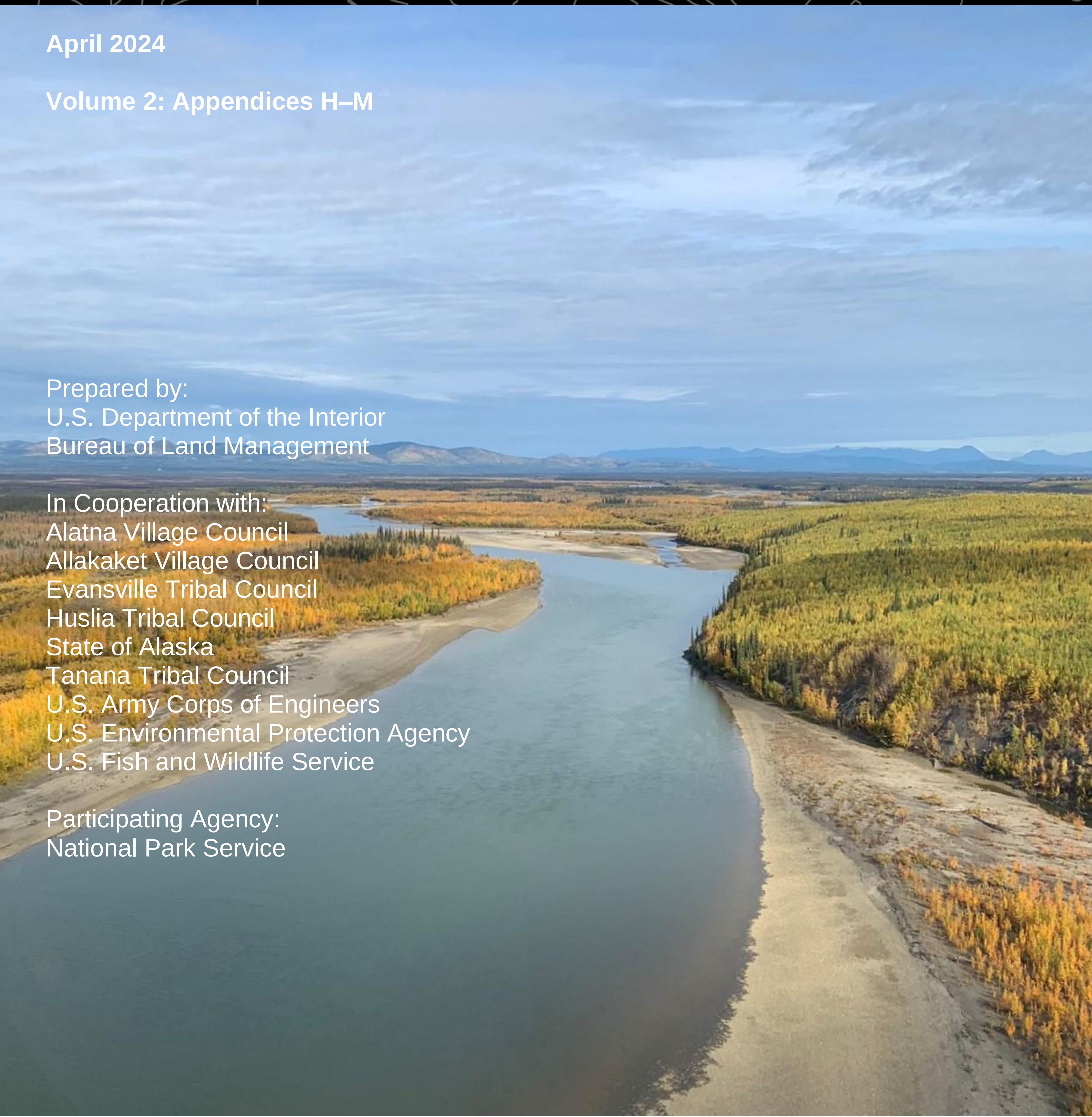
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Ambler Road

Final Supplemental Environmental Impact Statement



April 2024

Volume 2: Appendices H–M

Prepared by:
U.S. Department of the Interior
Bureau of Land Management

In Cooperation with:
Alatna Village Council
Allakaket Village Council
Evansville Tribal Council
Huslia Tribal Council
State of Alaska
Tanana Tribal Council
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

Participating Agency:
National Park Service

Mission

To sustain the health, diversity, and productivity of public lands for the use and enjoyment of present and future generations.

