloon Watershed |
|  | Roads |  | Harding Icefield |
|  | Major |  | Kenai River and Tributaries |
|  | Secondary |  | Lowland Lakes System |
|  | Rivers |  | Skilak Loop Area |
| | |  | Tustumena Lake and Tributaries |
| | | | Tustumena-Skilak Benchlands |

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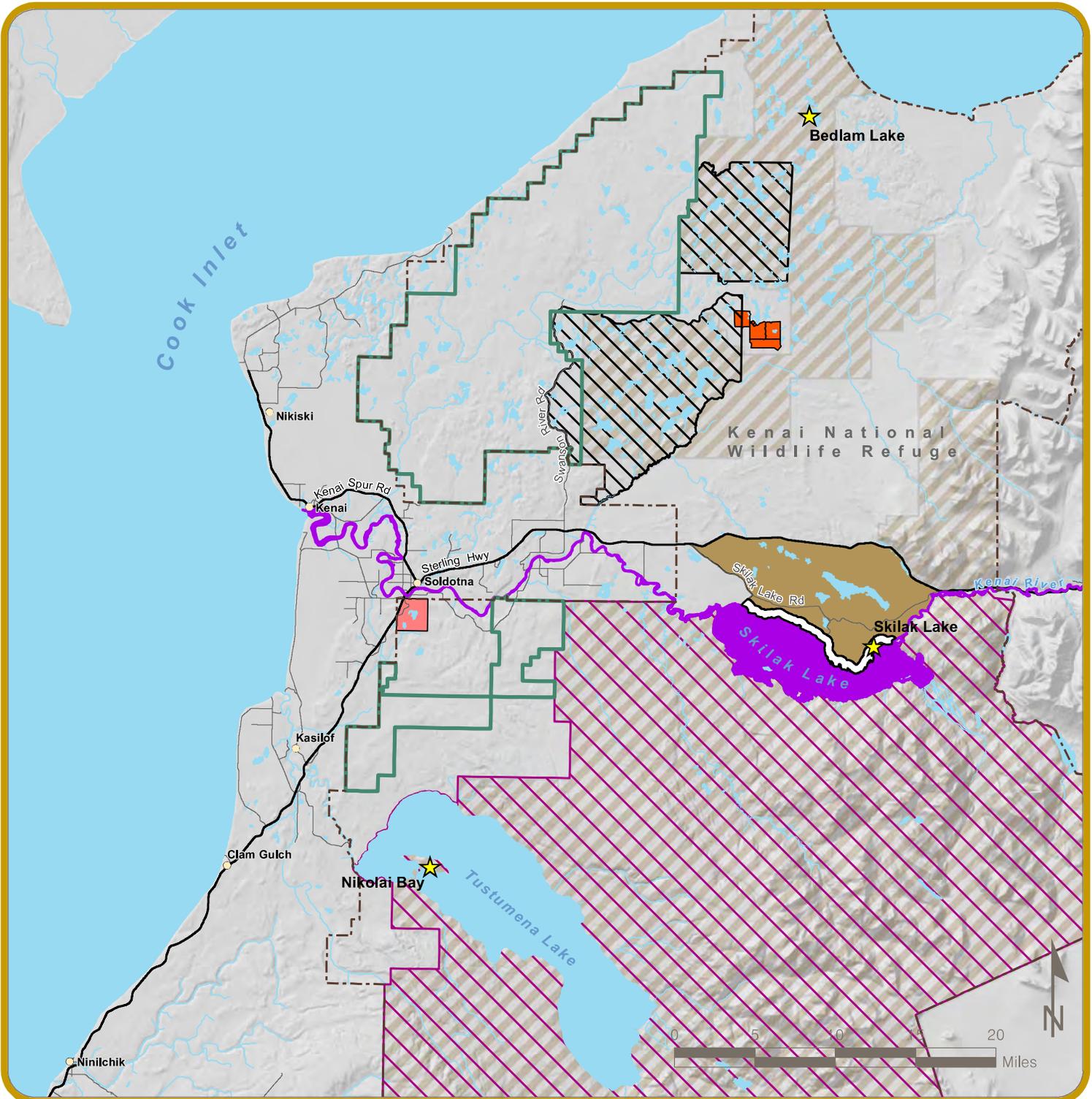
KNWR EA – Map 4 Special Values of Kenai National Wildlife Refuge

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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Legend

- KNWR Boundary
- Project Area
- Roads**
- Major
- Secondary
- Rivers

- Legislative Designations**
- Canoe Trail Systems
- Wilderness Areas
- Kenai River Special Management Area
- Administrative Designations**
- Andrew Simons Research Natural Area
- Other Research Natural Areas
- Moose Research Center
- Refuge Headquarters
- Skilak Wildlife Recreation Area
- Wildlife Travel Corridor

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KNWR EA – Map 5
Special Designated Areas of
Kenai National Wildlife Refuge

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Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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Skilak Wildlife Recreation Area Management Plan. This plan provides direction for managing the area, primarily for wildlife viewing and other forms of non-consumptive recreation such as environmental education, interpretation, photography, and other similar activities. The plan also provides overall management direction of the area, including facilities management and development. This plan was completed in 2007. There are no plans to revise it at this time.

National Recreation Canoe Trail System. The Kenai Refuge Canoe Trail System was originally constructed in the 1960s for the enjoyment of recreationists seeking a remote wilderness experience. As use increased in the 1970s, the need was recognized to formally set aside the system as a unit of the National Wilderness Preservation System, not only for wilderness recreation but also to protect habitat for wildlife requiring wilderness, including trumpeter swans, loons, wolves, and brown bears. In 1980, ANILCA created a new wilderness unit encompassing the Refuge Canoe Trail System. In 1981, the system received national recognition, becoming part of the National Recreation Trails System. The Kenai Refuge Canoe Trail System is separated into two areas: the Swanson River and Swan Lake routes. Both are located in northern lowland spruce and birch forest habitat. These canoe routes consist of lakes and rivers connected by water or land portages, creating a variety of trip options.

Kenai River Comprehensive Management Plan. The purpose of this plan, in part, “is to provide effective direction to the management of the fishery and wildlife resources, sensitive habitat areas, recreational, and development activities in the Kenai River Special Management Area and those areas adjacent to it.” The Kenai NWR continues to support this plan and will strive to fulfill its obligations as described. This plan was completed by ADNR and the KPB in 1986 and revised in 1997. There are no plans to revise it at this time.

Kenai River Special Management Area (KRSMA). KRSMA was formed as a unit of the Alaska State Parks System by legislative action in 1984. KRSMA encompasses state lands and waters within the Kenai River watershed between Kenai Lake and Cook Inlet. KRSMA is managed by the ADNR Division of State Parks; management includes administering public uses and facilities within the area. Managers issue permits to guides, operate campgrounds and boat launches, and develop and enforce regulations to ensure environmental protection and public safety. KRSMA borders the Kenai NWR and shares many of the same management objectives and public use responsibilities. While some jurisdictional issues remain unresolved between the Refuge and KRSMA, a cooperative working relationship between managers has proved successful in resolving potential conflicts. The Kenai NWR is a member of the KRSMA board, which is an advisory body on state park management issues that reports to the director of the Division of State Parks and to the Commissioner of Natural Resources. KRSMA’s management plan was completed in 1986 and revised in 1997.

Access for Oil and Gas Development. Geological and geophysical studies, including subsurface core sampling and seismic activities, require SUPs with site-specific stipulations that ensure consistency with management objectives of the CCP. Decisions to allow exploration will be made on a case-by-case basis, but may only be authorized where existing federal leases are held or where private subsurface ownership of oil, gas, or coal exists within the Refuge.

For national wildlife refuges in Alaska, ANILCA, as amended, provides key management direction. Section 1110(b) of ANILCA ensures adequate and feasible access, for economic or other purposes, across a refuge for any person or entity that has a valid inholding. An inholding is defined as state- or privately-owned land, including subsurface rights underlying public land,

valid mining claims, or other valid occupancy that is within or effectively surrounded by one or more conservation system units. The Kenai NWR is a conservation system unit. When a right-of-way permit is necessary under this provision (e.g., construction of permanent or long-term facilities), the Service will review and process the application in accordance with regulations at 43 CFR 36 and 50 CFR 29. Such permits are subject to terms and conditions as specified in the regulations (USFWS 2010).

ANCSA Section 22 provides management direction for accessing village corporation lands to balance commercial development. Section 22(g) of ANCSA provides that those refuge lands established prior to December 18, 1971, and conveyed under that act remain subject to the laws and regulations governing the use and development of the refuge. The compatibility standard states that the refuge will work with landowners to balance the commercial development and use of 22(g) land with the protection of resources important to refuge purposes (USFWS 2010).

3.3 Noise, Visual Resources, and Air Quality

The following sections describe existing conditions for noise levels, visual resources, and air quality.

3.3.1 Noise

The current soundscape in the Refuge is representative of undeveloped land; however, noise pollution is influenced by anthropogenic sources such as aircraft overflights, highway traffic, and snowmachine use. Background noise levels were measured at 5-kilometer intervals across the Refuge during the last 3 weeks in June in 2004 and 2006. The measurements were taken in the early morning hours (5:00 a.m. to 10:00 a.m.) in the absence of rain and high winds. The mean sound level, averaged from 257 sites across 2 million acres, was 45.1 decibels (dB) with values ranging from 32 to 95 dB (USFWS 2010, 3-26). Background noise levels typically measured in wilderness range from 3 to 40 dB (EPA 1974).

3.3.2 Visual Resources

The visual resources of the Kenai NWR vary depending on the location and vantage point of the viewer. The project area can be divided into two viewsheds, northern and southern.

In the northern project area, the Kenai Lowlands are the predominant feature, and the observer will observe many lakes and streams in boreal forest covering low hills, ridges, and muskeg. An observer in the northwestern project area looking west may find a vantage point to view Cook Inlet. An east-facing ridge on the northeastern side of the project area may be high enough to allow the observer a view of the Kenai Mountains to the east. The Swanson River and lower Kenai River are large, visible rivers in the northern section of the project area. Skilak Lake is also visible if the observer is in the lowest area of the project area's northern section. Throughout the northern project area, the observer will see forest scarring attributable to fires and dead-standing spruce trees resulting from spruce bark beetle infestations. In the Swanson River and Beaver Creek oil field areas, the observer will see many indications of human use, from well pads to gravel roads, and large lines of little vegetation cut through forests from historical seismic line placement.

The southern project area has similar views of forests, low hills, ridges, and muskegs, but with fewer lakes and streams than seen in the northern project area. Tustumena Lake is the largest lake on the Kenai Peninsula and is visible from the lower elevations of the project area's

southern section. No oil fields are in the southern project area viewshed, but urban sites are visible when in the northwesternmost corner of the southern project area, which is the location of Refuge Headquarters and the city of Soldotna. Similar to the northern project area, the observer in the southern viewshed will see both fire and spruce bark beetle damage to trees.

From the air, the project area appears as largely undisturbed boreal forest and muskeg, except for the Sterling Highway and associated urban areas, oil fields, and distinct straight lines of disturbed vegetation from previous seismic surveys.

3.3.3 Air Quality

Air quality is regulated by standards and implementation plans established under the Clean Air Act by the ADEC and the U.S. Environmental Protection Agency (EPA). The Kenai NWR is designated as a Class II air quality area under the Clean Air Act. Class II airsheds are generally pollution-free and allow some industrial development. Air quality in the Refuge is affected by both natural and human-made emission sources. Natural sources include wildland fires and volcanic ash. Human-made sources include motorized traffic (snowmachines, automobiles, aircraft, motorboats, all-terrain vehicles), and pollution from nearby urban areas. Industrial air pollutants in the area include the Swanson River and Beaver Creek oil and gas fields located in the Refuge and the Nikiski industrial complex located off Refuge. The Kenai NWR does not have air quality or visibility impairment data (USFWS 2010, 3-23).

ADEC has been conducting air quality monitoring at a site in Soldotna since October 2011. Monitoring was initiated in response to observations of dust events and summer wildland fires on the Kenai Peninsula. Currently, ADEC is monitoring for particulate matter, referred to as PM₁₀ and PM_{2.5}. Major sources of PM₁₀ affecting the monitoring site are wind-blown glacial silt from the Kenai River and other stream beds, open unvegetated ground, and vehicular traffic, particularly from unpaved roads. Major sources of PM_{2.5} include wood smoke from residential heating, vehicular exhaust, and particularly wildland fires. The KPB may also be subject to high levels of both PM₁₀ and PM_{2.5} resulting from volcanic eruptions (ADEC 2012).

3.4 Soils, Vegetation, Wetlands, and Hydrology

The Kenai Lowlands are described as ground moraine and inactive ice terrain with low ridges, hills, and muskeg (USFWS 2010, 3-9). The project area elevation is less than 500 feet and lacks much relief, and is dominated by boreal forests and extensive peatlands. Water resources within the project area include lakes, ponds, and streams, a portion of the Tustumena Lake watershed, the Swanson River, and portions of three tributaries of the Kenai River—Beaver Creek, Slikok Creek, and the West Fork of the Moose River.

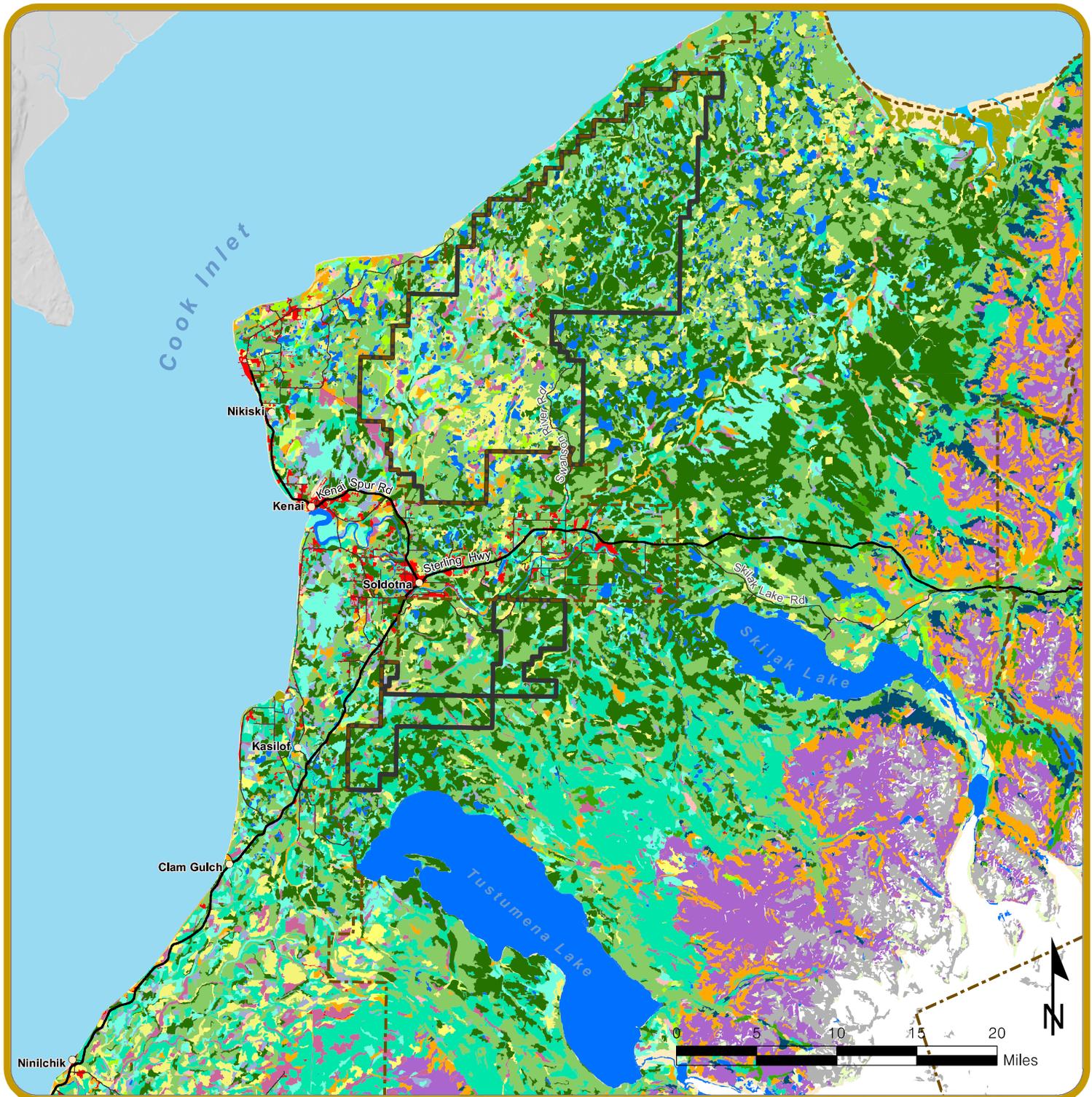
3.4.1 Soils

Parent materials for Kenai Lowland soils are glacial deposits capped by silt loam derived from windblown loess. These deposits vary from well-drained to poorly drained, and most are considered sub-marginal for agriculture. Silt loam surface layers on sloped landforms are vulnerable to erosion, especially when the vegetation layer is removed. Old glacial lakebeds are filled with layers of decomposing organic material, which create thick peatlands or muskegs that can be 13 to 23 feet thick (USFWS 2010, 3-10).

3.4.2 Vegetation

The subarctic climate of the Kenai Peninsula influences the vegetation types found within the project area. Generally, black spruce (*Picea mariana*) forest and muskeg are mixed with paper birch (*Betula papyrifera*) forests in the northern project area, and a combination of black spruce and mixed forest with wetlands are found in the southern project area (USFWS 2010, 3-29) (see Map 6).

The Service has identified 20 landcover types were in the project area, including 16 terrestrial vegetation classes, 2 aquatic classes, and 2 non-vegetative classes (USFWS 2010, 3-29). Landcover type, acreage represented, and percentage coverage found in the project area are presented in Table 3-3.



Legend

	KNWR Boundary		Project Area		Major Roads		Secondary Roads
Major Landcover					Other Shrub		Herbaceous
	Black Spruce		Alpine		Wetland - Graminoid		Stream/Lake
	White/Lutz/Sitka Spruce		Wetland - Shrub		Estuarine		Snow/Ice
	Mountain Hemlock		Wetland - Halophytic		Sparsely Vegetated		Barren/Rock
	Mixed Conifer		Urban/Cultural				
	Aspen						
	Paper Birch						
	Black Cottonwood						
	Mixed Deciduous						
	Mixed Forest						
	Alder						
	Willow						
	Alder/Willow						

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KNWR EA - Map 6 Major Landcover in the Kenai National Wildlife Refuge

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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Table 3-3: Landcover types occurring in the project area

Landcover Type	Acres	Percentage of Project Area
Black spruce (<i>Picea mariana</i>)	46,097	32
Mixed forest	39,173	27
Wetland – graminoid	15,761	11
White/Lutz/Sitka spruce (<i>Picea glauca/X lutzii/sitchensis</i>)	9,720	7
Paper birch (<i>Betula papyrifera</i>)	10,819	8
Lake	7,691	5
Wetland – shrub	3,511	2
Herbaceous	1,580	1
Willow (<i>Salix</i> sp.)	2,258	2
Alder (<i>Alnus</i> sp.)	2,354	2
Mixed deciduous	1,701	1
Black cottonwood (balsam poplar) (<i>Populus balsamifera</i>)	596	<1
Aspen (<i>Populus tremuloides</i>)	637	<1
Alder/Willow (<i>Alnus</i> sp./ <i>Salix</i> sp.)	286	<1
Stream	223	<1
Urban/Cultural	170	<1
Other shrub	79	<1
Mountain hemlock (<i>Tsuga mertensiana</i>)	129	<1
Barren – wet	20	<1
Sparsely vegetated	1	<1
Total	142,806	

Source: GIS analysis of USFWS landcover data (USFWS 2012a) and Apache-provided project area

The two largest natural disturbances to vegetation within the Refuge are spruce bark beetle and fires. Spruce bark beetles selectively attack mature white, Lutz, and Sitka spruce trees and have affected spruce in the northern and central sections of the project area. The Refuge was the epicenter of a spruce bark beetle outbreak that devastated 4 million acres of Sitka, white and Lutz spruce forest in southcentral Alaska over a 15-year period (USFWS 2012b) (see Map 7).

Fires have burned hundreds of thousands of acres in the Kenai NWR. In 1947 and 1969, two large human-caused fires burned 310,000 acres (24,709 acres within the project area, or 17 percent) and 86,000 acres (26,960 acres within the project area, or 19 percent), respectively, in the Kenai Lowlands, replacing mature forests with young forests in various stages of succession (see Map 8). Lowland black spruce forests and upland white, Lutz, and Sitka spruce forests are the two main landcover types where fires occur on the Kenai Peninsula.

Invasive flora is an increasing concern for Refuge managers. The Kenai NWR is situated on the highway system and home to commercial oil and gas activities. Studies have found that invasive

flora is well-established within the 35,840 acres of land most affected by humans. Ninety invasive flora species have been identified on the Kenai Peninsula and 62 of those identified species are associated with locations of oil and gas infrastructure, utility rights-of-way, seismic lines, and Refuge infrastructure. Refuge biologists predict increasing invasive flora establishments with increasing development both on and off Refuge lands (USFWS 2010, 3-53).

3.4.3 Wetlands

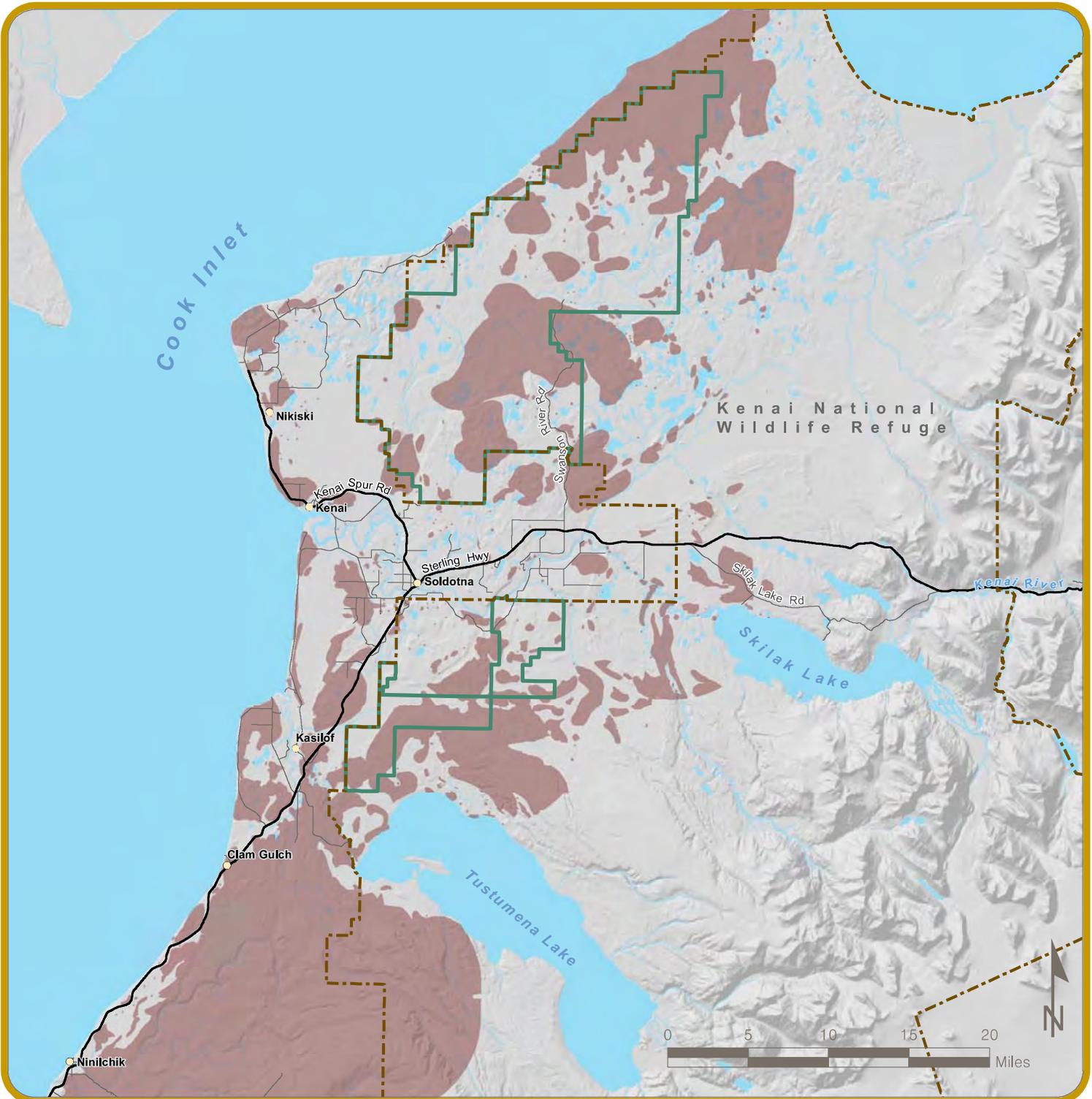
Thirty-six percent of the project area within the Kenai NWR is classified as wetlands by the Service’s National Wetlands Inventory (NWI) classification system (USFWS 2012a). Wetlands attenuate floodwater and snow melt, are valuable wildlife habitats used by many vertebrate species, and help improve water quality (USFWS 2012a). Twenty-five percent of NWI wetlands classified in the project area are freshwater forested/shrub wetlands (see Map 9). NWI wetland classification type, acreage represented, and percentage coverage found in the project area are presented in Table 3-4.

Table 3-4: NWI classified wetlands occurring in the project area

Wetland Classification	Acres	Percentage of Project Area
Freshwater emergent wetland	5,970	4
Freshwater forested/Shrub wetland	36,149	25
Freshwater pond	2,636	2
Lake	6,643	5
Riverine	3	<1
Total	51,401	36

Source: GIS analysis of USFWS NWI data (USFWS 2012a) and Apache-provided project area

Sphagnum moss-dominated fens and peatlands are defined by periodic saturation or coverage of the soil by water. Vegetation populations in wetlands have begun to change during the past half century because of an increasingly warmer and drier climate, resulting in black spruce and many shrub species moving into former fens and peatlands (USFWS 2010, 3-35).



Legend

-  KNWR Boundary
-  Project Area
- Roads**
-  Major
-  Secondary
-  Rivers
-  Spruce Bark Beetle Area of Infestation (1989 - 2001)

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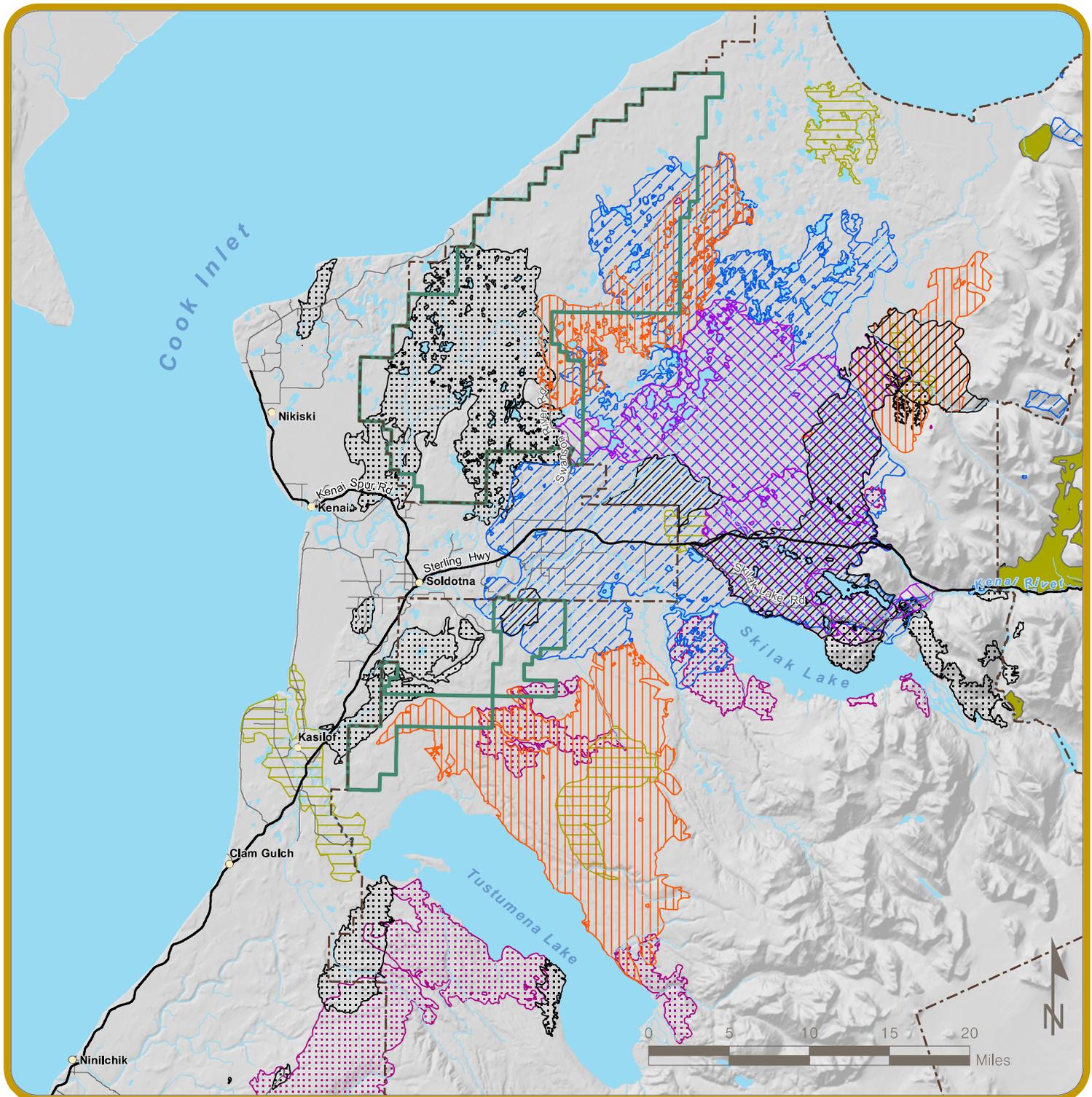
KNWR EA – Map 7
Spruce Bark Beetle Infestation
on the Kenai Peninsula

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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Legend

- | | | | |
|---|---------------|---|--------------|
|  | KNWR Boundary |  | Wild Fires |
|  | Project Area |  | 1708 – 1828 |
|  | Roads |  | 1829 – 1849 |
|  | Major |  | 1850 – 1888 |
|  | Secondary |  | 1889 – 1926 |
|  | Rivers |  | 1927 – 1959 |
| | |  | 1960 – 1996 |
| | |  | 1997 – 2010 |
| | |  | Unknown Date |

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Cook Inlet Seismic Exploration

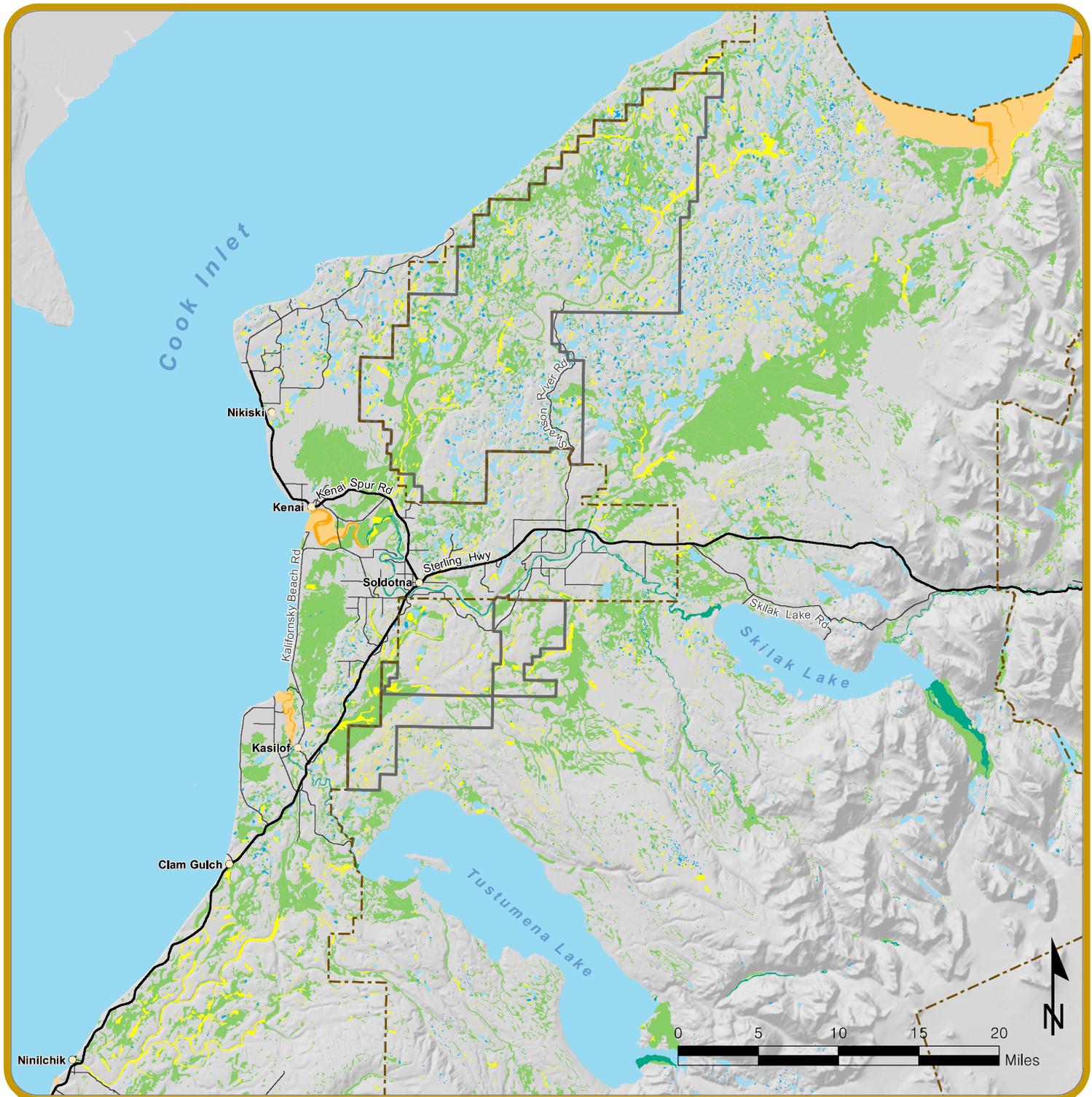
KNWR EA – Map 8
Fire History (1708 – 2010)
in KNWR

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Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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Legend

-  KNWR Boundary
-  Project Area
- Roads
 -  Major
 -  Secondary

- Wetlands Classifications from the National Wetlands Inventory
-  Estuarine and Marine Deepwater
 -  Estuarine and Marine Wetland
 -  Freshwater Emergent Wetland
 -  Freshwater Forested/Shrub Wetland
 -  Riverine
 -  Freshwater Pond
 -  Lake
 -  Other

Apache Alaska Corporation Cook Inlet Seismic Exploration

KNWR EA – Map 9 National Wetlands Inventory in Kenai National Wildlife Refuge

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Source: USFWS, KNWR, Apache, DOT, HDR 2012
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3.4.4 Hydrology

Seven watersheds consisting of 38 rivers and streams and 1,017 lakes and ponds occur within the project area. Nine streams and four lakes are classified as anadromous, as shown in Map 10. No designated wild and scenic rivers occur in the project area (USFWS 2009). The Swanson River is the largest flowing water in the northern project area, while the lower Kenai River is the largest flowing water in the southern project area (see Map 11). Most of the rivers and streams in the project area are non-glacial, lowland streams with moderate flows in late summer and fall and with high-flow periods in the summer (USFWS 2009). The majority of lakes and ponds in the project area freeze in November and thaw in May; larger rivers freeze later and thaw earlier than lakes and ponds (USFWS 2009).

