U.S. Fish and Wildlife Service

DOI FES 09-36

Proposed Land Exchange
Yukon Flats National Wildlife Refuge
Final Environmental Impact Statement

Summary

February 2010

U.S. Fish and Wildlife Service Mission Statement

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

Refuge Mission Statement

The mission of the National Wildlife Refuge 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 Improvement Act of 1997

DOI FES 09-36

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This is a non-technical summary of the Yukon Flats National Wildlife Refuge Proposed Land Exchange Final Environmental Impact Statement (Final EIS). The full-length Final EIS is available online at: http://yukonflatseis.ensr.com. If you wish to receive a paper copy or a compact disk of the entire document, please contact us at 907-786-3872 (Anchorage) or toll free at 1-800-531-0676 (Fairbanks). Comments on the Final EIS should be directed to:

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1 Introduction

1.1 Proposed Action

The U.S. Fish and Wildlife Service (Service) is considering a land exchange in the Yukon Flats National Wildlife Refuge (Refuge) with Doyon, Limited (Doyon). Doyon is the largest private landowner in the Refuge and an Alaska Native regional corporation established under the Alaska Native Claims Settlement Act of 1971 (ANCSA; 43 United States Code [USC] §1601 et. seq.).

The Refuge, which encompasses most of the area known as the Yukon Flats, is situated in the northeastern part of the interior of Alaska south of the Brooks Range and north of the Crazy and White Mountains (**Figure 1**). It is 10.9 million acres and it extends 220 miles east-west along the Arctic Circle from the Dalton Highway and Trans-Alaska Pipeline System (TAPS) in the west to within 30 miles of the Canadian border in the east, and about 120 miles north-south.

In 2004, the Service and Doyon tentatively agreed on the terms of a proposed land exchange. In the land exchange, Doyon would receive: (1) 110,000 acres of Refuge lands that may hold developable oil and gas resources (the "core lands"); and (2) oil and gas rights to an adjacent 97,000 acres of Refuge lands (the "halo lands;" **Figure 2**). In exchange, the United States Government (government) would receive a minimum of 150,000 acres of Doyon lands with priority fish and wildlife habitats. Doyon would also reallocate 56,500 acres of ANCSA land entitlements within the Refuge to areas outside of the Refuge. As a result, these lands would remain under Refuge management instead of being conveyed to Native corporations. Also, the Service and Doyon would each exchange about 132,000 acres ("consolidation exchange;" **Figure 2**) to consolidate ownerships and simplify land management within the Refuge boundaries.

Doyon has agreed to exchange at least 150,000 acres (Priorities 1 through 8; **Figure 2**) for 110,000 acres of Refuge land, but the actual amount traded to the Service could be more. A land appraisal would determine the value of each parcel, including the value of the mineral estate (oil and gas resources) and the submerged lands. If more than 150,000 acres are needed to equal the value of the Refuge parcel, the amount of Doyon land exchanged would increase. However, Doyon would exchange no less than 150,000 acres even if fewer acres are needed to equalize values. The Service evaluated Doyon-owned land based on habitat value during the negotiation process and would acquire lands from Doyon based on a priority list.

If Doyon were to subsequently produce oil and/or gas on the core lands, the Service would receive a perpetual production payment of 1.25% of the resource value at the wellhead. The payment would increase to 1.5% if a transportation corridor were constructed across Refuge lands. These funds could be used only to acquire additional lands within the Yukon Flats Refuge or other national wildlife refuges in Alaska and to construct refuge facilities. If oil or gas is produced on the exchange lands, Doyon has agreed to sell up to an additional 120,000 acres of its land holdings (surface and subsurface) within the Yukon Flats Refuge to the government (Priorities 9 through 16; **Figure 2**).

The Service Regional Director, Alaska Region, must decide whether to proceed with the land exchange and whether stipulations and mitigation measures would be necessary to protect Refuge

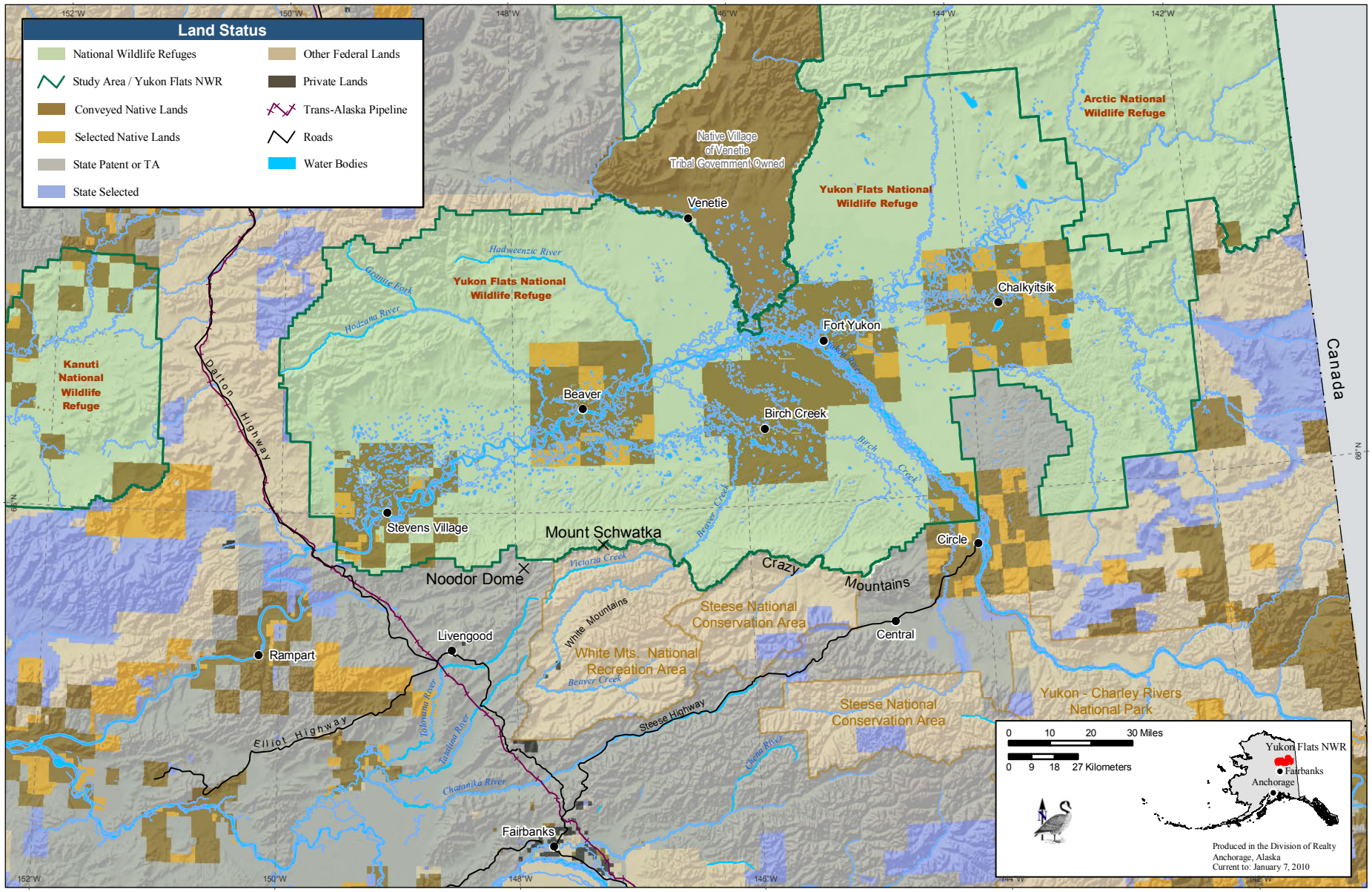
Proposed Land Exchange EIS

U.S. Fish & Wildlife Service

Figure 1

The Yukon Flats NWR and Surrounding Area

Yukon Flats National Wildlife Refuge, Alaska



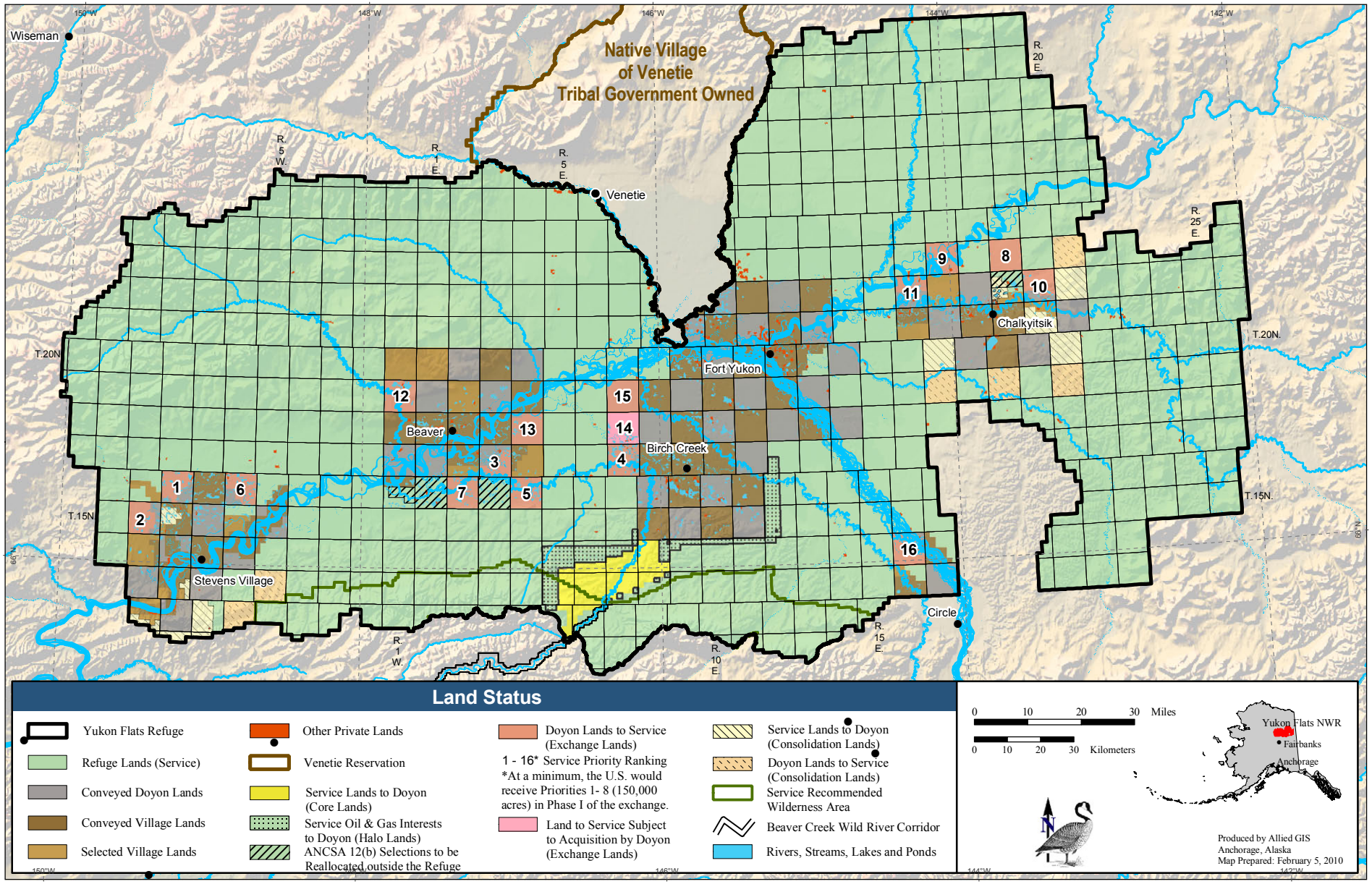
Proposed Land Exchange EIS

U.S. Fish & Wildlife Service

Yukon Flats National Wildlife Refuge, Alaska

Figure 2

Proposed Action and Priority Rankings for Doyon Lands



resources. If the Regional Director decides to proceed, the final land exchange agreement would be forwarded to the national Director of the U.S. Fish and Wildlife Service with the recommendation that the Director approve the land exchange. If approved, the land exchange agreement and supporting information would be sent to Congress for a 30-day review. The land exchange could be completed by the end of 2010, and oil/gas exploration on the core lands could follow within a few years.

1.2 Background

The Yukon Flats Refuge is located in eastern interior Alaska. The Refuge includes the Yukon Flats, a complex network of wetlands, lakes, and streams bisected by the Yukon River. The Refuge supports the highest density of breeding ducks in Alaska, and encompasses one of the greatest waterfowl breeding areas in North America.

The Refuge was created in 1980 by the Alaska National Interest Lands Conservation Act (ANILCA). The purposes for establishing and managing the Refuge are:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to canvasbacks and other migratory birds, Dall sheep, bears, moose, wolves, wolverines and other furbearers, caribou and salmon;

(ii) to fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;

(iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) 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.

Like most Alaska refuges, the Yukon Flats Refuge contains a patchwork of private land. About 23% of the land within the boundary of the Refuge is Native-owned or Native-selected; these lands were chosen by ANCSA Native corporations in the 1970s before the Refuge was established. The exterior Refuge boundaries encompass about 10.9 million acres of land and water, including about 2.5 million acres of land owned or selected by Native corporations or tribal governments. Doyon, the Native regional corporation for much of interior Alaska, currently has ownership interests in the surface and subsurface estates of 1.15 million acres of land and the subsurface estate of another 782,000 acres. During the ANCSA land selection process in the 1970s, Doyon recognized the region's oil and gas potential and worked with the Native village corporations to maximize Native ownership in this area. Doyon allocated over 330,000 acres of lands to villages in the Yukon Flats Refuge that could have been allocated to other villages throughout interior Alaska. The intent was to increase potential Native control of economically valuable oil and gas resources and compensate Native landowners for any future oil and gas development impacts by maximizing lands under their ownership. As a result, Doyon owns about 1.055 million or more acres of land with oil and gas potential inside the Refuge.

General ANCSA conveyance rules, however, put constraints on which lands were available to Native corporations. This limited their ability to obtain all lands with oil and gas development potential within the Yukon Flats basin. The proposed land exchange would enable Doyon to gain

title to land it was unable to acquire under ANCSA, including the deepest part of the sedimentary basin of the Yukon Flats. This deep area has the potential to hold economically viable quantities of oil/gas. Currently, Doyon is promoting oil/gas exploration and development of other lands it owns within the Yukon Flats Refuge and may develop these lands with or without the land exchange. However, having control of the deepest part of the basin could help Doyon attract oil industry partners to the Yukon Flats basin.

1.3 Why are we considering a land exchange?

The primary responsibility of the Yukon Flats Refuge is to protect and promote the purposes of the Refuge. However, as a public land management agency, the Service must consider input, proposals, and requests from the public. The Service's mission, *working with others to conserve, protect, and enhance fish, wildlife, and plants for the continuing benefit of the American people,* encourages a cooperative partnership-based approach to natural resource management. When Doyon approached the Service with a proposal for a fee-title land exchange within the Yukon Flats Refuge, the Service was interested enough to negotiate an exchange agreement. This *Proposed Land Exchange Yukon Flats National Wildlife Refuge Final Environmental Impact Statement* (EIS) will provide the Regional Director with information he must use to decide whether the proposed land exchange would benefit the Refuge and satisfy our statutory responsibilities, in addition to providing Doyon with lands having oil and gas potential.