Cover photograph: Middle Fork of the Koyukuk River in fall foliage.

Photograph courtesy of BLM staff

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Acronyms

AAC	Alaska Administrative Code
AADT	Annual Average Daily Traffic
ACEC	Area of Critical Environmental Concern
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
AIDEA	Alaska Industrial Development and Export Authority
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
ASTAR	Arctic Strategic Transportation and Resources
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DMTS	Delong Mountains Transportation System
DOT&PF	Alaska Department of Transportation and Public Facilities
DWT	dead weight tons
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FFS	Final Feasibility Study
GAAR	Gates of the Arctic National Park and Preserve
GHG	greenhouse gases
HHH	Hodzana Hills Herd
LNG	liquefied natural gas
MMA	Minimum Annual Assessment
MP	Milepost
NAAQS	National Ambient Air Quality Standards
NANA	NANA Regional Corporation
NAB	Northwest Arctic Borough

NEPA	National Environmental Policy Act
NOA	naturally occurring asbestos
NPR-A	National Petroleum Reserve-Alaska
OHV	off-highway vehicle
OTZ	OTZ Telephone Cooperative
PAH	polycyclic aromatic hydrocarbon
PEA	preliminary economic assessment
PFS	Pre-feasibility Study
PGE	platinum group element
REE	rare earth element
RFA	reasonably foreseeable action
RMH	Ray Mountains Herd
ROW	right-of-way
TAPS	Trans-Alaska Pipeline System
TMF	tailings management facility
USACE	U.S. Army Corps of Engineers
WAH	Western Arctic Caribou Herd
YKCA	Yukon-Kuskokwim Census Area

1. Introduction

This appendix describes the indirect and cumulative scenarios and assumptions associated with the Ambler Road based on reasonably foreseeable development caused by the road, taking into account past and present actions and other reasonably foreseeable actions (RFAs). According to the federal Council on Environmental Quality (CEQ), indirect effects "are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 Code of Federal Regulations [CFR] 1508.8). The Bureau of Land Management (BLM) considers mine development and changes to community access to be reasonably foreseeable, should a road be constructed. CEQ defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

2. Reasonably Foreseeable Actions*

The following sections present a forecast of mining development and activity and other past, present, and reasonably foreseeable actions and analyzes the anticipated indirect and cumulative effects of those actions.

The BLM and cooperating agencies re-examined RFAs from the 2020 Final EIS and made updates, as necessary, to incorporate new and updated information throughout this appendix. Updates made for the Supplemental EIS include the following:

- Updates were made to the ownership and status of mineral exploration projects.
- Updates were made to the hypothetical mining development scenario to incorporate new feasibility studies and technical reports for the four major mining prospects within the Ambler Mining District.
- Assumptions were updated for the hypothetical mining development scenario related to construction phasing. Two options for construction phasing are now considered possible based on the range of alternatives analyzed in the Supplemental EIS (including both two-phase and three-phase alternatives).
- Updates were made to the status of mining exploration projects outside the Ambler Mining District and associated maps at the end of this appendix.
- Updates were made to other uses of the road, including commercial use, public use, and unauthorized use (i.e., trespass).
- Updates were made to the status of existing and reasonably foreseeable Dalton Highway Improvement projects and the inclusion of the Willow Project, which will result in increased traffic on the Dalton Highway.
- New RFAs were added which were not previously considered in the Final EIS: OTZ Telephone Cooperative (OTZ) communication towers, fiber-optic development funding, proposed Alaska

Native Claims Settlement Act (ANCSA) 17(d)(1) withdrawals, the Port of Nome Expansion Project, Port of Alaska modernizations, and the Manh Choh mining project.