Approximately 750 feet below the ground surface, an aquifer fulfills water requirements for a number of commercial, industrial, and domestic uses on the Kenai Peninsula. In 1992, the community of Kenai used 282 million gallons of groundwater (Glass 1996) for residential and commercial needs. Surface waters combined with seasonal runoff from snow, rain, and glacial melt replenish groundwater resources on the Kenai Peninsula. As a source of drinking water, local groundwater drinking quality ranges from marginal to excellent. While dissolved solids measure at approximately 152 milligrams per liter, the groundwater resources on the Kenai Peninsula do not always align with EPA water regulations. When tested, 8 percent of wells had arsenic exceeding the EPA's primary maximum containment level of 10 micrograms per liter (EPA 2012a). Arsenic levels exceeding the maximum containment level 10 micrograms per liter may cause health effects such as skin damage, circulatory problems, or increased risks of cancer (EPA 2012a). Forty-six percent of wells sampled had iron levels greater than 300 micrograms per liter, the secondary maximum containment level (Glass 1996). Secondary maximum containment levels are set for nuisance chemicals, which are typically non-enforceable and usually tested on a voluntary basis, increased contaminants may result discolored water, bad smell, or cloudy water (EPA 2012b).

3.5 Wildlife, Fish, and Amphibians

The following sections describe existing conditions for wildlife, fish, and amphibians in the project area.

3.5.1 Wildlife

The Kenai NWR contains a diverse assemblage of habitat types and hosts a climate that attracts a wide variety of wildlife species. At least 151 bird, 20 fish, 30 mammal, and 1 amphibian species occur in the Refuge and the project area during at least part of the year. Key wildlife species in the project area include trumpeter swan (*Cygnus buccinator*), bald eagle (*Haliaeetus leucocephalus*), caribou (*Rangifer tarandus*), moose (*Alces alces*), brown bear (*Ursus arctos*), black bear (*Ursus americanus*), wolves (*Canis lupus*), and a variety of furbearers. Several important anadromous streams are located in the project area including the Kenai and Swanson rivers and all five species of Pacific salmon occur within the project area. Important resident fish include longnose sucker (*Gatostomus catostomus*) and lake trout (*Salvelinus namaycush*). The following sections provide information on wildlife and fish use of the project area during proposed seismic operations.

3.5.1.1 Birds

The project area provides nesting, brood rearing, wintering, and migratory habitat for waterbirds (waterfowl, loons, cranes, seabirds, and shorebirds) and landbirds (raptors, owls, grouse and ptarmigan, and passerines). Approximately 150 bird species have been documented within or adjacent to the Kenai NWR and 113 species are known to breed in the Refuge. The majority of these species inhabit the Kenai NWR during the summer breeding season and migrates to wintering grounds in the lower 48 states, Mexico, and Central America. Table 3-5 lists waterfowl, raptors, woodpecker, and passerines are present in the project area during the winter when the majority of seismic operations would occur.

The Kenai NWR has one of the highest densities of nesting common loons (*Gavia immer*) in North America. The Swanson Lakes area is designated as an Important Bird Area by the National Audubon Society because trumpeter swans are found in the lakes, streams, and ponds of this area. Hundreds of lakes are scattered throughout this Important Bird Area and drain into the Moose or Swanson rivers, which are both shallow streams that meander through poorly drained swamps and muskeg flats (National Audubon Society 2012).

Table 3-5: Winter resident bird species in the project area

Species Name	Scientific Name	Abundance	Species Name	Scientific Name	Abundance
Trumpeter swan	<i>Cygnus buccinator</i>	R	Three-toed woodpecker	<i>Picoides dorsalis</i>	U
Mallard	<i>Anas platyrhynchos</i>	R	Gray jay	<i>Perisoreus canadensis</i>	C
Common goldeneye	<i>Bucephala clangula</i>	U	Steller's jay	<i>Cyanocitta stelleri</i>	U
Common merganser	<i>Mergus merganser</i>	U	Black-billed magpie	<i>Pica hudsonia</i>	C
Spruce grouse	<i>Falcapennis canadensis</i>	C	Common raven	<i>Corvus corax</i>	C
Willow ptarmigan	<i>Lagopus lagopus</i>	U	Black-capped chickadee	<i>Poecile atricapillus</i>	U or C
Northern goshawk	<i>Accipiter gentilis</i>	C	Boreal chickadee	<i>Poecile hudsonicus</i>	C
Bald eagle	<i>Haliaeetus leucocephalus</i>	U	Red-breasted nuthatch	<i>Sitta canadensis</i>	R
Gyrfalcon	<i>Falco rusticolus</i>	R	Brown creeper	<i>Certhia americana</i>	R
Glaucous-winged gull	<i>Larus glaucescens</i>	R	American dipper	<i>Cinclus mexicanus</i>	U
Great horned owl	<i>Bubo virginianus</i>	C	Rusty blackbird	<i>Euphagus carolinus</i>	I
Snowy owl	<i>Bubo scandiacus</i>	I	Golden-crowned kinglet	<i>Regulus satrapa</i>	R
Northern hawk owl	<i>Surnia ulula</i>	U	Bohemian waxwing	<i>Bombycilla garrulus</i>	R
Great gray owl	<i>Strix nebulosa</i>	R	Northern shrike	<i>Lanius excubitor</i>	R

Species Name	Scientific Name	Abundance	Species Name	Scientific Name	Abundance
Short-eared owl	<i>Asio flammeus</i>	R	Pine grosbeak	<i>Pinicola enucleator</i>	U
Boreal owl	<i>Aegolius funereus</i>	U	Common redpoll	<i>Acanthis flammea</i>	C
Northern saw-whet owl	<i>Aegolius acadicus</i>	R	Pine siskin	<i>Spinus pinus</i>	I
Hairy woodpecker	<i>Picoides villosus</i>	R	White-winged crossbill	<i>Loxia leucoptera</i>	U
Downy woodpecker	<i>Picoides pubescens</i>	R	Snow bunting	<i>Plectrophenax nivalis</i>	U
Black-backed woodpecker	<i>Picoides arcticus</i>	I			

Sources: USFWS (n.d.), National Audubon Society (2002), eBird (2012)

Notes: C = Common (should see), U = Uncommon (might see), R = Rare (seldom seen), I = Irregular (not observed every year)

The following paragraphs present an overview of bird species or groups that would occur in the project area during the proposed seismic survey operation period.

Waterbirds

Very few waterbirds remain in the Refuge during the winter months given the lack of open water (see Table 3-5). The outlet of Skilak Lake is frequently ice-free during the winter and attracts a variety of waterbirds. In winter, several species of waterfowl remain in the open waters of the Kenai River. Trumpeter swans overwinter at the outlet of Skilak Lake and other areas with open water during mild winters. Mallards, common mergansers, and common goldeneyes can be found throughout the Refuge in areas with open water. The glaucous-winged gull is the only marine bird that may be present in the Refuge during the winter (USFWS 2010, 3-58).

The trumpeter swan, Canada goose (*Branta canadensis*), and 16 duck species are likely to breed in the project area. Three species of loons (common, red-throated [*Gavia stellata*], and Pacific [*Gavia pacifica*]) have been documented as breeding in the Refuge. Red-necked (*Podiceps grisegena*) and horned grebes (*Podiceps auritus*) nest on lakes in the Refuge. Most shorebird species in the Kenai NWR are migrants; however, a few nest in the Refuge, including greater (*Tringa melanoleuca*) and lesser yellowlegs (*Tringa flavipes*); least (*Calidris minutilla*), spotted (*Actitis macularius*), and solitary sandpipers (*Tringa solitaria*); semi-palmated plovers (*Charadrius semipalmatus*); and Wilson's snipe (*Gallinago delicata*) (USFWS 2010, 3-60).

The Kenai NWR provides transitory and permanent nesting habitat for trumpeter swans (Map 12). They nest on a variety of freshwater marshes, ponds, lakes, and rivers, including beaver impoundments. Recent aerial surveys of nesting trumpeter swans indicate that as many as 50 pairs may nest in the Refuge (USFWS 2010, 3-94).

Raptors and Owls

Raptors known to overwinter in the Kenai NWR include bald eagles, gyrfalcon, northern goshawk, and seven species of owls (see Table 3-5). Of these species, only the northern goshawk and great-horned owl are considered common during the winter (USFWS N.d.). Other raptor

species listed in Table 3-5 are considered uncommon or rare during the winter. Fourteen species or raptors have been documented breeding in the Refuge (USFWS 2010, 3-61).

Bald eagles are present year-round in the project area. Wintering bald eagles are common at the outlet of Skilak Lake where open water is maintained during the winter. Several hundred bald eagles are present every winter along the Kenai River, above and below Skilak Lake (USFWS 2010, 3-36).

Nesting bald eagles in the Refuge have been surveyed on an annual basis since 1957, and counts of wintering bald eagles have been conducted since 1983. Thirteen nests were identified during previous surveys conducted by Refuge staff within the project area (Map 13).

Bald eagles are protected under the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668–668c) and the Migratory Bird Treaty Act. BGEPA protects bald eagles by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The Service generally recommends no clearing of vegetation within 330 feet of any nest. No activity should occur within 660 feet of any nests between March 1 and June 1. Between June 1 and August 31, no activity should occur within 660 feet of active eagle nests until after juvenile birds have fledged, unless specifically authorized by the Service. The Bald Eagle Management Guidelines recommend that helicopters maintain a 1,000-foot buffer from any active nests during aircraft overflights (USFWS 2007).

Grouse and Ptarmigan

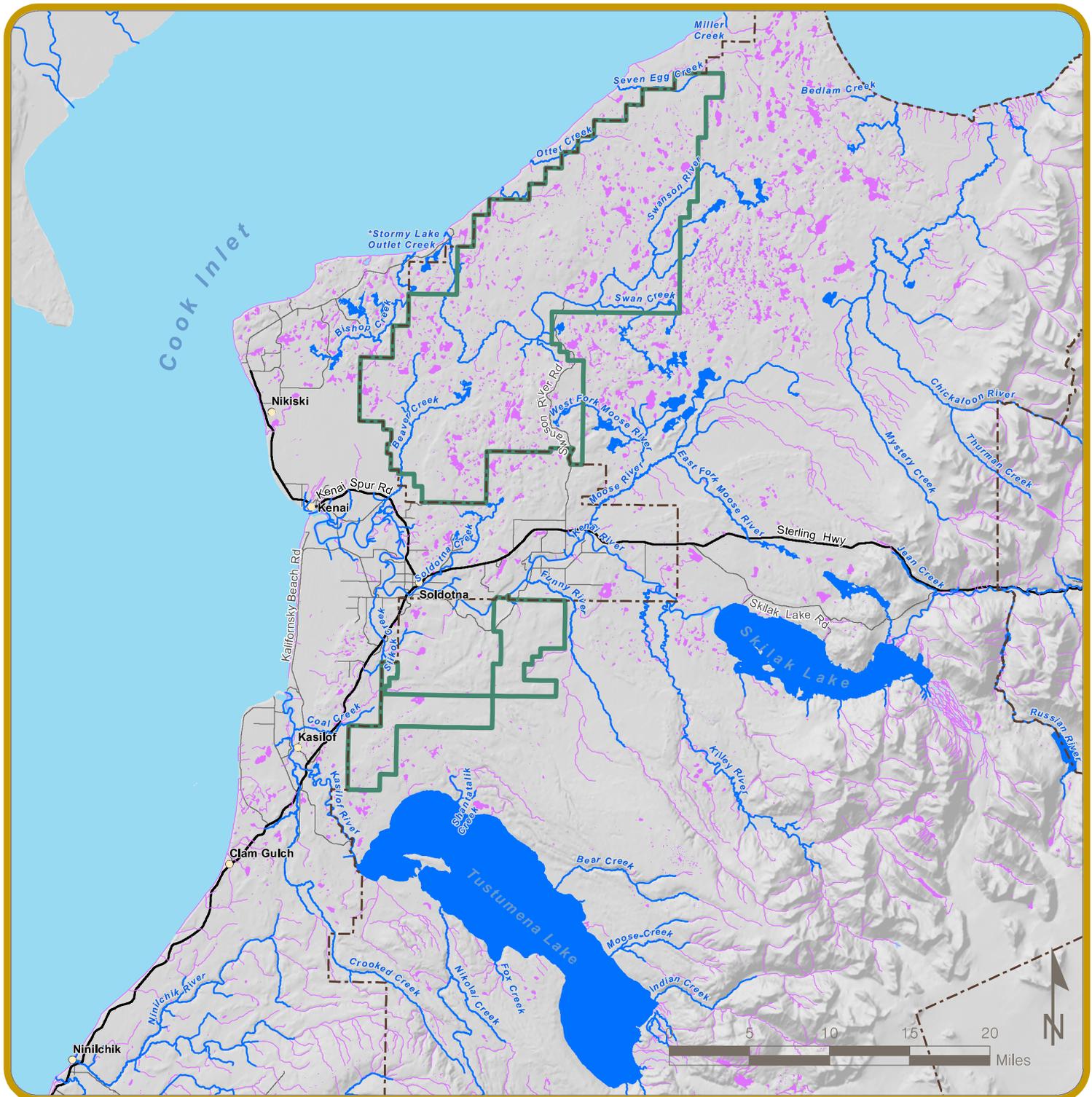
Important upland game birds in the project area include willow ptarmigan and spruce grouse. Spruce grouse inhabit forested habitat in the project area, whereas willow ptarmigan occur in subalpine shrub and alpine tundra habitats found in the upper elevations of the project area (USFWS 2010, 3-63).

Passerines

Close to 70 percent of passerine species that occur in the Kenai NWR migrate outside of Alaska for the winter. Most passerine migrants return to the state in May and leave in August or September. Black-billed magpie, common raven, black-capped chickadee, snow bunting, pine grosbeak, common redpoll, and pine siskin were the most common passerines documented during the Soldotna Christmas Bird Count (National Audubon Society 2012).

Resident birds remain active during the winter and rely primarily on fruit and seed crops. Resident ravens and gray jays scavenge on winter- or predator-killed carrion. Four woodpecker species—downy woodpecker, hairy woodpecker, three-toed woodpecker, and black-backed woodpecker—occur year-round in the Refuge.

The project area provides breeding habitat for the following passerine species: dark-eyed junco (*Junco hyemalis*), yellow-rumped warbler (*Setophaga coronata*), Swainson's thrush (*Catharus ustulatus*), boreal chickadee, orange-crowned warbler (*Oreothlypis celata*), ruby-crowned kinglet (*Regulus calendula*), gray jay, alder flycatcher (*Empidonax alnorum*), and American robin (*Turdus migratorius*). Avian species richness is greatest in black spruce, white spruce, hardwood, and mixed spruce-hardwood forest habitats in the Refuge (USFWS 2010) (see Figure 3.1).



Legend

- | | | | |
|---|-----------------|---|--------------------|
|  | KNWR Boundary |  | Anadromous Streams |
|  | Project Area |  | Resident Streams |
|  | Major Roads |  | Anadromous Lakes |
|  | Secondary Roads |  | Resident Lakes |

Apache Alaska Corporation Cook Inlet Seismic Exploration

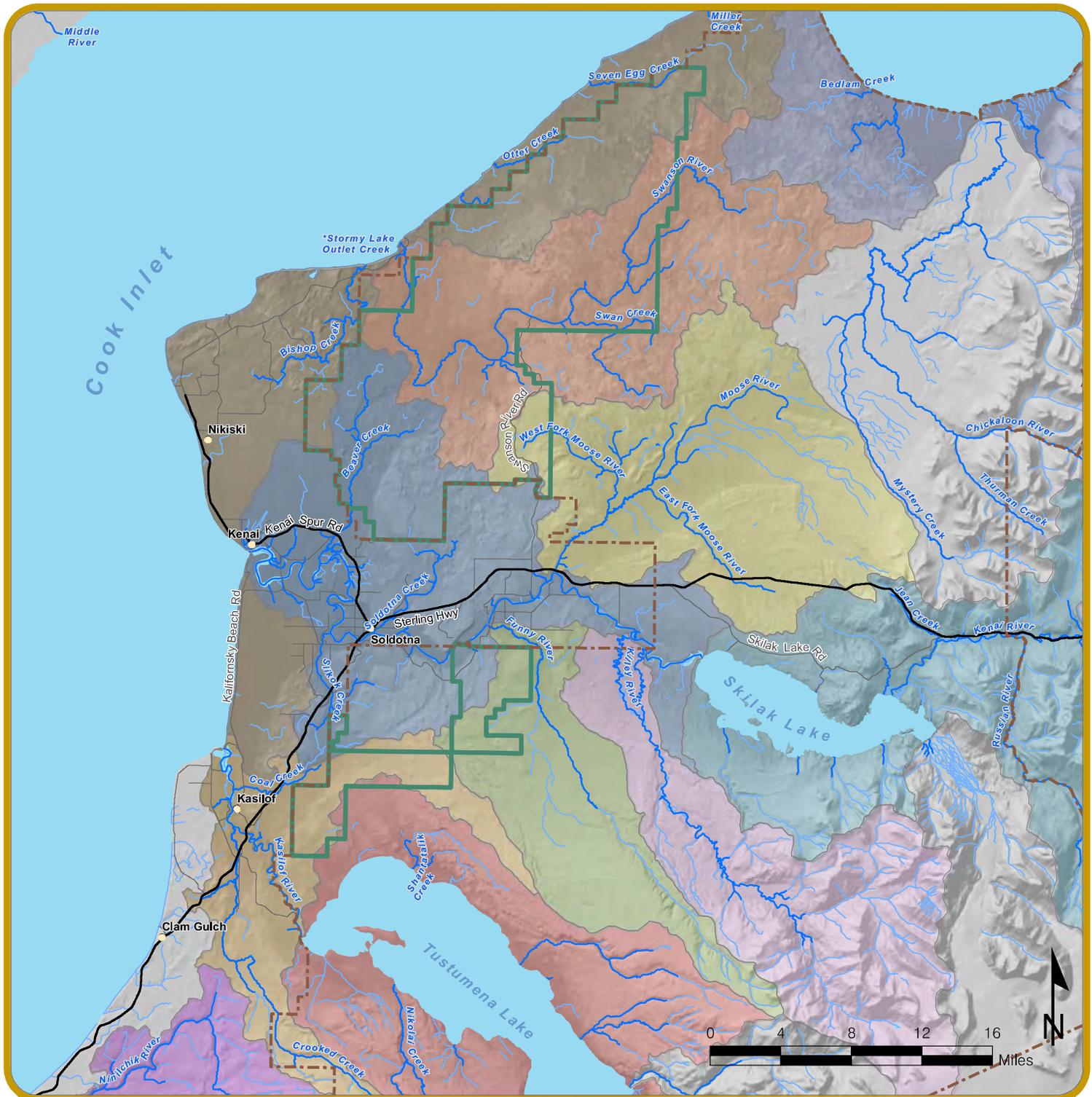
KNWR EA – Map 10 Aquatic Habitats in Kenai National Wildlife Refuge

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: ADF&G, USGS, KNWR, Apache, HDR 2012
Map Created By HDR 2/6/2013



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Legend

- | | | | |
|---|--------------------|---|--------------------------------|
|  | KNWR Boundary |  | Watersheds |
|  | Project Area |  | Funny River |
|  | Roads |  | Kasilof River |
|  | Major |  | Killey River |
|  | Secondary |  | Lower Kenai River |
|  | Anadromous Streams |  | Middle Kenai River |
|  | Resident Streams |  | Moose River |
| | |  | Ninilchik River |
| | |  | Swanson River |
| | |  | Turnagain Arm Frontage |
| | |  | Tustumena Lake |
| | | | Upper Kenai Peninsula Frontage |

Apache Alaska Corporation Cook Inlet Seismic Exploration

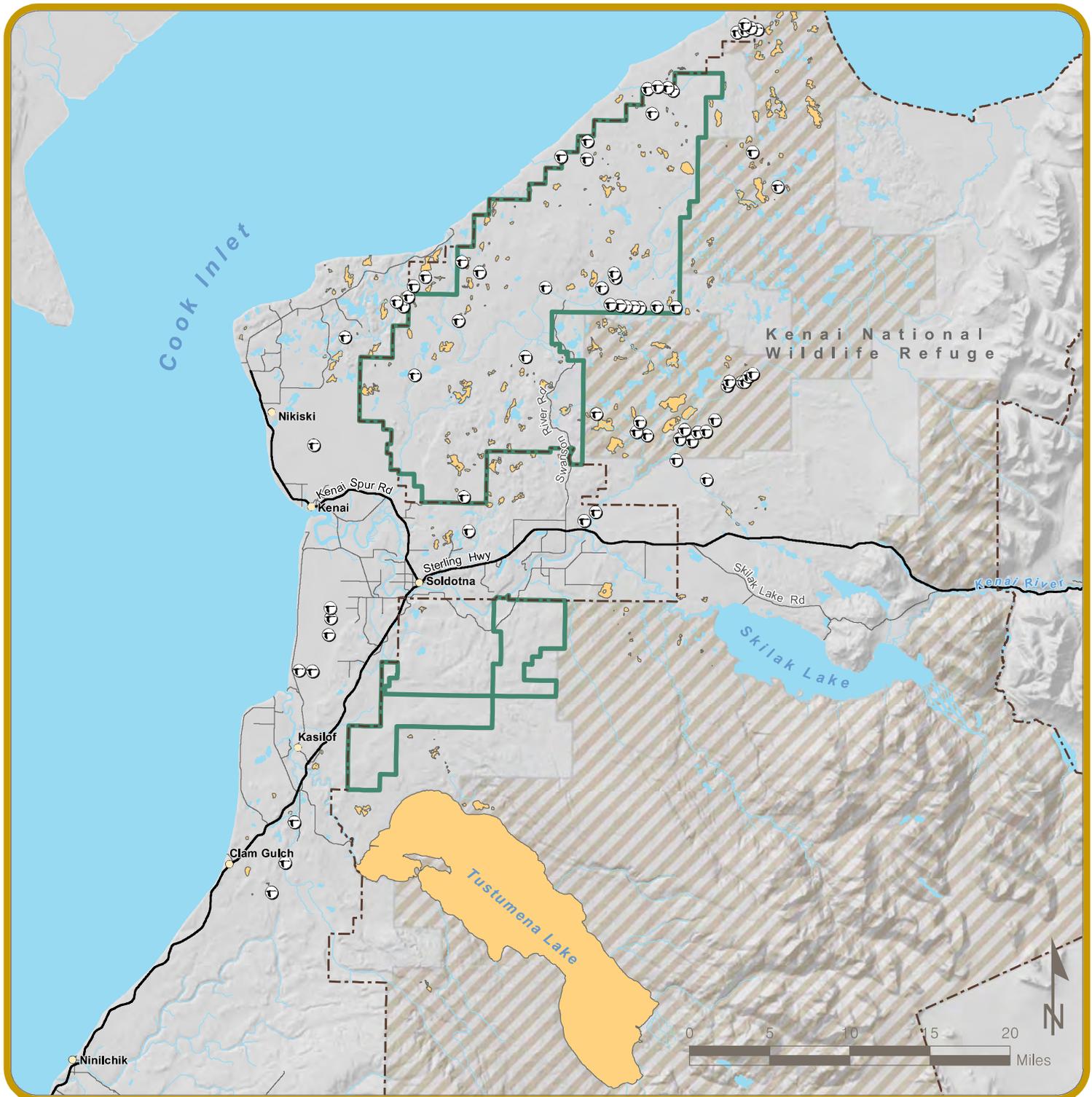
KNWR EA – Map 11 Watersheds in Kenai National Wildlife Refuge

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: ADF&G, USGS, KNWR, Apache, HDR 2012
Map Created By HDR 2/6/2013



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Legend

-  KNWR Boundary
-  Project Area
-  Major Roads
-  Secondary Roads
-  Rivers
-  KNWR Designated Wilderness Areas
-  Trumpeter Swan Nesting Lakes
-  Trumpeter Swan Non-Lake Nesting Sites

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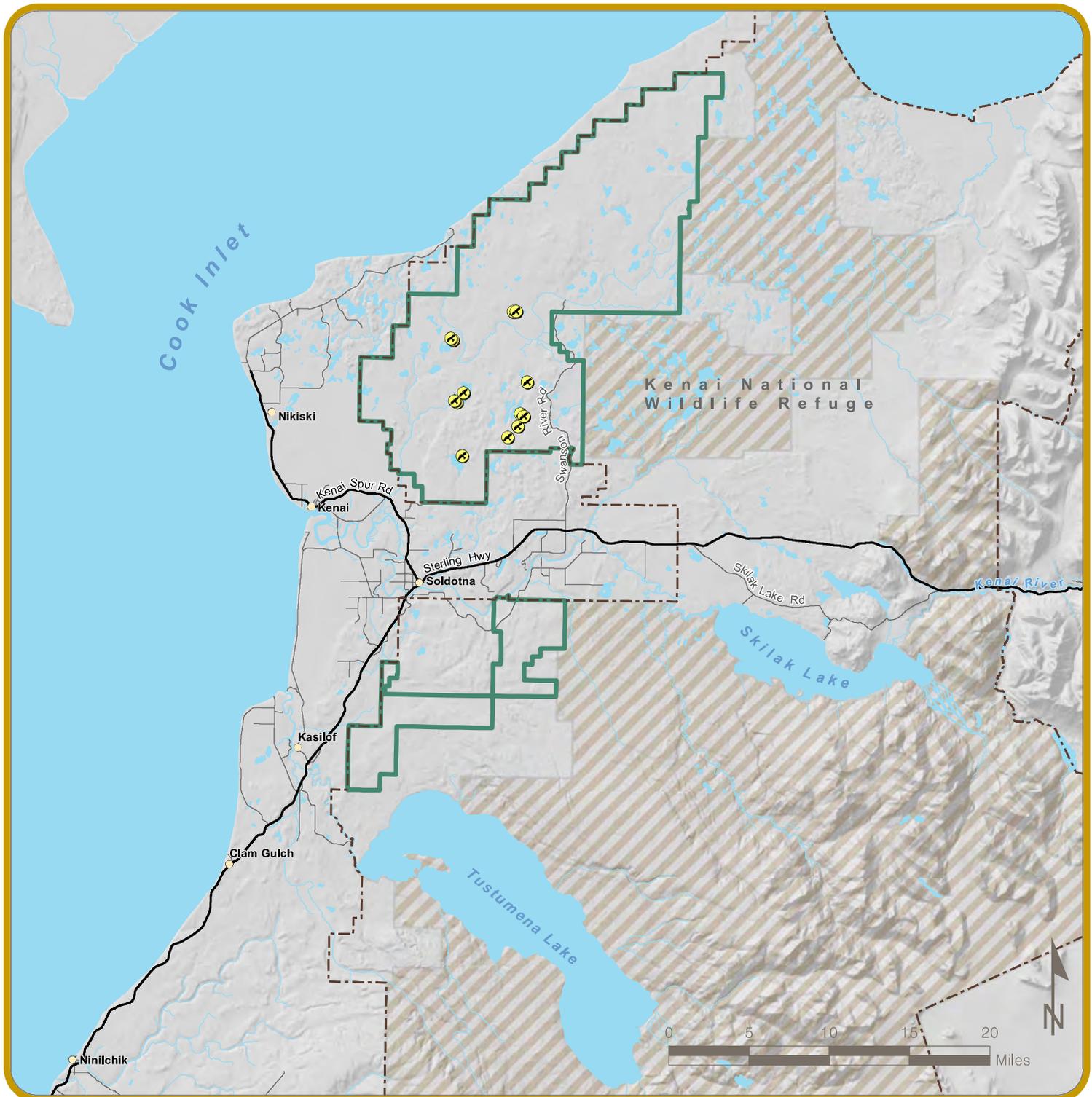
**KNWR EA – Map 12
Trumpeter Swan Nesting
Locations in the KNWR**

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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Legend

-  KNWR Boundary
-  Project Area
- Roads**
-  Major
-  Secondary
-  Rivers
-  KNWR Designated Wilderness Areas
-  Bald Eagle Nests Inside the Apache KNWR Project Area

Apache Alaska Corporation Cook Inlet Seismic Exploration

KNWR EA – Map 13 Bald Eagle Nests Inside Apache KNWR Project Area

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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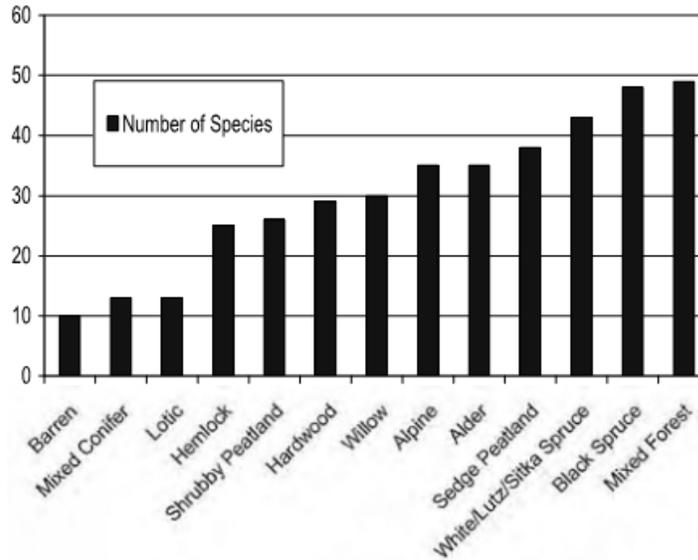


Figure 3.1: Avian species richness, by vegetation type, in the Kenai NWR

Source: USFWS (2010)

Non-native Birds

Several introduced species of game birds have been documented in the Kenai NWR. Ruffed grouse (*Bonasa umbellus*) were transplanted from interior Alaska to the Kenai Peninsula (Steen 1997) and have been documented breeding in the Refuge. Additionally, the following species have been documented in the Refuge: California quail (*Callipepla californica*), ring-necked pheasants (*Phasianus colchicus*), chukar (*Alectoris chukar*), northern bobwhite (*Colinus virginianus*), and rock pigeon (*Columba livia*). European starlings (*Sturnus vulgaris*), an invasive species that is not native to North America, has also been documented in the Refuge (USFWS 2010, 3-62).