The Service and Doyon have different reasons for pursuing a land exchange. For the Service, the proposed land exchange would:

- Increase the total amount of public lands managed in accordance with the Refuge purposes and the National Wildlife Refuge System mission,
- Add priority wildlife habitats to the Refuge, and
- Consolidate land ownership patterns in the Refuge.

Doyon, a for-profit Native regional corporation, must balance economic development with the need to protect the traditional lifestyle and culture of its Native shareholders. The proposed land exchange could potentially:

- Fulfill the ANCSA requirement to provide economic opportunities for Doyon and its shareholders,
- Create a rural economy that could potentially enable more people to live and work in their traditional villages rather than emigrating to urban centers, and
- Consolidate land ownership patterns in the Refuge.

1.4 Where is the oil and gas potential in the Refuge?

It is unknown whether recoverable quantities of oil or gas are present in the Yukon Flats basin. Oil is generated from buried organic material only when a complex and specific set of physical conditions are met. One important factor is depth. If prehistoric organic materials are buried under deep layers of sediment, the resulting heat and pressure may chemically change them into hydrocarbons. In 2006, scientists published a mapping of the areas believed to contain

sedimentary fill deep enough to have generated oil in the Yukon Flats basin. Because hydrocarbons are lighter than rock or water, the oil may then migrate upward or outward from the generation area. In the Refuge, this potential migration area includes the lands Doyon would receive in the land exchange as well as many Native lands (**Figure 3**). In 2007, new mapping was published for the Yukon Flats that suggested that the depth of sedimentary fill needed to generate hydrocarbons may be less than predicted during earlier mapping and that the area potentially containing oil and gas may be somewhat larger than the area shown in **Figure 3**. Even if conditions are right for oil generation, many other factors influence whether hydrocarbons are trapped in high enough concentrations to make drilling profitable.

Only future exploration can confirm the presence of economically viable reserves. However, the available geophysical and seismic data are promising. Current high oil prices are likely to spur interest in exploring frontier areas, like the Yukon Flats basin, where the geological data are limited, but show potential. Both the price of oil and the quantity present are major factors determining whether development would occur. As the price goes up, the quantity needed to make a profit goes down.

In 2004, the U.S. Geological Survey estimated the mean volume of oil and gas resources in the Yukon Flats basin to be 173 million barrels of oil and 5.5 trillion cubic feet of gas. Doyon believes the quantity of oil may be much higher—up to 800 million barrels in the core land exchange area alone.

As illustrated in **Figure 3**, many Native lands in the Refuge have oil and gas potential. Doyon owns the subsurface estate of all these lands. With or without the proposed land exchange, Doyon could explore these other private lands. In fact, if Doyon develops oil resources on the core lands received in the land exchange, the resulting infrastructure may increase the likelihood of developing additional oil fields on other private lands.

1.5 Would Doyon develop gas or oil?

Although the Yukon Flats basin is more likely to contain gas than oil, Doyon is more likely to develop oil than gas for logistical reasons. The TAPS lies within 80 miles of the proposed land exchange area and is currently operating at less than capacity. No comparable gas pipeline exists. Even if a gas pipeline is constructed in the future, it could be tied up for decades getting North Slope gas to market. Although gas development is a distant possibility, Doyon is much more likely to develop oil resources first. Therefore, the EIS focuses on oil, but not gas, development.

1.6 How would the oil get to market?

If Doyon produces oil either on lands it currently owns or those received by exchange, a pipeline and support road connecting to the TAPS would be needed to transport the oil to market. Depending on the location of the development, it might be impossible to avoid crossing Federal lands—either Refuge lands, Bureau of Land Management (BLM) lands (White Mountains National Recreation Area), or both. If that is the case, Doyon must obtain a right-of-way permit from the appropriate Federal agency (ANILCA § 1110(b), 43 Code of Federal Regulations [CFR] 36.10). Federal law requires the permitting process to include a complete NEPA analysis to evaluate site-specific impacts of the proposed transportation corridor and development project. The Federal agency could not deny the permit, but could impose reasonable stipulations and mitigation requirements to protect natural resources.

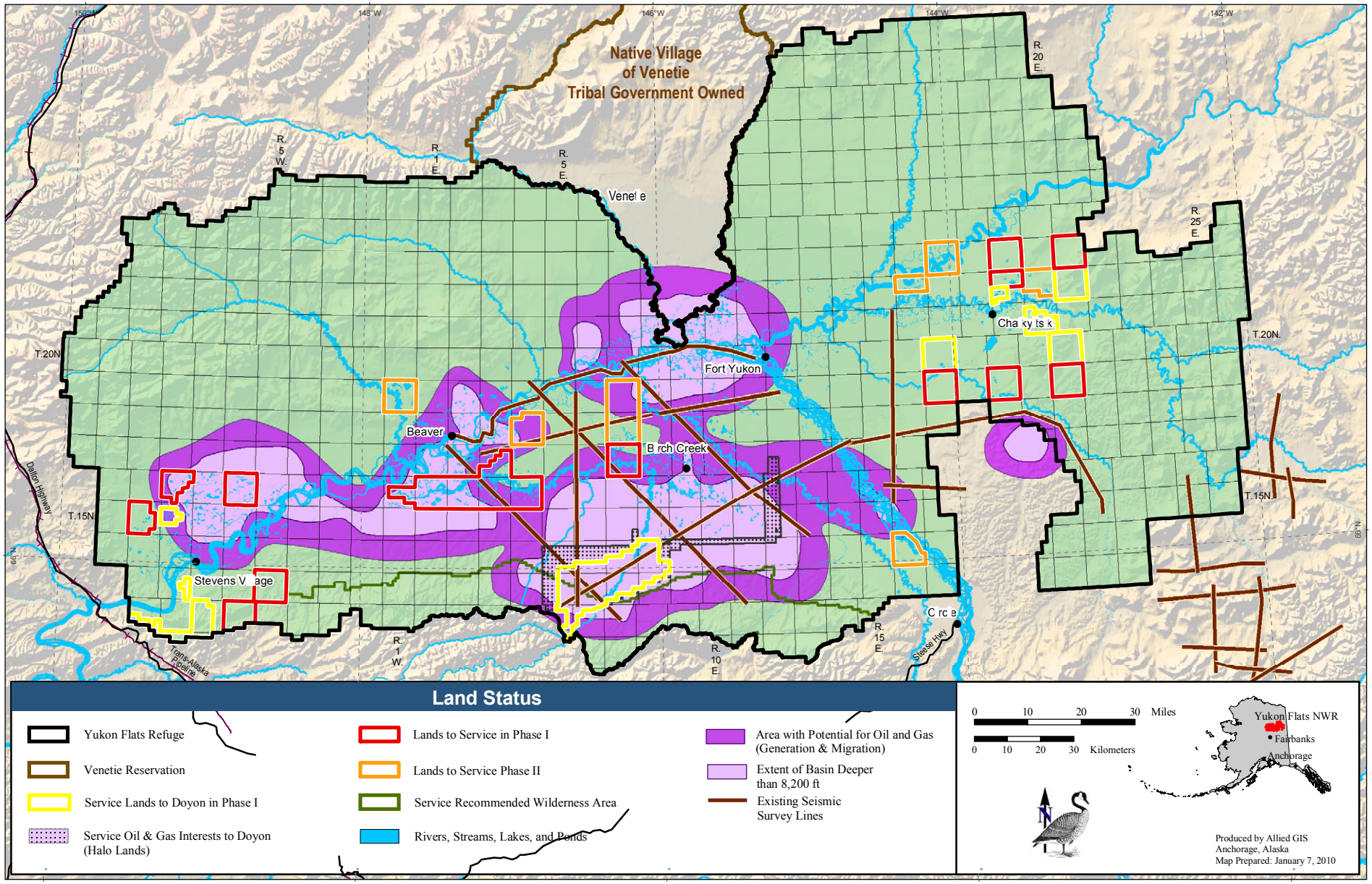
Proposed Land Exchange EIS

U.S. Fish & Wildlife Service

Yukon Flats National Wildlife Refuge, Alaska

Figure 3

Lands with Potential for Oil and Gas - Proposed Action



1.7 What are the key issues?

The land exchange proposal is controversial; both supporters and opponents have strong opinions. Most concerns center around the potential impacts of oil development in the Yukon Flats Refuge rather than on the land exchange itself. However, it is difficult to predict whether (or where) development may occur. If the land exchange proceeds, Doyon would begin exploring for oil on the core lands. But far less certain is whether economic quantities of oil are actually present on these or other Doyon-owned lands. The bottom line is that oil development is highly speculative and it is hard to predict what may happen. However, the EIS analyzes the impacts of oil development because it is a "reasonably foreseeable consequence" of the land exchange.

Issues identified during the scoping process were analyzed in the EIS. The key issues include how the land exchange could affect fish and wildlife; wetlands and aquatic habitats; the physical environment (water quality and quantity, hydrology, air quality, climate); subsistence; cultural and archaeological resources; socioeconomics; Refuge purposes; biological integrity, diversity and environmental health; land use; environmental justice (including human health); and access.

1.8 Why are we preparing an Environmental Impact Statement?

Section 910 of the ANILCA (Public Law [PL] 96-487) exempts land conveyances to Alaska Native corporations from compliance with the National Environmental Policy Act (NEPA). Under this provision, a NEPA document is not required when the Service and a Native corporation exchange lands. However, this land exchange is controversial. Both the public and Doyon urged the Service to thoroughly analyze the impacts of the proposed land exchange and potential oil and gas development. The Service agreed to prepare an EIS for the proposed land exchange.

The Notice of Availability of the *Proposed Land Exchange Yukon Flats National Wildlife Refuge Draft Environmental Impact Statement* was published in the Federal Register on January 25, 2008 (Federal Register, Volume 73, Number 17, Pages 4617-4619). The public comment period was originally scheduled from January 25, 2008, through March 25, 2008; however, a notice reopening the public comment period from April 17, 2008 through May 19, 2008, was published in the Federal Register on April 18, 2008 (Federal Register, Volume 73, Number 75, Page 20931). Public notices announcing the comment period were placed in newspapers with circulation in or near locations where public meetings were held. The Service issued a news release on February 4, 2008, notifying the public that the Draft EIS was available for public review, and listing the schedule for public comment hearings. The Service also issued a news release on April 14, 2008, notifying the public that the comment period had been reopened for 30 days. Information on the Draft EIS was also posted on the interactive website. The public was able to access the website to download a copy of the Draft EIS and the stand-alone Summary.

Public hearings were held in Steven Village on February 11; Beaver on February 12; Birch Creek on February 13; Venetie on February 15; Chalkyitsik on February 19; Fort Yukon on February 20; Fairbanks on February 21; Central on February 25; Circle on February 26; Arctic Village on February 27; and Anchorage on March 4, 2008. These hearings allowed the Service to provide an overview of the alternatives and record public comments and subsistence testimony.

The Service accepted all comments received from January 25 through May 19, 2008. Nearly 105,000 comments were received on the Draft EIS. Comments included letters, electronic mail,

and oral or written comments from the public hearings. Volume II of the Final EIS contains a summary of the issues and includes agency responses to specific comments.

After completion of the public hearings and closure of the public comment period, the core planning team, resource staff, and management met to review the comments and alternative proposals and to develop the Service's final Preferred Alternative. Several alternative proposals were received from the public and considered during the review (see Section 2.5 of the Final EIS). The Service also received numerous comments in support of the No Land Exchange (No Action) Alternative (90% of all respondents providing an opinion in their response). Less than 1% of respondents were in favor of each of the action alternatives—the Proposed Action, Land Exchange with Non-Development Easements, and Land Exchange Excluding the White-Crazy Mountains alternatives. About 9% of respondents did not provide an opinion on their preferred alternative.

The Service took these comments into consideration when reviewing the alternatives developed for the Final EIS. Based on these comments and other factors, the Service identified the No Land Exchange (No Action) Alternative as the final Preferred Alternative for the Final EIS. The Service rationale for selecting this alternative as the Preferred Alternative is given in Section 2.4.4 of the Final EIS.

2 What are the Alternatives?

Federal law requires that we consider a range of reasonable alternatives to the proposed action, including a "No Action" alternative. Three land exchange alternatives (including the Proposed Action) are considered in the EIS. They have the following features in common:

1. Each alternative consists of two phases. Phase I is the initial land exchange. After gaining title to the exchange lands, Doyon would explore for oil. Phase II would begin only if Doyon finds and produces oil on the land received in Phase I.

2. Doyon would retain a subsistence easement on any lands transferred to the Service. The easement would mirror Federal subsistence provisions under Title VIII of ANILCA.

3. To protect public access, the Service would reserve a public-use easement along Beaver Creek wherever the adjacent lands are traded to Doyon.

4. Native corporations would give up some of their land selections in the Refuge. A total of 56,500 acres of selected land would remain under Yukon Flats Refuge management instead of being conveyed into private ownership.

5. Doyon and the Service each would trade about 132,000 acres of land to consolidate ownerships and facilitate land management ("Consolidation Exchange").

6. If Doyon produces oil on lands received from the Service, the Service would require: (1) a perpetual production payment; and (2) additional compensation if a pipeline/road right-of-way crosses Refuge lands. The alternatives differ in the amount of the production payment and right-of-way compensation. In all cases, the Service could use the money from the perpetual production payment only to buy additional land from willing sellers in the Refuge or other national wildlife refuges in Alaska and to construct Refuge facilities.

Key features and differences of the alternatives are summarized in the following sections and in **Table 1**.

2.1 Proposed Action – Agreement in Principle

2.1.1 Phase I - Proposed Action

Doyon would receive from the Service:

- 110,000 acres (surface and subsurface) with oil/gas potential ("core lands," **Figure 2**).
- 97,000 acres of subsurface oil and gas interests ("halo lands"). No surface development or access would be allowed; Doyon could reach oil reserves on these lands only by directional drilling from the core lands.

In exchange, the Service would receive from Doyon:

- A minimum of 150,000 acres of land with priority fish and wildlife habitats (shown as Priority Parcel rankings 1 to 8 in **Figure 2**). The acreage would increase if appraisals indicate that more land is needed to equal the value of the 110,000 acre parcel Doyon would receive from the Service.

2.1.2 Phase II - Proposed Action

If Doyon locates and produces oil and/or gas resources on the lands acquired in Phase I, the Service would receive additional compensation from Doyon, including:

- A perpetual production payment equal to 1.25% of the value at the well head.
- A commitment to sell (at fair market value) up to 120,000 acres more land to the Service (identified as Priority Parcels 9 to 16 in **Figure 2**).

There are two potential routes for transporting oil to market by pipeline; one of these (northern route) crosses Refuge land; the other (southern route) crosses the White Mountain National Recreation Area, managed by the Bureau of Land Management (BLM). If Doyon were to receive a permit to construct a pipeline and road across Refuge lands, the Service would require additional compensation from Doyon including:

- 640 acres of land for every linear mile of pipeline crossing the Refuge.
- An increase in the perpetual production payment from 1.25% to 1.5%.