2.1. Mining Development Scenario in the Ambler Mining District*

The Alaska Industrial Development and Export Authority (AIDEA) has proposed a road for access to the Ambler Mining District (District), with the assumption that providing access will lead to mining exploration and development, with the plan that the project would not move ahead with road construction until legal agreements were in hand with the mining companies that would use the road, and with plans to finance road maintenance and mitigation with charges to mining company. This Supplemental Environmental Impact Statement (EIS) is not in response to a mining proposal. Therefore, direct impacts are those that occur at the time and place of road construction. Direct impacts are attributable to the footprint the construction of the road and the road itself would make on the land in the project area and include the anticipated use of the road. The BLM considers mining exploration and mine development reasonably foreseeable if the road were built as AIDEA has stated at Draft EIS public meetings and indicates on its website that the project would not move ahead with road construction until legal agreements were in hand with the mining companies that would use the road. Therefore, this analysis treats impacts resulting from mining exploration and development anticipated to occur off the road and later in time as indirect effects. Mining effects are also considered as cumulative effects.

AIDEA has provided details regarding the proposed road, but no similar details were provided for mining proposals. To evaluate the indirect and cumulative effects of reasonably foreseeable development, the BLM developed a reasonable mining scenario that presents a forecast of mining development and activity and other reasonably foreseeable development in the area in the decades following completion of the proposed road. During the drafting of the original EIS, the BLM convened a team of agency and private sector National Environmental Policy Act (NEPA) and mining professionals, and consulted with AIDEA and companies that anticipate mining in the District to gather information to inform development of a reasonable mining scenario. In developing the Supplemental EIS, the BLM and cooperating agencies re-viewed the mining development scenario from the 2020 Final EIS and made updates, as necessary, to incorporate new and updated information.

Construction and operation of an all-season, industrial access road to the District is intended to and would open the area to mining activities. The hypothetical baseline scenario provided in this appendix is an estimate of the levels of mining-related activities based on current information about the deposits and typical scenarios for mining development in Alaska. To avoid underestimating effects, the hypothetical scenario represents a high-production rate and favorable market prices.

This chapter lays out the reasonably foreseeable mining development scenario anticipated to result from development of the Ambler Road (road). Indirect effects based on this scenario are described in Section 3, Indirect and Cumulative Impacts.

2.1.1 Overview

The District is located in the Northwest Arctic Borough (NAB) along the southern foothills of the Brooks Range in north-central Alaska. Map 1 illustrates the location of the District relative to the industrial access road alternatives and other mining activities in the region. The District area has long been recognized as containing a variety of valuable mineral resources, and these resources have been explored or evaluated for more than a century (DOWL 2016). The primary identified mineral resources include copper, lead, zinc, silver, and gold (DOWL 2016). Development of a mine is primarily dependent on the economic feasibility of the endeavor, which includes several factors:

- **Technical analysis:** extent of the mineral deposit, purity of the mineral, ability to extract the mineral ore.
- **Financial analysis:** market analysis, availability and location of the potential work force, access for mine exploration and development (via airplane, boat, or road), mineral extraction methods.
- **Legal analysis**: land ownership, mining claim status.
- **Environmental analysis:** environmental impacts, permitting, reclamation.

Economic feasibility is still being determined for specific mine developments, but it is anticipated that with development of the industrial access road, mine development in the District would proceed. As stated in AIDEA's purpose and need for the project, the construction of an industrial access road is consistent with AIDEA's mission to increase job opportunities and otherwise encourage the economic growth of the state, including the development of its natural resources (DOWL 2016). Specifically, AIDEA's purpose for this project is to support mineral resource exploration and development in the District. The road would provide surface transportation access to the District to allow for expanded exploration, mine development, and mine operations at mineral prospects throughout the District. AIDEA indicates that surface transportation access would help to bring the high-value mineral resource areas into production (DOWL 2016).