Species of Conservation Concern

While no federally listed threatened or endangered species occur in the Kenai NWR, several species have been identified by Refuge staff and various agencies and nonprofit groups as birds of conservation concern that may occur in the project area during winter operations (USFWS 2010, 3-56). Table 3-6 lists birds that are listed as species of conservation concern in the project area. The list includes the Kenai NWR Species of Special Interest (SSI), Service Birds of Conservation Concern, and Alaska Audubon’s Watch List.

The Service developed the Birds of Conservation Concern, which provides a list of migratory and non-migratory bird species that represent the highest conservation priorities (USFWS 2008). The Audubon Alaska Watch List identifies Alaska birds that are vulnerable or declining, therefore warranting special conservation attention (Kirchhoff and Padula 2010).

Table 3-6: Birds of conservation concern in the project area

Common Name	Scientific Name	USFWS birds of conservation concern ^a	Kenai NWR species of special interest ^b	Audubon Alaska Watch List Species ^c	Habitat Association ^d
Trumpeter swan	<i>Cynus buccinator</i>		•		Preferred nesting habitat is a shallow wetland with an irregular shoreline; abundant, elevated nest sites; high volume and high diversity of aquatic invertebrates and/or plants, especially emergent vegetation and a low level of human disturbance.
Red-throated loon	<i>Gavia stellata</i>			•	Breeds in low tundra wetlands, bogs, and ponds in forests. In migration, flocks stage on large lakes. Winters in relatively shallow, sheltered marine habitat.
Horned grebe	<i>Podiceps auritus</i>	•			Nests on marshes and lakes where it builds a floating nest. Winters on large water bodies such as bays and inlets.
Bald eagle	<i>Haliaeetus leucocephalus</i>	•			Often found along Alaska's coast, offshore islands, and interior lakes and rivers.
Northern goshawk	<i>Accipiter gentilis</i>		•		Coniferous forests, mixed forests.
Solitary sandpiper	<i>Tringa solitaria</i>	•		•	Solitary and nests in muskeg bogs in areas of coniferous, particularly spruce, forest near ponds and lakes.
Lesser yellowlegs	<i>Tringa flavipes</i>	•		•	Typically nests in open boreal forest and forest/tundra ecotone with scattered shallow wetlands.
Arctic tern	<i>Sterna paradisaea</i>	•			Inshore/offshore marine waters, tidal flats and beaches, moraines, rivers and lakes, marshes; nests on sands, gravel, moss, or rocks.
Short-eared owl	<i>Asio flammeus</i>	•			Grasslands, salt marshes, estuaries, mountain meadows, and alpine and Arctic tundra.
Blackpoll warbler	<i>Dendroica striata</i>			•	Coniferous forests, mixed woodlands, shrub thickets; nests near ground in shrubs, thickets.
Olive-sided flycatcher	<i>Contopus cooperi</i>	•		•	Openings, including muskegs, meadows, burned and logged areas; streams, beaver ponds, bogs, lakes; uses dead tree snags or partially dead trees to perch for singing and hawking insects.

Common Name	Scientific Name	USFWS birds of conservation concern ^a	Kenai NWR species of special interest ^b	Audubon Alaska Watch List Species ^c	Habitat Association ^d
Rufous hummingbird	<i>Selasphorus rufus</i>	•			Forest edges and openings, sea level to alpine where flowers are available.
Rusty blackbird	<i>Euphagus carolinus</i>	•		•	Willow thickets near coastal rivers, swampy areas inland; nests in adjacent conifers, willow, or alders near water.
Varied thrush	<i>Ixoreus naevius</i>			•	Breeds in wet coniferous or mixed forests. Prefers mature forests with a closed canopy, but found in second growth forests.

^a USFWS (2008)

^b USFWS (2010)

^c Kirchoff and Padula (2010)

^d Poole (2005)

3.5.1.2 Terrestrial Mammals

The project area provides habitat for 30 species of terrestrial mammals that are ecologically, economically, socially, and culturally important species in the Kenai NWR. The discussion below focuses on mammal species that are of special interest in the Refuge, including black and brown bears, moose, caribou, gray wolves, and furbearers.

Black Bear

Black bears are common in forested habitats throughout the Kenai NWR but also occur above tree line in the Kenai Mountains (USFWS 2010). Black bears hibernate in dens during the winter, which may be located from sea level to alpine areas, and may be in rock cavities, hollow trees, or excavations (ADF&G 2012a). Schwartz and Franzmann (1991) found that the strength of black bear populations on the Kenai Peninsula was linked to moose abundance. Other important food sources for black bears include vegetation, berries, and salmon. Devil’s club (*Oplopanax horridus*) appears to be an important food source for black bears (Schwartz and Franzmann 1991).

Black bear populations on the Kenai Peninsula appear stable with estimates of 3,000 (Del Frate 2002). Black bear hunting is open year-round on the Kenai Peninsula and bear baiting is allowed in certain areas of Game Management Unit (GMU) 15, including areas in the Refuge. The average annual harvest of black bears was 360 from 2005 to 2010 for GMU 15 (J. Selinger 2011).

Brown Bear

The Kenai Peninsula brown bear is designated as a State of Alaska “species of greatest conservation need” based on the potential for future decline because of human encroachment

into brown bear habitat (ADF&G 2006). In August 2011, the State of Alaska eliminated the “species of special concern” list; the list is footnoted in Appendix 7 of the Alaska State Wildlife Action Plan. Additionally, brown bears are a species of continued interest and study in the Refuge because of the insular nature of their relatively small population and threats from human-caused mortality. The Kenai NWR has the largest continuous, homogenous block of brown bear habitat on the Kenai Peninsula and is federally mandated by Congress to conserve bear populations and habitat in their natural diversity (USFWS 2010, 3-65).

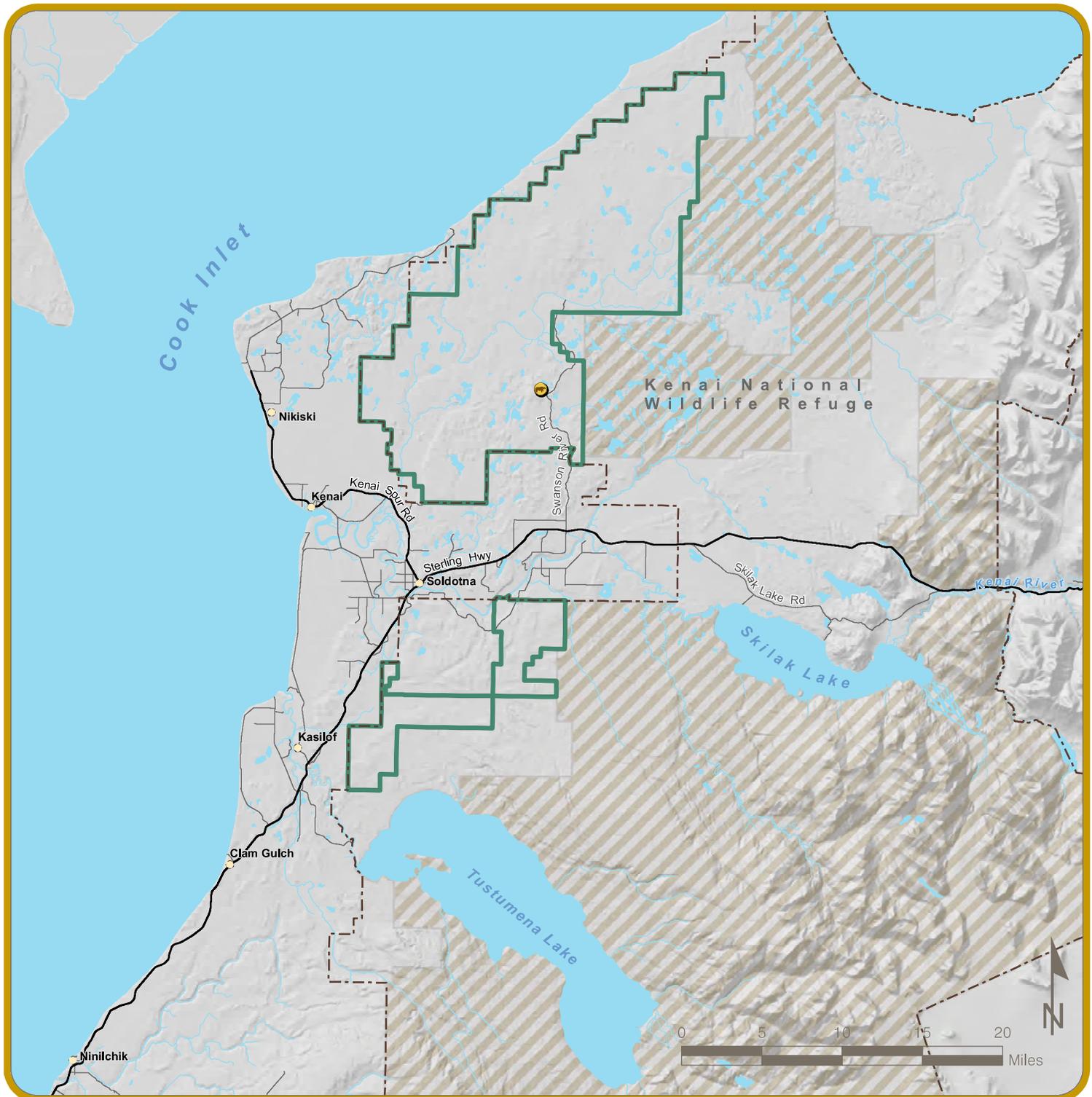
Brown bears are found throughout the Kenai lowland forests and intermountain valleys with highest densities occurring in forested lowlands and subalpine areas west of the Kenai Mountains (J. Selinger 2009a). Brown bears are opportunistic foragers, but they do have seasonal habitat preferences. Hilderbrand et al. (1999) found that moose carrion and calves accounted for approximately 76 percent of the spring-to-mid-July diet, with vegetation accounting for the remainder. Brown bears rely heavily on moose during the spring when they may be short of energy and/or protein from spring growth and lactation, or when they are replenishing lean mass lost while hibernating (USFWS 2009). Salmon accounted for the majority (approximately 60 percent) of the fall diet (Hilderbrand, et al. 1999).

The Kenai Peninsula population of brown bears is estimated at 624 individuals, based on a recent study conducted in 2010 (Morton, et al. 2013). The study used capture and genetic analysis of hair samples in a large study area and extrapolation to the Kenai Peninsula as a whole. The study area included 11,700 km² of the Kenai Peninsula on lands administered by the Refuge and Chugach National Forest. A total of 224 individual bears were noted in the study area. The published study indicated the population is likely stable, with approximately equal numbers of males and females (200 each) and about 224 dependent young. The Kenai Peninsula (GMU 7 and 15) encompasses 9,500 square kilometers (3,668 square miles) of available bear habitat (i.e., not counting ice fields, large lakes, and the human built environment) (Morton, et al. 2013). The estimated bear density is 45.1 bears per 1,000 square kilometers (11 to 12 bears per 100 square miles; (Morton, et al. 2013)). Despite the large runs of salmon in the Kenai River and other streams and their known use by bears for food, this population density is closer to Interior Alaska bear densities (non-salmon-dependent populations) than salmon-dependent coastal population densities (Morton, et al. 2013).

Brown bears are typically dormant during the winter months, entering their dens in November and emerging between March and June; however, bears may be active during the winter months (ADF&G 2006). One brown bear den has been documented within the project area (see Map 14). These dens likely represent only a small sample of the actual dens in the project area given the difficulty of finding dens (J. Selinger 2012).

Moose

Moose are common year-round in the Kenai NWR in association with a wide variety of forest, shrub (willow), and wetlands habitats from the Kenai Lowlands to the Kenai Mountains. Moose populations in the Refuge have increased from 5,000 moose in 1985 to almost 6,000 (USFWS 2010, 3-79). Winter habitat is considered to be the limiting factor for moose populations (USFWS 1999). Winter habitat for moose is associated with riparian vegetation along rivers and early seral forest. During deep-snow winters, moose tend to move into mountain valleys and onto the Kenai Lowlands (USFWS 2010, 3-79).



Legend

-  KNWR Boundary
-  Project Area
- Roads**
-  Major
-  Secondary
-  Rivers
-  KNWR Designated Wilderness Areas
-  Brown Bear Dens Inside the Apache KNWR Project Area

**Apache Alaska Corporation
Cook Inlet Seismic Exploration**

**KNWR EA – Map 14
Brown Bear Dens Inside
Apache KNWR Project Area**

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/12/2013



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The project area is located within GMU 15A, 15B, and a small section of 15C. ADF&G documented a decline in population size in GMU 15A. GMU 15B has remained relatively stable, while GMU 15C has seen an increase in population. Habitat quality has declined throughout most of GMU 15A as forest succession resulting from the 1947 Skilak Lake fire transitions from an intermediate to mature age class. GMU 15B has seen very little change in habitat conditions and GMU 15C had large wildland fires (Windy Point and Crooked Creek) and widespread logging of beetle-killed spruce on the lower Kenai Peninsula (J. Selinger 2011). Another factor that affects moose populations in the Refuge includes an increase in moose-vehicle collisions along the Sterling Highway (USFWS 2010, 3-91).

Caribou

Four caribou herds live on the Kenai Peninsula, but only two of the herds occur within the project area: the Kenai Lowlands herd (closed to hunting) and the Killey River herd (open to hunting). The Kenai Lowlands herd summers in Subunit 15A from north of the Kenai airport to the Swanson River and in the extreme western portion of 15B. The population winters on the lower Moose River to the outlet of Skilak Lake. Kenai Lowlands caribou migrate to calving grounds on the Kenai River Flats (USFWS 2010, 2-129). The Kenai Lowland herd has remained at around 135 to 150 caribou since 1998, although domestic dog and coyote predation at the urban interface may influence herd size (USFWS 2010, 3-79). The Killey River herd inhabits the upper drainages of Funny and Killey rivers and north to the Skilak River in Subunit 15B. The herd population is around 300 individuals (J. Selinger 2009b).

Gray Wolf

Wolves thrive in a wide variety of habitats where suitable prey populations exist (MacDonald and Cook 2009). An abundance of moose or caribou and minimal human disturbance are necessary to maintain wolf populations. An estimated 80 to 99 wolves occur in GMU 15A in at least five to seven packs (USFWS 2010). The Kenai River Valley is an important movement corridor for wolves and other carnivores because it provides easy access through the area (Jozwiak 1997).

Furbearers and other mammals

The Kenai NWR provides habitat for a variety of furbearer species, including Canada lynx (*Lynx canadensis*), red fox (*Vulpes vulpes kenaiensis*), marten (*Martes americana kenaiensis*), snowshoe hare (*Lepus americanus*), mink (*Neovison vison*), wolverine (*Gulo gulo*), river otter (*Lontra canadensis*), beaver (*Castor canadensis*), and coyote (*Canis latrans*). Other furbearers include short-tailed weasel (*Genus mustela*), least weasel (*Mustela nivalis*), muskrat (*Ondatra zibethicus*), red squirrel (*Tamiasciurus hudsonicus kenaiensis*), and northern flying squirrel (*Glaucomys sabrinus*) (USFWS 2010). The Refuge has designated the red fox, marten, and wolverine as “species of special interest” because of their declining populations and local rarity (USFWS 2010, see Table 3.7).

Other mammals that have been documented in the Refuge include vagrant shrew (*Sorex vagrans*), masked shrew (*Sorex cinereus*), dusky shrew (*Sorex monticolus*), pygmy shrew (*Sorex hoyi*), singing vole (*Microtus miurus*), tundra vole (*Microtus oeconomus*), northern red-backed vole (*Myodes rutilus*), northern bog lemming (*Synaptomys borealis*), and the little brown bat (*Myotis lucifugus*) (USFWS 2010) (see Table 3-7).

Species of Conservation Concern

The project area includes habitat for six mammal species that are identified as special status species by ADF&G and the Kenai NWR. Four species are listed as “species of greatest conservation need” as identified by ADF&G’s Comprehensive Wildlife Conservation Strategy (ADF&G 2006). In addition, the Refuge identifies three mammals in the project area as “species of special” or “continued” interest (USFWS 2010) (see Table 3-7).

Table 3-7: Mammal species of conservation concern known to occur in the project area

Common Name ^a	Scientific Name ^a	ADF&G “featured species” ^b	Species Note ^c	Status and Habitat Association ^{a, b}
Red squirrel	<i>Tamiasciurus hudsonicus kenaiensis</i>	•		Forest loss attributable to bark beetle infestation. Common in coniferous forests.
Little brown bat	<i>Myotis lucifugus</i>	•		Lack of information on life history. Widespread in a variety of habitats.
Red fox	<i>Vulpes vulpes kenaiensis</i>		SSI	Rare population on the Kenai Peninsula in boreal forest and other habitats.
Brown bear	<i>Ursus arctos</i>	•	SCI	Small population and threats from human-caused mortality. Forests, mountain meadows, muskegs.
Wolverine	<i>Gulo gulo luscus</i>		SSI	Declining harvest and population on Kenai Peninsula in wide range of habitats.
Marten	<i>Martes americana kenaiensis</i>	•		Very low densities on the western Kenai Peninsula and loss of forest attributable to bark beetle. Found in old-growth spruce forests with well-established understory.

^a (MacDonald and Cook 2009)

^b (ADF&G 2006)

^c (USFWS 2010)

Notes: SSI = Species of Special Interest, SCI = Species of Continuing Interest

3.5.1.3 Threatened and Endangered Species

In accordance with Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended, 16 USC 1531 et seq.), no federally listed threatened or endangered species are known to breed or overwinter in the Kenai NWR (USFWS 2010). In addition, no State-listed endangered species are known to occur in the project area (ADF&G 2012b).

3.5.2 Fish

Twenty-one fish species are documented in Kenai NWR water bodies. Table 3-8 provides the scientific and common name of each fish species occurring in Refuge waters.

Table 3-8: Fish species occurring within the Kenai NWR

Scientific Name	Common Name
<i>Oncorhynchus nerka</i>	sockeye salmon
<i>Oncorhynchus kisutch</i>	coho salmon
<i>Oncorhynchus gorbuscha</i>	pink salmon
<i>Oncorhynchus keta</i>	chum salmon
<i>Oncorhynchus tshawytscha</i>	chinook salmon
<i>Oncorhynchus mykiss</i>	rainbow trout/steelhead
<i>Salvelinus malma</i>	Dolly Varden
<i>Salvelinus alpinus</i>	Arctic char
<i>Thaleichthys pacificus</i>	eulachon
<i>Platichthys stellatus</i>	starry flounder
<i>Cottus aleuticus</i>	coastrange sculpin
<i>Lampetra japonica</i>	Arctic lamprey
<i>Lampetra tridentata</i>	Pacific lamprey
<i>Gasterosteus aculeatus</i>	threespine stickleback
<i>Pungitius pungitius</i>	ninespine stickleback
<i>Prosopium cylindraceum</i>	round whitefish
<i>Cottus cognatus</i>	slimy sculpin
<i>Esox lucius</i>	northern pike
<i>Gatostomus catostomus</i>	longnose sucker
<i>Thymallus arcticus</i>	Arctic grayling
<i>Salvelinus namaycush</i>	lake trout

Source: (USFWS 1995)

Nine streams and 4 lakes in the project area support anadromous fish (ADF&G 2012c, USFWS 2009). The Kenai River (5,563 square miles) watershed is the largest in the Kenai NWR and occurs within the project area. Two of the largest lakes on the Kenai Peninsula are near the eastern boundary of the project area (Skilak Lake and Tustumena Lake). Anadromous lakes and streams that provide habitat for spawning, rearing, overwintering, and migration of Pacific salmon, especially larger water bodies such as the Kenai River and Skilak and Tustumena lakes, are subject to Essential Fish Habitat (EFH) jurisdiction. For a complete overview of anadromous water bodies, see Appendix C; a hydrology discussion is provided in Section 3.4.4.

3.5.2.1 Anadromous Fish

Anadromous fish expected to occur in the project area include Pacific salmon, char, steelhead, stickleback, sculpin, flounder, lamprey, and eulachon (USFWS 1995).

Anadromous fish migrate by traveling from freshwater streams to sea to optimize feeding and growth. At maturity, they return to freshwater to spawn, where they die soon after spawning (Groot and Margolis 1991). Some anadromous fishes such as char, steelhead, and stickleback may utilize an amphidromous migration pattern involving travel between freshwater and nearshore coastal waters, primarily for feeding (Mecklenburg, Mecklenburg and Thorsteinson 2002). Amphidromous fish commonly return to freshwater streams and lakes to overwinter.

3.5.2.2 Pacific Salmon

Pacific salmon (sockeye, chum, pink, Chinook, and coho) occurring in the project area provide fish resources for annual commercial, personal-use, and sport-fish harvests along the Kenai Peninsula. Sockeye salmon in particular merit attention for their overall high annual harvest (USFWS 2009). In 2011, the estimated escapement of sockeye salmon on the Kenai and Kasilof rivers were 1,599,217 and 245,721, respectively. In the same year, approximately 5,277,400 sockeye salmon were commercially harvested in the Upper Cook Inlet. Moreover, an estimated 341,000 sockeye salmon were destined for sport fishery and 630,370 for personal use on the Kenai River (Shields and Dupuis 2012).

Pacific salmon (sockeye, coho, pink, chum, and Chinook) occurring within the project area each have a unique period of time for spawning, outmigration from freshwater to sea, and duration at sea. Table 3-9 provides an overview of sensitive periods documented for Pacific salmon.

Table 3-9: Periods of sensitivity for Pacific salmon

Species	Spawning	Freshwater Residence	Duration at Sea
Sockeye	Mid-June through August	1–3 years	2–3 years
Chinook	Late May through early August	2 years	3–7 years
Coho	Early run – late July through early September Late run – August through October	2–3 years	1 year
Chum	Mid-July through mid-August	Migrate to sea after emerging from gravel	3–6 years
Pink	Early July through August	Migrate to sea after emerging from gravel	1 year

Source: USFWS (1995)

3.5.3 Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act defines EFH as:

... those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: ‘Waters’ include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; ‘substrate’ includes sediment, hard bottom, structures underlying the waters, and associated biological communities; ‘necessary’ means 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’ covers a species’ full life cycle (50 CFR Part 600.10).

In the project area, the EFH designation applies to Pacific salmon habitat including inland freshwater rivers, streams, and lakes that support Pacific salmon. The Magnuson-Stevens Conservation and Management Act require agencies such as the Service to consult with the National Marine Fisheries Service to determine which waters contain EFH and to review proposed actions that may adversely affect EFH [50 CFR 600.930(a)(1)].

3.5.3.1 Anadromous Streams

The anadromous streams under EFH jurisdiction in the project area are identified in Table 3-10. The *2012 Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes* documents anadromous streams, lakes, and fish species under EFH jurisdiction (ADF&G 2012c). Anadromous streams provide important habitat for spawning, egg incubation, and rearing and feeding of young salmon. A more comprehensive review of anadromous water body information within the project area is provided in Appendix C.

Table 3-10: Anadromous streams under EFH jurisdiction within the project area

Anadromous Water Body Name	Sockeye Salmon	Coho Salmon	Pink Salmon	Chinook Salmon	Chum Salmon
Beaver Creek	•	•		•	
Bishop Creek	•	•	•		
Kenai River	•	•	•	•	•
Otter Creek		•			
Seven Egg Creek		•			
Swan Creek	•	•			
Swanson River	•	•			
West Fork Moose River	•	•		•	

Source: ADF&G (2012c)

3.5.3.2 Anadromous Lakes

Anadromous lakes provide migration corridors to spawning, rearing, and feeding habitat for Pacific salmon. Anadromous lakes are typically large and unimpeded enough to allow passage of migrating anadromous fish. Anadromous lakes under EFH jurisdiction occurring within the project area are identified in Table 3-11.

Table 3-11: Anadromous lakes projected as EFH within the project area

Anadromous Lake Name	sockeye Salmon	Coho Salmon	Pink Salmon	Chum Salmon	Chinook Salmon
Silver Lake		•			
Campfire Lake	•				
Beaver Lake		•			
Mosquito Lake		•			

Source: ADF&G (2012c)

3.5.4 Amphibians

The wood frog (*Rana sylvatica*) is widespread and relatively common in most of Alaska, including the Kenai NWR. The wood frog is considered a State “species of greatest conservation need” (ADF&G 2006). Loss and degradation of wetland habitat, especially in southcentral Alaska, is of concern (Gotthardt 2005). Wood frogs breed in early spring in shallow bodies of permanent or ephemeral water. A resident of grassland and open forest, wood frogs can often be found considerable distances from water. Wood frogs hibernate under the snow in shallow depressions of compacted forest litter (MacDonald 2004).

Wood frog populations have been monitored on the Refuge since 2000 as part of the National Abnormal Amphibian Program. Proximity to roads has been positively correlated with risk of skeletal abnormalities in Alaskan wood frogs, possibly resulting from chemical contamination of their habitat or by facilitating introduction of predators, parasites, or pathogens (Reeves, et al. 2008).

3.6 Public Uses

The Kenai NWR supports opportunities for wildlife-dependent recreation and associated activities, commercial services, and limited subsistence activities. Spring, summer, and fall activities include freshwater fishing, big game and waterfowl hunting, sightseeing, wildlife viewing, rafting, camping, and hiking. (see Map 15). Winter activities include trapping, cross-country skiing, snowshoeing, snowmachine use, and dog mushing (see Map 16). Within the project area, 137,057 acres (96 percent) are open to snowmachine use when the Refuge Manager determines adequate snow depth to reduce vegetation damage is present. The Kenai NWR is the most visited NWR in Alaska, and both Kenai Peninsula population and Sterling Highway summer traffic have doubled since 1985 (USFWS 2010, 3-139).

3.6.1 Fishing

Several recreational fisheries occur in the Kenai NWR, and others that occur off Refuge land are supplemented with Refuge-produced fish. In the Swanson River drainage, rainbow trout and coho salmon are the most popular sport fish species (USFWS 2010, 3-140). Most public use of the fishery occurs in the summer and fall, although some lakes are popular ice fishing locations in winter and early spring (see Table 3-12). The Swanson River drainage and freshwaters north of the Kenai River are open for recreational fishing from June 15 to April 14; Crooked Creek is open from August 1 to December 31; the Moose River drainage is open from June 11 to May 1; the Lower Kenai mainstem is open generally from January 1 to July 31; Skilak Lake is open year-round for all species of sport fish except coho salmon, Chinook salmon, and rainbow/steelhead trout (ADF&G 2013).

Table 3-12: Recreational fisheries in the Kenai NWR

Areas within the Kenai NWR	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Swanson River and freshwaters north of Kenai River												
Crooked Creek												
Moose River drainage												
Lower Kenai mainstem												
Skilak Lake												

Note: The blue shading indicates the open season for fishing.

Source: (ADF&G 2013)

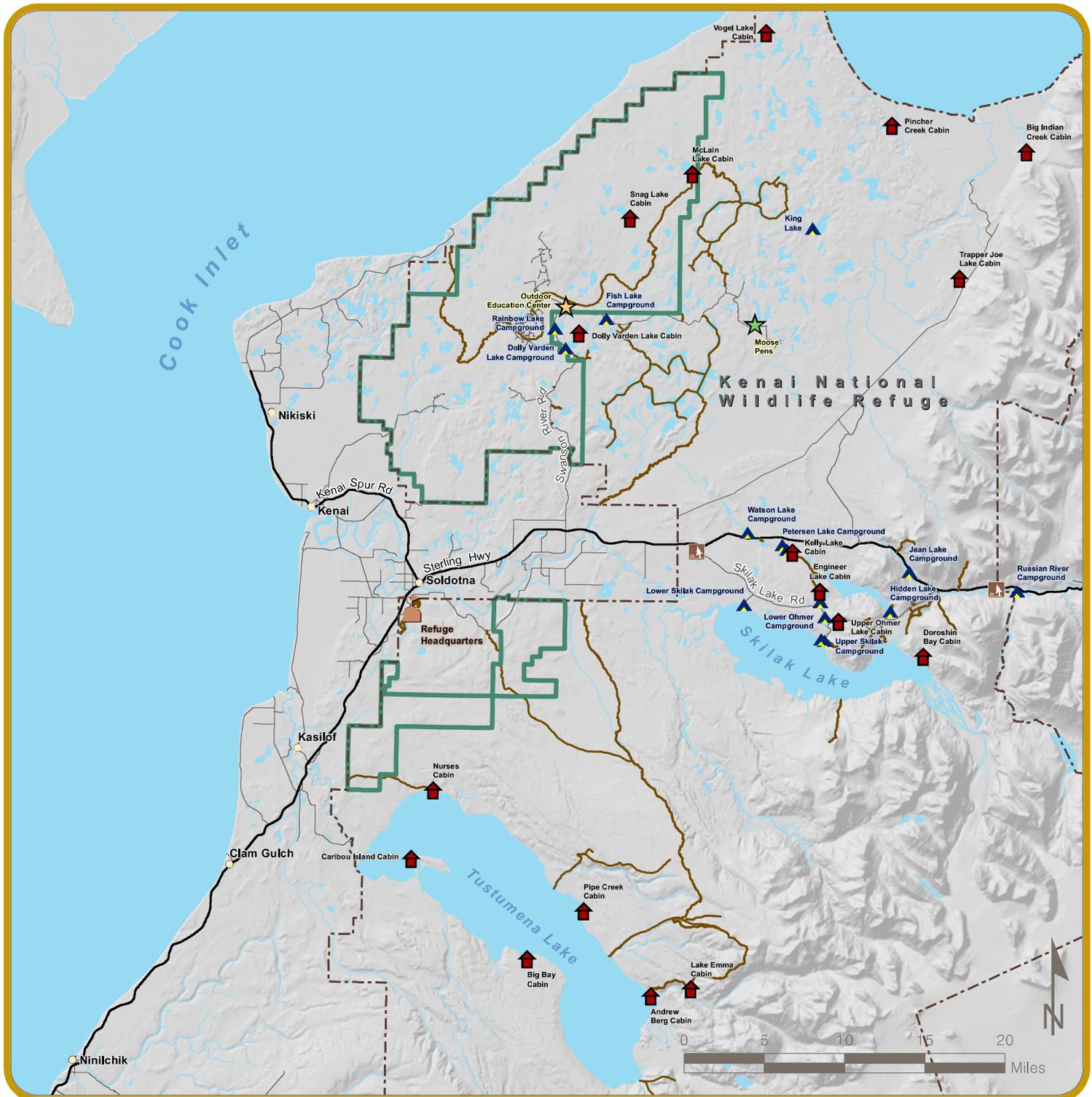
3.6.2 Hunting and Trapping

Hunting is a popular public use in the Kenai NWR. The project area lies within GMUs 15A, 15B, and 15C. Some areas within the Refuge specifically favor non-aircraft hunters and young hunters as well as traditional recreational hunters. Big game is the most commonly hunted, with small game, upland birds, and migratory waterfowl also sought but less popular. Hunting generally occurs in the fall between mid-August and the end of October. Brown bear hunting continues until the end of November. A spring brown bear hunt occurs from the beginning of April through mid-June. Wolverine and wolf hunting seasons continue until the end of March and the end of April, respectively, and there is no closed season for black bear (ADF&G 2012d). Additional information about these species is presented in Section 3.5.