2.2. Land Exchange with Non-development Easements Alternative

This alternative addresses concerns by the Alaska Native community that too much land would leave Native ownership and become Federal property under the Proposed Action. Under this alternative (**Figure 4**), Doyon would retain ownership of 120,000 acres of land that would be offered for sale under Phase II of the Proposed Action. Although retaining ownership, Doyon would donate non-development easements to the Service for all 120,000 acres during Phase I of the land exchange. Doyon would sell no lands to the Service in Phase II. Non-development

Table 1 Comparison of land transfers, perpetual production payments, and exploration sites for the alternatives

Description	Proposed Action – Agreement in Principle	Exchange with Non-Development Easements Alternative	Exchange Excluding the White-Crazy Mountains Alternative	Preferred Alternative - No Land Exchange Alternative
Service lands (subsurface and surface; core lands) transferred to Doyon (acres)	110,000	110,000	83,500	0
Service oil and gas interests (halo lands) transferred to Doyon (acres)	97,000	97,000	105,000	0
Doyon lands (subsurface and surface) transferred to the Service (acres)	≥ 150,000	≥ 150,000	≥ 115,000	0
Selected lands (ANCSA 12[b]) reallocated outside of Refuge (acres)	56,500	56,500	56,500	0
Beaver Creek public use easement (width in miles)	1	1	1	NA [1]
Development by Doyon allowed in Beaver Creek public use easement (≤ 1,000 acres)	Yes	Yes	Yes	NA [1]
ANCSA 17(b) public access easements across Doyon lands (number of easements)	Yes (2)	Yes (2)	Yes (1)	NA [1]
Subsistence easements on lands from Doyon	Yes	Yes	Yes	NA
Non-development easements on other Doyon lands (acres)	0	≤ 120,000	0	0
Consolidation lands to Doyon (acres)	132,000	132,000	132,000	0
Consolidation lands to the Service (acres)	132,000	132,000	132,000	0
White-Crazy Mountains recommended-Wilderness area excluded	No	No	Yes[2]	Yes
Perpetual production payment (percent)	1.25	0.25	1.25	0[3]
Perpetual production payment with ROW along northern route (percent)	1.5	0.5	1.5	0[3]
Additional Doyon lands available for purchase by the Service in Phase II (acres)	≤ 120,000	0	≤ 81,000	0[3]
Acres conveyed by Doyon to Service for each linear mile of ROW (Northern Route) across Service lands that connect to Doyon lands	640	640	640	0[3]
Exploration may occur on Doyon-owned lands that are not part of the exchange	Yes	Yes	Yes	Yes
Exploration occurs on Refuge lands	No	No	No	No

Notes:

[1] Not applicable; under this alternative the land is retained by the Service.

[2] Refers to surface lands only; approximately 20,800 acres of oil and gas interests (halo lands) in the recommended-Wilderness area would be exchanged to Doyon under this alternative, but no surface lands. In addition, a Title XI ROW may cross this land.

[3] Production takes place on Doyon or other Native lands not received in the exchange, so no perpetual production payment to Service is required.

Key:

ANCSA = Alaska Native Claims Settlement Act.

NA = Not applicable.

ROW = Rights-of-way.

easements would provide habitat protection by prohibiting commercial activities, but would differ from Refuge lands in the following ways: (a) Doyon would control access; (b) subsistence activities (other than fishing) would be under State rather than Federal jurisdiction; (c) no permanent structures would be allowed except for camps and cabins for traditional activities; and (d) surface activities and uses like timber/firewood harvest, cabin construction and use, and access to inholdings, would be permitted and controlled by Doyon, not the Service.

2.2.1 Phase I – Land Exchange with Non-development Easements

Phase I of the land exchange under Alternative 1 would occur as described above for the Proposed Action, with the addition of the following:

- Doyon would donate conservation easements prohibiting commercial and industrial development on 120,000 acres of Doyon's lands within the Refuge boundaries (**Figure 4**).

2.2.2 Phase II – Land Exchange with Non-development Easements

If Doyon locates and produces oil and/or gas resources on the lands acquired in Phase I, the Service would receive from Doyon:

- A perpetual production payment of 0.25% of the value at the well head.

If Doyon were to receive a permit to construct a pipeline and road across Refuge lands, the Service would require additional compensation from Doyon including:

- 640 acres of land for every linear mile of pipeline crossing the Refuge.
- An increase in the perpetual production payment from 0.25% to 0.5%.

2.3 Land Exchange Excluding the White-Crazy Mountains Alternative

This alternative addresses the concern that lands recommended for Wilderness designation would be traded to Doyon under the Proposed Action. Under this alternative, the Federal government would retain ownership of all lands the Service recommended for Wilderness designation (under the Wilderness Act of 1964) nearly 20 years ago. Doyon would receive some subsurface oil and gas interests (but no surface occupancy) within and along the northern edge of the recommended Wilderness area. This differs from the Proposed Action, under which we would trade 26,500 acres of recommended-Wilderness lands (surface and subsurface) to Doyon.

2.3.1 Phase I – Land Exchange Excluding the White-Crazy Mountains

This alternative differs from the Proposed Action in the following ways:

Doyon would receive from the Service:

- 83,500 acres (surface and subsurface) with oil and gas potential (core lands; **Figure 5**).
- 105,000 acres of subsurface oil and gas interests (halo lands) that surround the core lands. No surface occupancy for oil and gas development would be allowed on these lands.

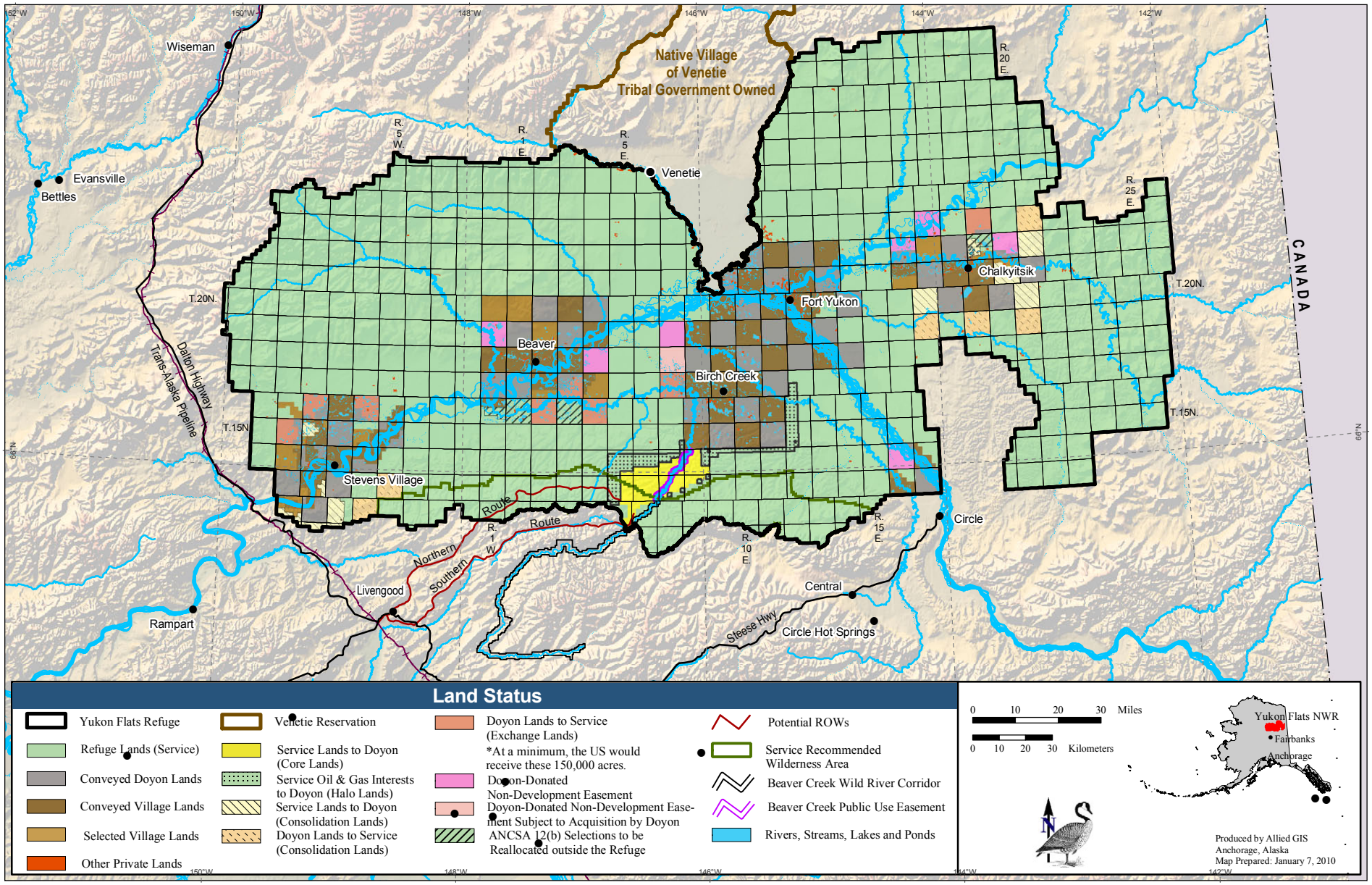
Proposed Land Exchange EIS

U.S. Fish & Wildlife Service

Figure 4

Land Exchange with Non-Development Easement Alternative

Yukon Flats National Wildlife Refuge, Alaska



In exchange, the Service would receive from Doyon:

- A minimum of 115,000 acres of land with priority fish and wildlife habitats. The acreage would increase if appraisals indicate that more is needed to equal the value of the 110,000 acres parcel Doyon would receive from the Service.

2.3.2 Phase II – Land Exchange Excluding the White-Crazy Mountains

If Doyon locates and produces oil and/or gas resources on the lands acquired in Phase I, the Service would require additional compensation. The only difference from the Proposed Action is:

- Doyon would sell up to 81,000 acres (rather than 120,000 acres) of its land holdings in the Refuge to the Service (**Figure 5**).

Under this alternative either of the potential routes for transporting oil to market by pipeline would cross Refuge land. The southern route would cross about 7 miles and the northern route would cross about 35 miles of Refuge lands. If Doyon were to receive a permit to construct a pipeline and road across Refuge lands along the southern route, the Service would not receive additional compensation. However, if the permit were for the northern route, the Service would receive from Doyon:

- An additional 640 acres of land for every linear mile of pipeline crossing the Refuge.

- An increase in the production payment from 1.25% to 1.5%.

2.4 Preferred Alternative - No Land Exchange Alternative (No Action Alternative)

Under this alternative the Service would not exchange land with Doyon. Lands within the Refuge would continue to be managed as they currently are. There would be no oil or gas development on the lands proposed for exchange to Doyon. Consolidation exchanges could take place, however none are planned under this alternative.

During scoping, commenters suggested that the No Land Exchange (No Action) Alternative should assume that there would be no oil and gas development anywhere within the Refuge boundaries. However, Doyon has stated their intention to pursue oil and gas exploration on other Doyon lands inside the Refuge, regardless of whether the land exchange proceeds or not. Of course, oil and gas development would occur only if technically and economically recoverable oil and gas resources are discovered on Doyon lands. If production does occur on Doyon-owned lands inside the Refuge, the Service would be required to provide access across Refuge lands (subject to reasonable regulations to protect Refuge resources), but would not be entitled to receive perpetual production payments or other forms of compensation. The EIS acknowledges the possibility that Doyon may develop its current land holdings with or without the land exchange. We address the potential impacts of oil and gas development on other Doyon lands in the Cumulative Effects analysis in Chapter 4 of the Final EIS.

The No Land Exchange (No Action) Alternative has been identified as the Service's Preferred Alternative for the Final EIS for several reasons. First, the Service has a limited understanding of the effects that oil and gas development would have on the hydrology of lands exchanged to Doyon and lands that would be retained by the Service. As discussed in Section 3.3.6, limited

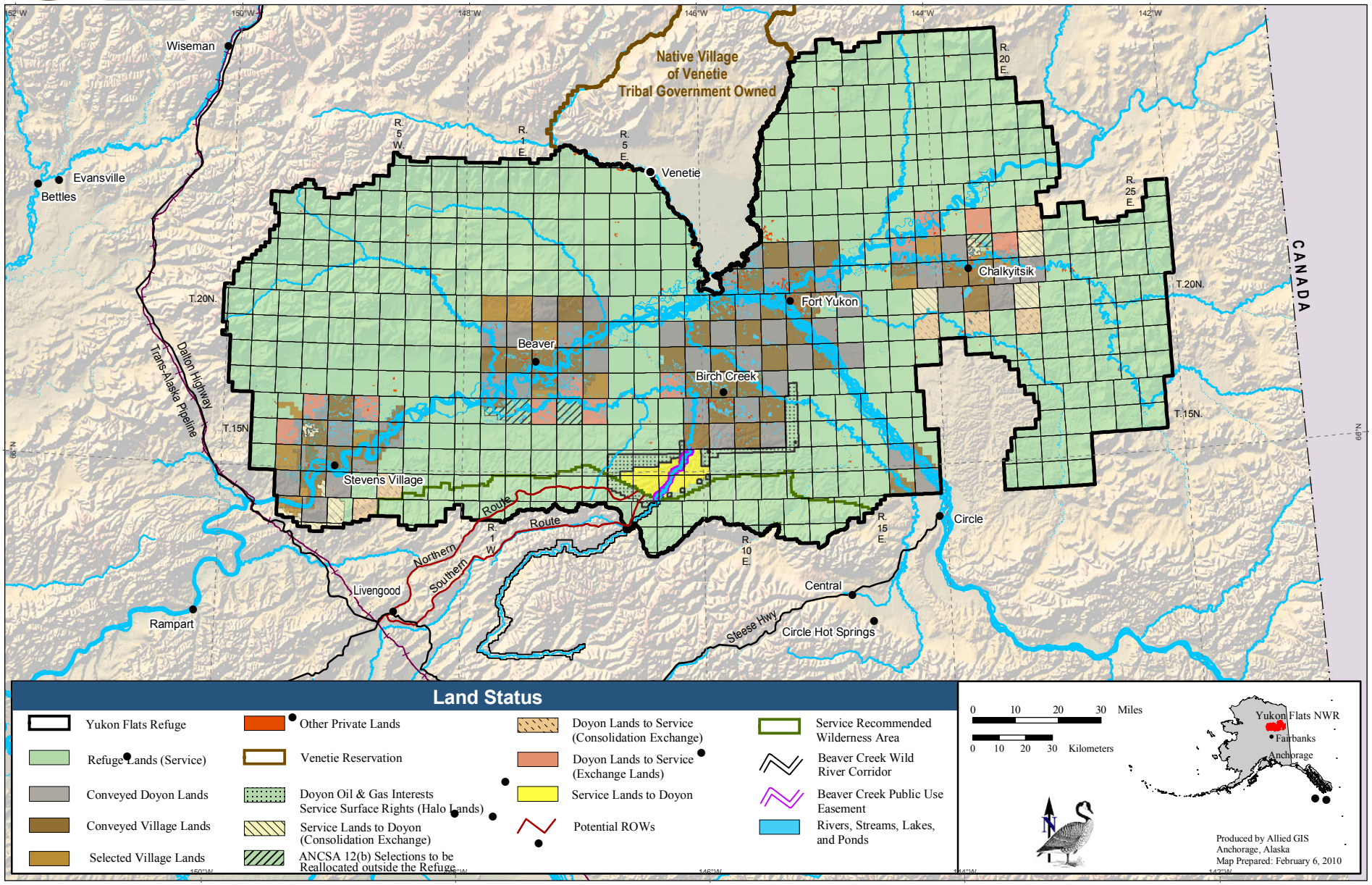
Proposed Land Exchange EIS

U.S. Fish & Wildlife Service

Yukon Flats National Wildlife Refuge, Alaska

Figure 5

Land Exchange Excluding White-Crazy Mountains Alternative



data are available to understand hydrologic functions in the parcels included in the proposed exchange. We do not understand the connectivity of subsurface and surface waters within and between habitats, including wetland and riverine systems. Thus, impacts from gravel and water (ponds and rivers) withdrawals are expected to have unknown direct and indirect consequences to water resources. The concern regarding the limited baseline information on hydrologic function is confounded by the limited information on where and how oil and gas development would occur on lands Doyon would obtain in the exchange and on lands currently owned by Doyon. The Service is especially concerned about where and how development would occur in the Beaver Creek watershed, including the 16 mile length of wild and scenic river corridor, and in proposed wilderness areas. Impacts to fisheries, riverine habitats, and wilderness character would be expected, but the level of impact is not known because of a lack of specific development scenario information.