AIDEA also lists multiple public benefits related to the project purpose, including direct employment for road construction and operation, indirect employment related to mining, revenues paid by mining companies to local and state governments and Alaska Native corporations, and commercial access opportunities for nearby communities associated with proximity to a road (DOWL 2016).

2.1.2 Description of Geology*

Physiography

The District contains three different physiographic provinces. Wahrhaftig (1965) continues to be the definitive reference for the descriptions of these provinces, and the following are excerpts from that reference dealing with physiographic areas which are present in the District. See https://ngmdb.usgs.gov/Prodesc/proddesc_4487.htm for a map of the provinces. See also *Mineral Occurrence and Development Potential Report-Leasable for the Central Yukon Resource Management Plan* (BLM 2018a).

1. Central and Eastern Brooks Range (6)

General Topography – The central and eastern Brooks Range is a wilderness of rugged glaciated east-trending ridges that rise to generally accordant summits 7,000 to 8,000 feet in altitude in the northern part and 4,000 to 6,000 feet in altitude in the southern part. The easterly grain of the topography is due to belts of hard and soft sedimentary and volcanic rocks. The mountains have cliff-and-bench slopes characteristic of glacially eroded bedded rocks. Abrupt mountain fronts face foothills and lowlands on the north.

Drainage – The drainage divide between the Bering Sea and Arctic Ocean drainages is near the northern edge of the range west of longitude 149 degrees west and in the center of the range east of longitude 149 degrees west. The major rivers flow north to the Arctic Ocean and south to the Yukon, Koyukuk, and Kobuk rivers in flat-floored, glaciated valleys 1 to 2 miles wide; they have a broad dendritic pattern. Minor tributaries flow east and west parallel to the structure, superposing a trellised pattern on the dendritic pattern of the major drainage.

Lakes – Large rock-basin lakes lie at the mouths of several large glaciated valleys on the north and south sides of the range. The Brooks Range in general is characterized by a paucity of lakes for a glaciated area.

Glaciers – Small cirque glaciers are common in the higher parts of the range, in the Schwatka Mountains (6a), and in mountains around Mount Doonerak. The firn line is at an altitude of about 6,000 feet in north-facing cirques and about 8,000 feet in south-facing cirques. Valley glaciers 6 miles long are fed from cirques and small icecaps in the Romanzof Mountains (6b).

Geology – The central and eastern Brooks Range is composed chiefly of Paleozoic limestone, shale, quartzite, slate, and schist. Northeast of the Sagavanirktok River the Paleozoic rocks are in faulted folds overturned to the north. Elsewhere they are in giant plates or nappes thrust to the north. The deformation is of Laramide age. The north front of the range is made of light-colored cliff-forming Mississippian limestone. Rocks south of latitude 68 degrees north are metamorphosed and generally equivalent in age to those farther north. Granitic intrusions underlie the higher parts of the Schwatka Mountains (6a) and Romanzof Mountains (6b), both of which rise to 8,500 to 9,000 feet in altitude.

2. Ambler Chandalar Ridge and Lowland Section (7)

General Topography – This section consists of one or two east-trending lines of lowlands and low passes 3 to 10 miles wide and 200 to 2,000 feet above sea level, bordered on the north by the abrupt front of the Brooks Range. Along the south side is a discontinuous line of rolling to rugged ridges, 25 to 75 miles long and 5 to 10 miles wide, rising to 3,000 to 4,500 feet in altitude. Some of these ridges are intensely glaciated. Within the lowlands are east-trending ridges 5 to 10 miles long.

Drainage – The western part of the section is drained by tributaries of the Kobuk River, the central part by the Koyukuk River and its tributaries, and the eastern part by the Chandalar River. Most streams flow south out of the Brooks Range across both the lowlands and the ridges to lowlands farther south. The drainage was probably superposed but may have been disoriented later by glaciers. The Chandalar River flows east along the eastern part of the trough.

Lakes – Several large lakes fill ice-carved rock basins in deep, narrow canyons across the southern ridge. Areas of ground and end moraines contain many ponds. The floodplains of the major streams have thaw lakes and oxbow lakes.