Trapping occurs in the Refuge during the open season, which begins November 10. Trapping is conducted by snowmachine, on foot, and by airplane. Trapping is less popular than hunting (see Map 17) (USFWS 2010, 3-147).

3.6.3 Wildlife Viewing and Photography

A combination of habitat variety, abundant wildlife population and diversity, easy access, and wide-ranging recreation facilities gives Refuge visitors outstanding opportunities for wildlife observation and photography. A variety of hiking trails and roadside lakes provide wildlife viewing and photography opportunities for big game and various waterfowl, raptors, and passerines. Within the project area, the Swan Lakes and Swanson River canoe trails are excellent venues to observe waterfowl, moose, and passerines. Bald eagles may be seen virtually anywhere in the Refuge (USFWS 2010, 3-146).



Legend

- | | | | |
|---|---------------|---|------------------|
|  | KNWR Boundary |  | Headquarters |
|  | Project Area |  | Public Use Cabin |
| Roads | |  | Campground |
|  | Major |  | Day Use Area |
|  | Secondary |  | Education Center |
|  | KNWR Trails |  | Research Center |
|  | Rivers | | |

Apache Alaska Corporation Cook Inlet Seismic Exploration

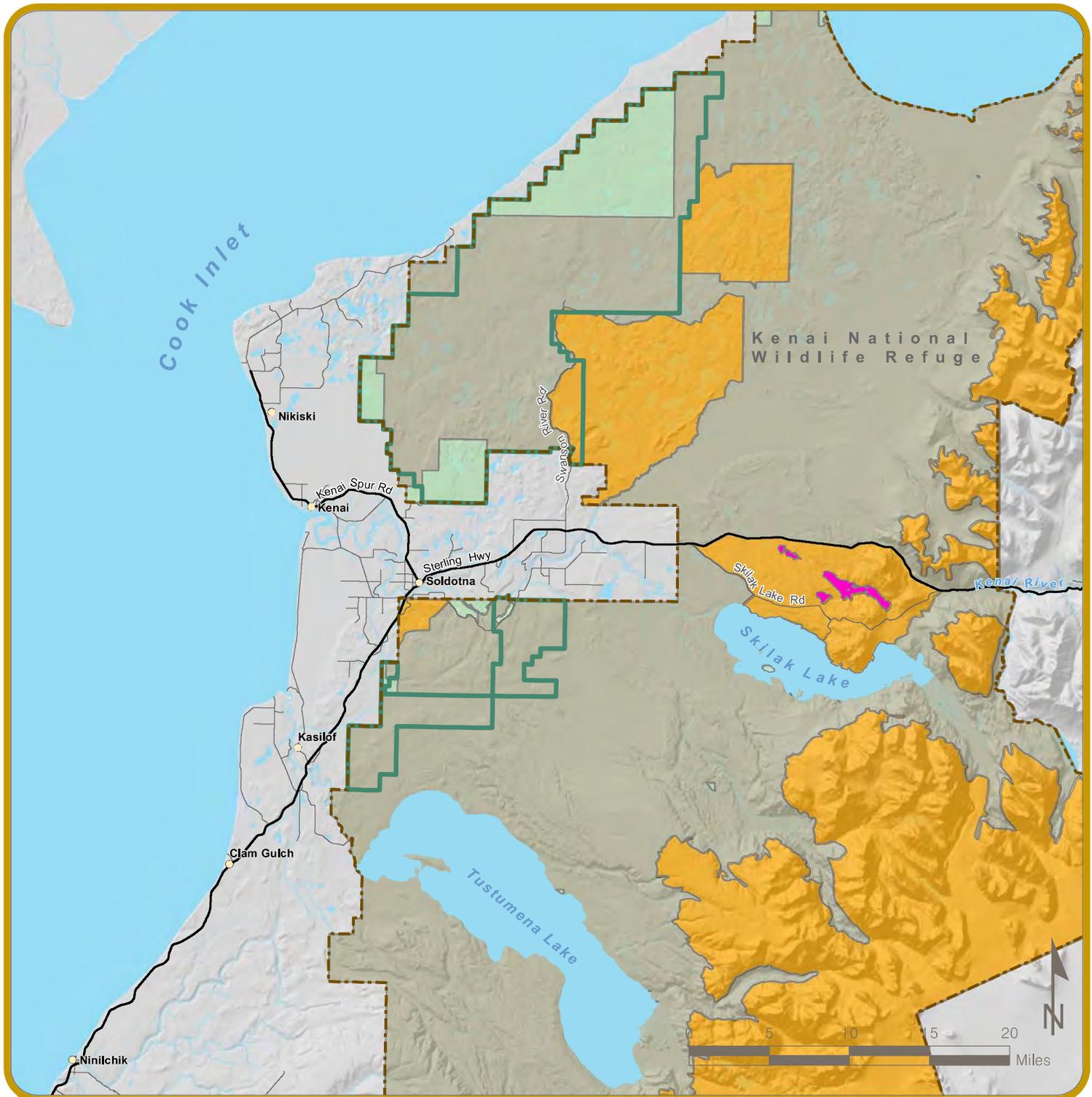
KNWR EA – Map 15 Public Facilities in the Kenai National Wildlife Refuge

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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Legend

- | | | | |
|---|-----------------|---|---|
|  | KNWR Boundary |  | Closed to Snowmachines |
|  | Project Area |  | Open to Snowmachines |
|  | Major Roads |  | State/Private Land |
|  | Secondary Roads |  | Open to Snowmachines for Ice Fishing Only |
|  | Rivers | | |

Apache Alaska Corporation Cook Inlet Seismic Exploration

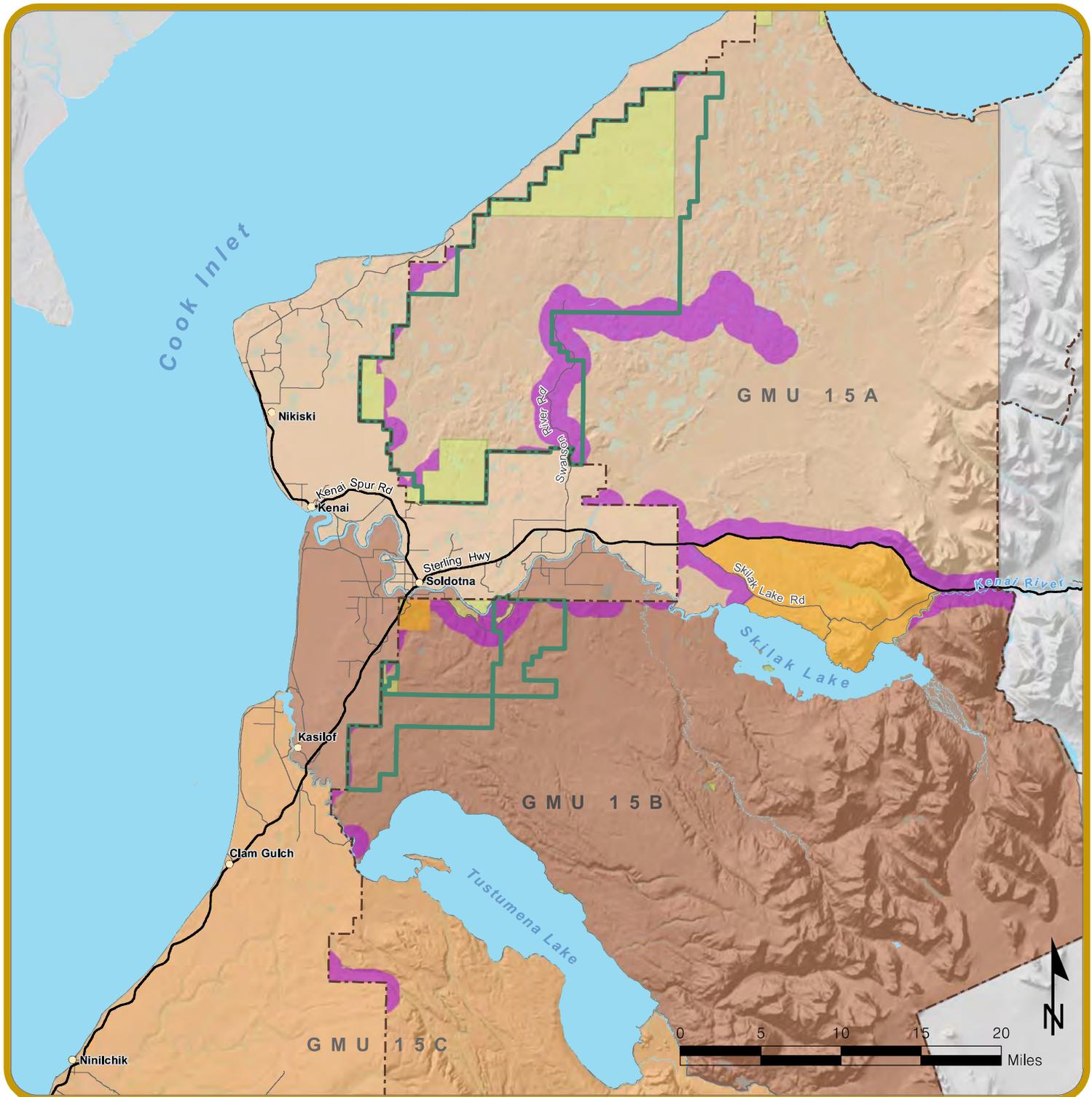
KNWR EA – Map 16 Snowmachine Regulations in Kenai National Wildlife Refuge

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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Legend

- | | | | |
|---|---------------|---|---|
|  | KNWR Boundary |  | Game Management Units (GMUs) |
|  | Project Area |  | 15A |
|  | Roads |  | 15B |
|  | Major |  | 15C |
|  | Secondary |  | Trapping Regulations |
|  | Rivers |  | No Trapping Permitted |
| | |  | Trapping Limited to Mink and Muskrat Only |
| | | | Non-Federal Lands |

Apache Alaska Corporation Cook Inlet Seismic Exploration

KNWR EA – Map 17 Game Management Units and Trapping Regulations in KNWR

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: ADF&G, USFWS, KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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3.6.4 Subsistence

The current subsistence hunting opportunities provided within the project area on Refuge are governed by the Service (USFWS 2012c). The Kenai NWR is used by rural residents of Cooper Landing, Nanwalek, Ninilchik, Port Graham, and Seldovia for subsistence hunting. These hunting opportunities surpass those provided by State of Alaska regulations. Rural residents of the approved communities reported taking 44 moose on federal public lands from 1996 through 2006 during the subsistence seasons (USFWS 2010, 3-151). Subsistence hunting open seasons found in the project area are presented in Table 3-13.

Table 3-13: Federal subsistence hunting open season schedules in GMU 15

Game	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Black bear												
Brown bear												
Moose												
Coyote												
Hare												
Lynx												
Wolf												
Wolverine												
Spruce grouse												
Ptarmigan												
Caribou ^a												
Goat ^a												
Ruffed grouse ^a												
Sheep ^b												

Note: The blue shading indicates the open season for hunting.

Source: (USFWS 2012c)

^a No federal open season

^b No federal subsistence priority

Subsistence fishing is allowed for smelt, burbot, rainbow trout/steelhead, Dolly Varden, arctic char, salmon, and all other fish other than the previous species listed for individuals in rural residents from seven qualifying communities on the Kenai Peninsula: Ninilchik, Moose Point, Chisik Island, Tustumena Lake, Eldred Passage, Cooper Landing, and Hope. There is no federal open season for burbot (USFWS 2011). Twenty-two subsistence fishing permits were issued to individuals from the qualifying Kenai Peninsula communities between 2002 and March 2007. Of these permits, only eight were used, and the reported harvest was 22 sockeye salmon, 20 lake trout, 31 coho salmon, and 6 Dolly Varden. From May 2007 through mid-August 2007, 191

subsistence fishing permits were issued to individuals from Hope, Cooper Landing, and Ninilchik. As of August 16, 2007, 33 permit holders reported a harvest of 444 sockeye from the Kenai River system. One permit holder reported a harvest of 25 sockeye from the Kasilof River through August 16, 2007. In 2008, 190 subsistence permits were issued for salmon and resident fish species in the Kenai and Kasilof rivers. A total of 1,464 salmon were reported harvested; no harvest of resident species was reported (USFWS 2010, 3-152). Subsistence fishing open seasons found in the project area are presented in Table 3-14.

Table 3-14: Federal subsistence general fishing open season schedules in Kenai Peninsula District

Fish	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Smelt												
Salmon (Kenai River and North)												
Chinook												
Sockeye												
Coho												
Pink												
Salmon (Kasilof River)												
Chinook												
Sockeye												
Coho												
Pink												
Trout												
Dolly Varden												
Burbot ^a												
All other fish												

Note: The blue shading indicates the open season for fishing.

Source: (USFWS 2011)

^a Harvest regulations are based on State of Alaska open seasons.

3.7 Cultural Resources

3.7.1 Prehistory

The prehistory of Upper Cook Inlet is understood primarily through excavations at a limited number of sites in the region. Late Pleistocene glaciation made habitation of the Cook Inlet region all but impossible prior to the retreat of the Wisconsin-era ice sheets approximately 10,000 years ago (Reger and Pinney 1996, Workman 1996). While the Cook Inlet environment may have been capable of supporting human populations as early as 10,000 years ago, the oldest known sites in the area are between 4,000 and 5,000 years old. The lowest component of the Beluga Point site (ANC-054) on the northern shore of Turnagain Arm, which dates to

approximately 4,000 years ago, contained several microblades and core fragments indicative of the Paleoarctic tradition. Beluga Point is approximately 25 miles east of the proposed project area. Two other sites (SEW-214 and KEN-094), located in the Kenai Mountains approximately 16 miles east of the project area, contained core and microblade technologies as well (Workman 1996). KEN-094 lies just inside KNWR's eastern boundary, while SEW-214 is located approximately 0.5 mile to the east, just outside the boundary. Radiocarbon dates from SEW-214 indicate that it was inhabited by approximately 5,000 years ago (Reger and Boraas 1996), but a typological comparison suggests occupation could have occurred as early as 8,000 years ago (Workman 1996).

Both the Beluga Point site and SEW-214 contain Northern Archaic components with notched chipped stone projectile points (Workman 1996). The existence of Northern Archaic sites along the Kenai River suggests that fishing became an important part the culture, traditionally adapted to hunting large mammals in boreal forest and open tundra environments (USFWS 2009).

Also present at the Beluga Point site were ground slate artifacts reminiscent of Ocean Bay assemblages from the Alaska Peninsula. Ocean Bay sites are more commonly found in the lower Kenai Peninsula around Kachemak Bay. None of the Ocean Bay sites from the Cook Inlet region contain ulus, lamps, adzes, or notched stones, but faunal remains reveal a diet consisting of both sea and terrestrial mammals, in addition to fish, shellfish, and birds (Workman 1996). Nothing identified as Ocean Bay has been found along the Kenai River (USFWS 2009).

Kachemak tradition assemblages appear around 3,000 years ago, and contain both ground slate and chipped stone artifacts (Reger and Boraas 1996). Coastal Kachemak sites, ascribed to the Marine Kachemak tradition, contain barbed darts and toggling harpoons, indicative of a reliance on maritime resources. Kachemak sites found along the Kenai River have been classified as Riverine Kachemak, and include many of the same artifacts found in Marine Kachemak sites, including notched and chipped stone tools, pumice abraders, and cobble cores (Reger and Boraas 1996). Riverine Kachemak sites demonstrate a subsistence focus on terrestrial mammals in addition to their heavy reliance on salmon (D. Reger 2003). The archaeological record is much more robust during the Kachemak period and includes semisubterranean houses, elaborate burials, and organic remains. Organic artifacts such as bone tools and needles are more commonly associated with Marine Kachemak sites, but limited organic remains—flexed burials, in particular—have been found in Riverine Kachemak sites. Kachemak cultures persisted in the Cook Inlet region for approximately 2,000 years, or until around 900 A.D., at which time a shift to Dena'ina Athabascan sites is demonstrated in the archaeological record (Reger and Boraas 1996).

Dena'ina village sites are characterized by large, multiroom, semisubterranean houses with a central hearth. Associated cache pits were used for storing salmon. Dena'ina assemblages show a preference for wood and bone tools to stone, although some slate tools have been found in Dena'ina sites. Copper artifacts have also been found at Cook Inlet Dena'ina sites, evidence of trade with Copper River Dena'ina groups, as well as glass beads in more recent sites indicating the arrival of Westerners (D. Reger 2003).

3.7.2 Early Western Exploration and Occupation

English Captain James Cook arrived in Cook Inlet in 1778, signaling the beginning of the historic period on the Kenai Peninsula (Kari 2003). For the next 20 years, English, Russian, and

Spanish expeditions continued to explore the Cook Inlet region, trading with the Dena'ina people they encountered. The Russians were the first to establish forts on the Peninsula; by the late 1790s, the Russians had forts at English Bay, the Kasilof River, Kenai, and Tyonek (Kari and Fall 2003, USFWS 2009). The Dena'ina relationship with the Russians was much more violent than with the English explorers, who did not attempt to settle in Dena'ina territory. On the Kenai Peninsula, in particular, encounters were often deadly. Tensions came to a head in the late 1790s, when Dena'ina groups led attacks against Russian forts at Tyonek and Illiamna. The Russians responded by killing nine Dena'ina men the following summer (Kari and Fall 2003). Dena'ina groups also instigated an attack on the Russian outpost at Kenai, but reinforcements arrived before it was completely destroyed (USFWS 2009).

While there was little Russian exploration of the Upper Cook Inlet area, the Russian presence did perpetuate the fur trading industry in the region. The Russians relied on Dena'ina middlemen (*qeshqa* – 'rich men,' or leaders) to bring furs to them, but Russian sites were almost exclusively restricted to the few established outposts along the coast (Kari and Fall 2003).

Historical records show evidence of small-scale beach mining by the Russians around Homer and Ninilchik. The Russians also mined small quantities of coal for use in their steamers and shipyards (Barry 1997). Peter Doroshin, a mining engineer from St. Petersburg, conducted the first gold exploration activities on the Kenai Peninsula in 1850 near the mouth of the Kenai River, and farther upriver the following summer. In 1851, the Russian-American Company directed him to look for coal. This ended the only recorded gold mining activities of the Russian-American Company, but Americans reported finding several Russian mining sites on the Kenai Peninsula, suggesting that exploration was happening independently of the company, or that it wasn't officially discussed so as not to attract the attention of the British and Americans (Barry 1997).

After the sale of Alaska to the United States in 1867, countless optimists made their way to the new territory to find their fortune. By the 1880s, prospectors had made their way to the Kenai Peninsula and the shores of Cook Inlet and were rediscovering prospects left behind by Russian miners. Gold was reported early on at Cooper Creek and Anchor Point, followed by Beach Creek and Ninilchik. Miners continued to find gold on creeks around the peninsula, including Resurrection Creek, Bear Creek, and Palmer Creek, instigating a small rush to the Kenai Peninsula in 1895. Several claims were staked along the Kenai River during this period (Barry 1997).

3.7.3 *Previously Identified Sites*

Eight sites are listed in the Alaska Heritage Resources Survey within the project area. Documented sites include prehistoric and historic sites. The majority of the documented archaeological sites within the project area consist of depression features, which are most often identified as house or cache pits, representing cache sites and village sites formerly occupied by Dena'ina Athabascans. The six prehistoric Dena'ina sites within the project area consist of single and multi-room house features and associated cache pits. Generally very few artifacts are associated with Dena'ina sites. Additionally, many of the documented sites in the region have been reported but have not been mapped or tested, leaving little detailed information about artifact assemblages or site features at the majority of documented sites.

The two known historic sites within the project area are cabin sites. KEN-408 is a log cabin historically used for trapping and believed to date to the early 1900s. KEN-491 consists of the remains of a cabin built in 1965 by a biologist working for ADF&G studying spruce grouse. In accordance with a Programmatic Agreement for management of historic cabins, the Service is attempting to document all historic cabins in the Kenai NWR (USFWS 1996).

3.8 Socioeconomics

3.8.1 Social and Economic Characteristics

KPB encompasses the Kenai Peninsula, Cook Inlet, and a large area northeast of the Alaska Peninsula. The borough includes portions of the Chugach National Forest, the Kenai NWR, Kenai Fjords National Park, and portions of Lake Clark and Katmai National Parks. Kenai and Soldotna are KPB's population centers, approximately 65 air miles south of Anchorage (Alaska Department of Commerce, Community, and Economic Development [DCCED] (DCCED 2012)).

The Kenai River is a major sport fishing location for Anchorage residents and tourists. The river is world-renowned for trophy-sized salmon, making KPB well-traveled by local and visiting sportsmen. The area has a well-capitalized infrastructure of airports, sports, roads, public schools, and energy-related facilities. KPB's economy consists of industries including commercial fishing, mining, timber, tourism, and petroleum activities. Recreational activities and natural beauty have led to a growing tourism industry with a well-developed list of attractions including several within the Refuge (DCCED 2012).

The Kenai Peninsula is connected to Alaska's road system by the Seward and Sterling Highways. Homer and Seward have developed deepwater ports, and the Nikiski industrial area has private docking facilities for tankers, ocean-going freighters, and other marine transportation. The Seward Coal Loading Facility is located in Seward at the southern terminus of the Alaska Railroad. The Alaska Marine Highway System serves Homer and is primarily used for tourism. (DCCED 2012).

3.8.2 Employment and Population

Leading economic activities in KPB are government, education, health, oil and gas, leisure, and trade (Alaska Department of Labor and Workforce Development [ADOLWD] (2012)). Growing industries within the area include construction, manufacturing, information technology, financial investment, and engineering (ADOLWD 2012).

More than 55,400 people live in KPB, which encompasses over 24,000 square miles (DCCED 2011). The Kenai Peninsula hosts 8 percent of the state population and 6 percent of its jobs (ADOLWD 2008). Larger communities in KPB include Homer, Seward, Kenai, Nikiski, and Soldotna (DCCED 2011).

Wages for 2010 averaged \$970 million, with about 20 percent from state government, 15 percent from education, 14 percent from local government, and 13 percent from natural resources (oil, gas, and mining) (DCCED 2011). The 2010 median household income was approximately \$57,500 (ADOLWD 2012), and the area's per capita personal income was about \$41,000 (DCCED 2012). The August 2012 unemployment rate was 7.3 percent (ADOLWD 2012).

3.8.3 Oil and Gas Activities

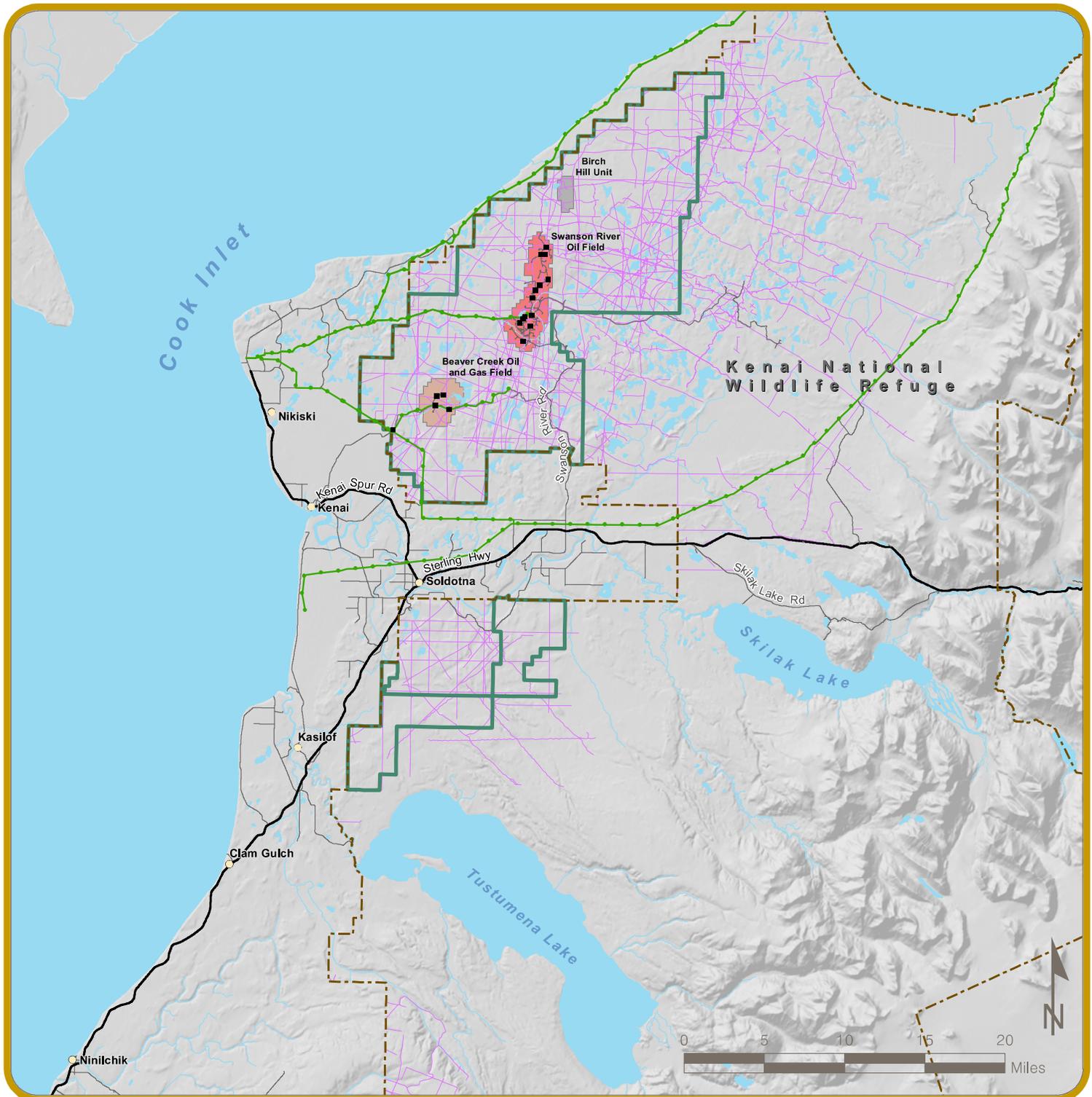
Exploration for oil in the Cook Inlet area began in the 1800s. Oil was discovered on July 23, 1957, in the Kenai NWR (Hartz, et al. 2009). In October 1959, the first major gas discovery in the Cook Inlet area was made in the Kalifornsky Beach gas field near Kenai (Hartz, et al. 2009). In 1962, Pan American Petroleum Corporation discovered the first offshore oil in Cook Inlet. This led to extensive exploration throughout the Cook Inlet region in the 1960s and 1970s. In the 1990s and early 2000s, new oil developments and production began in the West MacArthur River Unit and in the Redoubt Unit, respectively (Hartz, et al. 2009).

During the early 2000s, exploration and development drilling activity and 3D seismic acquisition have increased in Cook Inlet. Companies are looking for reserves to replace declining fields (ANGDA 2012).

Offshore oil and gas production in Cook Inlet and downstream production primarily take place north of Kenai. Nikiski is the main industrial base for the entire state of Alaska and is responsible for the highest volume of value-added manufacturing based on oil or natural gas. The area supports two production facilities, the Tesoro refinery (70 percent of all in-state gasoline production), and the ConocoPhillips liquefied natural gas plant (the first liquefied natural gas plant in North America shipping more than 1 million tons annually). BP Exploration Gas to Liquids test plant and research facility closed in 2009 (AEDC 2012). Existing Cook Inlet oil production is handled through the Trading Bay production facility located on the west side of Cook Inlet and the Tesoro refinery located at Nikiski. Almost all of the Drift River oil terminal crude is transported to the oil refinery in Nikiski. The Tesoro refinery normally processes up to 55,000 oil barrels per day, with a crude oil capacity of 72,000 barrels per day (ADNR 2011). Recent refinery production has been augmented by North Slope oil transported by tanker from Valdez. Almost all of the Tesoro refinery output is consumed in Alaska primarily for heating homes and businesses in the Cook Inlet Region but is also consumed locally as jet fuel, diesel and propane. Tesoro's Nikiski refinery produces ultra low sulfur gasoline, jet fuel, and ultra low sulfur diesel, heating oil, heavy fuel oils, propane and asphalt. Crude oil is delivered by double-hulled tankers through Cook Inlet and Kenai Peninsula pipelines. The Nikiski Alaska Pipeline route (see Map 18) runs along the Kenai Spur Highway through the Captain Cook State Recreation Area, and then parallels the coast to Point Possession before crossing Turnagain Arm. The pipeline route continues along the Tony Knowles Coastal Trail, to the Ted Stevens Anchorage International Airport. The pipeline runs near the Alaska Railroad ROW for the remainder of the route, terminating at the Port of Anchorage (ADNR 2010).

The oil and gas industry contributes to the local economy through employment opportunities in both primary markets and support services. According to the Alaska Oil and Gas Association (AOGA), hydrocarbon industry-related employment provides about 2,400 jobs for KPB, making up approximately 12 percent of the region's total employment (KPB 2012a) and creating 743 support activity jobs within KPB (AOGA 2012).

AOGA reported 1,274 KPB residents worked in oil and gas support industry jobs in 2007 with estimated wages of \$101.3 million (AOGA 2012). These are jobs held by KPB residents who work both in and out of the borough. The industry operates year-round, and workers typically earn wages well above the national average, as shown in Table 3-15 (KPB 2012a, U.S. Department of Labor 2012, AOGA 2012, ADOLWD 2012).