Second, the land exchange would create a private lands corridor that would bisect the Refuge north to south and cause habitat fragmentation on the Refuge. Although the exchange of lands is not expected to significantly impact resources, it would facilitate infrastructure development and increase access, which are expected to affect resources, especially wildlife with large home ranges (e.g., bears, moose, wolverines, wolves). In addition, lands surrounding the 110,000-acre core lands would likely require more restrictive fire management and fire suppression to protect oil and gas field infrastructure, which would increase fire suppression costs from current levels and affect the natural fire regime. Species that benefit from early succession habitats, such as moose and furbearers, would likely be affected.

Third, the Service is concerned that the proposed land exchange could magnify projected changes to Refuge resources from climate change. Climate change projections for the Yukon Flats include a long-term drying trend, change in seasonal moisture distribution, change in wetland structure and function, loss of permafrost, later freeze up and earlier breakup on rivers, and an increase in fire severity and frequency. Water withdrawals, increased access, and infrastructure associated with oil and gas field development on exchange lands could exacerbate climate change effects on Refuge resources. These effects could include: (a) loss of fish habitat, a decrease in fish productivity, and an increase in rate of fish disease; (b) a decrease in the amount of surface water available for breeding birds; and (c) an increase in winter snow that acts as a stressor to moose movement.

Fourth, infrastructure associated with access corridors from the proposed land exchange (corridors to remove oil and gas product, transport equipment for exploration, and connect developed sites between villages) would increase human use of the Refuge. Competition between local subsistence users and non-local users (sport hunters and fishers, other recreation users) could increase and create conflicts between user groups. Increased human access and use would have direct impacts to Refuge resources and could facilitate movement of invasive species into the Refuge.

Fifth, there is concern that the final Agreement could differ substantially from the draft Agreement. During the early negotiations, it was the Service's understanding that development opportunities would be restricted to the core lands in the south-central portion of the Refuge. Thus, the Service negotiated to receive parcels in lowlands in areas distant to the 110,000-acre parcel. Revised USGS oil and gas basin data (Till et al. 2006; Rowan and Stanley 2007) now indicate a much larger area of the Yukon Flats Basin and Refuge as sufficiently deep to have potential oil and gas generation than was the case when parcels were originally selected for the proposed land exchange and the Agreement in Principal was negotiated. These new findings

make it more likely that parcels proposed for acquisition by the Service (parcels near Stevens Village and Beaver Village) would be adjacent to prospective areas of development and ultimately less desirable to the Service. Finally, the majority (>90%) of the general public and local residents oppose the proposed exchange.

This change, along with Doyon's decision to not include high quality native conveyed lands in the initial negotiations, could hinder the Service's ability to acquire high quality habitats. The likelihood of the Service achieving an equal exchange of lands in future negotiations has substantially decreased. Finally, the majority (>90%) of the general public and local residents oppose the proposed land exchange. Most villages downriver of the Refuge also oppose the proposed land exchange. The public and local residents are opposed to land trades that increase the net amount of Federal lands near villages and are opposed to any conveyed lands being transferred out of Native ownership. They are also concerned about contamination of the Yukon River salmon fishery from potential oil spills associated with exploration and development on the Refuge, impacts to the Beaver Creek watershed, degradation of wilderness character, adverse impacts to air and water quality and animal populations, and conflicts with the mission of the Service and purposes of the Refuge, which include protection of Refuge resources and conservation of oil and gas resources on Refuge lands.

2.5 Oil Development on Other Doyon Lands

Whether or not the Service exchanges lands with Doyon, Doyon could develop other Native lands within the Refuge boundaries. Doyon intends to explore for oil on these lands and to develop oil resources if economically recoverable quantities of oil are discovered. Under any of the alternatives (including the No Land Exchange Alternative), Doyon could develop oil resources on lands they currently own and/or on lands received by exchange. The Draft EIS analyzes the potential effects of developing a second oil field on other Native lands as "cumulative effects."

2.6 Conceptual Development Scenarios

Because Doyon has no specific development plans at this time, we had to make a variety of assumptions before we could analyze the potential impacts of oil and gas exploration and development. We assumed that exploration activities would consist of seismic surveys and exploratory drilling on the core lands. We assumed that the amount of oil present could range from 125 million barrels of oil (small field) to 500 million barrels (large field). We developed hypothetical models of a small and large oil field based on North Slope oil fields of comparable sizes. The large field scenario (based on the Alpine Field on the North Slope of Alaska) consists of two main production and gravel-drilling pads, a gravel airstrip, and five satellite fields with intrafacility gravel roads and pipelines, and an oil sales pipeline connecting with the TAPS. The small field scenario (based on the Tarn, Tabasco, and Badami fields on the Alaska North Slope) assumes all production facilities and drill sites would be located on a single gravel pad, supported by a gravel airstrip, a gravel access road, and an oil sales pipeline. We also assumed that Doyon might explore and develop other lands it owns within the Refuge. Because exploration/development of these lands could occur independently of the proposed land exchange, these impacts were analyzed as cumulative or additive effects.

3 What are the Environmental Consequences?

It is difficult to predict with certainty how the proposed land exchange or the land exchange alternatives would affect the resources and people in the Yukon Flats Refuge. Much of the difficulty stems from uncertainty about whether recoverable quantities of oil actually exist and where those resources may be. For analysis purposes, the EIS assumes there would be development on the core lands received by Doyon. In addition, the EIS assumes there would be a second oil field development on other lands owned by Doyon inside the Refuge. The effects of this second large field are analyzed as cumulative effects that could occur under any of the alternatives, including the No Land Exchange Alternative. The proposed land exchange and subsequent oil production in the Yukon Flats basin would have both positive and negative consequences—economic, social, and environmental. The following discussion briefly summarizes some of the potential effects of the land exchange alternatives and subsequent oil development. The discussion is followed by a table that compares in more detail the effects of each alternative on the resources of the Yukon Flats Refuge. The table also summarizes the cumulative or additive effects of other potential actions ─ including the possibility that Doyon may develop other Native-owned lands inside the Refuge.

Fish and Wildlife. A primary purpose of the Refuge is conserving fish and wildlife populations in their natural diversity. All the land exchange alternatives would increase the amount of land managed for fish and wildlife conservation, facilitate management by consolidating Refuge land, and add more lowland habitats to the Refuge. Wetland-dependent species (including waterfowl, beaver [*Castor canadensis*], moose [*Alces alces*], muskrat [*Ondatra zibethicus*], and river otter [*Lontra canadensis*]) may benefit because more of their preferred habitats would receive long-term protection. On the other hand, more than 4% of the midland lake zone habitat would be traded to Doyon. Birds that prefer these upland lake habitats (loons [*Gavia* spp.], scoters [*Melanitta* spp.], some diving ducks [*Aythya* spp.], thrushes, and sparrows) and mammals that use the uplands (gray wolf [*Canis lupus*], Dall sheep [*Ovis dalli*], grizzly bear [*Ursus arctos*], and marten [*Martes americana*]) could be displaced due to habitat loss or degradation if the land is developed. Oil development could affect other animal and fish species, as well. Exploration and development have the potential to destroy, alter, fragment, or degrade habitats and increase erosion, sedimentation, and thermokarsting (formation of shallow pits, depressions, and hummocks caused by thawing permafrost) near construction sites. A pipeline and road corridor could potentially have the most far-reaching effects to fish and wildlife. Their long, linear configuration can affect large expanses of watersheds and potentially alter animal behavior or movement patterns across a large area.

Wetlands and Aquatic Habitats. The Yukon Flats wetlands are highly productive and biologically diverse systems. In addition to supplying important habitat for fish and wildlife, wetlands provide ecological functions including water storage and filtration. The proposed land exchange would increase the total amount of wetlands and aquatic habitats under Refuge management. However, oil development would also increase water consumption from surface and/or groundwater sources. Recent evidence suggests that the Refuge is experiencing a drying trend. This trend could be exacerbated by construction activities that alter drainage patterns or disturb the permafrost layer. These effects would be most likely to occur at construction sites on the “core lands” and along pipeline/road corridors. Most of the core lands are in the midland lake zone, an area characterized by deep lakes and spruce forests. However, the hydrological relationship between this area and the lowland wetland habitats is poorly understood. If the

wetlands in the midland lake zone serve as reservoirs for the lowland wetland habitats, impacts to the former could ultimately affect the lowland wetlands, as well.

Physical Environment. The physical environment of the Yukon Flats Refuge is largely unaltered from historical conditions and supports healthy populations of fish, wildlife, and plants. Many of the physical effects of oil development (from gravel pads and roads, gravel mines, pipelines) can trigger changes in the physical behavior of the permafrost and the active layer that thaws each summer. These changes in turn can affect local hydrology. In addition, oil exploration and production would increase emissions of air pollutants. The increase of air pollutants would be greatest over the production drilling pad, but would decrease rapidly with distance. This localized increase would last as long as production continues (estimated at 30 – 50 years). However, air-quality models predict that levels would be well below allowable State and Federal standards at the edge of the production pad. Oil development activities can also affect water quantity and quality. Oil production would require large volumes of surface water (about 830 acre-feet or about 270.5 million gallons of surface water over the life of the field) and oil spills have the potential to degrade water quality. Statistically, most spills are small and are confined to gravel production pads where they pose little threat to water resources. The worst case scenario, a large oil spill in flowing water, could kill or harm aquatic species and accumulate in stream sediments. However, large spills are highly unlikely events; spill response plans ensure that operators are prepared to contain and recover oil if a spill does occur.

Subsistence. The residents of the Yukon Flats engage in a variety of subsistence activities, including hunting, fishing, trapping, berry picking, and gathering plants and fire wood. Subsistence is not only an important source of food, but is also a way of life central to residents' culture and identity. The land exchange could potentially affect subsistence activities by changing management or access on lands used for subsistence, increasing or decreasing local competition through changes in management, and affecting plant and animal availability through disturbance or contamination from oil and gas exploration or development. However, all lands acquired by the Service would have a Federal subsistence priority for local rural residents under the provisions of Title VIII of ANILCA. In addition, Doyon would retain a subsistence easement on all lands transferred to the Service. The easement would mirror the Title VIII provisions and would ensure that those provisions (protecting subsistence priorities for rural residents) would remain intact should these provisions be repealed on Federal lands in the future. The subsistence evaluation prepared for the Final EIS concluded that the effects of the actions would fall below the level of significantly restricting subsistence uses and needs on Federal lands. The *ANILCA Section 810 Analysis of Subsistence Impacts* evaluation for the proposed land exchange is included in **Appendix C**.

Cultural and Archeological Resources. More than 200 Alaska Heritage Resources Survey sites and more than 500 Gwich'in "place names" are documented in the Refuge. Place names are important indicators that cultural resources, such as subsistence camps, cabins, and places of cultural importance, may exist in the area. Relatively few (less than 5%) of the total documented cultural resource sites are located on lands involved in the proposed exchange. However, undiscovered sites are likely present in the affected area. Under each land exchange alternative, some documented sites would leave Federal ownership and others would be acquired. Overall, there would be a net increase of documented sites on Refuge lands and these sites would receive long-term protection. Construction activities could affect sites on lands leaving Federal ownership, however. Before oil development or pipeline construction could begin, Federal laws would require a cultural resource survey on the affected lands. This would increase the likelihood of identifying and evaluating cultural resources for listing on the National Register of Historic

Places. However, construction activities and increased access in remote areas could increase the potential for vandalism or damage to cultural resources.

Socioeconomics. Currently, the communities in the Yukon Flats support a mixed subsistence/cash economy. Under all the land exchange alternatives, the major effects of oil exploration and development to local communities would be an increase in job opportunities and personal income. Economic benefits would extend beyond the local communities. Oil development would result in a revenue stream to the State of Alaska (taxes), to the Service (perpetual production payments), and to Doyon (royalties for leasing their land to the oil industry). By law, a total of 70% of the royalties to Doyon would be shared with the other Alaska regional corporations. In addition, a share of the royalties would go to village corporations (on a per capita basis) in the Doyon region. There are potential negative effects, as well. The oil production phase would require far fewer local workers than the construction phase, creating the potential for an economic "bust" after construction is completed. Social effects are hard to predict, but rapid industrial development in small rural communities can lead to a decline in traditional cultural values and result in a variety of social issues. Although some residents welcome the changes development can bring to a community (more jobs, improved public services, better housing), others view development as a threat to the long-term survival of cultural traditions and a unique way of life.

Refuge Purposes. The National Wildlife Refuge System Administration Act, as amended, states that each refuge shall be managed to fulfill the specific purposes for which that Refuge was established. The purposes of the Yukon Flats Refuge are listed in Section 1.3. The degree to which a land exchange could either limit or facilitate our ability to fulfill these purposes depends largely on whether or not Doyon produces oil on the core lands. All of the land exchange alternatives would consolidate ownerships, add priority habitats to the Refuge, and increase the total amount of land subject to the Federal subsistence provisions of Title VIII of ANILCA. All these outcomes would be beneficial to the purposes of the Refuge. However, transferring prospective land to Doyon would also increase the likelihood of oil development inside Refuge boundaries and could result in a pipeline and access road right-of-way across the Refuge and the potential for oil spills. Oil development and production are unlikely to facilitate our ability to conserve fish and wildlife populations and habitats in their natural diversity or to ensure water quality and quantity within the Refuge. Refuge purposes may be further jeopardized if Doyon also locates oil on lands it currently owns in the Refuge and develops a second field and pipeline (a cumulative effect).

Biological Integrity, Diversity, and Environmental Health. It is Service policy to maintain existing levels of biological integrity, diversity, and environmental health at the refuge scale and to restore degraded elements where feasible. Our ability to achieve this goal within the Yukon Flats Refuge depends partly on if, where, and how much oil development might occur inside Refuge boundaries. Currently, the Yukon Flats Refuge is relatively unaltered from its historic condition. The land exchange alternatives would increase the total amount of wetland habitats managed by the Refuge and consolidate Refuge and Doyon lands into larger blocks of habitat. These actions would have a positive effect on our ability to maintain the biological integrity, diversity and environmental health of the Refuge. However, the land exchange alternatives would also create a large block of private land extending north to south in the mid-section of the Refuge, essentially splitting the Refuge in half. Depending on how and where development might occur, animal movements between the east and west halves of the Refuge could be altered. Infrastructure (including a road and pipeline) and development activities would alter the relatively pristine nature of the landscape, destroy or modify habitats, alter wildlife behavior and

movements, and could introduce invasive species and affect the composition, structure, and functioning of soil, water, air, and other abiotic features at development sites. Altering the natural fire regime (because of increased fire suppression near infrastructure) could cause a shift to more mature forest stages and a change in the wildlife species using these areas.