Glaciers and permafrost – The section contains no glaciers but is underlain by continuous permafrost.

Geology – The ridges are composed in part of resistant massive greenstone (metamorphosed basalt) of Mesozoic age. The lowlands are underlain largely by Cretaceous sedimentary rocks folded into synclines. Pleistocene glaciers from the Brooks Range extended across the lowland and through passes in the line of ridges.

3. Baird Mountains (5)

General topography – Moderately rugged mountains having rounded to sharp summits 2,500 to 3,000 feet in altitude rise abruptly from lowlands on the south and west to a subsummit upland along the crest of the Baird Mountains. This subsummit upland slopes gently northward and merges with the Aniuk Lowland and Cutler River Upland. Scattered groups of higher mountains (3,500–4,500 feet in altitude) rise above the subsummit upland; they were centers of glaciation in Pleistocene time. The indistinct boundary with the Schwatka Mountains on the east is drawn where the relief increases abruptly eastward.

Drainage – The Baird Mountains are drained by streams that flow north to the Noatak River and south to the Kobuk River. The south-flowing streams head in narrow ravines with steep headwalls, several hundred feet high, incised in broad, flat passes that are the beheaded parts of north-draining valleys. This relationship indicates that the divide is migrating to the north by headward erosion.

Lakes and glaciers –There are no lakes or glaciers in the Baird Mountains.

Geology – Schist, quartzite, and limestone of Paleozoic age make up most of the Baird Mountains. Structural trends are eastward, and the internal structure is probably anticlinorial. Differential erosion involving limestone and volcanic rocks of a northeast-trending anticline along the northwestern border of the mountains has produced prominent northeast-trending ridges.

2.1.3 Past and Present Mineral Exploration and Development Potential*

The District has been explored for mineral potential since the 1950s and contains one of Alaska's major mineral belts (Grybeck et al. 1996). NovaCopper U.S., Inc. (now Trilogy Metals, Inc. [Trilogy] or Ambler Metals LLC[1]), Valhalla Mining, LLC (Valhalla), and Teck Resources, Inc. (Teck) have staked more than 160,000 acres of mining claims in the District. To date, there are four major mineral deposits within the District in various stages of exploration: Arctic, Bornite, Sun, and Smucker, which are shown on Map 2. These 4 deposits have the potential to provide copper, zinc, lead, silver, and gold ore (Cardno 2019). The anticipated mineral resource in the District is 265,500,000 tonnes[2] of ore (Trilogy 2023a, 2023b; SolidusGold Inc. [SolidusGold] 2022). Table 2-1 highlights the potential mineral resources for each of the three companies that have staked the majority of claims in the District. Mineral resource estimates for the Arctic deposit are based on the 2023 feasibility analysis (Trilogy 2023a), whereas estimates for the other three projects are based on less advanced technical reports and preliminary exploratory results (Trilogy 2023b; SolidusGold 2022).

Table 2-1. Estimated resources for four major deposits in the District*

Deposit	Owner	Mineral resource (million tonnes)	Ore concentrates
Arctic	Ambler Metals (formerly Trilogy Metals, Inc.)	40.2	Cu, Zn, Pb, Ag, Au
Bornite	Ambler Metals (formerly Trilogy Metals, Inc.)	202.7	Cu, Co
Sun	Valhalla Mining, LLC	11	Cu, Zn, Pb, Ag, Au
Smucker	Teck Resources, Inc.	11.6	Cu, Zn, Pb, Ag, Au

Source: Trilogy 2023a, 2023b; SolidusGold 2022

Note: Ag = silver; Au = gold; Cu = copper; Pb = lead; Zn = zinc; Co=Cobalt. The "mineral resource" column indicates data available, whether "indicated," "inferred," or both. Percentages of valuable minerals within the ore vary. All deposits are in the exploration stage, with various amounts of data gathered and made public. In general, most is known about the Arctic deposit and less about the others. Mineral resources are not the same as mineral reserves and do not indicate a determination has been made that the resources are economically minable or that these numbers represent the maximum extent of the resource that may be minable at each deposit. Exploration continues in the area.