Legend

-  KNWR Boundary
-  Project Area
- Roads**
-  Major
-  Secondary
-  Rivers

Existing Oil and Gas Infrastructure

-  Oil/Gas Buildings
-  Pipeline
-  Seismic Line
- Oil and Gas Lease Areas**
-  Beaver Creek Oil and Gas Field
-  Birch Hill Unit
-  Swanson River Oil Field

Apache Alaska Corporation Cook Inlet Seismic Exploration

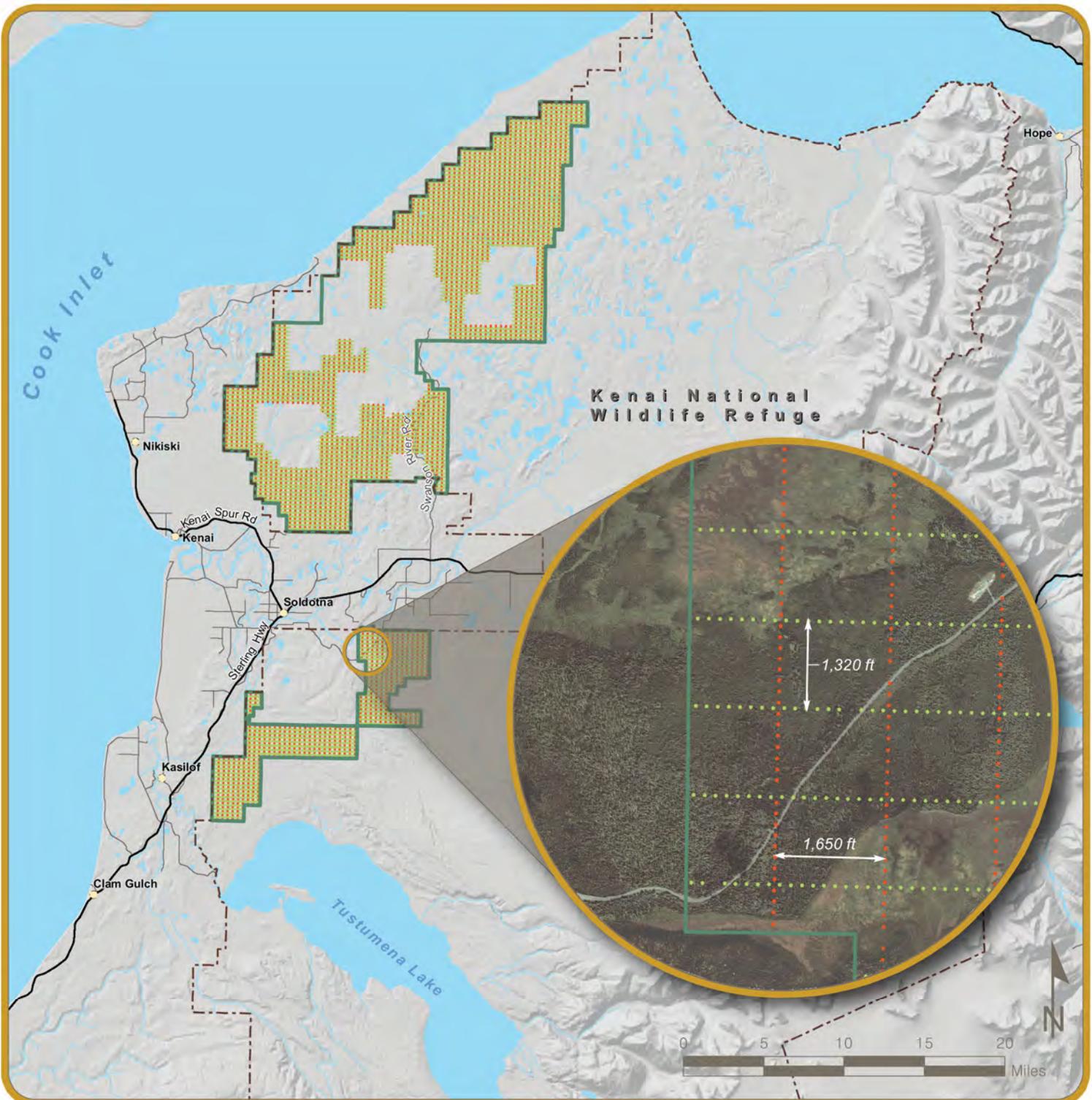
KNWR EA – Map 18 Existing Oil and Gas Infrastructure in KNWR

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 2/6/2013



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Legend

- KNWR Boundary
- Project Area
- Roads**
 - Major
 - Secondary
 - Rivers
- Seismic source points spaced 165 feet apart on lines spaced at 1,650 foot intervals
- Receiver nodes spaced 165 feet apart on lines spaced at 1,320 foot intervals

Apache Alaska Corporation Cook Inlet Seismic Exploration

KNWR EA – Map 19 Seismic Source and Receiver Node Distribution in the KNWR Project Area

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data.

Source: Apache, KNWR, DOT, HDR 2012
Map Created By HDR 2/18/2013



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Table 3-15: Oil, gas, and mining wage and salary employment averages for KPB and Untied States

Employment Sector	Average Monthly Employed	Average Annual Wage (\$)	Percentage of Averages
KPB	2,950	68,857.00	12.90
United States	139,550	46,252.50	5.40

Sources: KPB (2012b); U.S. Department of Labor (2011); ADOLWD (2012)

Oil and gas property taxes contribute to KPB tax revenue; in 2011, KPB reported a gross oil and gas property tax benefit of about \$7.1 million roughly 9 percent of KPB tax revenues (DCCED 2012).

3.8.4 CIRI Leasing Program

CIRI is Southcentral Alaska’s largest private landowner. Under provisions of ANCSA, and with development rights to oil, gas, and coal resources, CIRI has received entitlements to about 750,000 acres of subsurface real estate in and around oil-producing regions on the Kenai Peninsula and the western side of Cook Inlet. CIRI’s leasing program attracts new exploration entrants, including independent oil and gas companies. Development of the Cook Inlet oil and gas basins holds economic importance for CIRI because revenues gained through the CIRI leasing program benefit the corporation and the financial holdings of their Native Alaskan shareholders. Cook Inlet natural gas is the region’s primary energy generation source, and Cook Inlet gas prices are increasing to match world energy prices. Higher prices encourage oil and gas exploration and production by making it more profitable for companies leasing Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate to find and develop new Cook Inlet area oil and gas reserves. Low State of Alaska Cook Inlet production taxes of 17 cents per million cubic feet for gas and none for oil, in combination with exploration credits, make the CIRI leasing program attractive to companies in pursuit of oil and gas (ANGDA 2012, CIRI 2012).

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4.0 ENVIRONMENTAL CONSEQUENCES

4.1 Environmental Impact Methodology

Environmental consequences are described in terms of direct, indirect, and cumulative impacts. Direct impacts are those caused by the action and occur at the same time and place. Indirect impacts are those caused by the action, but occur later in time or are further removed in distance, and are still reasonably foreseeable. Direct and indirect impacts are described together within each resource impact evaluation. Direct and indirect impacts from the alternatives on each resource were considered in the context of four evaluation categories:

- magnitude (major or minor)
- duration (long-term or temporary)
- potential to occur (probable or likely)
- geographic extent (extensive or limited)

Definitions of direct and indirect environmental impact intensities are summarized in Table 4-1.

Table 4-1: Definitions of direct and indirect environmental impact intensities for project area resources

Impact Category	Intensity Type	Definition
Magnitude	Major	Elimination of resource or resources' access to essential needs
	Minor	Modification to resource from original condition
Duration	Long term	Irreversible impact on resource
	Temporary	Impact lasts duration of project (one season) or less
Potential to occur	Probable	Highly likely to occur or will occur
	Unlikely	Not likely to occur or low likelihood of occurring
Geographic extent	Extensive	Project area and beyond
	Limited	Portion of project area

Cumulative impacts are discussed in Section 5.0.

4.2 Noise, Visual Resources, and Air Quality

The following sections describe potential impacts on noise levels, visual resources, and air quality in the project area.

4.2.1 Noise

The following sections describe potential impacts on noise levels, visual resources, and air quality in the project area.

4.2.1.1 Proposed Action

Noise impacts associated with proposed project activities are probable and expected to be minor and temporary in nature. Noise from helicopters, drilling equipment, and the presence of workers has the potential to increase noise in the project area during seismic surveys. Helicopter support will occur between October 1 and April 30 on Refuge lands overlying the CIRI-owned coal, oil

and gas resources and subsurface estate; however, helicopter equipment noises would occur on TNC 22(g) lands between August 15 and December 15. Up to four helicopters could operate at one time to move personnel and equipment in and out of work areas. Noise disturbances associated with seismic surveys and their effects on wildlife are described in Section 4.5.1.

Helicopter noise would vary depending on the model of aircraft used, the location of use, and the duration of the activity. The Federal Aviation Administration reports expected noise levels by helicopter model in A-weighted decibels (dBA) for flyover, takeoff, and landing activities (14 CFR 150.9). A-weighted decibels are used to characterize sound levels that can be sensed by the human ear. “A-weighted” denotes the adjustment of the frequency range to what the average human ear can sense when experiencing an audible event. Noise levels associated with helicopter models that may be used on the project are presented in Table 4-2.

Table 4-2: Maximum Noise Levels (Lmax dBA) for Expected Helicopter Activities

Helicopter type (Helicopter substitution)	Flyover^a	Takeoff^b	Landing^b
Bell 205 (Bell 212)	94	56	62
Bell 206 (OH-58)	91	55	57
Bell 407 (SA-350)	88	52	59
Hughes 500D	87	51	56

^a Flyover noise level was calculated overhead at 100 feet above ground level.

^b Takeoffs and landings were calculated at 325 feet above ground level and 3,000 feet away.

Note: Noise levels were calculated using Flyover Noise Calculator (USAF 2002).

The noise levels in Table 4-2 were calculated using Flyover Noise Calculator (USAF 2002). Some of the helicopter models that would be used under the proposed action were not available in this program; therefore, models that were similar were used as substitutes.

Noise from helicopters was estimated in Lmax. This value represents the maximum sound level that occurs during an aircraft overflight. For takeoffs and landings, noise levels were estimated at 325 feet above ground level and about 3,000 feet away. For flyovers, noise levels were estimated at 100 feet above ground level, directly overhead. Consequently, the noise levels from flyovers are higher than the takeoffs and landings. Noise from flyovers is estimated to be between 87 and 94 dBA and noise from takeoffs and landings is estimated to be between 51 and 62 dBA. The larger helicopters such as the Bell 205 are generally louder than the smaller helicopters such as the Hughes 500D.

For comparison, an automobile traveling at 60 miles per hour, when heard from a distance of 100 feet, registers approximately 65 dBA; a vacuum cleaner from 10 feet registers approximately 70 dBA; and a food blender at 3 feet registers approximately 90 dBA (FAA 1985).

The noise levels presented above were calculated for peak levels for each activity. The impact of these noise levels on particular resources is discussed by specific resource in the sections below.

Decibels are based on a logarithmic scale. As such, they are not added or subtracted linearly. As an example, if two helicopters were flying over an area with levels of 94 dBA and 87 dBA, they would produce a combined noise level of 95 dBA. However, if each helicopter had a level of 55 dBA, the combined noise level would be 58 dBA.

4.2.1.2 No Action

Under the No Action Alternative, no changes to ambient noise levels would occur in the project area.

4.2.2 Visual Resources

4.2.2.1 Proposed Action

Under the proposed action, minor temporary impacts on visual resources would be probable in the Kenai NWR because there would be limited impacts in discreet sections of the project area at any one time. Helicopters moving personnel and equipment in and out of the work areas would be in specific areas for short periods of time. No structures would be constructed, snowmachines would be used only during the season authorized by the Refuge Manager to move personnel or equipment, and no wires would be used to connect the receiver nodes to the monitors. There would be a temporary disturbance affecting visual resources with regard to trampling caused by foot traffic in and around the drilled shot holes as well as disturbed soil resulting from the drilled shot holes.

4.2.2.2 No Action

Under the No Action Alternative, there would be no impacts on existing visual resources on the Kenai NWR.

4.2.3 Air Quality

4.2.3.1 Proposed Action

Seismic surveys would involve the use of the limited mechanical equipment including helicopters and heli-portable drills. These mobile sources use internal combustion engines that use mainly diesel and emit air pollutants in relatively low quantities. Air pollutants generated by seismic surveys would be minor, temporary, and limited to the immediate area near the site of the activity.

4.2.3.2 No Action

Under the No Action Alternative, no changes to air quality would occur in the project area.

4.3 Soils, Vegetation, Wetlands, and Hydrology

The Apache 3D seismic survey would be completed between October and April on Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate. Impacts from source point drilling, setting of charges, and detonating charges would be minimized by conducting work while the ground is frozen. No tracked vehicles would be used during this work, and that would minimize soil, vegetation, wetlands, and hydrology impacts as well.

4.3.1 Soils

4.3.1.1 Proposed Action

Minor, temporary impacts on soils throughout the entire extent of the project area would be probable during the proposed action. There would be 22,732 source point holes drilled throughout the project area over three seasons. The drill hole would have a 3-inch diameter and a depth of 35 feet, giving the affected surface area of the soil of one drilled source point 0.049 ft². The volume of affected soil per drilled hole would be 1.72 ft³, which would be temporarily displaced prior to backfilling after the charge is inserted and before the crew moved to the next source point. Based on these calculations, the total surface acreage of directly affected soil would be 0.026 acres over three seasons.

Approximately 2 square feet of soil surrounding each source point would be disturbed during drilling activities. With 22,732 source points, a total of approximately 1.04 acres of soil would be temporarily disturbed over three seasons of seismic activity.

The proposed work would not involve clearing, stripping, or significant disruption of soils because all source point drilling work would occur during the winter on snow.

4.3.1.2 No Action

Under the No Action Alternative, there would be no impacts on existing soil resources on the Kenai NWR.

4.3.2 Vegetation

4.3.2.1 Proposed Action

Minor, temporary impacts on vegetation would be probable during the proposed action. Sixty percent of all source point locations are located in black spruce and mixed forest landcover types (32 percent and 28 percent, respectively) and 48 percent of all receiver nodes are located in those same landcover types (26 percent and 22 percent, respectively). Any work completed in these landcover types may require alternative drill and receiver node locations to avoid any tree damage. The vegetation would be disturbed during this project by source hole drilling where the total acreage of affected vegetation would be 1.04 acres over three seasons.

Vegetation would be affected by human compaction as they survey the area, work around the source holes during the drilling and the distribution of monitor nodes, and clean-up after the seismic study. Landcover type, number of source points, percentage of source points located in each landcover type, number of receiver nodes, and percentage of receiver nodes located in each landcover type found in the project area are presented in Table 4-3.

Table 4-3: Landcover types and potential impacts occurring in the project area

Landcover Type	Number of Source Points	Percentage of Source Points	Number of Receiver Nodes	Percentage of Receiver Nodes
Black spruce	7,338	32	9,145	32
Mixed forest	6,367	28	7,965	28
Wetland – graminoid	2,439	11	3,166	11
Paper birch	1,664	7	2,134	7
White/Lutz/Sitka spruce	1,562	7	1,885	7
Lake	1,250	5	1,568	5
Wetland – shrub	536	2	698	2
Alder	380	2	467	2
Willow	367	2	467	2
Mixed deciduous	269	1	356	1
Herbaceous	214	1	327	1
Aspen	115	1	116	<1
Black cottonwood (balsam poplar)	93	<1	127	<1
Alder/Willow	44	<1	57	<1
Stream	34	<1	48	<1
Urban/Cultural	26	<1	29	<1
Mountain hemlock	20	<1	22	<1
Other shrub	12	<1	19	<1
Barren – wet	2	<1	3	<1
Total	22,732		28,599	

Source: Acreage analysis with ArcGIS of Kenai NWR data (USFWS 2010) and Apache-provided project area

Native vegetation may be affected by the introduction of invasive and exotic (potentially invasive) species. Increased foot traffic during this project would increase the potential of transporting exotic and invasive species’ seeds throughout the project area. The only means of seed transport during this project would be on the equipment, on the helicopter skids, and on the boots of the work crews. Power washing all potential seed transport surfaces prior to entering the Refuge would minimize the potential spread of exotic and invasive species seeds.

The introduction and dispersal of non-native plants, some of which are invasive and injurious, is a potential impact with long-term implications. More than 110 exotic vascular plants now occur on the Kenai Peninsula, most of which occur on lands outside Refuge boundaries. While the potential for this impact would be reduced with snow cover, helicopter operations and foot travel could result in transport of invasive plant seeds during snow free periods. Seed production of many invasive plant species is in full swing during August and September. This impact would be

mitigated by ensuring that helipads and crew staging areas are weed-free and all equipment is clean.

4.3.2.2 No Action

Under the No Action Alternative, there would be no impacts on existing vegetation resources in the Kenai NWR.

4.3.3 Wetlands

4.3.3.1 Proposed Action

Minor, temporary impacts on wetlands would be probable during the proposed action. During the premapping and surveying phase of the 3D seismic study, no source points would be placed in or within ponds or lakes and none would be placed in or near rivers and streams. A total of 22,732 drilled shot holes would be advanced in the project area and 36 percent of those points lie within wetlands, based on NWI classification. Given these points within wetlands have the same surface impacts as soil resources, the total direct surface impacts on wetlands will be 0.38 acres (16,454 ft²). As described, soil removed during drilling would be temporarily displaced before being backfilled into the hole following insertion of the source charge. There would also be 28,598 receiver nodes placed throughout the Kenai NWR project area, and 36 percent of those points lie within NWI-classified wetlands.

Completing all source point work during the winter when all wetlands are frozen would minimize impacts on wetlands. Also, not using tracked vehicles would minimize wetland impacts. The number of source points, percentage of total source points, number of receiver nodes, and percentage of total receiver nodes that would be located in NWI-mapped wetlands in the project area are presented in Table 4-4.

Table 4-4: Classified wetlands identified within the project area

Wetland Classification	Number of Source Points	Percentage of Source Points	Number of Receiver Nodes	Percentage of Receiver Nodes
Freshwater forested/Shrub	5,782	25	7,226	25
Freshwater emergent	939	4	1,206	4
Riverine	0	0	0	0
Freshwater pond	442	2	546	2
Lake	1,064	5	1,351	5
Total	8,227	36	10,329	36

Source: Acreage analysis with ArcGIS of Kenai NWR data (USFWS 2010) and Apache-provided project area

4.3.3.2 No Action

Under the No Action Alternative, there would be no impacts on existing wetlands resources in the Kenai NWR.

4.3.4 Hydrology

4.3.4.1 Proposed Action

Minor, short-term impacts on hydrological resources in the project area are unlikely to occur. Apache does not plan to use heavy equipment, drill or shoot charges in or near streams, rivers lakes, and ponds. Apache will maintain a minimum of 100-foot setback from any water body that may support fishery resources, a 116-foot setback from the bank of anadromous streams (ADF&G 1991) supporting Pacific salmon species, and an additional 200-foot setback of shot holes would be maintained along the Swanson River. Streams would be identified by field crews and marked on field maps prior to deployment of seismic field crews and start-up of seismic operations. Apache will adhere to all stipulations associated with the Service SUP.

4.3.4.2 No Action

Under the No Action Alternative, there would be no impacts on hydrology in the Kenai NWR.

4.4 Wildlife, Fish, and Amphibians

The following sections describe potential impacts on wildlife, fish, and amphibians in the project area.

4.4.1 Wildlife

Consultation under Section 7 of the Endangered Species Act was made verbally with the USFWS Endangered Species branch on April 24 and 25, 2013. The USFWS confirmed that no threatened or endangered species are present in the project area, and provided data regarding overwintering habitat for Steller's eider, a threatened specie, along the coast of the Cook Inlet. Spatial comparison of the overwintering habitat with the project area resulted in a determination of no potential to affect Steller's eiders. As directed by the USFWS contact, a memo to file was prepared documenting the finding, and no further consultation was required (HDR 2013c).

4.4.1.1 Birds

Proposed Action

Seismic surveys on Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate would be conducted between October and April, avoiding the peak nesting period for most Alaska birds (May to August). No vegetation clearing would be conducted to facilitate seismic surveys or deployment of nodes.

Helicopter overflights and seismic surveys in any given area would occur intermittently for only a brief period before moving on. Seismic surveys would likely disturb and/or displace overwintering birds in the project area along helicopter flight routes and in areas where seismic surveys occur. Helicopter overflights and detonation of explosives have the possibility of disturbing or displacing birds from preferred feeding, roosting or nesting habitats.

Seismic survey work would be conducted between August 15 and December 15 on TNC 22(g) lands, and between October 1 and April 30 on Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate.

Low level helicopter operations and landings would be the main source of disturbance of migratory waterbirds. By mid-August, most juvenile migratory landbirds will have fledged; however, juvenile survival could be impacted for some migratory waterbirds if disturbance

results in separation from attendant adults. Trumpeter swan nesting and brood rearing have been documented in previous years on numerous wetlands both on the TNC 22(g) lands and immediately adjacent Refuge lands within one mile of the TNC 22(g) lands. Because of their proximity to documented swan nests/brood rearing habitats on the TNC 22(g) lands, these areas may represent habitats within nesting and brood rearing territories that are used differentially between and among years by the same swan pairs and their broods in this overall area. Observing required 1,000-foot buffer no-fly zones around adult swans with broods during flight operations would reduce the potential for any impacts. This will require continuous monitoring and flexibility since adult swans and broods become increasingly mobile during the August to September time period.

Owls nest earlier than other species in the Kenai NWR, with pair bonds and nesting territories being established during early winter months. Nests may be active in late February or early March. Nesting owls could be affected by helicopter overflights and detonation of explosives. No clearing of trees would be conducted to facilitate seismic activities. If owl nests (cavities or nests in trees) are observed during seismic pre-surveys, those areas will be avoided with a 660-foot buffer until owls have fledged.

Trumpeter swans are sensitive to human disturbance, especially while nesting, and react negatively to aircraft overflights by flushing from their nests or ceasing feeding (Henson and Grant 1991). The Refuge recommends that aircraft avoid lakes with nesting swans (see Map 12) and maintain a 1,000-foot buffer from areas with open water where swans overwinter (USFWS 2010, J. Morton 2012).

Nesting and wintering bald eagles may be disturbed by helicopter overflights during seismic operations. Apache would consult with the Service prior to commencing seismic surveys and, if required, update aerial bald eagle nest surveys to determine the current status of the nests (i.e., which nests are still active and whether any additional nests in the project area may be affected by seismic surveys). The Service developed the National Bald Eagle Management Guidelines to ensure that construction activities are consistent with BGEPA and the Migratory Bird Treaty Act (USFWS 2007). The Bald Eagle Management Guidelines recommend that helicopters maintain a 1,000-foot buffer from any active nests during aircraft overflights.

Given the limited and temporary nature of seismic surveys, coupled with the timing of the seismic survey operations during the seasons when most birds are gone, direct disturbance effects on birds would be minor and temporary. Avoidance and minimization measures described in Section 6.0 would further reduce any impacts on birds.

No Action

Under the No Action Alternative, no changes to birds or bird habitat would occur in the project area.

4.4.1.2 Mammals

Proposed Action

Noise from drilling equipment, helicopters, detonation of charges, and the presence of crews could temporarily displace terrestrial mammals from preferred habitat into less desirable habitat and temporarily alter the normal behavior of certain mammal species.

Noise from helicopter overflights and crews on the ground during seismic surveys could potentially displace or disturb denning black and brown bears. Studies of radio-collared black and grizzly bear responses to seismic survey activities determined that none of the bears left their dens as a result of seismic activities, although one bear exhibited signs of movement within its den (Reynolds, Reynolds and Follmann 1983, Hanberg and Bartlett 2002). Disturbance from seismic activities could potentially have significant energetic costs on denning bears. One documented brown bear den is in the project area (see Map 14). Apache would work closely with Refuge staff to ensure that known bear denning locations are avoided during helicopter overflights and by ground survey crews. If bear dens are discovered during seismic surveys, Apache would cease activities in the area and contact staff at the Refuge headquarters. Avoidance of areas with known bear dens and adherence to the Wildlife Avoidance Plan (Appendix D) would reduce impacts on bears and bear dens.

Caribou, moose, and grey wolves could be disturbed or displaced for short distances during seismic surveys and helicopter overflights. During deep-snow winters, moose may congregate in mountain valleys and onto the Kenai Lowlands (USFWS 2010). During periods of extreme cold or severe winters, disturbance from project-related activities could result in additional winter-related mortality of moose calves and adults, and/or decreased reproductive success the following spring. Helicopter overflights during this sensitive period when moose have little energy reserves may cause additional stress and force moose to move into less preferred winter habitat.

Terrestrial mammals would be present throughout the duration of the seismic surveys and node deployment; however, these species are capable of avoiding seismic operations and moving into adjacent habitat. Although temporary and limited displacement may occur, the effect of seismic surveys on terrestrial mammals is expected to be minor and temporary.

No Action

Under the No Action Alternative, no changes to mammals or mammal habitat would occur in the project area.

4.4.2 Fish

4.4.2.1 Proposed Action

Minor impacts associated with noise disturbance from detonations and helicopter traffic are likely to result in short-term and temporary displacement of fish. Salmonidae species are considered generalists for hearing capabilities; they detect particle motion in sound (Popper and Hastings 2009). In addition, salmonidae species are relatively fast swimmers and can quickly relocate to a more desirable location when startled by noises (CDOT 2009).

Detonations associated with Apache's 3D seismic surveys would include 4.4- and 9.7-pound charges placed into holes ranging in depth from 16 to 25 feet deep for lower pressure charges and 35 feet deep for 9.7-pound charges. The source points would be drilled and detonated between October 1 and April 30.

During the survey program, Apache would maintain a minimum 100-foot setback from any water body that may support fishery resources, a 116-foot setback from the bank of anadromous streams supporting Pacific salmon species (per ADF&G stipulations), and an additional 200-foot setback of shot holes would be maintained along the Swanson River. Streams with anadromous

or resident fish would be identified by field crews and marked on field maps prior to deployment of seismic field crews and start-up of seismic operations.

The banks and shorelines of anadromous streams and lakes under EFH jurisdiction will be held at a 116-foot setback from all charges. A 116-foot setback, which is the distance established by ADF&G, ensures Apache would be well below the ADF&G Blasting Standards for protection of fish. ADF&G requires all explosive activities within or near water bodies supporting fish be held under 2.7 pounds per square inch (ADF&G 1991). Apache will adhere to all stipulations associated with the SUP.

4.4.2.2 No Action

Under the No Action Alternative, there would be no impacts on existing fish resources in the Kenai NWR.

4.4.3 Amphibians

4.4.3.1 Proposed Action

Wood frogs hibernate under the snow in shallow depressions of compacted forest litter (MacDonald 2004). Seismic surveys have the potential to affect hibernating wood frogs in the project area by inducing stress associated with acoustic energy pulses transmitted into the ground and by direct mortality from drilling equipment. There would be no tracked vehicles, but crews walking on snow would create compacted snow. It is unknown how compacted snow may affect overwintering wood frogs (Tessler 2012). Given the limited and temporary nature of seismic surveys, coupled with the fact that the total acreage of affected soil would only be 0.026 acres, disturbance effects on wood frogs would be minor and temporary.

4.4.3.2 No Action

Under the No Action Alternative, no changes to wood frogs or wood frog habitat would occur in the project area.

4.5 Public Uses

Considering the high visitation numbers to the Kenai NWR and the extensive acreage covered during the proposed Apache 3D seismic study, public use resources may be affected by the proposed project. There would be no use of tracked vehicles but all work would be supported by helicopters. The seismic survey would be completed from October through April on Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate. Keeping the work regionalized within the Kenai NWR project area and avoiding public use resource areas during peak-use times would minimize the impacts on public use resources in Refuge. The number of source points, percentage of total source points, number of receiver nodes, and percentage of total receiver nodes found in the special designated areas and areas with special values in the project area are presented in Table 4-5.

Ninety-six percent of source points and receiver nodes are within areas open to snowmachines.

Table 4-5: Potential impacts to project area special values and special designated areas

Special Values and Special Designated Areas	Number of Source Points	Percentage of Source Points	Number of Receiver Nodes	Percentage of Receiver Nodes
Lowland Lakes System ^a	5,463	24	7,051	25
Tustumena Lake and Tributaries ^a	2,579	11	3,175	11
Canoe Trail System ^b	928	4	1,161	4
Kenai River and Tributaries ^a	289	1	392	1
Total	9,259	41	11,779	41

Source: Acreage analysis with ArcGIS of Kenai NWR data (USFWS 2010) and Apache-provided project area data

^a Special values area

^b Special designated area

4.5.1 Fishing

4.5.1.1 Proposed Action

Minor temporary impacts on public use fishing resources are probable during the proposed action. All activity for the Apache 3D seismic survey would be supported by helicopters, and although there would be little impact on the fish by the helicopters, the people fishing would be affected by the flights. Most of the public use occurs in the summer and fall, although some lakes are popular ice fishing locations in winter and early spring. Avoidance of these popular fishing locations during the open season dates listed in Section 3.0 would reduce impacts on public use fishing resources.

4.5.1.2 No Action

Under the No Action Alternative, there would be no impacts on existing fishing resources in the Kenai NWR.

4.5.2 Hunting and Trapping

4.5.2.1 Proposed Action

Minor temporary impacts on public use hunting and trapping resources are probable during the proposed action. All activity for the Apache 3D seismic survey would be supported by helicopters. Helicopter flights would affect both the game and the people hunting and trapping. Activities on Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate would occur between October 1 and April 30, and activities on TNC 22(g) lands would occur between August 15 and December 15. These timeframes may impact hunting activities within the same areas between mid-August and the end of October. The helicopter flights and human activity may cause game to leave impact areas and make hunting more difficult. Crews working near active hunting areas would be within gunshot range, which would be unsafe. Avoidance of popular hunting and trapping areas during the open season dates listed in Section 3.0 would reduce impacts on public use hunting and trapping resources. Designated trapping areas, number of source points, percentage of total source points, number of receiver nodes, and percentage of total receiver nodes found in the project area are presented in Table 4-6.

Table 4-6: Trapping areas and proposed impacts occurring in the project area

Trapping Areas within Project Area	Number of Source Points	Percentage of Source Points	Number of Receiver Nodes	Percentage of Receiver Nodes
Federal lands open to all trapping	12,664	56	15,882	56
Federal lands limited to mink and muskrat trapping only	2,793	12	3,522	12
Non-federal lands open to all trapping	7,275	32	9,194	32
Total	22,732	100	28,598	100

Eighty-one percent of the 113 trappers that received permits for the 2012-2013 trapping season indicated that they planned to trap in at least a portion of the proposed project area. Of those, ten indicated they would be trapping with the use of an airplane (HDR 2013d). Temporary flight restrictions may be imposed by the Service in areas around the active helicopter work zone. The Service may close the project area to trapping during the project to protect both the trappers as well as the seismic survey crews while in the field.

4.5.2.2 No Action

Under the No Action Alternative, there would be no impacts on existing hunting and trapping resources in the Kenai NWR.

4.5.3 Wildlife Viewing and Photography

4.5.3.1 Proposed Action

Minor temporary impacts on public use wildlife viewing and photography resources are probable during the proposed action. All activity for the Apache 3D seismic survey would be supported by helicopters. There would be impacts on both the wildlife and the people viewing wildlife and taking photographs in areas where helicopter overflights and landing zones are active. Avoidance of popular locations for wildlife viewing and photography during peak times of the season would reduce impacts on public use wildlife viewing and photography resources.

4.5.3.2 No Action

Under the No Action Alternative, there would be no impacts on existing wildlife viewing and photography resources in the Kenai NWR.

4.5.4 Subsistence

4.5.4.1 Proposed Action

Minor temporary impacts on public use subsistence resources are probable during the proposed action’s timeframe, which will occur on Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate between October 1 and April 30 for three seasons beginning in 2013. All activity for the Apache 3D seismic survey would be supported by helicopters. Helicopter flights would affect both the wildlife and the subsistence hunters and fishers. Avoidance of historically used locations for subsistence hunting and fishing during peak times of the season would reduce impacts on public use subsistence resources.

Appendix E includes an evaluation of potential impacts to subsistence uses of federal lands in the project area, as required by Section 810 of ANILCA. Communities must be designated as rural to participate in subsistence activities on federally-owned lands under federal subsistence regulations. The nearest rural-designated community to the project area is Cooper Landing.