Land Use. Primary land uses in the Refuge include subsistence, recreation, trapping, and conservation. Because other sections discuss subsistence and conservation in more detail, this section focuses on recreation and trapping. Both of those uses are believed to be relatively low in the Refuge. Nevertheless, the land exchange alternatives would increase the amount of public land available for these uses inside the Refuge, but would also change the distribution of public lands. Some areas currently used for recreation would no longer be available, including the "core lands" (currently used by at least two trappers). Recreational float trips on Beaver Creek attract some visitors (probably less than 200 per year). The Service would protect public access to that area by reserving a public use easement along that portion of the Beaver Creek corridor that would be traded to Doyon. Although access would be ensured, oil development activities could degrade the quality of the experience if users are within hearing range or sight distance of construction activities.

Vegetation. There has been relatively little human disturbance to vegetation within the Refuge. However, disturbed areas have been slow to recover. Seismic lines cleared in the 1970s are still quite visible. Exploration (under all the land exchange alternatives) would involve some clearing for seismic surveys, camp sites, ice pads for exploratory drilling, and access trails. Oil development would remove, alter, or disturb vegetation during construction of gravel pads, roads, gravel mines, and other infrastructure. Indirect effects on vegetation from roads could occur from dust, roadside flooding, thermokarst and roadside snow accumulation. Gravel placement for infrastructure would destroy vegetation within the footprint and could alter drainage patterns; this in turn could affect plant communities. Road access into the Refuge would also increase the potential for the spread of invasive species that could alter natural plant diversity. Invasive species could be introduced either in seed mixtures and mulches during restoration efforts, or inadvertently carried in on equipment. Oil spills could directly harm vegetation, especially if the spill occurred in the summer. Spills on snow cover or frozen ground could be cleaned up without damage to most ground vegetation.

Environmental Justice. Executive Order 12898 directs Federal agencies to assess whether their actions would have disproportionately high and adverse human health or environmental effects on minority and low-income populations. Alaska Natives make up about 84% of the population in the affected area and qualify as a low-income population. As discussed above, this population could experience both positive and negative social and economic effects from oil development on Doyon-owned lands. It is more difficult to assess the human health effects to the local population. Human health effects of oil and gas activities are not well documented and it is difficult to tease apart the many interacting factors that contribute to health. Human health includes physiological, psychological, and social well-being and can be influenced by changes to both the physical and social environment. Alaska Natives are concerned about contaminants accumulating in the subsistence food supply, but the source of these contaminants and the pathways by which they enter and move within ecosystems are not well understood. Under the land exchange alternatives, development activities (including potential road corridors) are not in close proximity to villages and are in areas lightly used for subsistence purposes. These factors should minimize the potential exposure pathways and the effects on human health. Oil industry and State and Federal regulatory practices should minimize the risk of health effects due to noise, air pollution, and waste

discharges. A very large oil spill could affect subsistence resources or uses. However, a large spill is an unlikely event.

Access. Currently there are no roads into the Yukon Flats Refuge. Local residents travel primarily by boat in summer or by snowmachine in winter. Recreational use is low and access is limited (small plane, boat, snowmachine). If Doyon were to discover oil, a pipeline and support road would be necessary to get the oil to market. If any portion of the pipeline/road must cross Federal land, another NEPA analysis would be required. Using detailed, site-specific information, the analysis would assess the effects of the entire project, including both the access corridor and oil field development. However, until Doyon discovers recoverable quantities of oil and reveals development plans, we have too little information to completely assess impacts from a pipeline right-of-way and access road. At this point, we do not know the location of the right-of-way or whether any portion of the road would be open to the public. Both of these factors would determine the range of potential effects. Two possible routes have been proposed by Doyon. One would cross Refuge land and one would cross the White Mountains National Recreation Area. Either route could have long-term effects on these remote areas. If open to the public, or accessed illegally, a road could increase the use of previously inaccessible areas by hunters, recreational users, and local residents. Roads also have the potential to alter animal habitat and behavior, affect hydrology and plant communities, increase animal-vehicle collisions, create noise, degrade the visual experience, and compromise wilderness values.

Cumulative Effects. The primary cumulative effects resulting from the action alternatives when compounded with other past, present, and future activities are related to oil and gas exploration and development in the Refuge. Under all action alternatives, there would be a cumulative increase in greenhouse gas emissions that could contribute to climate change; a cumulative increase in consumption of mineral resources and surface water; a cumulative loss of vegetation, wetlands, and fish and wildlife habitat; and a greater likelihood of impacting cultural resources. Risks for impacts to resources from an oil spill also would increase. Development in the Refuge would result in additional right-of-ways (ROWs) across Federal lands, which could impact wildlife movements, and alter visual resources and wilderness qualities over a larger, additive, area. Subsistence use also could be impacted cumulatively as development occurs over a larger area; however, potential effects to subsistence use would be on privately owned lands rather than on Federal public land.

The cumulative effects to socioeconomics are expected to be positive, as jobs would be created that would likely improve the regional economy. Jobs for local residents would likely be short-term (3 to 5 years) during the construction phase of the project. Some long-term (up to 50 years) jobs could be available to local residents during the production phase of the project.

The cumulative effects given above would also occur under the No Land Exchange Alternative. Under the No Land Exchange Alternative, Doyon could pursue oil and gas exploration on other Doyon lands inside the Refuge. However, as there would be no land exchange, direct effects associated with oil and gas exploration and development would be limited to Doyon lands within the Refuge. Cumulative effects associated with oil and gas exploration and development under the No Land Exchange Alternative would be less than would occur under the action alternatives.

3.1 Comparison of Effects

Table 2 summarizes and compares the environmental effects of the Proposed Action, the Land Exchange with Non-development Easements Alternative, the Land Exchange Excluding the White-Crazy Mountains Alternative, and the No Land Exchange Alternative. The effects are summarized for each phase of the land exchange. Phase I includes the initial land exchange plus exploration activities; Phase II includes oil field development activities. The table also summarizes the cumulative effects of the alternatives when added to other past, present, or reasonably foreseeable future actions (activities likely to occur within the estimated 50-year life of an oil development project). For analysis purposes, we assumed that Doyon may develop a second large field on Doyon-owned lands (other than the core lands). These impacts are summarized in the Cumulative Effects section of the Final EIS.

Table 2 Comparison of alternatives with respect to significant environmental issues

Issue		Proposed Action - Agreement in Principle	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative))
Air Quality	Phase I	Drill rigs would increase air pollutant concentrations, but air quality would be expected to meet NAAQS/Alaska AAQS at the drill pad edge. Effects would last as long as drilling (4 months/year for 4 years). Exploratory drilling would have a minimal short-term and long-term effect on local and a negligible effect on regional air quality.	Effects on air quality would be similar to those for the Proposed Action.	Effects on air quality would be similar to those for the Proposed Action.	No effects on air quality.
	Phase II	Emissions from development facilities would have a minor effect beyond immediate localized area for 30-50 years. Air quality would be expected to meet NAAQS and Alaska AAQS within 100 yards of facility. An oil spill could result in the release of volatile organic compounds within the area of the spill.	Effects on air quality would be similar to those for the Proposed Action.	Effects on air quality would be similar to those for the Proposed Action.	No effects on air quality.
	Cumulative	Oil and gas exploration and development on other Doyon lands would have similar air quality effects as above, but they would not accumulate due to distance and dispersion.	Effects on air quality would be similar to those for the Proposed Action.	Effects on air quality would be similar to those for the Proposed Action.	A small or large field may be developed on non-exchange lands, which would have similar effects on air quality as described for Phase II of the Proposed Action.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Climate	Phase I	Greenhouse gas emissions would be negligible.	Effects on climate would be similar to those for the Proposed Action.	Effects on climate would be similar to those for the Proposed Action.	No effects on climate.
	Phase II	Greenhouse gas emissions from field operation would equal about 0.008% of U.S. emissions.	Effects on climate would be similar to those for the Proposed Action.	Effects on climate would be similar to those for the Proposed Action.	No effects on climate.
	Cumulative	Greenhouse gas emissions from operation of large fields on core and non-exchange lands could total 1.14 tons annually or about 0.017% of U.S. emissions. Decreasing production in other Alaska fields may result in no accumulation from oil and gas industry. Combustion of oil produced by a large field could represent as much as 216 tons of CO2e or approximately 0.1% of total U.S. annual emissions (approximately 7,200 million tons) from the burning of fossil fuels over the life of the project. Emissions from oil produced by a small field would be one quarter of that or less. Development of an additional large field on non-exchange lands could double the greenhouse gas emissions.	Cumulative effects would be similar to those for the Proposed Action.	Cumulative effects would be similar to those for the Proposed Action.	A small or large field may be developed on non-exchange lands, which would have similar effects on climate as development of a single small or large field under Phase II of the Proposed Action. There would also be greenhouse gas emissions associated with construction and operation of a natural gas pipeline from the North Slope, and new development associated with villages in or near the Refuge.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Climate (continued)	Cumulative (continued)	There would also be greenhouse gas emissions associated with construction and operation of a natural gas pipeline from the North Slope, and new development associated with villages in or near the Refuge.			
Geology, Geologic Hazards, and Soil	Phase I	There would be no impacts to geology or geologic hazards from the Proposed Action. Clearing of seismic survey lines, access trails, and ice pads could cause minor subsidence and deepening of permafrost active layer over portions of 490-660 acres.	Effects on soils would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including lands with oil and gas potential, affording some protection to soil on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	Effects on soils would be similar to those for the Proposed Action.	No effects on geology, geologic hazards, and soil.
	Phase II	Loss of 735-1,200 acres of soil due to gravel pads/roads, and 145-240 acres of direct impact from gravel mining if an oil field is developed. Indirect effects would include thermokarst, erosion, subsidence, and flooding, which could affect as much as 7,200 acres. Soil could be impacted by spills onto land and through cleanup efforts. If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of	Effects on geology, geologic hazards, and soil would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact soil. Geology and	Effects on geology, geologic hazards, and soil would be similar to those for the Proposed Action.	No effects on geology, geologic hazards, and soil.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Geology, Geologic Hazards, and Soil (continued)	Phase II (continued)	Doyon lands; about 45,000 acres of these lands have oil and gas potential. Geology and soil on these lands would be protected from future development. Geology and soil would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands would also be protected.	soil would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands would also be protected.		
	Cumulative	Exploration and development on Doyon-owned lands would have a similar effect as activities on core lands, and the effects would be additive resulting in double the area of soil on the Refuge lost due to exploration and development. Climate change could increase the effects of line clearing.	Cumulative effects to geology, geologic hazards, and soil would similar to those for the Proposed Action.	Cumulative effects to geology, geologic hazards, and soil would similar to those for the Proposed Action.	Exploration and development on Doyon-owned lands would have similar effects on geology, geologic hazards, and soil as those described for exploration and development in Phase I and II of the Proposed Action.
Paleontological Resources	Phase I	Potential for minor effects to paleontological resources from exploration.	Effects to paleontological resources would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including lands with oil and gas potential, affording some protection to paleontological resources on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	Effects to paleontological resources would be similar to those for the Proposed Action.	No effects to paleontological resources.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Paleontological Resources (continued)	Phase II	The primary impact to paleontological resources would result from the excavation of material for construction of the permanent facilities. Extraction of the terrestrial materials could impact paleontological resources. Up to 1,200 acres of soil could be impacted due to gravel pads/roads, and up to 240 acres of direct impacts could occur from gravel mining if an oil field is developed. Paleontological resources could be adversely impacted by an oil spill. If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of Doyon lands; about 45,000 acres of these lands have oil and gas potential. Paleontological resources on these lands would be protected from future development. Paleontological resources would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands.	Effects to paleontological resources would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact paleontological resources. Paleontological resources would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands.	Effects to paleontological resources would be similar to those for the Proposed Action.	No effects to paleontological resources.
	Cumulative	Exploration and development on Doyon-owned lands would have a similar effect as activities on core lands, and the effects would be additive resulting in double the area of ground disturbance on the Refuge lost due to exploration and development.	Effects to paleontological resources would be similar to those for the Proposed Action.	Effects to paleontological resources would be similar to those for the Proposed Action.	Exploration and development on Doyon-owned lands would have similar effects on paleontological resources as those described for exploration and development in Phase I and II of the Proposed Action.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Oil and other Mineral Resources	Phase I	The Service would experience a net loss of 76,200 acres with oil and gas potential, while Doyon gains same.	The Service would experience a net loss of 76,200 acres with oil and gas potential, while Doyon gains same. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including about 45,000 acres with oil and gas potential, affording some protection to oil and other mineral resources on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	The Service would experience net loss of 59,400 acres with oil and gas potential, while Doyon would gain 59,400 acres.	No effect on oil and other mineral resources.
	Phase II	Service would have a net gain of 44,500 acres with oil and gas potential, while Doyon loses same. Potential for removal of 125-500 MMbbls of oil if oil is discovered. Up to about 12,000,000 cubic yards of gravel could be removed if an oil field is developed, with up to half of the gravel coming from Federal lands for a ROW. If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of Doyon lands; about 45,000 acres of these lands have oil and gas potential. Oil and other mineral resources on these lands would be protected from future development.	There could be removal of 125-500 MMbbls of oil under this alternative if oil is discovered. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact gravel resources. Oil and other mineral resources would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands.	The Service would have a net gain of 9,300 acres with oil and gas potential. There could be removal of 125-500 MMbbls of oil if oil is discovered. Up to about 12,000,000 cubic yards of gravel could be removed if an oil field is developed, up to half could be from Federal lands for a ROW.	No effects on oil and other mineral resources.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Oil and other Mineral Resources (continued)	Phase II (continued)	Oil and other mineral resources would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands; portions of the proposed ROW routes would be within areas with high oil and gas potential.			
	Cumulative	Oil and gas development on other Doyon lands without halo lands could result in drainage of resources under Federal lands. Potential development on non-exchange private lands in Refuge could double use of gravel (24,000,000 cubic yards) and oil production from lands within outer Refuge boundary.	Effects to oil and other mineral resources (oil, gas, gravel) would be similar to those for the Proposed Action.	Effects on mineral resources (oil, gas, gravel) would be similar to those for the Proposed Action.	Development on other Doyon lands would have similar effects on oil and other mineral resources as described for exploration and development in Phase I and II of the Proposed Action.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Water Resources	Phase I	There would be a net gain of 1,430 lakes (24,100 acres) and 118 river miles on Refuge lands. Exploration activities could result in erosion of streambanks and sedimentation of streams. Exploratory drilling would consume up to 20 ac-ft of surface water per winter drilling season, for 4 seasons.	Effects to water resources would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including lands with oil and gas potential and about 42,600 acres of lakes and 232 river miles, affording some protection to water resources on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	There would be a net gain of 1,250 lakes (22,000 acres) and 116 river miles on Refuge lands. Effects to water resources from exploration and exploratory drilling would be similar to those for the Proposed Action.	No effects to water resources.
	Phase II	Consumption of up to 830 ac-ft of surface water over field life. Removal of water for development could adversely impact the hydrology of lowland habitats below development areas and impact lowland vegetation. If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of Doyon lands; about 45,000 acres of these lands have oil and gas potential. Water resources would be protected from future development. Water resources would also be protected on lands obtained by the Service if a ROW was constructed across Refuge.	Effects to water resources would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact water resources. Water resources would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands.	Consumption of up to 830 ac-ft of surface water over field life. Removal of water could adversely impact the hydrology of lowland habitats below development areas and impact lowland vegetation. If oil resources were discovered and developed on exchange lands, the Service would use production payments to purchase up to 81,000 acres of Doyon lands that have about 1,770 lakes (36,300 acres) and 165 river miles that would benefit water resources on the Refuge.	No effects on water resources,