The Arctic Project is one of two Ambler Metals (formerly Trilogy) major projects that constitute the Upper Kobuk Mineral Project. The Arctic Project is located on the east side of Subarctic Creek,

[1] In February 2020, Trilogy Metals Inc. and South32 Limited announced the completion of the formation of a 50/50 joint venture company named Ambler Metals LLC (Ambler Metals). Ambler Metals will be working to advance the Upper Kobuk Mineral Projects, including the Arctic and Bornite Projects.

[2] Tonnes is an industry term for metric tons and is equivalent to 2,204.6 pounds. In comparison, a U.S. ton (also referred to as a short ton) is the equivalent of 2,000 pounds.

approximately 170 miles east of Kotzebue, 22 miles northeast of the village of Kobuk, and 160 miles west of the Dalton Highway. In total, the Arctic Project is approximately 231,008 acres and is the most advanced mining project in the District. As of 2022, an estimated 40.2 million tonnes of valuable minerals have been identified at the Arctic Mine, including copper, zinc, lead, gold, and silver (Trilogy 2023a). The project proposes a single open-pit mine, a conventional grinding mill-and-flotation circuit complex with a production rate (mill input rate) of 10,000 tonnes of ore per day over a 13-year anticipated life span (Trilogy 2023).

The Bornite Project is the other major Upper Kobuk Mineral Project and occurs on land owned by NANA Regional Corporation (NANA). The Bornite Project is located approximately 15 miles southwest of the Arctic Project on a 241,000-acre site. It consists of two mineralized zones: Ruby Creek and South Reef. Exploration has determined that Ruby Creek resources may be extracted through open-pit mining, while South Reef resources may be extracted using underground mining methods. For purposes of this evaluation and for simplicity, all of the Bornite Project is assumed to be an open pit mining operation because not enough is known about the underground portion and examining the mine as an open pit provides a more conservative estimate of surface and ground-disturbing impact. The Bornite Project is estimated to contain approximately 202.7 million tonnes of primarily copper resources (Trilogy 2023b).

The Sun Project is owned by Valhalla and is located approximately 35 miles east of the Arctic Project (Freeman 2018). The Sun deposit is 62,720 acres in size totaling 392 State of Alaska 160-acre claims. The 11 million tonnes of mineral resources include silver, copper, lead, zinc, and gold. Valhalla is currently conducting exploration activities within the Sun Project (ADNR 2023; SolidusGold 2022).

The Smucker Project is owned by Teck Resources, Inc. and is located 25 miles west of the Arctic Project. The property includes 27 State of Alaska claims. Resources include copper, lead, zinc, silver, and gold. Early estimates indicate that the Smucker deposit contains about 11.6 million tonnes of mineral resources in the form of copper, zinc, lead, silver, and gold. The Smucker deposit is still in the early stages of exploration (Cardno 2015).

Outside the Ambler Mining District, there is potential for additional mining development to occur along the three alternative routes. This would include access to the mining claim clusters near the Zane Hills and Ray Mountains for Alternative C, access to mining claims east of the District along Alternatives A and B, and other locations as shown in Map 1. East of the District, over 300,000 acres of mining claims have been staked, including mining claims owned by Trilogy Metals for the Helpmejack and Malamute projects, as well as mining claims owned by South32 for the Roosevelt project (see Map 1).

The Roosevelt project is owned by South32 and located 20 miles west of Coldfoot and 30 miles north of Bettles. The project consists of over 105,000 hectares of State of Alaska Mineral Claims in a geological belt that may have potential to be similar to the Ambler Mining District and could be host to copper, zinc, lead, and silver mineralization.

The Malamute and Helpmejack projects, staked by Trilogy Metals in 2021, are located east of the District near the Roosevelt project and cover strike lengths approximately 12 kilometers and 8 kilometers long, respectively. Although they are still in exploration phases, early-stage results show potential for copper, zinc, and cobalt mineralization (Trilogy 2023c).