Based on the subsistence hunting open season schedule presented in Table 3-13, hunting seasons for black bear, brown bear, coyote, hare, lynx, wolverine, spruce grouse, and ptarmigan would at least partially overlap with the proposed seismic program schedule of October 1 through April 30. The Service may close specific areas to subsistence hunting while the proposed seismic program is operating in order to minimize potential conflicts between hunters and survey field crews. This temporary closure of specific areas would temporarily impact subsistence users through restricting access to the area and potentially would cause increased subsistence use of other, open areas during that time. The proposed seismic program does not include permanent impacts to the project area; as such, impacts to subsistence users and resources would be temporary and not result in permanent changes to management or use of the resource within the project area.

4.5.4.2 No Action

Under the No Action Alternative, there would be no impacts on existing subsistence resources in the Kenai NWR.

4.6 Cultural Resources

4.6.1 Proposed Action

The potential for direct or indirect impacts on cultural resources as a result of the proposed action exists, although impacts are unlikely because measures would be implemented to minimize and avoid adverse effects to historic properties. Minimization measures for impacts on cultural resources are described in greater detail below. The magnitude of any impacts, should they occur, would be minor, but they would be long-term in that impacts on cultural resources are irreversible. The extent of potential impacts would be limited to specific, individually affected sites. Surface disturbance from drills would be limited to an approximately 3-inch hole, drilled to a depth of up to 35 feet below the surface at each shot-hole location. No further surface disturbance is anticipated from the blast or proposed access during project operations.

The potential to inadvertently affect archaeological sites is greater than the potential to affect historic sites, as historic remains are more often visible on the ground surface and thus more effectively avoided during project operations. Previously undocumented historical sites encountered by the survey crews would be flagged for avoidance before source points are drilled.

Direct impacts on cultural resources could include drilling source holes into or through archaeological sites, or through the displacement of subterranean features from source disturbance. However, the potential for displacement of subsurface features is low given the winter timing of the source shots. Frozen ground geophysical surveys have been shown to minimize the risk of impacts on cultural resources (BLM 2009, 59), and work is proposed during these months to minimize any potential impacts.

No disturbance of subsurface features attributable to compaction from vehicle weight would occur because work in the Refuge would be limited to foot and helicopter traffic only.

Indirect impacts on cultural resources considered for this type of work often include an increase in the looting of archaeological sites. An increase in looting could result from the influx of people (such as the survey or drilling crews) in areas where sites are located, or from an increased number of people with access to locational information for sites. The potential for looting is unlikely on account of site type within the project area, which are predominantly depression features with very few associated material artifacts. Additionally, archaeological sites or any type of cultural resource would not be identified as such on maps distributed to ground crews. All areas marked for avoidance, including archaeological sites, natural or biological resources, and hazards, would simply be identified as “avoidance areas” on survey maps.

Requirements for compliance with Section 106 of the NHPA would be completed prior to initiation of ground-disturbing activities. The Regional Historic Preservation Officer would determine, in consultation with the State Historic Preservation Officer and identified Section 106 consulting parties, an appropriate level of effort for identification of previously unrecorded sites within the project area (USFWS 1996). The results of a field survey, if required, would be combined with the literature review prepared concurrent with the EA and would be submitted as a separate, confidential document.

The literature review, as defined in the Kenai NWR Cultural Resource Guide (USFWS 1996), would aid in the identification of high probability areas within the project area as well as assist the Service in addressing identified data gaps. The sensitive nature of the information requires that it be submitted independently of the EA.

The potential for impacts on cultural resources would be minimized using the following precautions:

- All identified cultural resources would be treated as eligible for listing in the National Register of Historic Places and would be protected during operations with a 300-foot buffer.
- If archaeological, historic, or cultural materials are encountered during construction, a 300-foot buffer would be applied and the site would be avoided.
- High probability areas, such as those identified in the Refuge Revised CCP and EIS (USFWS 2009, 3-113) and through the literature review, would be identified before the initiation of ground-disturbing activities and would be subject to pedestrian survey or be flagged for avoidance.
- Work would be limited to helicopter-slung drill rigs, significantly limiting the potential for impacts on buried cultural resources.

4.6.2 No Action Alternative

The No Action alternative would not potentially affect cultural resources within the project area.

4.7 Socioeconomics

4.7.1 Proposed Action

Operation of Apache’s 2011-2012 seismic survey program resulted in approximately 225 direct, indirect, and induced jobs resulting in over \$22.5 million a year in payroll expense for skilled oil and gas industry jobs in Alaska (Parker 2012). Because of Apache’s local hire policies, approximately 60 percent of these jobs went to Alaska residents. Purchases during the 2011–2012 season were made from gas producers, construction contractors, engineering firms,

environmental service firms, utility companies, retail and wholesale business, and other types of businesses that typically support oil and gas companies.

Conducting the proposed project would result in similar economic gains for KPB and Alaska, resulting in minor, temporary, probable, and extensive benefits. The total economic output for Apache's 2013-2014 operation is estimated at \$510 million, with approximately 380 jobs affected (Parker 2012).

CIRI and TNC entered into exploration agreements with Apache for work on land within the Kenai NWR. Through exploration of Refuge lands overlying the CIRI-owned coal, oil and gas resources and subsurface estate, CIRI has potential for future royalties if recoverable oil and gas reserves are discovered and developed.

4.7.2 No Action Alternative

Under the No Action Alternative, the seismic program would not occur on Kenai NWR land, but could occur elsewhere in the KPB. Jobs and economic benefits to the KPB would not last as long, and the potential for discovering recoverable oil and gas reserves within CIRI and state subsurface estates would be diminished.

The No Action Alternative would result in minor, temporary, probable, and extensive impacts on the KPB and state economies.

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5.0 CUMULATIVE IMPACTS

The Council on Environmental Quality regulations (40 CFR Part 1508.7) define cumulative effects as "... the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions... Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

The proposed activity is within an area of the Kenai NWR that includes three oil and gas units and associated buildings, seismic lines, and pipelines. This area is managed for wildlife with multiple permissible human uses. Based on the impacts presented in Chapter 4, the impacts of the proposed action would be temporary and negligible after mitigation and restoration. Cumulative effects would consist of the combined effect of concurrent activities in the Refuge on the natural and human environment. Because much of the proposed activity would occur during winter months when wildlife and human use of the area is at its lowest, the cumulative effect of the proposed activity with other activities on resources within the refuge during the survey period would be negligible. The addition of negligible project impacts to other past, present, and reasonably foreseeable future actions does not result in cumulative impacts that would adversely impact the identified resources in Chapters 3 and 4.

Interpretation of the seismic survey could result in a subsequent proposal for exploratory drilling, and could then lead to additional oil and gas development in the project area. This would only occur if oil and gas development in the area is practical and economical. If this is the case, the impacts of additional oil and gas development would need to be assessed on a case-by-case basis but generally would result in the following:

- increased economic activity in the area
- increased air pollution emissions
- increased disturbance of wildlife and their habitats
- possible impacts on water quality and fisheries
- possible alteration of scenic resources
- possible increases in recreational opportunities
- possible impacts on recreational activities

While the seismic survey is the first step in what may lead to exploration and production of oil and gas resources in the project area, those phases are dependent on interpretation of the results of the seismic survey. At this point, the location and extent of exploratory drilling or establishment of production wells in the project area is purely speculative. While these actions may qualify as "reasonably foreseeable future actions," they lack detail in spatial and temporal location. Additionally, Apache could be required to prepare a separate permit application for exploratory drilling, provided the data from this proposed action supports further geologic investigation.

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6.0 MITIGATIONS AND MEASURES TO MINIMIZE HARM

This chapter outlines the avoidance and mitigation measures and permit stipulations that would be incorporated as part of the permitted project and includes measures the applicant has incorporated into the proposed project by design, Refuge stipulations for seismic survey activities, and additional measures developed for this proposed project specifically.

6.1 Applicant's design measures

1. Use of wireless nodal technology which allows the following avoidance measures:
 - a. No wheeled or tracked vehicles will be used in the Refuge except snowmachines in season as approved by the Refuge Manager.
 - b. No seismic lines will be cleared.
 - c. No vegetation clearing will occur.
2. Impacts to the environment would be avoided through modification of the shot hole and node placement pre-plot to avoid and buffer cultural resources, structures, anadromous streams, bald eagle, owl and trumpeter swan nests, and other identified sensitive areas. The land survey, helicopter, drill, recording, and clean-up crews would all use the same pre-plot while in the field to ensure that these identified areas are avoided. An environmental field monitor will be a part of the field team to assist in identifying eagle and swan nests not previously identified; these locations will be noted and avoidance buffers applied. The environmental monitor will assist the field crews with identifying and avoiding sensitive areas that were not identified in the pre-plot. The Refuge staff and Apache will work to develop a plan for the duties of this environmental monitor, who will report directly to Refuge staff regarding the field survey program and adherence to the SUP stipulations. Inadvertent discovery protocol for cultural resources is outlined in the Cultural Resources Survey Plan for the Refuge (HDR 2013a). Avoidance areas, described in Table 2-2, include the following:
 - a. 300 foot setbacks from established boundaries of identified cultural resources
 - b. 116 foot setbacks from anadromous stream banks
 - c. 1,000 foot setbacks from active bald eagle nests during the period when bald eagles are in attendance
 - d. 1,000 foot setbacks from trumpeter swan nests and documented swan nest lakes
 - e. 660 foot setbacks from active owl nests during the period when owls are in attendance
3. Drill rigs and sling loads of receiver nodes would be lowered to the ground using cables up to 100 feet long and personnel would be dispatched to the ground at pre-determined landing zones to avoid the need for vegetation clearing. In areas where vegetation is too thick to allow for placement of drill rigs, the pre-plot would be adjusted to avoid the area.
4. Personnel camps and equipment storage would be sited outside the Refuge.
5. Helicopter pilots would avoid sensitive areas previously identified and logged on the pre-plot by coordinating their GPS with the pre-plot prior to mobilization to the field. The project environmental monitor would assist in identifying sensitive areas in the field not previously identified on the pre-plot and establishing avoidance buffers. Helicopter pilots would not

enter airspace or land inside established buffer zones for bald eagle or trumpeter swan nests, cultural resources, anadromous streams, or other sensitive areas identified in the pre-plot. Continuous flight location data would be recorded during flight operations to confirm that buffers and sensitive areas were avoided. In areas where vegetation is too thick to land, the pre-plot would be adjusted to avoid these areas.

6. Waste and hazardous material handling would be conducted in controlled situations at pre-determined locations. A hazardous and flammable materials management plan would be prepared prior to commencement of activities; appropriate agencies would be consulted to ensure best management practices for fire and spill prevention are in place.
7. Clean-up crews would walk survey lines to remove all stakes, flagging, and other materials used to conduct the survey to ensure that the project area is not permanently impacted.

6.2 Kenai NWR seismic survey stipulations

Draft stipulations that may be associated with the SUP are included in Appendix B.

6.3 Additional project specific measures

1. Equipment (e.g., helicopters, survey tripods, drill rigs, slings, nodes) and gear (e.g., boots, clothing) that has been used in off-pavement areas should be disinfected of potential exotic and invasive plant parts and seeds before entering the Kenai NWR.
2. If owl nest cavities are observed during summer months during surveys to place receiver nodes, tree locations should be noted and added to the pre-plot as avoidance areas.
3. Avoid identified bear den sites by a 660-foot setback.
4. If archaeological, historic, or cultural materials are encountered during seismic survey activities, apply a 300-foot setback from the site, add it to the pre-plot and avoid the area.
5. Identify high probability cultural resource areas, such as those identified in the Refuge Revised CCP and EIS (USFWS 2009, 3-113) and through the literature review, before the initiation of ground-disturbing activities.
6. Work will be limited to helicopter-slung drill rigs, significantly limiting the potential for impacts to buried cultural resources.

7.0 FINDINGS AND DETERMINATIONS

The information contained in this Draft EA will be considered by the Service when developing SUP stipulations for conducting proposed 3D seismic survey activities within the Refuge.

Based on the level of impacts and comments received from the public, the Service will determine whether project impacts may or may not be significant. If impacts from the proposed project are not significant, the Service will issue a FONSI. If impacts are found to be significant, an environmental impact statement and Record of Decision will be required.

The Service will consider the potential environmental consequences of the proposed action, Apache's proposed mitigation and measures to minimize harm, and Apache's commitment to obtain all appropriate permits and authorizations to conduct project activities.

The Service could grant Apache a SUP for the project following publication of the FONSI or Record of Decision. The SUP would include access to the Kenai NWR land where CIRI holds subsurface estate and where TNC holds surface ownership. The SUP would include stipulations that must be adhered to during seismic survey activities conducted within the Refuge.

Appendix B describes typical SUP stipulations for seismic survey projects.

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8.0 CONSULTATION AND COORDINATION

As part of its comprehensive 3D seismic survey program in the Cook Inlet Basin, Apache has consulted with federal, state, and local agencies, ANSCA Native corporations, federally recognized tribes, and private organizations and individuals. This consultation and coordination has been conducted to obtain surface and subsurface lease agreements, acquire permits and authorizations, and obtain rights-of-way.

Agency consultation and coordination has been ongoing since Apache began planning the 3D seismic program in 2010. Permits and authorizations required to conduct the seismic program in the Cook Inlet basin are listed in Table 8-1.

Table 8-1: Cook Inlet basin area permit, authorization, and approval consultation

Agency/ Organization/ Entity	Permit, Authorization, or Approval	Additional Information
<i>Federal Permits and Authorizations</i>		
Kenai NWR	Special use permit	For activities in the Kenai NWR
	Compatibility determination	For activities occurring on TNC 22(g) lands
USFWS	Archaeological Resources Protection Act permit	For cultural resource surveys in the Kenai NWR
	Marine Mammal Protection Act and Endangered Species Act consultation and/or authorization	Incidental harassment authorization for sea otters and Steller’s eiders if marine or transitional zone activities occur in sea otter or Steller’s eider habitat – outside the Kenai NWR. Endangered Species Act Section 7 consultation required if proposed activity may adversely affect federally-listed species.
	Bald and Golden Eagle Protection Act consultation	Consultation regarding disturbance setbacks from active bald eagle nests for seismic survey activities that occur during periods when bald eagles will be attending nests
U.S. Army Corps of Engineers	Clean Water Act Section 404 Nationwide Permit 6	For survey activities in wetlands and waters of the United States that result in placement of fill (i.e., drilling shot holes)
	Rivers and Harbors Act Section 10 general permit	For marine receiver placement – outside the Kenai NWR
National Marine Fisheries Service	Marine Mammal Protection Act and Endangered Species Act authorizations	Consultation and incidental harassment authorization for beluga whales and harbor seals – outside the Kenai NWR
<i>Alaska Department of Natural Resources</i>		
Oil and Gas	Geophysical land use permit	For seismic survey activities on state land
Parks and Outdoor Recreation	Land use permit	For activities within state parks and recreation areas
	Kenai River Special Management Area permit	If shot holes will be required within Kenai River setbacks

Agency/ Organization/ Entity	Permit, Authorization, or Approval	Additional Information
Alaska Department of Natural Resources (continued)		
Mining, Land, and Water	Land use permit	For seismic survey activities on undesignated state land – outside the Kenai NWR
State Historic Preservation Officer	Permit for cultural resource investigations on state land	Cultural resource surveys on state land – outside the Kenai NWR
	Letter of concurrence	Agreement between Apache and the State Historic Preservation Officer that archaeological sites and cultural resources will be avoided
State of Alaska—Department of Fish and Game		
Alaska Department of Fish and Game	Fish habitat permit	Separate permits required for water withdrawal, blasting near fish streams, and/or fish stream crossings by wheeled or tracked vehicles – outside the Kenai NWR
	Special area permit	Required for certain seismic survey activities in state critical habitat areas (e.g., air guns, drilling and blasting shot holes) – outside the Kenai NWR
	Fish resource permit	Required if fish sampling needed for fish habitat permits
Kenai Peninsula Borough (KPB)		
Kenai River Center	Multiagency permit	
KPB	Land use permit	For seismic work on KPB land – outside the Kenai NWR
	Right of way permit	For seismic work on KPB roads and setbacks – outside the Kenai NWR
	Floodplain permit	For seismic work within designated floodplains on the Kenai Peninsula – outside the Kenai NWR
	Habitat protection permit	Required if shot holes will be within 50 feet of anadromous streams
City of Soldotna	TBD	
City of Kenai	TBD	
Private		
Alaska Mental Health Trust	Land use permit	Seismic survey activities on Mental Health Trust Lands
Kenai NWR Oil and Gas Unit Operators	Letters of non-objection	The Kenai NWR requires letters of non-objection from the current operators of Refuge oil and gas units before issuing a SUP
ANCSA Native Corporations with oil and gas land holdings	Lease agreements	Oil and gas lease agreements with the subsurface land owner are required to explore and develop oil and gas resources
Private landowners	Rights of entry	Negotiations with individual private landowners – outside the Kenai NWR

Consultation with federally recognized tribes, ANSCA Native corporations, and subsistence harvest organizations has also been ongoing since 2010. This consultation has been conducted to obtain surface and subsurface oil and gas lease agreements and rights-of-way, to discuss the overall seismic program and concerns regarding subsistence issues, and to resolve concerns about seismic program impacts. Table 8-2 lists consultation and coordination efforts with federally recognized tribes, ANSCA Native corporations, and subsistence organizations.

Table 8-2: Region 3 tribal and Native corporation consultation and coordination

Tribe or Corporation	Meeting Date	Purpose of Meeting
Native Village of Tyonek	November 2010 – September 2012	Multiple meetings, phone calls, and e-mail exchanges to discuss Apache plans
	October 3, 2011	Barbeque and community meeting
	October 31, 2011	Signed temporary lease agreement
	December 2011	Signed 3-year lease agreement
	October 30, 2012	Drilling meeting and luncheon
Tyonek Native Corporation	November 2010 – September 2012	Multiple meetings, phone calls, and e-mail exchanges to discuss Apache plans
	October 2011	Signed agreement
	September 2012	Signed revised and expanded agreement
Ninilchik Native Association/Ninilchik Traditional Council	November 2011– May 2012	Multiple meetings, phone calls, and e-mail exchanges to discuss Apache plans
	May 2011	Signed agreement with Ninilchik Native Association for use of lands and roads
Salamatof Native Association	November 2010– September 2012	Multiple meetings, phone calls, letters, and e-mail exchanges to discuss Apache plans
Knikatnu	Spring 2011	Meeting to discuss Apache plans
Knik Tribal	September 5, 2012	Meeting to discuss Apache plans
Alexander Creek	February 1, 2012	Meeting to discuss Apache plans
Cook Inlet Marine Mammal Council	March 2011– February 2012	Multiple meetings, phone calls, and e-mail exchanges to discuss Apache plans; discussions ended because the Council was disbanded
CIRI	November 2010– September 2012	Multiple meetings, phone calls, letters, and e-mail exchanges to discuss Apache plans
	October 5, 2011	Signed initial land use permit for land near Village of Tyonek
	July 2012	Signed exploration agreement
Village of Eklutna	March – April 2012	Meetings to discuss Apache plans
Kenaitze Indian Tribe	November 2012	Meetings to discuss Apache plans

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9.0 LIST OF PREPARERS

This Draft EA was prepared by HDR Alaska, Inc., a third-party contractor, under direction of the Service’s Refuge and Regional offices. Technical input regarding project description and operations were provided by Apache. Individuals, their professional affiliation,, role in preparing this document, and qualifications are presented below:

Name, Firm, Project Function	Qualifications
Tina Adair, HDR List of Preparers Graphic Design Document Preparation	B.S. Communications 25 years of diversified experience writing, editing, technical editing, and producing graphics for client projects, including EISs, EAs, technical reports, and white papers.
Donna Robertson Aderhold, HDR Purpose and Need Consultation and Coordination	M.Sc. Wildlife and Fisheries Sciences, B.S. Wildlife Biology 20 years of experience providing technical expertise and project management on environmental projects related to wildlife, wetland, and vegetation field investigations in support of EAs and third-party EISs, Section 404 Clean Water Act permits, Section 7 and 10 Endangered Species Act consultation, NEPA documentation, and other environmental compliance needs.
Michael Allwright, HDR QA/QC	M.Sc. Biology, B.A. Geology 15 years of experience providing technical expertise and project management on environmental projects related to planning, compliance, and remediation projects in support of EAs and third-party EISs, Section 404 Clean Water Act permits, NEPA documentation, and other environmental compliance needs; has played a key role in regulatory interpretation and compliance and served as a field manager for implementation of work plans, site development, and geophysical data collection.
Jodie Anderson, HDR Affected Environment and Environmental Consequences (General Setting, Soils, Vegetation, Wetlands, Hydrology, Public Uses)	Ph.D. Interdisciplinary Studies, M.A. Biology, B.S. Biology 18 years of experience in agriculture and natural resource projects, planning, and research, developing natural resource curriculum, implementing research, project management, and monitoring projects for agricultural resources and soil nutrients.
Erin Begier, HDR References Document Production	B.S. Business Management 15 years experience in office software and data management, NEPA project coordination and document production.
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Name, Firm, Project Function	Qualifications
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Marta Czarneski, Apache Permitting Coordinator	M.S. Environmental Engineering 17 years of environmental permitting and compliance experience in all environmental media; 13 years in the oil and gas sector supporting onshore and offshore facilities.
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Anna Kohl, CEP-IT, HDR Project Manager Alternatives Findings and Determinations Mitigation and Measures to Minimize Harm	Certificate in NEPA, B.A. Geology 10 years of experience managing private- and public-sector environmental and NEPA projects; coordinated and reviewed technical reports and draft documents related to wetlands, hydrology, fish passage, wildlife movement, water quality, and project alternative evaluations; experienced with field work and composition of wetland delineations and functional assessments, environmental site assessments, site monitoring, baseline environmental studies, and review and incorporation of technical studies into environmental documents.
Scott Norton, HDR GIS	Certificate GIS, B.A. Art and Design (Art/Photography) 7 years of experience in GIS using ArcGIS, database management using AutoCAD, and environmental data information systems, as well as providing wetland assessment and delineation and sample handling/management for groundwater, surface water, industrial wastewater, and soil sample collection.
Lisa Parker, Apache Government Relations Manager	B.S. Political Science 30 years of experience in land management, permitting, and project management including stakeholder engagement related to natural resource development and implementation in Alaska.
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Susanna Schippers, HDR Technical Editor	B.A. Creative Writing 14 years of experience as a technical editor, writer, NEPA planner, and public involvement specialist with responsibilities for editing and writing environmental documents; managing document production; and planning and implementing community outreach efforts for transportation and public works projects.

Name, Firm, Project Function	Qualifications
Carol Snead, HDR Cumulative Impacts	M.Sc. Geology, B.S. Geology 23 years of experience in the preparation and management of environmental assessments and impact evaluations in accordance with NEPA for transportation, hydropower, utility corridors, military, and other development projects.
Gary Streff, Apache Geophysical Operations Manager	B.Sc. Electronics Engineering 37 years of worldwide seismic experience covering land, marine, and transition zone acquisition.

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Appendix A

Description of Federal Laws Pertaining to Apache's Proposed Seismic Survey in the KNWR

The federal laws that guide decision-making for oil and gas activities on the Kenai National Wildlife Refuge (KNWR) are summarized below. Additional information about these regulations can be found in the Comprehensive Conservation Plan (CCP) for KNWR (USFWS 2010).

National Wildlife Refuge System Administration Act (16 USC 668dd–668ee), as amended by the National Wildlife Refuge System Improvement Act (Public Law 105-57)

The National Wildlife Refuge System Administration Act provides guidelines and directives for administration and management of all areas in the national wildlife refuge system, including “wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, or waterfowl production areas.”

The 1997 amended National Wildlife Refuge System Improvement Act gives guidance to the Secretary of the Interior for the overall management of the refuge system. The Act’s main components include: a strong and singular wildlife conservation mission for the refuge system; a requirement that the Secretary of the Interior maintain the biological integrity, diversity, and environmental health of the refuge system; a new process for determining compatible uses of refuges; a recognition that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation and photography, and environmental education and interpretation, when determined to be compatible, are legitimate and appropriate public uses of the refuge system; that these compatible wildlife-dependent recreational uses are the priority general public uses of the refuge system; and a requirement for preparing comprehensive conservation plans (USFWS 2012).

Alaska Native Claims Settlement Act of 1971, as amended (43 USC 1601–1624)

ANCSA authorized Alaska Natives to select and receive title to 44 million acres of public land in Alaska as partial settlement of their aboriginal claim to land in the state. ANCSA established a system of village and regional Native corporations to manage the lands and cash payments, and made extensive provisions regarding the operations of the corporations. Special provisions were made for, and restrictions placed on, selection of lands within existing National Wildlife Refuges (USFWS 2012).

Alaska National Interest Land Conservation Act of 1980, as amended (16 USC 140hh–3233, 43 USC 1602–1784)

ANILCA expanded the Federal conservation system in Alaska (including national parks, refuges, forests, Wilderness areas, and Wild and Scenic Rivers. Specifically, title III of ANILCA established new refuges, identified the purposes of each refuge, and provided administrative guidance for management of refuges in Alaska, including requiring the preparation and periodic updating of a CCP for each refuge.

In addition, ANILCA provided comprehensive management guidance for all Federal public lands in Alaska, including provisions regarding wilderness; subsistence; transportation and utility corridors; oil and gas leasing; mining; public access; and hunting, fishing, and trapping (USFWS 2010: A-2).

Portions of ANILCA that are relevant to the proposed project include the following:

§ 303: ADDITIONS TO EXISTING REFUGES

4) KENAI NATIONAL WILDLIFE REFUGE.-- (A) The Kenai National Wildlife Refuge shall consist of the existing Kenai National Moose Range, including lands, waters, interests, and whatever submerged lands, if any, were retained in Federal ownership at the time of statehood, which shall be redesignated as the Kenai National Wildlife Refuge, and an addition of approximately two hundred and forty thousand acres of public lands as generally depicted on the map entitled "Kenai National Wildlife Refuge", dated October 1978, excluding lands described in P.L.O. 3953, March 21, 1966, and P.L.O. 4056, July 22, 1966 withdrawing lands for the Bradley Lake Hydroelectric Project.

(B) The purposes for which the Kenai National Wildlife Refuge is established and shall be managed, include--

- (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, moose bears, mountain goats, Dall sheep, wolves and other furbearers, salmonoids and other fish, waterfowl and other migratory and nonmigratory birds;
- (ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;
- (iii) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge;
- (iv) to provide in a manner consistent with subparagraphs (i) and (ii), opportunities for scientific research, interpretation, environmental education, and land management training; and
- (v) to provide, in a manner compatible with these purposes, opportunities for fish and wildlife-oriented recreation.

§ 702 DESIGNATION OF WILDERNESS WITHIN THE NATIONAL WILDLIFE REFUGE SYSTEM

In accordance with subsection 3(c) of the Wilderness Act (78 Stat. 892), the public lands within the boundaries depicted as "Proposed Wilderness" on the maps referred to in §302 and §303 of this Act or the maps specified below are hereby designated as wilderness, with the nomenclature and approximate acreage as indicated below:

- 7) Kenai Wilderness of approximately one million three hundred and fifty thousand acres as generally depicted on a map entitled "Kenai National Wildlife Refuge", dated October 1978

§ 707 ADMINISTRATION

Except as otherwise expressly provided for in this Act wilderness designated by this Act shall be administered in accordance with applicable provisions of the Wilderness Act

governing areas designated by that Act as wilderness, except that any reference in such provisions to the effective date of the Wilderness Act shall be deemed to be a reference to the effective date of this Act, and any reference to the Secretary of Agriculture for areas designated in §§701 and 702 shall, as applicable, be deemed to be a reference to the Secretary of the Interior.

§ 1110: SPECIAL ACCESS AND ACCESS TO INHOLDINGS

(a) Notwithstanding any other provision of this Act or other law, the Secretary shall permit, on conservation system units national recreation areas, and national conservation areas, and those public lands designated as wilderness study, the use of snowmachines (during periods of adequate snow cover, or frozen river conditions in the case of wild and scenic rivers), motorboats, airplanes, and non-motorized surface transportation methods for traditional activities (where such activities are permitted by this Act or other law) and for travel to and from villages and homesites. Such use shall be subject to reasonable regulations by the Secretary to protect the natural and other values of the conservation system units, national recreation areas, and national conservation areas, and shall not be prohibited unless, after notice and hearing in the vicinity of the affected unit or area, the Secretary finds that such use would be detrimental to the resource values of the unit or area. Nothing in this section shall be construed as prohibiting the use of other methods of transportation for such travel and activities on conservation system lands where such use is permitted by this Act or other law.

(b) Notwithstanding any other provisions of this Act or other law, in any case in which State owned or privately owned land, including subsurface rights of such owners underlying public lands, or a valid mining claim or other valid occupancy is within or is effectively surrounded by one or more conservation system units, national recreation areas, national conservation areas, or those public lands designated as wilderness study, the State or private owner or occupier shall be given by the Secretary such rights as may be necessary to assure adequate and feasible access for economic and other purposes to the concerned land by such State or private owner or occupier and their successors in interest. Such rights shall be subject to reasonable regulations issued by the Secretary to protect the natural and other values of such lands.

§ 1111 TEMPORARY ACCESS

(a) IN GENERAL.--Notwithstanding any other provision of this Act or other law the Secretary shall authorize and permit temporary access by the State or a private landowner to or across any conservation system unit, national recreation area, national conservation area, the National Petroleum Reserve Alaska or those public lands designated as wilderness study or managed to maintain the wilderness character or potential thereof, in order to permit the State or private landowner access to its land for purposes of survey geophysical, exploratory, or other temporary uses thereof whenever he determines such access will not result in permanent harm to the resources of such unit, area, Reserve or lands.

(b) STIPULATIONS AND CONDITIONS.--In providing temporary access pursuant to

subsection (a), the Secretary may include such stipulations and conditions he deems necessary to insure that the private use of public lands is accomplished in a manner that is not inconsistent with the purposes for which the public lands are reserved and which insures that no permanent harm will result to the resources of the unit, area, Reserve or lands.

Wilderness Act of 1964 (16 USC 1131–1136)

The Wilderness Act provides criteria for determining suitability and establishes restrictions on activities that can be undertaken on a designated area. In addition, ANILCA Section 702 established seven wilderness areas in the National Wildlife Refuge system in Alaska, including approximately 1.35 million acres of the Kenai Wilderness in the KNWR. ANILCA also provided for use of motorized vehicles and construction of cabins, fisheries and aquaculture facilities, and other structures in these wilderness areas, in recognition of the unique conditions in Alaska (USFWS 2012).

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Appendix B

Draft Special Use Permit Stipulations

SEISMIC SURVEY SPECIAL CONDITIONS

The following are special conditions that the Service may include as part of any Special Use Permit that it may issue for the Apache 3D Seismic Project.

1. The permittee and contracting party chief will, before beginning operations or use of Refuge lands under this permit, meet with the Refuge Manager or his designee for the purpose of discussing the stipulations contained in this document, proposed operations of this program, and any additional requirements as deemed necessary.
2. The permittee shall, before any operations under this special use permit, inform the Refuge Manager in writing of the name and address of a local employee who will represent the permittee in all matters contained in this permit.
3. Before program commencement, a map will be required that accurately depicts routes of travel, the array of seismic lines and locations of shot holes, and locations of any support facilities required including field manpower camps, fuel storage sites, and satellite areas of storage of explosives. All camp and storage sites located on Refuge lands must be approved by the Refuge Manager before onset of field operations.
4. Letters of non-objection, as they may apply, from CIRI and from Unit Operators of the Swanson River Oil and Gas Field must be obtained by the permittee and submitted to the Refuge Manager before any operations over the conveyed subsurface estate, on Native-selected or conveyed lands.
5. The use of any facilities, equipment storage space, or construction of temporary structures within the Swanson River Oil and Gas Field will require prior authorization and a statement of non-objection from that field operator.
6. The Refuge Manager or his designee must be kept informed in a timely manner of all operations conducted on Refuge lands. A progress report of field operations (verbal or written) must be submitted daily (faxed copy of Daily Reports is acceptable) to the Refuge Manager or his designee. In the event of a spill, the spill and corrective action taken shall be described in the daily report. All spill reporting shall be in accordance with state and federal regulations.
7. The use of helicopters is authorized with the following understanding:
 - a. Landings are prohibited except in the direct support of the activities covered by this permit and emergencies.
 - b. The recreational use of helicopters is prohibited.
 - c. Clearing of vegetation for landing or takeoff is not allowed.
 - d. Fuel caches are not permitted except as may be authorized by the Refuge Manager.
 - e. All helicopter operations shall comply with United States Department of Transportation, 14 CFR.
 - f. All helicopter fueling operations and all transport and storage of helicopter fuel will comply with the National Fire Protection Association 407 (NFPA 407) Standard for Aircraft Fuel Servicing.