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Water Resources (continued)	Cumulative	Exploration and development on other Doyon lands could result in consumption of up to another 910 ac-ft of surface water over field life if a large field is developed on other Doyon lands. The effects could be additive if water sources are in the same drainage. Climate change could result in less available surface water and increase the effects of withdrawals.	Cumulative effects on water resources would be similar to those for the Proposed Action.	Cumulative effects on water resources would be similar to those for the Proposed Action.	Water resource effects would be similar to those under Phase I and II of the Proposed Action. Climate change could result in less available surface water and increase the effects of withdrawals.
Water Quality	Phase I	Minor effects on water quality due to erosion and sedimentation from the clearing and use of seismic survey lines and accessing drill sites. Drilling fluids, wastewater, and solid wastes, and spills could impact surface water or groundwater.	Effects on water quality would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including lands with oil and gas potential and about 42,600 acres of lakes and 232 miles of river, affording some protection to water quality on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	Effects on water quality would be similar to those for the Proposed Action.	No effect on water quality.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Water Quality (continued)	Phase II	Potential effects due to erosion and sedimentation from equipment access, gravel mining, and pipeline, road, and facility construction. Excessive withdrawals of surface waters could affect water quality, water quantity, and habitat value. Small oil spills likely to occur but would have negligible effect on water quality. Large and very large spills could affect water quality but have a low probability of occurrence. If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of Doyon lands; about 45,000 acres of these lands have oil and gas potential. Water resources and water quality on these lands would be protected from future development. Water resources would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands.	Effects on water quality would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact water quality. Water resources would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands.	Effects on water quality would be similar to those for the Proposed Action.	No effect on water quality.
	Cumulative	Additional oil and gas exploration and development on other Doyon lands would have similar effects to above and could have potential to accumulate if situated in the same drainage.	Effects on water quality would be similar to those for the Proposed Action.	Effects on water quality would be similar to those for the Proposed Action.	Effects on water quality would be similar to those under Phase I and II of the Proposed Action.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Hydrology	Phase I	Minimal effect on surface hydrology due to overland moves of equipment.	Effects on hydrology would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including lands with oil and gas potential and with 42,000 acres of lakes and 232 river miles, affording some protection to hydrology on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	Effect on hydrology would be similar to those for the Proposed Action.	No effect on hydrology.
	Phase II	Potential effects on drainage patterns due to wetland and stream crossing associated with culverting, and pipeline, road, and facility construction. Potential for excessive drawdown of surface water resources during winter during low flow periods with unknown impacts to lowland hydrology. If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of Doyon lands; about 45,000 acres of these lands have oil and gas potential. The hydrology on these lands would be protected from future development. Water resources would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands.	Effects on hydrology would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact hydrology. Water resources would also be protected on lands obtained by the Service if a ROW was constructed across Refuge lands.	Effect on hydrology would be similar to those for the Proposed Action.	No effect on hydrology.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Hydrology (continued)	Cumulative	Additional oil and gas exploration and development on other Doyon lands would have similar effects to above and could have potential to accumulate if situated in the same drainage.	Effects on hydrology would be similar to those for the Proposed Action.	Effects on hydrology would be similar to those for the Proposed Action.	Effects on hydrology would be similar to those under Phase I and II of the Proposed Action.
Biodiversity, Biological Integrity, and Environmental Health	Phase I	The Service would receive at least 150,000 acres in the lowlands with priority fish and wildlife habitat value and Doyon would receive 110,000 acres in the uplands. This would result in a habitat increase under Service management for plant and animal species that favor lowland habitats. Effects would be minor; however, as lowland habitat under Service management would increase by only about 2% and upland habitat would decrease by about 2% from current levels. Refuge lands are currently about 48% lowland and 52% upland. There would be a net gain of 96,500 acres of Refuge lands. Refuge lands would be consolidated. The size of habitat blocks would increase, which would facilitate management. The exchange would result in a block of private lands extending from the southern to northern Refuge boundaries.	Effects on biodiversity and biological integrity would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including about 45, 000 acres with oil and gas potential, affording some protection to biodiversity, biological integrity, and environmental health on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	Refuge lands would increase by 88,000 acres, and Refuge lands would be consolidated. The habitat types of exchanged lands and the potential effects on the biological integrity, diversity, and environmental health of the Refuge would be similar to those described for the Proposed Action. Under this alternative, private lands would not extend from the southern to northern Refuge boundaries due to the exclusion of the recommended-Wilderness area, which is approximately 7 miles wide.	Under the No Land Exchange Alternative, there would be no land exchange. There would be no increase or consolidation of Federal lands in the Refuge. This alternative would not affect the Refuge's biological integrity, diversity, and environmental health.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Biodiversity, Biological Integrity, and Environmental Health (continued)	Phase I (continued)	Seismic surveys would not be conducted on Refuge lands. Thus, direct impacts to biological integrity, diversity, or environmental health of the Refuge would not occur from seismic exploration. However, the activities and movements of wildlife on Refuge lands adjacent to the core lands could be impacted by seismic activities.			
	Phase II	The Service could acquire up to 120,000 acres of Doyon lands within the Refuge. These lands contain priority wildlife habitats. This would increase the size of habitat blocks that would better facilitate management of Refuge lands. The purchase of lands would have a positive effect on the Service's ability to maintain the biological integrity, diversity, and environmental health of the Refuge.	Effects on biodiversity, biological integrity, and environmental health due to development would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact biodiversity, biological integrity, and environmental health.	The Service could acquire up to 81,000 acres of Doyon lands within the Refuge. These lands contain priority fish and wildlife habitats. This would increase the size of habitat blocks, which would better facilitate management of Refuge lands. The transfer of lands would have a positive effect on the Service's ability to maintain the biological integrity, diversity, and environmental health of the Refuge.	Under the No Land Exchange Alternative, there would be no oil exploration or development on Refuge lands. There would be no increase or consolidation of Federal lands in the Refuge. This alternative would not affect the Refuge's biological integrity, diversity, and environmental health.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Biodiversity, Biological Integrity, and Environmental Health (continued)	Phase II (continued)	Infrastructure and activities associated with oil development on core lands and pipeline/road ROWs could have adverse effects on the biological integrity, diversity, and environmental health of the Refuge. Development activities could alter wildlife migration patterns on the Refuge. Oil infrastructure would require protection from wildland fire, potentially altering fire regimes in forest stands affecting forest stand age and composition.		Other effects on biodiversity, biological integrity, and environmental health would be similar to those for the Proposed Action.	
	Cumulative	Cumulative effects would primarily be associated with the Proposed Action and exploration and development on Doyon-owned lands. Water withdrawals for oil field development could exacerbate the drying effects of climate change and degrade the biological integrity, diversity, and environmental health of the Refuge. Construction of oil field pads, roads, and pipeline, and a natural gas pipeline, and climate change could degrade the biological integrity, diversity, and environmental health of the Refuge.	Cumulative effects would be similar to those for the Proposed Action.	Cumulative effect would be similar to those under the Proposed Action.	Cumulative effect would be similar to those under Phase I and Phase II of the Proposed Action.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Refuge Purposes	Phase I	The transfer of lands from Doyon to the Service does not conflict with Refuge purposes. There would be a net increase of 96,500 acres of Refuge lands containing priority fish and wildlife habitats, increasing opportunities for conservation. Refuge lands would be consolidated, increasing the size of habitat blocks under Federal ownership and facilitating management of Refuge lands. Exploration would occur on private lands, which would have little effect on Refuge purposes except for cleared snow trails on about 28 miles (100 acres) of Refuge lands.	Effects on Refuge purposes would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including about 45,000 acres with oil and gas potential, affording some protection to Refuge purposes on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	There would be a net increase of 88,000 acres of Refuge lands containing priority wildlife habitats, increasing opportunities for conservation. Refuge lands would be consolidated, increasing the size of habitat blocks under Federal ownership and facilitating management of Refuge lands. Exploration would occur on private lands, which would have little effect on Refuge purpose, except for cleared snow trails on about 28 miles (100 acres) of Refuge lands.	Lands administered by the Refuge would continue to remain in relatively pristine condition and serve to meet the Refuge purposes identified under Section 302(9)(B) of ANILCA. Most Doyon land would also continue to remain in pristine condition and support the Refuge purposes at a regional scale.
	Phase II	If development occurs, the Service could purchase up to 120,000 acres of Doyon lands in the Refuge, which would increase acreage under Service management and further consolidates Refuge lands, facilitating management and conservation.	Effects on Refuge purposes would be similar to those under the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact Refuge purposes.	If development occurs the Service could purchase up to 81,000 acres of Doyon lands in the Refuge, which increases acreage under Service management and further consolidates Refuge lands, facilitating management and conservation.	Lands administered by the Refuge would continue to remain in relatively pristine condition and serve to meet the Refuge purposes identified under Section 302(9)(B) of ANILCA. Most Doyon land would also continue to remain in pristine condition and support the Refuge purposes at a regional scale.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Refuge Purposes (continued)	Phase II (continued)	Development would only occur on private lands and therefore affect Refuge purposes only indirectly except along a road/pipeline ROW that might be constructed on Refuge lands if the northern route is selected. The 1,090 acres of Refuge lands that could be directly affected would no longer fully support Refuge purposes. The ROW could disturb animals or their movements and increase access by the public, which could affect ability to meet Refuge purposes. Increased public use and harvest would require increased active and responsive management.		Development would only occur on private lands and therefore affect Refuge purposes only indirectly except along a road/ pipeline ROW that might be constructed on Refuge lands if the northern route was selected. The 1,090 acres of Refuge lands that could be directly affected would no longer fully support Refuge purposes. The ROW could disturb animals or their movements, and increase access by the public, which could affect the ability to meet Refuge purposes.	
	Cumulative	Development of core and other non-exchange lands would be on private lands, and not directly affect the Refuge or its purposes. As much as 37-247 miles of ROWs (450-2,790 acres) could be developed on Refuge lands. These lands would not fully support Refuge purposes. Indirect effects associated with these ROWs (e.g., vehicle disturbance, habitat effects, increased hunting) would also affect the Refuge's ability to meet established conservation purposes.	Cumulative effects on Refuge purposes would be similar to those for the Proposed Action.	Cumulative effect on Refuge purposes would be similar to those under the Proposed Action.	Cumulative effect would be similar to those under Phase I and Phase II of the Proposed Action.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Vegetation	Phase I	Vegetation would be cleared from 490-660 acres for seismic survey lines, camps, access trails, and drilling pads. Regeneration of vegetation could take 30-230 years depending on vegetation type. Vegetation could also be impacted by spills of drilling fluids and waste.	Effects on vegetation would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including lands with oil and gas potential, affording some protection to vegetation on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	Effects on vegetation would be similar to those for the Proposed Action.	No effects on vegetation.
	Phase II	If development occurs, 882–1,440 acres of vegetation would be lost or harmed for facility construction and mining, and an additional 415 acres could be cleared of woody vegetation for a ROW. Vegetation could be impacted by spills onto land and through cleanup efforts. If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of Doyon lands; about 45,000 acres of these lands have oil and gas potential. Vegetation on these lands would be protected from future development. Vegetation would also be protected on lands obtained by the Service if a ROW was constructed across Refuge.	Effects on vegetation would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact vegetation. Vegetation would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	Effects on vegetation would be similar to those for the Proposed Action.	No effects on vegetation.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Vegetation (continued)	Cumulative	Seismic surveys and exploratory drilling on Doyon-owned lands would be additive to those on core lands and past seismic surveys; 1,200-1,500 acres within the Refuge. Effects of development on Doyon-owned and core lands would be additive; 1,400-3,400 acres could be lost to gravel mining and gravel pads/roads and 600-1,100 acres could be affected by a cleared ROW. Total direct effects could be 1,800-2,600 acres. Indirect effects could impact an additional 2,800-6,800 acres.	Cumulative effects on vegetation would be similar to those for the Proposed Action.	Cumulative effects on vegetation would be similar to those for the Proposed Action.	Effect on vegetation would be similar to those under Phase I and Phase II of the Proposed Action. Past seismic surveys would be additive to seismic and other exploration on non-exchange lands. Direct effects could include a total of 670-840 acres plus additional acres for access. Development on Doyon-owned lands would directly affect 540-1,920 acres, and an additional 175-650 acres would be cleared and maintained for a ROW. Total direct effects could be 1,210-2,760 acres. Indirect effects could impact an additional 600-3,600 acres.
Wetlands and Floodplains	Phase I	The Proposed Action could have an effect on wetlands or floodplains. Exploration activities would result in clearing of vegetation from 150-180 acres of wetlands and cause minor erosion and sedimentation. A spill of drilling fluids or other harmful fluids used during exploration could adversely impact wetlands.	Effects on wetlands and floodplains would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including lands with oil and gas potential and with about 40,000 acres of wetland habitat, affording some protection to wetlands that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	Effects on wetlands and floodplains would be similar to those for the Proposed Action.	No effects on wetlands or floodplains.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Wetlands and Floodplains (continued)	Phase II	Approximately 265-432 acres of wetland would be lost due to gravel pads and mining, and 126 acres would be cleared of woody vegetation. However, the extent of wetlands is highly variable, and effects will depend on specific locations of activities. If the southern route is selected for the ROW, the Victoria Creek floodplain would be crossed twice with a road/pipeline. Wetlands and floodplains could be adversely impacted by spills onto land and water and through cleanup efforts. If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of Doyon lands; about 45,000 acres of these lands have oil and gas potential. Wetlands and floodplains on these lands would be protected from future development. Wetlands and floodplains would also be protected on lands obtained by the Service if a ROW was constructed across Refuge.	Effects on wetlands and floodplains would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact wetlands and floodplains. Wetlands and floodplains would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	Effects on wetlands and floodplains would be similar to those for the Proposed Action.	No effects on wetlands and floodplains.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Wetlands and Floodplains (continued)	Cumulative	Few past effects. Future effects include oil exploration and development on Doyon owned lands and core lands. Direct effects would be loss of 960-1,800 acres of wetlands. Effects would be additive but dependant on siting of facilities/ activities in wetlands. Climate change could result in additional loss of wetlands.	Cumulative effects on wetlands and floodplains would be similar to those for the Proposed Action.	Cumulative effects on wetlands and floodplains would be similar to those for the Proposed Action.	Effects of oil and gas exploration and development on other Doyon-owned lands on wetlands and floodplains could similar to those for Phase I and Phase II of the Proposed Action. Climate change could result in additional loss of wetlands.
Fish and Essential Fish Habitat	Phase I	Amount of fish habitat on Federal lands in the Refuge would increase by about 1,430 lakes (24,100 acres) and 118 river miles. Ice bridge crossings of streams and seismic surveys over streams could impact fish and fish overwintering habitat. A spill of drilling fluids or other harmful materials used during exploration could harm fish.	Fish habitat on Federal lands would increase by 1,430 lakes (24,100 acres) and 118 river miles – same as under the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including lands with oil and gas potential and about 42,000 acres of lakes and 232 river miles that could have fish habitat, affording some protection to fish on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative. Adverse impacts to fish from exploration would be similar to those for the Proposed Action.	Net gain of water bodies on Refuge lands would be 1,250 lakes (22,000 acres) and 116 river miles. Adverse impacts to fish from exploration would be similar to those for the Proposed Action.	No effects on fish or their habitats.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Fish and Essential Fish Habitat (continued)	Phase II	If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of Doyon lands; about 45,000 acres of these lands have oil and gas potential. Fish and fish habitat on these lands would be protected from future development. Net gain of water bodies on Refuge lands of about 2,290 lakes (42,600 acres) and 232 river miles if an oil field was developed and all available Phase II lands were purchased. Fish and fish habitat would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge. Fish could be impacted by excessive water withdrawals during winter, but should be protected by regulations and flow reservations. Fish could be impacted by changes in water quality or flow due to road/facility construction. Fish could be impacted by spills onto land and through cleanup efforts.	Effects to fish would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact fish and fish habitat. Fish and fish habitat would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	If oil development occurs, 81,000 acres of lowlands with priority wildlife habitat would be made available for purchase by the Service. Purchase of all these lands would increase total net gain of fish habitat on Refuge lands to 169,000 acres. Net gain of 1,770 lakes (36,300 acres) and 165 river miles if an oil field was developed and all available Phase II lands were purchased. Fish and their habitats would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge. Effects on fish from development would be similar to those under Proposed Action.	No effects on fish or their habitats.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Fish and Essential Fish Habitat (continued)	Cumulative	Past effects to fish have occurred from placer mining, but fish resources have recovered. Future oil and gas exploration and development on non-exchange Native lands in the Refuge would have effects on fish as described above for the Proposed Action. Effects would be additive on migratory fish populations but not on resident fish. Climate change could reduce fish habitat, increase disease, lower productivity, and shift species ranges to the north. These effects could be additive.	Cumulative effects on fish would be similar to those for the Proposed Action.	Cumulative effects on fish would be similar to those for the Proposed Action.	Exploration and development on non-exchange lands would have similar effects on fish as for Phase I and Phase II of the Proposed Action. Climate change could reduce fish habitat, increase disease, and lower productivity, and these effects could be additive.
Birds	Phase I	In exchange for 110,000 acres of mostly upland habitat, the Service would obtain at least 150,000 acres of lowlands that are priority wildlife habitats. These lowlands have relatively high densities of nesting swans and waterfowl/ waterbirds. The exchange would result in a net gain of 96,500 acres of available bird habitat under Service management (Refuge lands). Refuge lands in the midland lake zone habitat would be reduced by 79,600 acres (4%).	Effect on birds would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including lands with oil and gas potential and about 40,000 acres of wetland habitat, affording some protection to aquatic and upland bird habitat on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	In exchange for 83,500 acres of mostly upland habitat, the Service would obtain 115,000 acres of lowlands that are priority wildlife habitats. These lowlands have relatively high densities of nesting swans and waterfowl/waterbirds. The exchange would result in a net gain of 88,000 acres of bird nesting habitat under Service management (Refuge lands).	No effects on birds or their habitats.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Birds (continued)	Phase I (continued)	Exploration would disturb resident birds and result in the alteration (clearing of woody vegetation) of about 490-660 acres of bird habitat, which would require 30-230 years for regrowth. Nesting owls could be disturbed. Spills of drilling fluids and other harmful materials could harm birds and their habitat.		Exploration would disturb resident birds and result in the alteration (clearing of woody vegetation) of about 490-660 acres of bird habitat, which would require 30-230 years for regrowth. Nesting owls could be disturbed. Spills of drilling fluids and other harmful materials could harm birds and their habitat.	
	Phase II	If oil development occurs, 120,000 acres of lowlands with priority wildlife habitat would be made available for purchase by the Service. Purchase of all these lands would increase total net gain of bird habitat on Refuge lands to 216,500 acres. Birds and their habitats would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	Effects to birds would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact birds and their habitats. Birds and their habitats would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	If oil development occurs, 81,000 acres of lowlands with priority wildlife habitat would be made available for purchase by the Service. Purchase of all these lands would increase total net gain of bird habitat on Refuge lands to 169,000 acres. Birds and their habitats would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	No effects on birds or their habitats.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Birds (continued)	Phase II (continued)	Development would result in the direct loss of 882-1,440 acres of bird habitat due to gravel pads/roads and mining, and alteration of 415 acres (cleared ROW). These effects would be on private lands and last for at least 30-50 years. Birds could be impacted by spills onto land or water and through cleanup efforts. Birds would also be impacted by disturbances from oil development.		Development would result in the direct loss of 882-1,440 acres of bird habitat due to gravel pads/roads and mining, and alteration of 415 acres (cleared ROW). These effects would be on private lands and last for at least 30-50 years. Birds could be impacted by spills onto land or water and through cleanup efforts. Birds would also be impacted by disturbances from oil development.	