8. All hazardous material containers and fuel drums must be marked with the date use began contents, and permittee or contractor's name.
9. The permittee shall develop and have onsite a SPCC Plan. A copy of this plan will be submitted to the Refuge Manager before construction begins.
10. Stationary fuel storage facilities must not be placed within 100 feet of the annual floodplain of a watercourse or closer than 100 feet to a water body and must be placed within an impermeable barrier providing 110 percent capacity of the largest independent fuel storage container.
11. Refueling of equipment shall not occur within 100 feet of an annual floodplain of a watercourse or within 100 feet of any water body.
12. Sorbent material in sufficient amount to handle operation spills must be on hand at all times both in the field and at staging areas for use in the event of an oil or fuel spill.
13. Fuel may be stored only at the locations that have received prior approval of the Refuge Manager or his designee. Fueling operations for helicopters shall occur at specified landing zones. Field locations for fly tank placement and refueling for drills and other equipment sites will be recorded with GPS coordinates and the helicopter pilot will keep a written log for each point where the fly tanks are placed. Drillers will keep a daily log of fuel sites as they occur in the field. A separate data sheet will be completed in the field at each refueling location documenting the GPS coordinates, system, date, time, confirmation of whether any fuel was spilled, and whether any leaks in the equipment were detected.
14. The permittee will conduct pre- and post-project soil sampling at the bulk fuel storage locations to confirm that there have been no spills on land. At the conclusion of the project, if there are any field refueling locations that warrant sampling or are in question, the data sheets will be used to determine if a fuel spill may have occurred. Soils contaminated with petroleum products shall be reported immediately to the Kenai NWR. In addition, the appropriate notification to the ADEC will be made on the basis of reporting criteria. The contracting company will be notified of any problems. Cleanup and removal of contaminated soil will take place before the completion of the project.
15. All Resource Conservation and Recovery Act hazardous wastes shall be stored, transported, and disposed of in accordance with regulation requirements.
16. All seismic charge material shall be housed in magazines located at approved locations. Magazines shall be a safe distance from the main staging area. Magazines shall be signed and marked in accordance with ATF requirements.
17. Staging of materials and equipment will not be allowed in public use areas.
18. All food wastes shall be stored in animal-proof containers and disposed of regularly at a permitted offsite facility.

19. All gray and black water generated shall be stored onsite in holding tanks until it can be transported from the site to a permitted treatment facility.
20. All solid waste generated on the project site shall be disposed of in accordance with Title 18, Alaska Administrative Code, Chapter 60 (18 AAC 60) (Solid Waste Regulations) and 18 AAC 62 (Hazardous Waste Regulations). This shall include back-hauling all non-wood, non-petroleum solid waste from the project area and properly disposing of it in a permitted landfill.
21. The permittee shall not conduct operations under this permit that may unduly damage any wildlife habitat or wildlife resource or interfere with wildlife concentrations. Wildlife will not knowingly be harassed or approached closely enough to disrupt the animal's activity or to endanger human life. Any problems or concerns about the wildlife will be reported as soon as practical to the Refuge Manager. This permit may be canceled or revised at any time by the Refuge Manager to protect wildlife habitat and wildlife resources on the Refuge. There shall be no taking of any animal except in the case of Defense of Life and Property (DLP). In the case of DLP, the permittee shall report the taking to the ADF&G and the Refuge.
22. The permittee shall contact the Refuge to obtain locations of all known bear dens. In the case that a bear den is found by the permittee, the permittee shall contact the Refuge. The contractor shall not operate within a 1/8-mile radius of any known bear dens.
23. All activity shall be prohibited within a 660-foot radius of eagle nests during February and March. During other months of the year, the Refuge Manager may require separation distances of up to 1/2 mile if activities conflict with nesting activities of bald eagles. Disturbance and destruction of eagle's nests or nesting trees is strictly prohibited.
24. If the permittee must cross an open-water anadromous or resident fish stream with a motor vehicle, the permittee shall contact ADF&G and obtain the correct authorization. In the event of vehicle movement on a frozen water surface, the permittee shall comply with ADF&G Fish Habitat Permit FG 97-II-GP01, issued January 2, 1997.
25. Seismic charges shall not be detonated within 100 feet, beneath, or adjacent to marine, estuarine, or fresh waters that support fisheries at the time of the project.
26. Optimally, all shots deployed will be shot or recovered. If any charge cannot be shot or recovered, the location shall be noted and provided to the Refuge.
27. If the permittee discovers any historic, prehistoric, or archaeological sites or artifacts during the course of field operations, all activity at that site shall cease and the State Historic Preservation Office and the Refuge shall be contacted immediately.
28. The permittee shall post warnings of seismic survey activity on all snowmachine trails and working travel routes.
29. The permittee shall seek to notify trappers operating in the project area of proposed survey activity. The permittee shall also place a public notice in a local newspaper apprising the public of proposed survey activity.

30. If seismic crews discover wolf kills or wolves actively feeding on carcasses in the field, they shall consult with the Refuge Manager about what actions, if any, are to be taken.
31. If project operations encounter or infringe on areas identified as critical for moose wintering activities, the permittee shall consult with the Refuge to determine whether operations should be modified to lessen the disturbances.
32. No new roads or trails may be constructed. Clearing routes of travel, felling or cutting of trees, or blazing of trails is not permitted without prior approval of the Refuge Manager. Existing roads, trails, and natural clearings must be used wherever possible.
33. No use of surface vehicles off the established and maintained road system will be permitted without prior approval of the Refuge Manager.
34. Vehicles parked along the traveled portions of the Swanson River/Swan Lake Road should not impede the normal flow of vehicular traffic. Whenever possible, vehicles should be parked at the turnouts situated along the roads. Any seismic activity that may interrupt the normal flow of vehicular traffic along Swanson River/Swan Lake Road shall be controlled with traffic warning signs and flag persons.
35. Shot holes will maintain a minimum distance of 100 feet from any water body that may support fishery resources. These areas shall be identified and so marked on field maps before field operations begin. A 200-foot setback of shot holes will be maintained along the Swanson River.
36. The permittee will not use any water source within the permit area without advance approval or use equipment under conditions and in manner that will, in the opinion of the Refuge Manager, damage lakes or streams or other wildlife resources.
37. The permittee will in a timely manner fill, plug as necessary, and cover all holes, pits, and excavations that may be constructed by the permittee. Should artesian water develop from any such drill site, the permittee will contain and properly plug and abandon the well as may be appropriate under existing regulations.
38. The permittee is responsible for maintenance of Swanson River/Swan Lake Road during seismic operations. Any associated gates must be closed and locked at all times except during moments of ingress or egress.
39. The permittee is responsible for ensuring that all personnel associated with this program, especially those conducting activities authorized under this special use permit, are familiar with and adhere to the conditions of this permit.
40. Inspections of ongoing activities in addition to a final inspection of the permit area may be required by the Refuge Manager to determine compliance with the terms of this permit.
41. All survey flagging, stakes, wire, or other debris associated with this program must be removed from Refuge lands. However, shot points may remain identified to assist the required

summer cleanup crew until that project has been completed and final approval is received from the Refuge Manager.

42. A summer cleanup program must be developed along seismic lines to be certain all holes are properly filled and any debris associated with this project has been collected and removed from Refuge lands. The cleanup party foreman will report to the Refuge Manager or his designee to discuss this program prior to authorized field cleanup operations.
43. The permittee shall provide the Refuge Manager with a project report, summarizing field operations, within 30 days of permit expirations.
44. The permittee shall be held liable and will indemnify and hold harmless the government, its agents, and employees against all actions or claims for all damages to persons or property, including death arising or resulting from the fault, negligence, or wrongful act, or wrongful omission of the permittee, his agents, property of a third person, or injury including death, to such persons in accordance with the Federal Tort Claims Act, U.S.C. 2671-2680.
45. Endorsement of this permit signifies the permittee's complete understanding and concurrence with all the conditions set forth in the General Stipulations found on the reverse side of the permit, the special conditions in this document, and other appropriate conditions/stipulations as they may apply. The Refuge Manager must approve any amendments or modifications to these special conditions or to the special use permit in writing.
46. The permittee agrees and recognizes that this permit does not alter, change, amend, relieve, or eliminate the necessity for the permittee to fully comply with all other federal, state, or local statutes and regulations applicable to the conduct of geophysical operations. The permittee herein agrees to comply with all federal statutes and regulations requiring the consent of mineral owner, mineral lease offeror, or mineral lease holder concerning geophysical operations on leases or mineral acreage within the permit area.
47. Failure to comply with state or federal regulations or any conditions of this permit could result in immediate revocation of this permit and possible denial of future permit requests for land administered by the Service.
48. Failure by the Service to enforce any of the conditions or requirements of the permit does not constitute a waiver by the Service of such conditions or requirements.
49. A report containing the results of seismic information acquired within unitized areas (Birch Hill and Swanson River Oil and Gas Field) and within those areas of the Refuge outside private subsurface ownership will be submitted to the Regional Director, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, Alaska 99503. Seismic data should be submitted within six (6) months following expiration of the special use permit. Data will be accompanied by a map showing shot point locations at an appropriate scale (generally 1:96,000 or larger) and one reproduction of this map. All data should be stamped "Confidential" by the permittee and will be kept confidential to the extent permitted by law. These data may be used by the Department of the Interior in responding to Congress relative to the ANILCA, and upon proper request, may be disclosed to any committee or

subcommittee of Congress evaluating the Kenai NWR or its resources. There will be no publication of the data.

50. After the seismic survey has been completed, a CAD or shapefile (compatible with the Kenai NWR's geographic information system database) will be submitted to the Refuge office containing information about where the actual shotlines were located on the ground for inclusion in the Refuge's electronic seismic survey database.

Appendix C

Anadromous Water Bodies within the Proposed Project Area

Anadromous Water Bodies (Streams and Lakes) within the Proposed Project Area				
Water Body Number	Water Body Name	Species present	Latitude	Longitude
244-30-10010-2025	Beaver Creek	sockeye	60.57331049770	-151.09544295900
244-30-10010-2025-0010	Beaver Lake	coho	60.65688083630	-150.98119068300
247-90-10030	Bishop Creek	pink	60.75534409690	-151.10274185500
247-90-10020-2058-0010	Campfire Lake	sockeye	60.74304503530	-150.60831905100
244-30-10010	Kenai River	coho, Dolly Varden	60.48054980640	-150.12047431400
244-30-10010-2063-3025-0030	Mosquito Lake	coho	60.63387373530	-150.81471444100
247-80-10015	Otter Creek	coho, Dolly Varden	60.86853053840	-150.86704892400
247-80-10010	Seven Egg Creek	coho	60.93772083770	-150.70737803600
244-30-10010-2063-3025-0020	Silver Lake	coho	60.64443658780	-150.79832504400
247-90-10020-2058	Swan Creek	coho	60.74114804290	-150.61519024200
247-90-10020	Swanson River	coho	60.85239656380	-150.56776550500
244-30-10010-2063-3025	West Fork Moose River	coho, sockeye	60.58353732330	-150.66967833100

Source: Johnson and Blanche 2012

Appendix D

Wildlife Avoidance Plan

Wildlife Interaction and Avoidance Plan

Prepared for:

Apache

Apache Alaska
Corporation
510 L Street, Suite 301
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Prepared by:



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December 2012

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1.0 INTRODUCTION

This document presents the Wildlife Interaction and Avoidance Plan for proposed three-dimensional (3D) seismic survey within the Kenai National Wildlife Refuge (KNWR (Map 1). Apache Alaska Corporation (Apache) has contractual agreements with Cook Inlet Region, Inc. (CIRI), and Tyonek Native Corporation (TNC) to conduct oil and gas exploration and, potentially, development activities on CIRI and TNC surface and subsurface lands on the Kenai Peninsula in Alaska. Some of these CIRI and TNC lands are within the KNWR (Map 2).

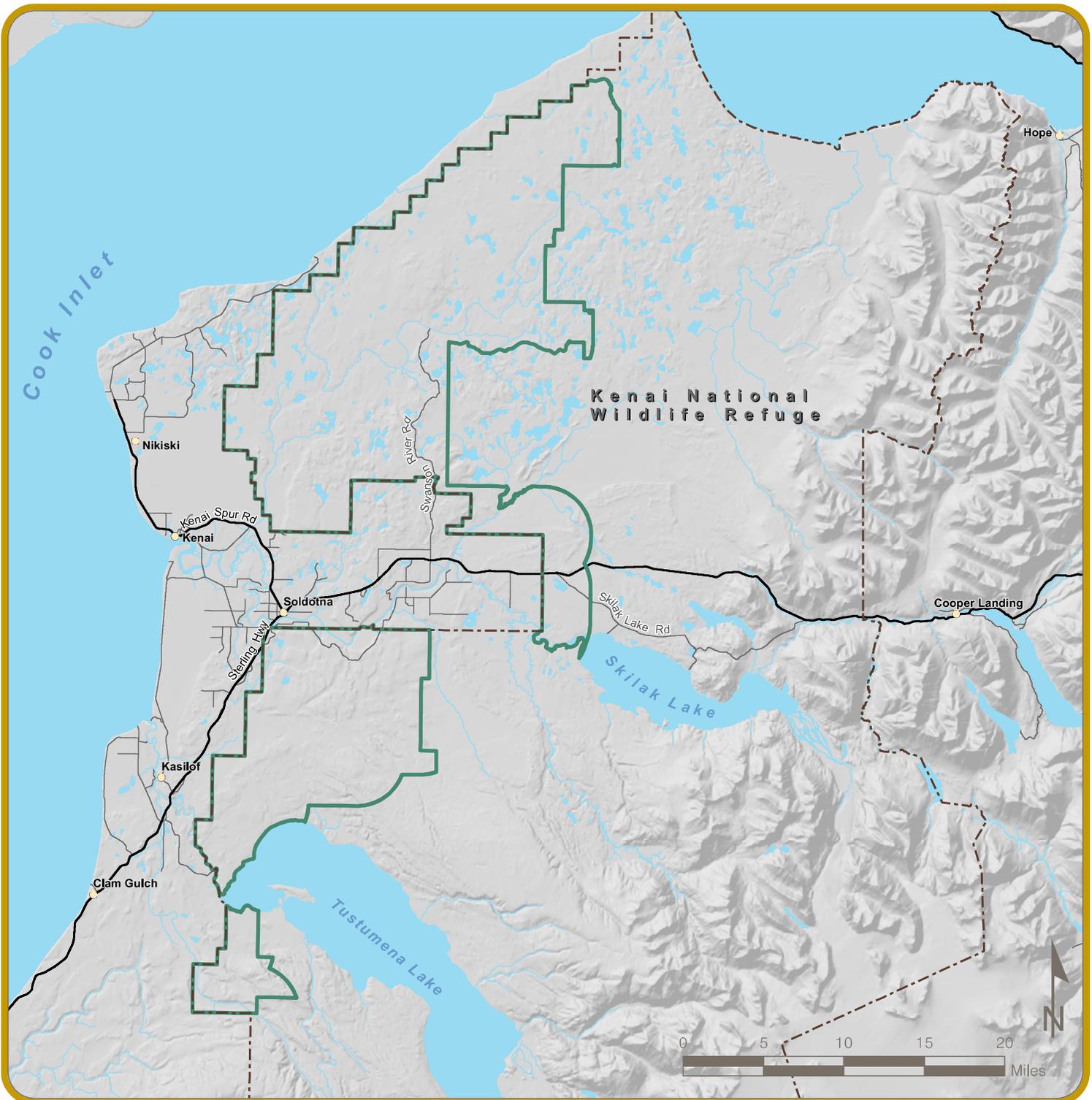
Apache also has lease agreements with the State of Alaska for oil and gas exploration and development of the state's subsurface estate in the Cook Inlet basin adjacent to KNWR land. Some of the state leases are approved and active while others are preliminary and have not yet been issued. While preliminary results of lease sales are being adjudicated by the state, the apparent winner of the tracts has the right to conduct seismic exploration activities for these subsurface areas. Apache requires temporary access to KNWR land to image the oil and gas potential of this state subsurface estate.

To evaluate the potential of oil and gas reserves of these areas, Apache proposes to conduct a 3D seismic survey to develop high-quality imagery of subsurface geological features that may contain recoverable oil and gas. Within KNWR, the project would achieve dual purposes: (1) to image the subsurface of CIRI and TNC lands within KNWR, and (2) to support imaging of state lands adjacent to KNWR lands.

The proposed action would involve four phases: land surveying, source point drilling, receiver deployment and data collection, and clean-up. Land survey activities would commence in early September 2013, and would establish field locations for receiver nodes intended to record off-KNWR source point transmittal as well as for placement of on-KNWR source point locations. The first set of receiver nodes placed on KNWR land would record seismic source points being detonated in adjacent areas, west of KNWR. Subsequent drilling of source point holes on KNWR land, deployment of receivers, and source point detonation would occur in winter. Activities related to placement of receiver nodes to record off-KNWR source points would occur between early May and late August.

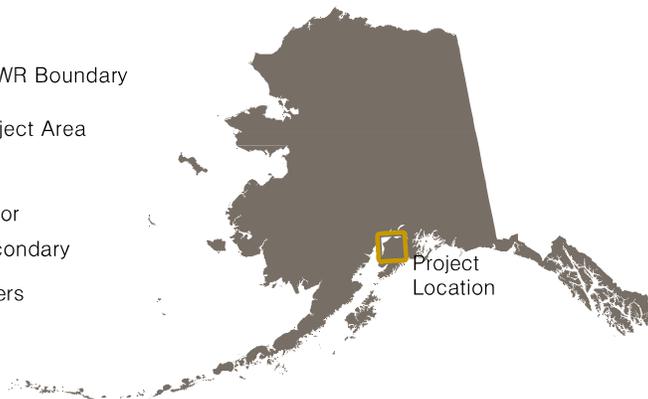
The first phase consists of office-based planning and preliminary grid design to establish pre-plots. Field survey crews then confirm receiver and source point locations and establish the grids on the ground. Phase two consists of drilling the source point holes along the established source point lines, confirming depths, and setting the source point charges. The third phase includes deployment of nodes along the receiver node lines, detonating charges, recording data, and recovering the nodes. The final phase consists of a clean-up of the grid and recovery of debris from earlier phases. This sequential process requires coordination, communication, and safe operation of helicopters, drill, and ground crews. Safety is the primary component of any field program.

The basic geometry for the proposed action is a grid of source points and receiver nodes, laid out in lines perpendicular to each other. Receiver node lines will be 1,320 feet (0.25 mile) apart, and nodes will be placed 165 feet apart on the node lines. Source point lines will be 1,650 feet (0.31 mile) apart, with source points placed 165 feet apart on the point lines. Denotation of source points will take place at a rate of approximately one square mile per day. In order to record the source points, the node recording grid (referred to as a "patch") required to be on the ground includes up to



Legend

-  KNWR Boundary
-  Project Area
- Roads**
-  Major
-  Secondary
-  Rivers



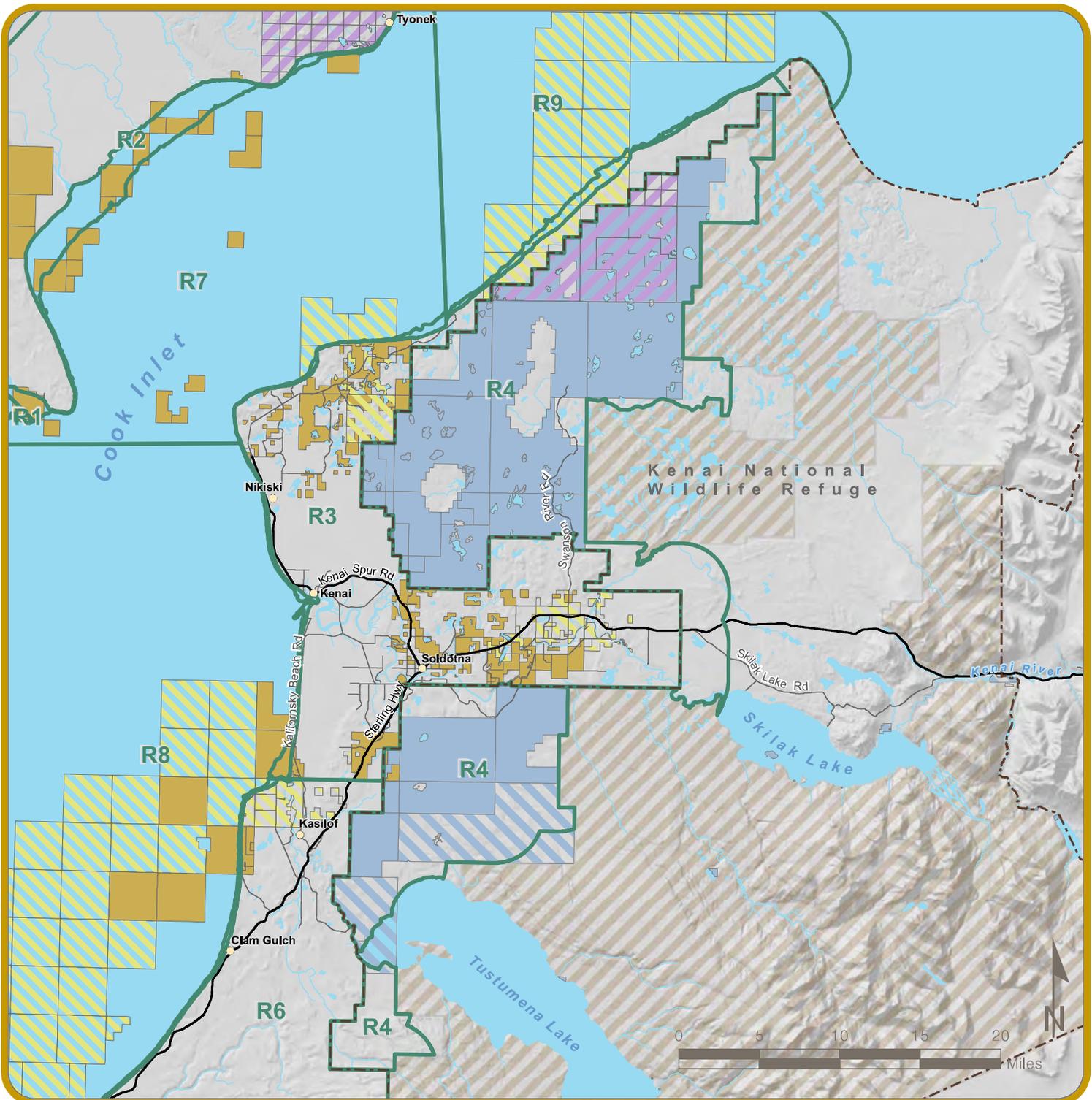
Apache Alaska Corporation
Cook Inlet Seismic Exploration

KNWR EA – Map 1
Apache Project Area
In The KNWR

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: Apache, KNWR, DOT, HDR 2012
Map Created By HDR 11/20/2012





Legend

- | | | | |
|---|----------------------------------|---|---------------------------------|
|  | KNWR Boundary |  | Tyonek Native Corporation Land |
|  | Exploration Regions |  | Subsurface Conveyed to CIRI |
|  | Roads |  | Subsurface Selected by CIRI |
|  | Major |  | Cook Inlet O&G Lease Boundaries |
|  | Secondary |  | Leased to Apache, Active |
|  | Rivers |  | Apache Bids, Not Yet Issued |
|  | KNWR Designated Wilderness Areas | | |

Apache Alaska Corporation Cook Inlet Seismic Exploration

KNWR EA – Map 2

Area of proposed Drilling Operations in the KNWR

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 11/20/2012



40 lines of 120 receiver nodes, or approximately 37.5 square miles (10 miles of line, with each line 3.75 miles long).

The proposed operations include drilling the source point holes to a depth of 35 feet below ground surface. A 9.7-pound source charge is placed at the bottom of the hole and backfilled prior to detonation. Receivers are autonomous nodes that are placed on the ground surface and use wireless technology to record position, weather, and seismic data.

The following Wildlife Interaction and Avoidance Plan has been developed to minimize impacts to KNWR wildlife resources and to ensure the safety of project crews. Field crews will be trained with an understanding of the importance of minimizing disturbance to wildlife and safety precautions to prevent injury to wildlife or humans. The seismic surveys have the potential to disturb nesting migratory birds and wintering birds and the potential to disturb denning brown and/or black bears and other terrestrial wildlife; therefore, this plan has been developed for the following purposes:

- Prevent or minimize disturbance to nesting and wintering migratory birds in the project area
- Prevent disturbance to trumpeter swans overwintering and breeding in the project area
- Prevent disturbance to any bear dens and prevent or minimize the potential for adverse human-bear interactions
- Implement observation and reporting procedures for human-bear interactions
- Prevent disturbance to other terrestrial wildlife in the project area

2.0 REGULATORY REQUIREMENTS

Apache's seismic survey activities will need to comply with all federal and state regulations protecting migratory birds, bald eagles and brown bears as described in the following sections.

2.1 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712) protects migratory birds, and their nests, eggs, young, and parts from possession, sale, purchase, barter, transport, import, and export, and take. For purposes of the MBTA, "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect." (50 C.F.R. § 10.12). The MBTA applies to migratory birds that are identified in 50 C.F.R. § 10.13 (defined hereafter as "migratory birds"). In Alaska, all native birds except grouse and ptarmigan (which are protected by the State of Alaska) are protected under the MBTA.

Many migratory birds, including raptor species, are sensitive to disturbance when nesting and roosting. Helicopter overflights may result in disturbance during the nesting season and to overwintering migratory birds. Should such disturbance result in abandonment of a nest with eggs or young, the activity causing the disturbance would violate the MBTA.

2.2 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668a - 668d) provides additional protection to bald eagles that occur in the project area year-round. The BGEPA prohibits the take, possession, sale, purchase, barter, offer to sell, purchase, or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit [16 U.S.C. § 668(a)]. "Take" under this statute is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, or molest or disturb" 50 C.F.R. § 22.3.

“Disturb,” in turn, is defined as “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

The United States Fish and Wildlife Service (USFWS) generally recommends no clearing of vegetation within 330 feet of any nest. No activity should occur within 660 feet of any nests between March 1 and June 1. Between June 1 and August 31, no activity should occur within 660 feet of active eagle nests until after juvenile birds have fledged, unless specifically authorized by USFWS. The Bald Eagle Management Guidelines recommend that helicopters maintain a 1,000-foot buffer from any active nests during aircraft overflights (USFWS 2007).

2.3 Kenai Peninsula Brown Bear Conservation

The Kenai Peninsula brown bear is designated as a State of Alaska “species of greatest conservation need” based on the potential for future decline because of human encroachment into brown bear habitat (Alaska Department of Fish and Game [ADF&G] 2006). Additionally, brown bears are a species of continued interest and study in KNWR because of the insular nature of their relatively small population and threats from human-caused mortality (USFWS 2010).

The Kenai Peninsula Brown Bear Conservation Strategy (ADF&G 2000) includes recommendations that are intended to reduce negative impacts to brown bear habitat and minimize adverse human-bear interactions that can negatively impact brown bear populations on the Kenai Peninsula. These recommendations are incorporated in Section 5.0 Human-Bear Interactions and Avoidance.

3.0 WILDLIFE INTERACTION AND AVOIDANCE MITIGATION AND TRAINING

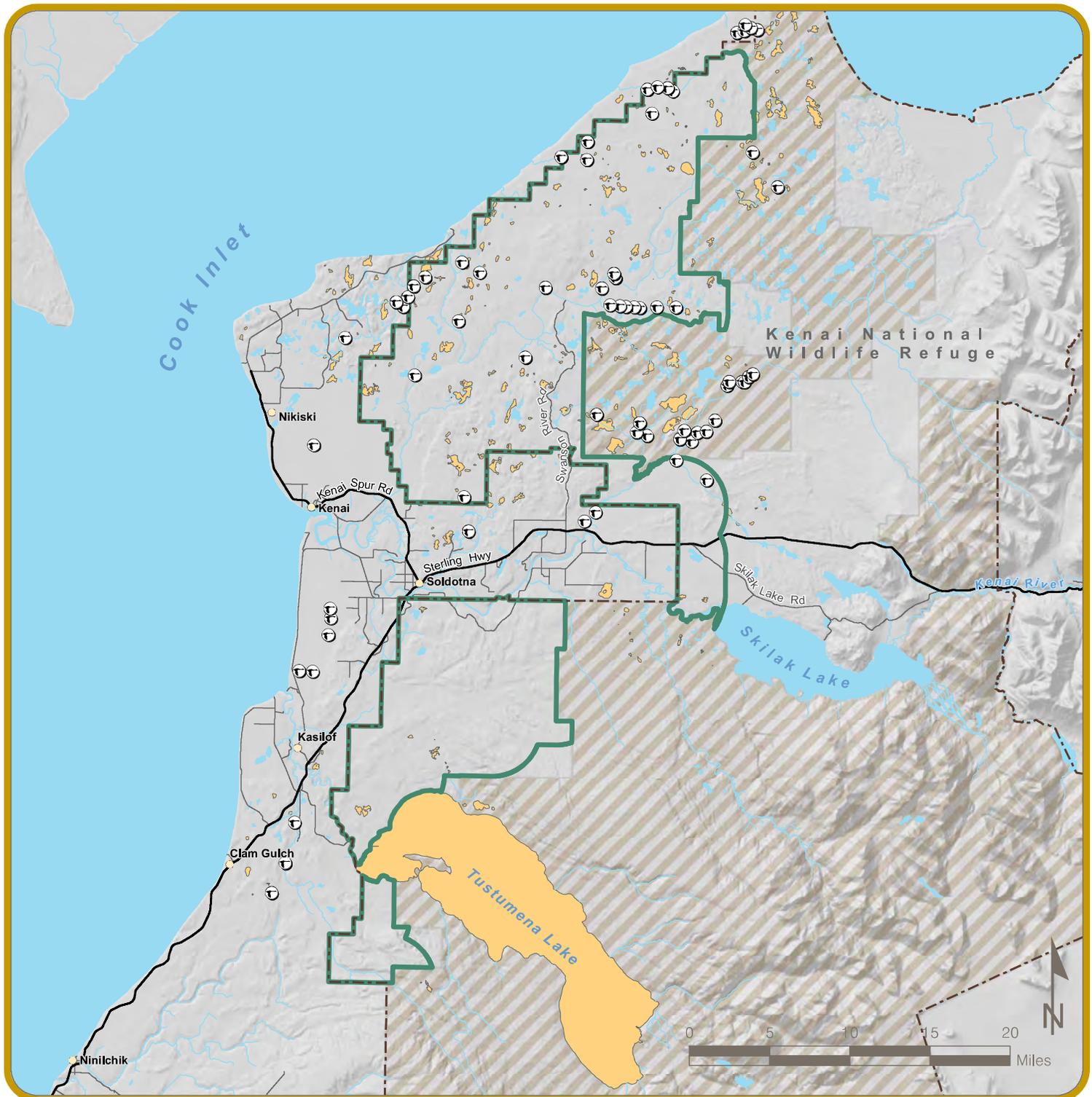
Apache personnel will be trained and required to adhere to the following mitigation and avoidance measures to avoid interaction with wildlife species for the safety of personnel and wildlife.

3.1 Breeding and Resident Birds

To avoid disturbance of breeding migratory birds in southcentral Alaska, the USFWS recommends restricting vegetation clearing and grubbing to outside of the time frame of May 1 – July 15. No vegetation clearing or grubbing would be conducted as part of the seismic surveys; however, crews traveling between sites may encounter ground or shrub nesting birds during the breeding season. If Apache or its contractors encounter an active nest, it is illegal to disturb it and crews should attempt to immediately leave the area. Bear guards will assist in the observation and identification of bird behaviors that indicate a nest may be nearby and adjust seismic activities accordingly.

Trumpeter swans are sensitive to human disturbance, especially while nesting, and react negatively to aircraft overflights by flushing from their nests or ceasing feeding. KNWR recommends that aircraft avoid lakes with nesting swans (Map 3) and maintain a 1,000-foot buffer from areas with open water where swans overwinter (USFWS 2010; Morton 2012). Apache will include known swan nest lake locations and wintering sites into their pre-plot maps and include a 1,000 foot buffer around these sites. Any new swan nesting lakes or wintering locations will be incorporated into the pre-plots maps as they are discovered.

Owls nest earlier than other species in KNWR, and nests may be active in late February or early March when seismic crews are on the ground. Nesting owls could be affected by helicopter



Legend

-  KNWR Boundary
-  Project Area
-  Trumpeter Swan Nesting Lakes
-  Trumpeter Swan Non-Lake Nesting Sites
- Roads**
-  Major
-  Secondary
-  Rivers
-  KNWR Designated Wilderness Areas

Apache Alaska Corporation
Cook Inlet Seismic Exploration

KNWR EA – Map 3
Trumpeter Swan Nesting
Locations in the KNWR

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 11/20/2012



overflights and detonation of explosives. No clearing of trees would be conducted to facilitate seismic activities. However, if owl nest cavities are observed during seismic pre-surveys, those areas should be avoided until owlets have fledged.

3.2 Nesting and Wintering Bald Eagles

Nesting and wintering bald eagles may be disturbed by helicopter overflights during seismic operations. Apache would consult with USFWS prior to commencing seismic surveys and, if required, update aerial bald eagle nest surveys to determine the current status of the nests (i.e., which nests are still active and whether any additional nests in the project area may be affected by seismic survey activities). Apache will include known bald eagle nest sites on their pre-plot maps and include a 1,000 foot buffer around these sites. Any new nests documented during Apache overflights will be documented and reported to the KNWR and incorporated into the pre-plot maps. Apache will coordinate closely with KNWR to ensure avoidance measures are adequate to avoid the need for a Bald Eagle Take Permit. If seismic activities cannot avoid active bald eagle nests, an eagle take permit may be necessary.

3.3 Human-Bear Interaction and Avoidance

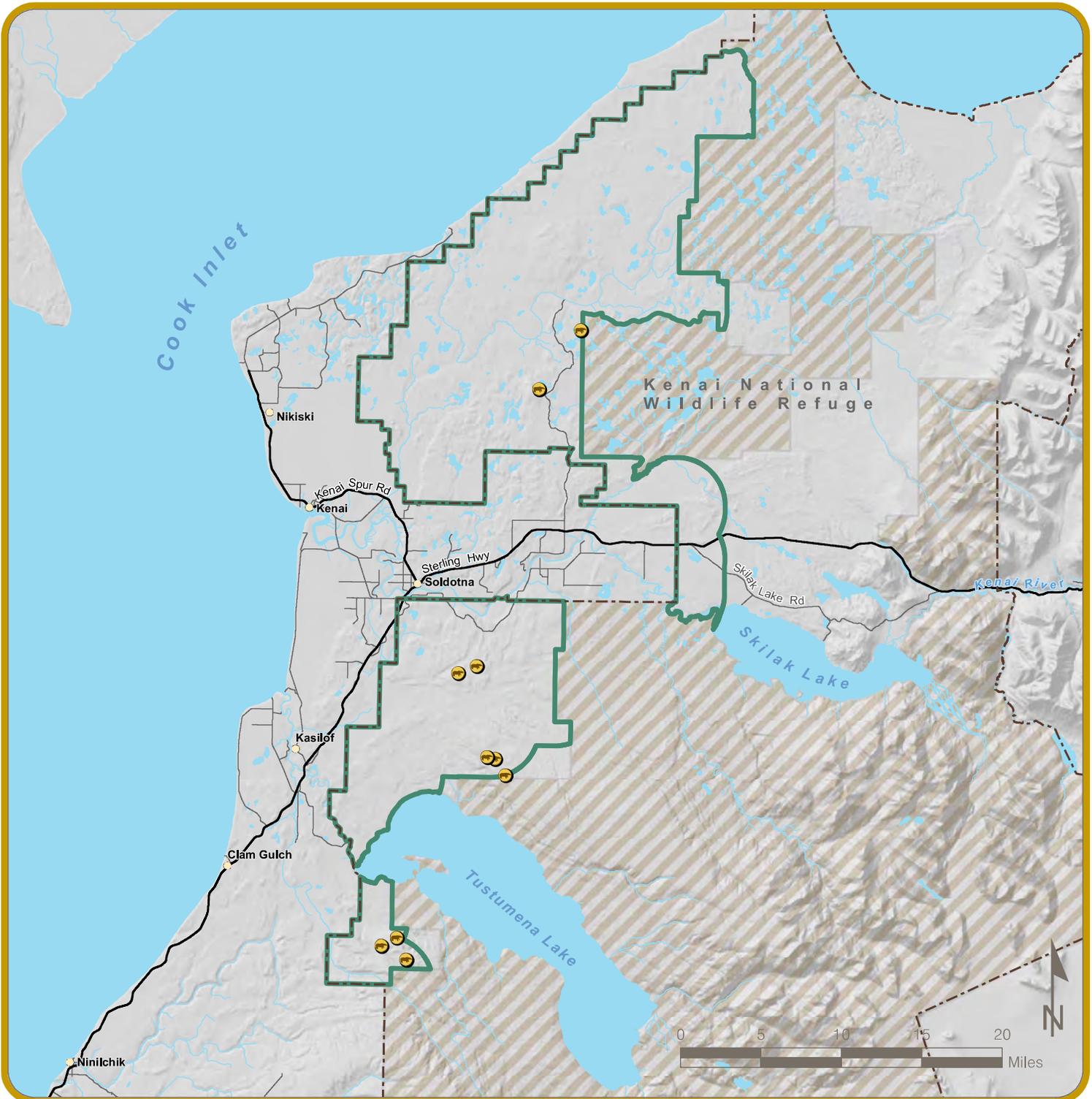
Both black and brown bears occur in the project area year-round and project activities could result in disturbance or human-bear interactions. Brown bears are typically dormant during the winter months, entering their dens in November and emerging between March and June; however, bears may be active during the winter months (ADF&G 2006). Ten brown bear dens have been documented within the project area (Map 4). These dens likely represent only a small sample of the actual dens in the project area given the difficulty of finding dens (Selinger 2012).

Black bears are common in forested habitats throughout KNWR but also occur above tree line in the Kenai Mountains (USFWS 2010). Black bears hibernate in dens during the winter, which may be located from sea level to alpine areas, and may be in rock cavities, hollow trees, or excavations.

Noise from helicopter overflights and crews on the ground during seismic surveys could potentially displace or disturb denning black and brown bears and result in human/bear conflicts. Disturbance from seismic activities could potentially impact denning bears.

Apache would contact the KNWR and ADF&G prior to the initiation of September 2013 drilling of source points and associated activities to determine if any new bear dens have been documented in the project area. Seismic survey activities started between November 1 and April 15 may not be conducted within one-half mile of known occupied brown bear dens, unless alternative mitigation measures are approved by the ADF&G (Selinger 2012). Additionally, low level flights of less than 1,000 feet above documented dens would be avoided. If Apache crews encounter an occupied den not previously identified by ADF&G or KNWR, they would report it to the Division of Wildlife Conservation, ADF&G, and the KNWR staff listed on Table 1 within 24 hours.

A qualified and armed bear guard will travel with each seismic crew. Any bear sightings would be reported immediately to Apache and the appropriate USFWS and ADF&G personnel listed in Table 1. If a bear is observed within or near the project area crews will immediately report the sighting to ADF&G, KNWR and Apache. Crews will be instructed to make loud noises before walking into an area with poor visibility. Bear guards will report bear signs (scat and tracks) to other crews that may be in the vicinity. Daily safety briefings would include recent bear sighting information and reminders of safe practices in bear country. To minimize the potential for human-bear interactions, Apache requires all personnel to receive mandatory bear safety training as described below.



Legend

-  KNWR Boundary
-  Project Area
- Roads**
-  Major
-  Secondary
-  Rivers
-  KNWR Designated Wilderness Areas
-  Brown Bear Dens Inside the Apache KNWR Project Area

Apache Alaska Corporation
Cook Inlet Seismic Exploration

KNWR EA – Map 4
Brown Bear Dens Inside
Apache KNWR Project Area

This map contains public and private data sets and is intended for representational purposes only; HDR makes no guarantees as to the accuracy or correctness of the data

Source: KNWR, Apache, DOT, HDR 2012
Map Created By HDR 11/20/2012



3.4 Bear Avoidance and Interaction Training

All Apache personnel will receive mandatory bear awareness safety training, which will include the following:

- How to be bear aware as a crew and bear hazing as a crew.
- Do's and don'ts around wildlife.
- What to do if a bear charges.
- Working close together in high risk areas and being ultra observant in high risk areas.
- Individual responsibilities of each crew member and communication with bear guards.

In addition, personnel will attend a bear safety course taught by ADF&G and/or watch one of the following videos:

- *Living in Bear Country*
- *Working in Bear Country*
- *Staying Safe in Bear Country*

Food Handling and Management

Proper handling of food waste during seismic activities will ensure crews do not inadvertently attract bears. All Apache crew members would be expected to adhere to the following measures:

- Apache crews will NOT feed wildlife.
- Apache crews will NOT dispose of any food waste in project area. Food would be stored in bear-proof containers when possible.

4.0 OTHER WILDLIFE INTERACTIONS

Caribou, moose, and grey wolves could be disturbed or displaced for short distances during seismic surveys and helicopter overflights. During deep-snow winters, moose may congregate in mountain valleys and onto the Kenai Lowlands (USFWS 2010). Helicopter overflights during this sensitive period when moose have little energy reserves may cause additional stress and force moose to move into less preferred winter habitat. Additionally, moose and other terrestrial mammals may seek out packed surfaces such as snowmachine trails during deep-snow winters therefore increasing the risk of animal-vehicle collisions. Seismic crews will travel with caution on packed snowmachine trails to avoid collisions with moose and other wildlife.

5.0 REPORTING AND PRIMARY NOTIFICATION REQUIREMENTS

If a bear is observed within or near the project area crews will immediately report the sighting to ADF&G, KNWR and Apache staff listed in Table 1 with details regarding the nature of the sighting and the location of the sighting. The observer or crew supervisor will fill out the Bear Observation Form (Appendix A). Copies of the completed Bear Observation Form will be made available to safety personnel. Details of the encounter or observation will be incorporated into daily safety meetings to inform all Apache personnel of the encounter. Copies of the Bear Observation Form will also be sent to KNWR and ADF&G contacts below.

Table 1 Primary and Alternative Contacts for Apache Seismic Activities

Primary Contact	Alternate Contact
ADF&G Area Biologist	
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7.0 BEAR OBSERVATION FORM

Observer Name:			
Date:	Time:	Am/Pm/24	
Phone:	Email:		
Latitude:	Longitude:	Datum:	
Black Bear Or Brown Bear:			
Number and Type of Bear(s) Observed (e.g. 1 sow with 2 cubs):			
Estimated size and weight of bears:	Color of bear:	Distinguishing features of bear:	
Location of Observation/Encounter:			
Description of the Observation/Encounter:			
Agency/Contacts:			
ADF&G:	Time: _____	Date: _____	
KNWR	Time: _____	Date: _____	
Apache Alaska	Time: _____	Date: _____	

Appendix E

Section 810 Subsistence Evaluation

1.0 INTRODUCTION

The U.S. Fish and Wildlife Service (Service) has received an application for a special use permit (SUP) from Apache Alaska Corporation (Apache) to conduct a three-dimensional (3D) seismic survey on portions of the Kenai National Wildlife Refuge (NWR). The purpose of this survey is to develop high-quality imagery of subsurface geological features which may contain recoverable oil and gas, on selected lands within the Kenai NWR and adjacent leases. These are federal lands which provide subsistence opportunities to qualified rural Alaska residents under the provisions of the Alaska National Interest Lands Conservation Act (ANILCA).

Section 810 of ANILCA requires an evaluation of the direct and cumulative effects on subsistence uses of federal lands. An estimate of the current and future use of subsistence resources is part of the evaluation. This report was prepared to comply with Title VIII, Section 810, of ANILCA. It evaluates potential restrictions to subsistence activities which could result from implementation of the 3D seismic survey on the Kenai NWR.

2.0 EVALUATION

Title VIII of ANILCA (16 USC Section 3120), in Section 810(a), requires that an evaluation of subsistence uses and needs be completed as part of any federal agency determination to “withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands.” Subsistence uses are defined in this title as the “customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food [for] handicrafts for barter, or sharing and for customary trade.” Because Apache proposes to conduct a 3D seismic survey on portions of the Kenai NWR, an evaluation of potential subsistence impacts under ANILCA Section 810 must be completed for the proposed survey.

Specifically, ANILCA 810(a) requires an evaluation based on three specific issues:

1. The effect of use, occupancy or disposition on subsistence uses and needs.
2. The availability of other lands for the purpose sought to be achieved.
3. Other alternatives that would reduce or eliminate the use, occupancy, or dispositions of public lands needed for subsistence purposes (16 USC § 3120).

The harvest of subsistence resources by Alaska Native cultures has been an essential way of life for thousands of years and has also become critical to the lives of many non-Natives, particularly rural Alaskans. According to Alaska Department of Fish and Game (ADF&G), Alaska’s rural residents harvest approximately 44 million pounds of wild foods each year, with an average of 375 pounds per person. Fish comprise about 60 percent of this harvest, but account for only 2 percent of all fish caught in Alaska (Seitz et al. 1992).

Federal law defines rural and non-rural areas for purposes of subsistence access and management. Communities must be designated as rural to participate in subsistence on federally-owned lands under federal subsistence regulations. The FSB is charged with determining that a community has customarily and traditionally harvested particular subsistence resources. The FSB has identified three non-rural areas on the Kenai Peninsula: the Homer Non-rural Area (including Homer, Anchor Point [portion], Kachemak City, and Fritz Creek [portion]); the Kenai Non-rural Area (including Clam Gulch, Kalifornsky, Kasilof, Kenai, Nikiski, Salamatof,

Soldotna, and Sterling); and the Seward Non-rural Area (including Seward and Moose Pass) (Fall, et al. 2004).

The data presented within this document are taken largely from several publications from ADF&G and focus on Cooper Landing, which is the closest rural community to the project area. In 1990 and 1991, the ADF&G Division of Subsistence conducted a study of wild resources use and harvest patterns for the communities of Cooper Landing, Hope, and Whittier. The study, “The Use of Fish and Wildlife in the Upper Kenai Peninsula Communities of Hope, Whittier, and Cooper Landing” (Seitz, Tomrdle and Fall 1992), found similar harvest quantities and range of resources used for the three subject communities. A survey published in 2000 by ADF&G, “Wild Resource Harvests and Uses by Residents of Selected Communities of the Kenai Peninsula Borough,” documents wild resource uses by Ninilchik residents within the project area (Fall, et al. 2000). In 2002, the FSB funded the ADF&G Division of Subsistence to conduct a thorough subsistence use household survey of Kenai Peninsula communities, documenting subsistence uses of fish on federal and state lands. The surveys, published in 2004, included the communities of Cooper Landing, Hope, and Ninilchik, and patterns of subsistence use were found to be consistent with earlier surveys (Fall, et al. 2004).

3.0 PROPOSED ACTION ON FEDERAL LANDS

A detailed description of the proposed action on federal lands for the Apache 3D seismic survey is found within the Draft Environmental Assessment (HDR 2013).

Impacts to subsistence resources and use on federal lands will be temporarily impacted if the Refuge modifies access to the seismic survey area in a given season. Project impacts will be temporary and will not result in permanent changes to subsistence resources or use. Customary and traditional subsistence use on federal lands will continue as authorized by federal law under the proposed activities.

4.0 AFFECTED ENVIRONMENT

In accordance with Title VIII of ANILCA, subsistence uses are allowed on federal public lands within the Kenai NWR. Federal regulations allow qualified rural residents to harvest fish, wildlife, plants, or other subsistence resources. Subsistence activities include hunting, fishing, trapping, picking and gathering.

4.1 Wild Resource Harvest for Cooper Landing, Hope, and Ninilchik

The 1992 ADF&G survey found that the per capita harvest of wild resources in the Cooper Landing area totaled 91.5 pounds, and the mean household harvest totaled 238 pounds (Seitz, Tomrdle and Fall 1992). Quantities of specific resources harvested and the percentages of households harvesting particular resources are detailed in Table 2. The 2004 study surveyed the harvest and use of fish in 103 Copper Landing households. The study found that 90% of Cooper Landing households used fish, about 73% of households harvested fish, and 62 pounds of fish were harvested per capita (Fall, et al. 2004). Table 3 summarizes the most common types of fish harvested within the Cooper Landing area. The amount of wild resources harvested in Cooper Landing was relatively high compared with several other small, mostly non-Alaska Native communities located on the road system (such as Hope or Ninilchik) but modest compared with other small, isolated, mostly Alaska Native communities in the Cook Inlet basin (such as

Nanwalek, Tyonek, and Port Graham) (Fall, et al. 2004). The patterns of harvest in Cooper Landing generally follow seasonal availability and harvest regulations.

Table 4-1: Estimated Harvest and Use of Wild Resources in Cooper Landing, 1990-1991

Resource Type	Average Pounds	Pounds Per Capita	Specific Resource	Households Used (%)
All Resources	238	91.5	All Resources	100
Fish	140.2	53.9	Sockeye Salmon	77
Salmon	102.6	39.5	Berries	71
Non-Salmon Fish	37.6	14.4	Halibut	65
Land Mammals	75	28.8	Dolly Varden	57
Large Land Mammals	74.5	28.6	Coho Salmon	53
Small Land Mammals	0.5	0.2	Moose	43
Marine Mammals	0	0	Other Plants	35
Birds and Eggs	6.4	2.5	Grouse	33
Migratory Birds	1.2	0.5	Chinook Salmon	30
Other Birds	5.2	2.0	Lake Trout	25
Marine Invertebrates	5.9	2.3		
Vegetation	10.6	4.1		

Source: (ADF&G 1992).

Table 4-2: Top Fish Resources in Cooper Landing Community in 2002-2003

Resource	Pounds per Person	Total Fish Harvest (%)
Sockeye Salmon	28.0	45.5
Coho Salmon	12.2	19.8
Halibut	10.5	17.0
Chinook Salmon	4.2	6.8
Lake Trout	2.2	3.6
Dolly Varden	1.4	2.3
Rainbow Trout	1.2	1.9
Black Rockfish	0.7	1.1
Eulachon	0.6	1.0

Source: (ADF&G 2003).

For the community of Hope, the 1992 ADF&G survey reported the per capita harvest of wild resources totaled 110.7 pounds, and the mean household harvest totaled 262 pounds (Table 4) (Seitz, Tomrdle and Fall 1992). For the 60 households surveyed in Hope from the 2004 survey, the study found that 83% of Hope households used fish, almost 67% of households harvested fish, and 62 pounds of fish were harvested per capita (Fall, et al. 2004). Table 5 summarizes the types and amount of each fish type harvested per person for the community of Hope. For both Cooper Landing and Hope, moose contributed to the second most significant portion of residents' harvests, next to sockeye salmon (Seitz, Tomrdle and Fall 1992). Also, the overall use

of berries by the communities of Cooper Landing, Hope and Whittier represented a majority of households, ranging from 71% to 78% of households.

Table 4-3: Estimated Harvest and Use of Wild Resources in Hope, 1990-1991

Resource Type	Average Pounds	Pounds Per Capita	Specific Resource	Households Used (%)
All Resources	262.2	110.7	All Resources	100
Fish	155.9	65.8	Sockeye Salmon	59
Salmon	118.5	50.1	Berries	78
Non-Salmon Fish	37.4	15.8	Halibut	53
Land Mammals	77.7	32.8	Dolly Varden	59
Large Land Mammals	73.8	31.1	Coho Salmon	54
Small Land Mammals	3.9	1.7	Moose	68
Marine Mammals	0	0	Other Plants	39
Birds and Eggs	5.6	2.4	Grouse	21
Migratory Birds	0.9	0.4	Chinook Salmon	35
Other Birds	4.8	2.0	Lake Trout	10
Marine Invertebrates	9.5	4.0		
Vegetation	13.5	5.7		

Source: (ADF&G 1992).

Table 4-4: Top Fish Resources in Hope Community in 2002-2003

Resource	Pounds per Person	Total Fish Harvest (%)
Sockeye Salmon	17.8	28.5
Coho Salmon	14.8	23.7
Halibut	10.5	16.8
Pink Salmon	6.5	10.4
Chinook Salmon	4.2	6.7
Chum Salmon	3.4	5.4
Dolly Varden	1.6	2.6
Eulachon	1.4	2.2

Source: (ADF&G 2003).

A survey conducted on wild resource uses of selected communities within the Kenai Peninsula Borough published in 2000 included data on wildlife harvests and other wild resources for the community of Ninilchik (Fall et al. 2000). Quantities of specific resources harvested and the percentages of households harvesting particular resources for Ninilchik are detailed in Table 6. The 2004 survey specific to fish interviewed 100 Ninilchik households and found that 96% of households used fish, 73% of households harvested fish, and almost 82 pounds of fish were harvested per capita (Fall, et al. 2004). Table 7 summarizes the top fish resources harvested in Ninilchik, as well as individual usage of fish.

Table 4-5: Estimated Harvest and Use of Wild Resources in Ninilchik, 1990-1991

Resource Type	Average Pounds	Pounds Per Capita	Specific Resource	Households Used (%)
All Resources	439.5	163.8	All Resources	99
Fish	216.6	80.7	Sockeye Salmon	90.1
Salmon	113.9	42.5	Berries	69.3
Non-Salmon Fish	102.8	38.3	Halibut	66.3
Land Mammals	177.7	66.5	Dolly Varden	65.3
Large Land Mammals	176.2	65.7	Coho Salmon	63.4
Small Land Mammals	1.5	0.6	Moose	56.4
Marine Mammals	0	0	Other Plants	53.5
Birds and Eggs	3.8	1.4	Grouse	31.7
Migratory Birds	1.2	0.5	Chinook Salmon	23.8
Other Birds	2.6	1.0	Lake Trout	21.8
Marine Invertebrates	29.6	11		
Vegetation	11.7	4.4		

Source: (ADF&G 1992).

Table 4-6: Top Fish Resources in Ninilchik Community in 2002-2003

Resource	Pounds per Person	Total Fish Harvest (%)
Halibut	28.8	35.2
Sockeye Salmon	20.7	25.3
Coho Salmon	11.1	13.6
Chinook Salmon	8.4	10.3
Pink Salmon	4.4	5.4
Chum Salmon	2.3	2.8
Pacific Cod	1.6	2.0
Black Rockfish	0.8	1.0
Rainbow Trout	0.6	0.7
Dolly Varden	0.6	0.7

Source: (ADF&G 2003).

Mapped data were collected from some of the surveyed households during the 1992 ADF&G survey, providing general locations within southcentral Alaska of wild resource use areas by Cooper Landing, Hope, and Whittier residents (ADF&G 1994). Generally speaking, the Kenai NWR was used by residents of Hope and Cooper Landing for harvesting salmon, non-salmon fish, black bear, moose, and furbearers. Cooper Landing residents also reported harvesting vegetation, birds, goats, sheep and firewood in the Kenai NWR area. These maps do not detail whether wild resource use areas occurred on Federal or State lands or information on access points to these areas. Data on moose harvests, where harvest locality is also general, exist only at the game management unit (GMU) level, and does not help to determine where subsistence moose hunting is occurring within the Kenai NWR. Moreover, data from ADF&G does not

indicate whether moose harvests within GMU 7, which encompasses the entire eastern Kenai Peninsula from Hope to Seward, including Kenai Fjords National Park, were made by residents of Cooper Landing, Hope, or by residents from another community within this GMU.

The 1992 household survey does offer specifics on moose harvest quantities for the communities of Cooper Landing and Hope. The estimate total community harvest of moose for 1990-1991 for Cooper Landing was 10 animals for 18.7 pounds per person (Seitz, Tomrdle and Fall 1992). The estimated total community harvest for moose for 1990-1991 for Hope was 6 animals for 19.0 pounds per person, the highest of any single resource harvested (Seitz, Tomrdle and Fall 1992). Historically, moose have been an important source of food for both Cooper Landing and Hope. Between 1975 and 1990, Hope residents reported harvesting an average of 3.3 moose per year and Cooper Landing residents reported harvesting an average of 5.4 moose per year (Seitz, Tomrdle and Fall 1992).

For the community of Ninilchik, the 2000 ADF&G survey provides general locations of wild resource harvests also at the game management unit level (Fall et al. 2000). The majority of the project area is located within GMU 15A and 15B and a smaller portion is located in GMU 7. The data presented in Table 7 are the result of 101 surveyed households in 1998 and illustrate the relatively low level of usage of the project area by Ninilchik residents for harvesting wild resources.

Table 4-7: Percentage of Ninilchik Households Harvesting Wild Resources within Specific GMUs (1998)

Resource Type		Location of Reported Harvest		
		GMU 15A: Kenai NWR	GMU 15B: Kenai NWR	GMU 7: Kenai NWR and Chugach National Forest
Salmon		2.0	3.0	2.0
Non-Salmon		0.0	1.0	1.0
Moose	Hunt	0.0	1.0	0.0
	Harvest	0.0	1.0	0.0
Dall Sheep	Hunt	0.0	2.0	0.0
	Harvest	0.0	2.0	0.0
Brown Bear	Hunt	0.0	1.0	0.0
	Harvest	0.0	0.0	0.0
Black Bear	Hunt	0.0	1.0	0.0
	Harvest	0.0	0.0	0.0

Source: (ADF&G 2003).

5.0 SUBSISTENCE USES AND NEEDS EVALUATION

To determine the potential impact on existing subsistence activities to rural communities with customary and traditional uses of subsistence resources within the project area, the project was analyzed using three evaluation criteria related to existing subsistence resources that could be impacted. The evaluation criteria are:

- the potential to reduce harvestable resources used for subsistence caused by a decline in subsistence resource population or increased competition;
- the potential to reduce the availability of resources used for subsistence caused by an alteration of their normal distribution; and
- the potential limitation of the access of subsistence users to resources used for subsistence.

5.1 Changes in Resources, Habitat, or Competition for Resources

Changes in both terrestrial and aquatic resources may temporarily occur as a result of Apache's proposed 3D seismic survey. Some habitat for terrestrial wildlife would be temporarily altered during the survey. Given the anadromous stream and waterway setbacks established by ADF&G, no aquatic resources or habitat will be directly impacted. The areas of habitat impact would contribute to temporary wildlife displacement and potential migration route disruption.

Salmon represented one of the most heavily used subsistence resources for the rural communities of Cooper Landing, Hope, and Ninilchik. Depending on the time of year of the survey in a specific survey section, subsistence harvest access to populations of salmon could be temporarily impacted. The primary concern would be for safety and keeping non-survey personnel out of the 3D seismic survey areas during the survey.

Moose inhabit the entire project area, and project work would temporarily impact habitat in some way. The USFWS believes that in some areas of the Kenai Peninsula, the moose population is in a slow but steady decline because of the progression in forest succession (USFWS 2010). The moose population in GMU 15A (within the Kenai NWR and north of the Sterling Highway) contains an estimated 2,070 animals, with a 95% confidence interval that the population falls between 1,700 and 2,430 animals (Selinger 2006). Trend surveys show that there has been a steady decline in population size since February 2001 in GMU 15A, an area in which 3,400 moose were recorded ten years ago (Selinger 2006). GMU 15B (within the Kenai NWR and south of the Sterling Highway) is estimated to have a stable population of 960 moose, with a 95 percent confidence interval that the population falls between 780 and 1,140 animals (Selinger 2006).

Noise and temporary habitat fragmentation would occur due to the 3D seismic survey project and may potentially affect moose. The project could also temporarily impact the habitat of lynx, wolves, brown bears and other wildlife. These species did not constitute a significant proportion of wild resources harvested by Cooper Landing and Hope residents as documented in the 1992 survey.

No temporary or permanent roads will be constructed during this project. There will not be improved access to subsistence use areas and the project will not affect the intensity of subsistence harvest by subsistence users. Temporary closure of an area during the survey may shift subsistence users to another harvest area and could create a temporary increase in competition for resources due to the proposed project.

There may be disrupted connectivity of trails in the project area and could temporarily restrict subsistence access to specific areas within the project footprint. This temporary closure of an area could introduce an increase in competition for unregulated subsistence resources. Unregulated wild resources such as berries, eggs, or wood, for example, could potentially be over-harvested in areas receiving higher levels of use and could result in land managers needing to introduce regulation restrictions for those wild resources.

5.2 Changes in Resource Availability due to Alteration in Migration Pattern or Distribution of Resources

The proposed project will not adversely affect the distribution or migration patterns of aquatic subsistence resources. Terrestrial wildlife resource availability may be temporarily affected as a result of potential changes to migration patterns resulting from the project activities.

5.3 Physical or Legal Barriers to Access Resources

Several access areas to federal lands may be temporarily affected as a result of the proposed 3D seismic survey. If an area is closed to subsistence harvest activities during the proposed project, subsistence users may move to another location for their harvest. The proposed work will not be a permanent barrier to subsistence resources or their harvest.

6.0 CONCLUSION

Based on available data on subsistence use within the project area by residents of Cooper Landing, Hope, and Ninilchik, the potential impacts to aquatic and terrestrial subsistence resources are thought to be temporary and minimal for the proposed Apache 3D seismic survey project. The data examined provides an understanding on how the project area has been used for subsistence purposes by the rural-qualified residents of Cooper Landing, Hope, and Ninilchik. The various subsistence surveys document the important role of wild resources in the diets of rural Alaskan residents.

The documents referenced in this study quantify wild resource harvests taken under both Federal subsistence regulations and State regulations. Based on the 1992 household survey findings, salmon were the most important wild resource harvested based on harvest quantities for both Cooper Landing and Hope (ADF&G 1992). Salmon harvests by the residents of Cooper Landing and Hope were taken largely under State sport fishing regulations and not under Federal subsistence regulations. The 2004 household survey noted that less than 12% of all salmon harvested by both Cooper Landing and Hope residents were taken under subsistence regulations (Fall, et al. 2004). The community of Ninilchik harvested 30% of salmon by means of subsistence methods, but residents mostly fished areas located outside of the project area (Fall, et al. 2004). While it is apparent that wild resources play an important role in the diets of Cooper Landing, Hope, and Ninilchik residents, the level and intensity of uses on the Federal public lands of the Kenai NWR are less conclusive.

In addressing the evaluation criteria listed in Section 5.0, it is unlikely that a significant reduction of harvestable resources in subsistence use areas would occur due to other subsistence users or recreational hunting and fishing. Aquatic and terrestrial resource populations will likely not be substantially affected by the increased access to subsistence use areas as a result of any of the project activities. Aquatic resource distributions will likely be unaffected by the 3D seismic survey project.

This evaluation concludes that the possibility of a significant restriction of subsistence uses is not reasonably foreseeable from the proposed project activities. Because no significant restriction of subsistence uses is anticipated, specific notice and hearings related to subsistence are not required by ANILCA; however, because this project involves an environmental assessment, notice to the public and agencies about the project as a whole will take place, and a public comment period will be held.

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