	Cumulative	Few past effects, seismic surveys have altered some habitat. Some bird species are in regional or national declines, others such as swans are increasing. Future effects would be primarily habitat loss due to exploration and development on non-exchange and core lands. Past and future effects on habitat would be additive. Past and future exploration and development would result in the alteration (clearing) of 1,800-2,600 acres and loss (gravel mining/pads/roads) of 1,400-3,400 acres of bird habitat; total area affected represents 0.03-0.05% of lands within exterior Refuge boundaries. Climate change could result in less surface water for waterbirds.	Cumulative effects on birds would be similar to those for the Proposed Action.	Cumulative effects on birds would be similar to those for the Proposed Action.	Cumulative effects on birds would be similar to those under Phase I and II of the Proposed Action. Past and future effects on habitat would be additive. Past and future exploration and development would result in the alteration (clearing) of 850-1,490 acres and loss (gravel mining/pads/roads) of 540-1,920 acres of bird habitat. Total represents 0.01-0.03% of lands within exterior Refuge boundaries. Climate change could result in less surface water for waterbirds.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Mammals	Phase I	In exchange for 110,000 acres of mostly upland habitat, the Service would obtain at least 150,000 acres of lowlands that are priority wildlife habitats. The exchange would result in a net gain of 96,500 acres of available habitat under Service management (Refuge lands). Exchange will result in a 2% decrease in acres of upland habitat and 2% increase in acres of lowland habitat managed by the Service, which would be expected to favor more aquatic species (e.g., muskrat, beaver, otter, mink, moose) than upland species (e.g., wolves, marten, lynx). Exploration would disturb mammals and result in the temporary loss/alteration (clearing of vegetation) of about 490-660 acres of mammal habitat, which would require 30-230 years for regrowth. Cleared survey lines could potentially increase wolf predation of moose or caribou. Surveys could directly disturb burrowing small mammals and denning bears; however, past studies indicates effects such as den abandonment or loss of cubs is unlikely. A spill of drilling fluids or other harmful materials during exploration could harm mammals and their habitats.	Effects on mammals would be the similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including lands with oil and gas potential, affording some protection to mammal habitat on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	In exchange for 83,500 acres of mostly upland habitat, the Service would obtain at least 115,000 acres of lowlands that are priority wildlife habitats. The exchange would result in a net gain of 88,000 acres of available habitat under Service management. The exchange would result in a decrease in acres of upland and increase in acres of lowland habitat managed by Service, which would be expected to favor more aquatic species (e.g., muskrat, beaver, otter, mink, moose) than upland species (e.g., wolves, marten, lynx). Effects from exploration would be similar to those for the Proposed Action.	No effects on mammals or their habitats.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Mammals (continued)	Phase II	If oil development should occur, up to 120,000 acres of lowland habitat would be made available for purchase by the Service, thus increasing the total net gain of habitat on Federal lands on the Refuge by 216,500 acres. The increase in lowland habitat managed by the Service could benefit aquatic species (e.g., muskrat, beaver, otter, mink, and moose). Mammals and their habitats would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge. Development would result in the direct loss of 882-1,440 acres of mammal habitat due to gravel pads/roads and mining, and alteration of 415 acres (cleared ROW). Mammals would be disturbed and avoid a larger area. Development of an access road could increase hunting pressure on mammals. These effects would be on private lands and last for at least 30-50 years. Mammals could also be impacted by spills onto land and through cleanup efforts.	Effects on mammals would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact mammals and their habitats. Mammals and their habitats would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	If oil development should occur, up to 81,000 acres of lowland habitat would be made available for purchase by the Service, thus increasing the total net gain of habitat on Federal lands on the Refuge by 169,000 acres. The increase in lowland habitat managed by the Service could benefit aquatic species (e.g., muskrat, beaver, otter, mink, and moose). Mammals and their habitats would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge. Lands in the White-Crazy Mountains area would be excluded; some of these lands may be used by Dall sheep and caribou. Effects to mammals due to development would be similar to those under the Proposed Action.	No effects on mammals or their habitats.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Mammals (continued)	Cumulative	Few past effects, but seismic surveys have altered some habitat. Most populations are healthy, although the moose density is depressed on the Refuge. Future effects would be primarily habitat loss due to exploration and development on Doyon-owned and core lands. Past and future effects on habitat would be additive. Past and future exploration and development would result in the alteration (clearing) of 1,800-2,600 acres and loss (gravel mining/pads/roads) of 1,400-3,400 acres of mammal habitat. Total area affected represents 0.03-0.05% of lands within exterior Refuge boundaries. Access roads could increase hunting and interrupt or affect mammal movement. This could impact moose populations.	Cumulative effects on mammals would be similar to those for the Proposed Action.	Cumulative effects on mammals would be similar to those for the Proposed Action.	Cumulative effects would be similar to those under Phase I and II of the Proposed Action. Past and future effects on habitat would be additive. Past and future exploration and development would result in the alteration (clearing) of 850-1,490 acres and loss (gravel mining/pads/roads) of 540-1,920 acres of mammal habitat. Total area represents 0.01-0.03% of lands within exterior Refuge boundaries. Access roads could increase hunting and interrupt or affect mammal movement. This could impact moose populations.
Threatened and Endangered Species	Phases I and II	No effects on threatened and endangered species.	No effects on threatened and endangered species.	No effects on threatened and endangered species.	No effects on threatened and endangered species.
	Cumulative	No effects on threatened and endangered species.	No effects on threatened and endangered species.	No effects on threatened and endangered species.	No effects on threatened and endangered species.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Land Use/ Recreation	Phase I	Opportunities for recreation by the public would increase as lands open to the public would increase by 96,500 acres. Most adverse effects on public use of Beaver Creek would be avoided with the establishment of the 13,000-acre Beaver Creek public use easement. Trapping that currently takes place along Beaver Creek would be restricted to the easement area. Recreation opportunities would increase due to a net gain in lakes and rivers within Federal lands in the Refuge as most recreation is associated with water. This would include a net gain of 47 miles along Beaver Creek. There would be some loss of recreational opportunities in the vicinity of exploration equipment and drill rigs.	Effects on recreation would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including about 45,000 acres with oil and gas potential, affording some protection to recreation and other minimal impact land uses on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	Opportunities for recreation by the public would increase as lands open to public would increase by 88,000 acres. Most adverse effects on public use of Beaver Creek would be avoided with establishment of the 13,000-acre Beaver Creek public use easement. Trapping that currently takes place along Beaver Creek would be restricted to the easement area. Recreation opportunities would increase due to net gain in lakes and rivers within Federal lands in the Refuge as most recreation is associated with water. This would include a net gain of 47 miles along Beaver Creek.	No increase or change in opportunities for public recreation.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Land Use/ Recreation (continued)	Phase II	Opportunities for recreation would increase through Service purchase of up to 120,000 acres if Phase II lands are purchased. Recreational values would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge. Public use could be prohibited on up to 1,000 acres at unknown locations along Beaver Creek. Recreational values could be degraded by noise, visual, and aesthetic impacts from development.	Effects to land use and recreation would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact land use and recreation. Recreational values would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	Opportunities for recreation would increase through Service purchase of up to 81,000 acres, to 169,000 acres if all Phase II lands are purchased. Public use could be prohibited for up to 1,000 acres along Beaver Creek. Recreational values would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	No effects on land use and recreation.
	Cumulative	Seismic lines, trails, and ROWs could affect land use/recreation by providing access. The effects associated with past and future exploration and development on non-exchange and core lands would be additive. As much as 37-247 miles of ROWs (450-2,790 acres) could be developed on Refuge lands. The magnitude of the effect would depend on the amount of public access.	Cumulative effects on land use and recreation would be similar to those for the Proposed Action.	Cumulative effects on land use and recreation would be similar to those for the Proposed Action.	Cumulative effects to land use and recreation would be similar to those that would occur under Phases I and II of the Proposed Action.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Wilderness	Phase I	There would be no effects on designated Wilderness. Approximately 26,370 acres of the 658,000 acres of Refuge lands that have been recommended for Wilderness designation would be transferred to Doyon, effectively dividing the remaining area into two parcels. All Refuge lands meet Wilderness suitability criteria and therefore have high wilderness value. These lands would be increased by 96,500 acres.	Effects on wilderness would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including about 45, 000 acres with oil and gas potential, affording some protection to wilderness values on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	There would be no effects on designated Wilderness. The 658,000-acre recommended-Wilderness area on the Refuge would remain intact and in Federal ownership. All Refuge lands meet the Wilderness suitability criteria and therefore have high wilderness value. These lands would be increased by 88,000 acres.	No effects on designated Wilderness or wilderness values.
	Phase II	Up to 120,000 acres of lands with high wilderness value would come under Federal ownership if all Phase II lands are acquired. Lands with wilderness values would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge. Development would be restricted to private lands except for a pipeline/road ROW. If the northern route was selected, approximately 42 miles (510 acres) would be within the recommended-Wilderness area.	Effects on wilderness would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact wilderness values. Wilderness values would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	Up to 81,000 acres of lands with high wilderness value would come under Federal ownership if all Phase II lands are acquired. Wilderness values would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge. Development would be restricted to private lands except for a pipeline/road ROW. If the northern route was selected, approximately 42 miles (510 acres) would be within the recommended-Wilderness area; if the southern route were selected, 8 miles (95 acres) would be on the recommended-Wilderness area.	No effects on designated Wilderness or wilderness values.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Wilderness (continued)	Cumulative	Development on non-exchange lands would result in a ROW across Federal lands in the Refuge. Development would occur on lands with wilderness values and the effects would be additive. As much as 37-247 miles of ROWs (450-2,790 acres) could be developed on Refuge lands.	Cumulative effects on wilderness values would be similar to those for the Proposed Action.	Cumulative effects would be similar to those for the Proposed Action. With regard to lands with wilderness values, however, the Service-recommended wilderness area would not be directly affected. Development on other Doyon lands near Birch Creek could require a ROW through the area.	Development on non-exchange lands would result in effects on lands with high wilderness value similar to that described for Phase I and II of the Proposed Action. The recommended-Wilderness area would not be affected except that a ROW could be required if field is developed in Birch Creek area.
Wild and Scenic Rivers	Phase I	No lands within Beaver Creek Wild River corridor would be exchanged. Federal ownership along other segments of Beaver Creek would increase (see Land Use above). Refuge lands to the west of the wild river corridor would be transferred to Doyon and thus would be open to exploratory drilling.	Effects on wild and scenic rivers would be the similar to those for the Proposed Action.	Effects on wild and scenic rivers would be similar to those for the Proposed Action except that lands to the west of the wild river corridor would not be transferred to Doyon. Neither drilling nor development could take place in this area.	No effects on wild and scenic rivers.
	Phase II	Development could take place on lands to the west of and within the view shed of the Beaver Creek Wild River corridor.	Effects on wild and scenic rivers would be similar to those for the Proposed Action.	Neither drilling nor development could occur on lands near the Beaver Creek Wild River corridor, but a pipeline (particularly southern route) ROW could be constructed in the area.	No effects on wild and scenic rivers.
	Cumulative	No additional cumulative effects on Beaver Creek Wild River corridor.	Cumulative effects on wild and scenic rivers would be similar to those for the Proposed Action.	Cumulative effects would be similar to those for the Proposed Action.	No effects on wild and scenic rivers.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Special Areas	Phase I	Phase I would have no direct effects on the WMNRA or Steese National Conservation Area. Exploratory drilling operations could occur within the viewshed of the WMNRA.	Effect on special areas would be the similar to those for the Proposed Action.	There would be no effects on special areas.	No effects on special areas.
	Phase II	Development on core lands would result in an approximately 32-mile (390 acres) pipeline/road ROW across the WMNRA if southern route was selected and 37-mile (450 acres) ROW across Refuge lands if northern route was selected. Oil field could be within view shed of WMNRA.	Effects on special areas would be similar to those under the Proposed Action.	Development on core lands would result in 32 miles (390 acres) of ROW on WMNRA, and 7 miles (85 acres) if the southern route selected, and 42 miles (510 acres) of ROW if the northern route is selected, on Refuge lands.	No effects on special areas.
	Cumulative	Development of oil on non-exchange lands could possibly result in additional ROWs across Refuge, WMNRA, or Steese National Conservation Area.	Cumulative effects on Special Areas would be similar to those for the Proposed Action.	Cumulative effect on Special Areas would be similar to those under the Proposed Action.	Cumulative effects on Special Areas would be similar to those under Phase I and Phase II of the Proposed Action.
Visual Resources	Phase I	Loss of Federal ownership of 26,500 acres of some of the more scenic areas (White Mountains) on the Refuge in exchange for additional lowland areas. One of the Refuge's special values is the White Mountains and their scenic nature. Clearing of 100-200 miles of seismic survey lines (170-340 acres) and 70 miles (250 acres) of access trail would affect visual resources on private lands and could affect visual resources on nearby Federal lands for up to 230 years.	Effects on visual resources would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including about 45, 000 acres with oil and gas potential, affording some protection to visual resources on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	No effects on visual resources in the White Mountains from land exchange. Effects of seismic surveys would be similar to those under the Proposed Action.	No effects on visual resources.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Visual Resources (continued)	Phase II	Development of an oil field on core lands and an access road could affect visual resources over 52,500-95,500 acres in the foreground, 505,500-863,000 acres in the middle ground, and 1,233,500-1,955,500 acres in the background. Some impacts would be within the Class II area in the WMNRA. Visual resources could be impacted by spills onto land or water and through cleanup efforts. If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of Doyon lands; about 45,000 acres of these lands have oil and gas potential. Visual resources on these lands would be protected from future development. Visual resources would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	Effect on visual resources would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact visual resources. Visual resources would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	Effects on visual resources would be similar to those under the Proposed Action.	No effects on visual resources.
	Cumulative	Development on non-exchange lands could be as much as double the effects on visual resources but would probably be less due to level terrain.	Cumulative effects on visual resources would be similar to those for the Proposed Action.	Cumulative effects on visual resources would be similar to those for the Proposed Action.	Cumulative effect on visual resources would be similar to those for Phase I and Phase II of the Proposed Action.
Socioeconomics	Phase I	No effects from land exchange on socioeconomics. Exploration could increase personal income and create jobs. Seismic surveys could generate 110-134 (direct, indirect, induced) jobs State-wide; drilling could create 95-320 jobs State-wide.	Effects on socioeconomics would be similar to those for the Proposed Action.	Effects on socioeconomics would be similar to those for the Proposed Action.	No effects on socioeconomics.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Socioeconomics (continued)	Phase II	Oil field development would create 950-6,700 (direct, indirect, induced) jobs during field construction/development for 3 years and 100-360 jobs during production for 30-50 years. A large field would produce approximately $96,400,000-$131,200,000 in average annual tax revenues, and a small field would produce $23,600,000-$35,900,000 in average annual tax revenues, to the State. If the northern route was selected for a ROW, a large field would produce $6,500,000-$9,000,000 in average annual perpetual production payments to the Service, and a small field would generate $1,900,000-$2,600,000 in perpetual production payments for 30-50 years. If the southern route were selected, Service annual production payments would be reduced to $5,400,000-$7,500,000 for a large field and $1,200,000-$1,600,000 for a small field.	A similar number of jobs and State tax revenues would be created as under the Proposed Action. If the northern route was selected for a ROW, a large field would produce $2,200,000-$3,000,000 in average annual perpetual production payments to the Service, and a small field would generate $600,000-$900,000 in average annual perpetual production payments for 30-50 years. If the southern route were selected, Service annual production payments would be reduced to $1,100,000-$1,500,000 for a large field and $300,000-$400,000 for a small field.	Effects on socioeconomics would be similar to those for the Proposed Action.	No effects on socioeconomics.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Socioeconomics (continued)	Cumulative	Collapse of fur prices, harvest restrictions on commercial salmon fisheries, and isolation and lack of opportunity have resulted in a depressed area economy. Exploration and development on non-exchange lands would create similar numbers of jobs to those indicated for development on core lands. These may or may not be additive depending on whether the programs are concurrent or consecutive. Production on non-exchange lands create similar (to core land development) revenues to the State and Doyon and increased revenue to village corporations (ranging from $1,000,000-$5,000,000 annual average), and these positive effects would be additive. There would be positive effects on jobs and income for villages and the State. The Alaska gas pipeline could result in gas development and additional jobs. Formation of a borough could result in additional jobs and increased or improved services.	Cumulative effects on socioeconomics would be similar to those for the Proposed Action.	Cumulative effects on socioeconomics would be similar to those for the Proposed Action.	This alternative would likely have less cumulative positive effect on socioeconomics. Oil development could proceed on non-exchange lands without an exchange. Effects on socioeconomics would be similar to Phase I and Phase II of the Proposed Action except there would be no production payments to Service, which would increase revenue to Doyon.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Cultural Resources	Phase I	Seven place name sites would leave Federal ownership, and 3 AHRS sites and 11 place name sites would enter Federal ownership. Exploration could directly and indirectly impact undocumented cultural resources.	Effects on cultural resources would be similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including about 45, 000 acres with oil and gas potential, affording some protection to cultural resources including one AHRS and four place names on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	No AHRS sites and 7 place name sites would leave Federal ownership, and 3 AHRS sites and 9 place name sites would enter Federal ownership. Exploration could directly and indirectly impact undocumented cultural resources.	No effects on cultural resources.
	Phase II	One AHRS site and 4 place name sites would enter Federal ownership. Development and production could directly and indirectly impact undocumented cultural resources. If oil resources were discovered and developed, the Service would purchase up to 120,000 acres of Doyon lands; about 45,000 acres of these lands have oil and gas potential. Cultural resources on these lands would be protected from future development. Cultural resources would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge.	Effects on cultural resources would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact cultural resources.	No AHRS sites and 6 place name sites would enter Federal ownership. Cultural resources would also be protected on lands obtained by the Service if a ROW was constructed across the Refuge. Development and production could directly and indirectly impact undocumented cultural resources.	No effects on cultural resources.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Cultural Resources (continued)	Cumulative	Exploration and development on Doyon-owned lands would increase the opportunity for direct and indirect impact on unidentified cultural resources.	Effects on cultural resources would be similar to those under the Proposed Action.	Effects on cultural resources would be similar to those under the Proposed Action.	Effects on cultural resources would be similar to those under Phase I and Phase II of the Proposed Action.
Subsistence	Phase I	Service would have a net gain of 96,500 acres. Generally more townships with subsistence use go to Service than Doyon. Service lands are open to the public, so competition for subsistence resources could increase, but there is very little public use on Refuge lands now and a subsistence easement and priority is maintained.	Effects on subsistence would be the similar to those for the Proposed Action. However, Doyon would also grant non-development easements on 120,000 acres of Doyon lands in Phase I, including about 45, 000 acres with oil and gas potential, affording some protection to subsistence resources on this acreage that would not occur under Phase I of the Proposed Action and Exchange Excluding White-Crazy Mountains Alternative.	Service would have a net gain of 88,000 acres. Effects on subsistence on transfer of lands would be similar to those under the Proposed Action.	No effects on subsistence resources.
	Phase II	Service could purchase up to 120,000 acres if oil is developed on exchange lands; effects on these lands would be similar to Phase I. Plant and animal subsistence resources would also become available to the public on lands obtained by the Service if a ROW was constructed across the Refuge. Development on core lands would have minimal effects on subsistence for Beaver, Birch Creek, and Fort Yukon as there is little overlap of subsistence use areas.	Effects on subsistence from development on core lands would be similar to those for the Proposed Action. The Service would not purchase up to 120,000 acres of Doyon lands under this Phase; these lands would be afforded similar, but lesser, protection under Phase I and some land uses would be allowed on non-development easements that could impact subsistence.	Service could purchase up to 81,000 acres if oil is developed on exchange lands; effects on these lands would be similar to Phase I. Plant and animal subsistence resources would also become available to the public on lands obtained by the Service if a ROW was constructed across the Refuge. Effects on subsistence from development on core lands would be similar to those under the Proposed Action.	No effects on subsistence resources.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Subsistence (continued)	Cumulative	Oil development on non-exchange lands would result in additional impacts to subsistence (changes in access to resources, resource availability, and increased concern about contamination of subsistence foods). The effects could be additive as subsistence use takes place across broad areas.	Cumulative effects on subsistence would be similar to those for the Proposed Action.	Cumulative effects on subsistence would be similar to those for the Proposed Action.	Cumulative effects on subsistence would be similar to those for Phase I and Phase II of the Proposed Action. However, oil development could occur on private lands in high-use subsistence areas adjacent to villages.
Environmental Justice	Phase I	Alaska Native ownership in the Refuge would be reduced by 96,500 acres. Remaining Native land ownership would be consolidated. Seismic surveys would create about 33 local jobs and drilling would create 66 local jobs that could be filled by local residents. These jobs would last 2-5 years.	Effects on Environmental Justice populations would be similar to those for the Proposed Action.	Alaska Native ownership in the Refuge would be reduced by 88,000 acres. Remaining Native land ownership would be consolidated. Seismic surveys would create about 33 local jobs and drilling would create 66 local jobs that could be filled by local residents. These jobs would last 2-5 years.	No effects on Environmental Justice populations.
	Phase II	Native land ownership would be reduced by up to 120,000 acres if development occurred on exchange lands. Native land ownership would also be lost on Doyon-owned lands obtained by the Service if a ROW was constructed across the Refuge.	Effects on Environmental Justice would be similar to those under the Proposed Action except that Native ownership would be up to 120,000 acres greater than under Proposed Action. Native land ownership would be lost on Doyon-owned lands obtained by the Service if a ROW was constructed across the Refuge.	Effects on Environmental Justice would be similar to those under the Proposed Action except that 81,000 acres would leave Native ownership under this alternative and Doyon royalties would be similar to those under the Proposed Action.	No effects on Environmental Justice populations.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Environmental Justice (continued)	Phase II (continued)	Development would create about 106-176 local jobs during field construction that would last a few years and about 14-74 local jobs that could last 30-50 years during field production. Fifty percent of any increases in Doyon profits would go to Native shareholders. Seventy percent of royalty payments to Doyon (estimated at $182.4-$896.8 million) would be shared with other Alaska Native regional corporations. Adverse social effects could include increased alcohol and drug use, loss of language and subsistence skills, and declines in cultural values. Effects on health and subsistence activities of environmental justice populations are addressed in this table under those headings. To the extent exploration, development, or a Title XI right-of-way involves land under local Native ownership, it would require access permits (i.e., surface use agreements) from the Village corporation. The access permits would likely include land use requirements and restrictions, thus allowing the local community to have input on any potential exploration or development.	Creation of jobs due to development would be similar to those Proposed Action. Doyon royalties (and thus the sharing with other Regional Corporations) would be greater (estimated at $199.0-$976.5 million) under this alternative than the Proposed Action.		

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Environmental Justice (continued)	Cumulative	There would be additional positive (economic) and adverse (social) effects on environmental justice populations from development on non-exchange land and with the Alaska natural gas pipeline. The gas pipeline may result in borough formation, with consequent improvements in services, which could mitigate some adverse social effects of development. The gas pipeline could open up opportunities for development of gas fields with additional economic effects. To the extent exploration, development, or a Title XI right-of-way involves land under local Native ownership, it would require access permits (i.e., surface use agreements) from the Village corporation. The access permits would likely include land use requirements and restrictions, thus allowing the local community to have input on any potential exploration or development.	Cumulative effects on environmental justice populations would be similar to those for the Proposed Action.	Cumulative effect on environmental justice populations would be similar to those for the Proposed Action.	Cumulative effects would be the similar to those for Phase I and Phase II of the Proposed Action depending on discovery and development of oil on other Doyon lands.
Health	Phase I	No effects on human health.	No effects on human health.	No effects on human health.	No effects on human health.
	Phase II	Employment resulting from the exploration or development could alter social structure and have sociological effects on health such as increased drug abuse, alcoholism, and domestic violence.	Effects on human health would be similar to those under the Proposed Action.	Effects on human health would be similar to those under the Proposed Action.	No effects on human health.

Table 2 Comparison of alternatives with respect to significant environmental issues (continued)

Issue		Proposed Action	Exchange with Non-Development Easements	Exchange Excluding White-Crazy Mountains	Preferred Alternative – No Land Exchange Alternative (No Action Alternative)
Health (continued)	Cumulative	Employment from the construction of Alaska gas pipeline and additional oil and gas development on other Doyon lands would also be expected to result in employment and would be additive to the effects of the Proposed Action. Potential for increase in wildland fires and smoke due to climate change. Incorporation as a borough may result in services that mitigate for adverse health effects associated with oil development and wildland fires.	Cumulative effects on human health would be similar to those for the Proposed Action.	Cumulative effects on human health would be similar to those for the Proposed Action.	Oil development on other Doyon lands would have a similar effect on health as under Phase I and Phase II of the Proposed Action. Employment from construction of Alaska gas pipeline would also be expected to result in employment and would be additive to the effects of the Proposed Action. Incorporation as a borough may result in services that mitigate for adverse health effects associated with oil development and wildland fires.

Key:

> = greater than.
< = less than.
AAQS = Ambient Air Quality Standards.
ac-ft = acre-feet.
ANILCA = Alaska National Interest Lands Conservation Act.
AHRS = Alaska Heritage Resource Survey
CO_2e = carbon dioxide equivalent.
MMbbls = Million barrels.
Mts. = Mountains.
NAAQS = National Ambient Air Quality Standards.
ROW = Right-of-Way.
WMNRA = White Mountains National Recreation Area.