The following studies and resources further document the mineral potential of the project area:

- Other studies regarding minerals in the project area include a mineral investigation report for the Koyukuk Mining District (Kurtak et al. 2002), a study of resource potential for critical minerals in Alaska in 2016 (Karl et al. 2016), and a summary report on leasable mineral occurrence and development potential (BLM 2016).

- The BLM notes bituminous coal occurrences along Alternatives A and B in the Upper Koyukuk Basin (resource quantity is not available) and sub-bituminous coal occurrences along Alternative C in the Rampart Field (estimated resources: 50 million short tons; BLM 2018b).
- Maps 3 through 8 identify potential for rare earth elements (REEs), placer gold, platinum group elements (PGEs), carbonate-hosted copper, sandstone-hosted uranium, and tin-tungsten-molybdenum deposits, respectively. These areas could also be potentially accessed from the industrial access road for further exploration and development.

2.1.4 Reasonably Foreseeable Mine Development Scenario*

The hypothetical baseline scenario projects an estimated level of activity in the District that would occur under any of the build alternatives. The activities evaluated are typical of those associated with mining in northern Alaska. Table 2-2 provides an estimated timeline for the major steps in exploring and developing a mine. While these time frames are mine-specific and may vary, the time frames provided are included for context and to project a potential schedule for development of the District as it relates to the construction and operation of the proposed road.

Table 2-2. Typical time frames for mine exploration and development*

Project phase	Typical time frame	Projected activities
Prospecting and staking	2 years	Geological data and map reviews, airborne geophysics, non-invasive exploration. Completed for the initial four projects.
Exploration	2–6 years	Subsurface investigations that include drilling and bulk sampling. This phase can continue for many years and be concurrent with multiple feasibility studies. The time frame shown assumes an aggressive exploration schedule. Exploration has been initiated for the four projects and is largely completed for the Arctic project but is still underway for the remaining three projects.
Feasibility studies and permitting	6–8 years	Prepare increasingly rigorous feasibility studies, enter into the NEPA process, and obtain permits for mine development.
Development	2–4 years	Development of the mining facility to bring the mine into production.
Production	5–35 years	Mine life spans vary depending on the extent of the deposits and market conditions. The Arctic Project has indicated a minimum life span of 13 years.[a] Production of each mine would vary, but is estimated between 5 and 35 years based on production rates anticipated for the Arctic Project and applied to the total anticipated mineral resource in the District.[b]
Closure and reclamation	2–5 years	Closure of the mine, including removing equipment and some roads, and reclamation of the area.
Long-term monitoring and management	50+ years	Following closure and reclamation, the site is monitored until physical and chemical stability is achieved, and typically includes post-closure water management and treatment. This time frame varies and can be perpetual. The relatively small amounts of fuel, personnel, and supplies needed for the monitoring effort are assumed to be delivered by air during this period.

[a] Trilogy 2023a
[b] Wood 2019

Method and Assumptions for Hypothetical Development Scenario Projections

The hypothetical development scenario provided in this report is an estimate of the levels of mining-related activities that are anticipated based on current information about the deposits and typical scenarios for mining development of base metal deposits in northern regions of Alaska.

The time frame used for the hypothetical development scenario is approximately 50 years, which correlates to the requested term of the right-of-way (ROW) authorization for the proposed road. This time frame accounts for the time required to construct the main access road and, assuming positive feasibility, bring mining operations online, mine the deposit, and close and reclaim the mines. Given the probable deposit sizes in the District, and realistic mining rates, it is reasonable to expect that the life cycles of the larger deposits fit within the proposed life span of the road.

Additional assumptions to support the hypothetical development scenario are as follows:

- Industry would aggressively explore the District.
- Economic conditions would be strong enough to support development in the District.
- The four most advanced projects - Arctic, Bornite, Sun, and Smucker - would be developed and would consist of four separate mines.
- Production activities at each deposit would continue year-round for approximately 5 to 35 years, depending on deposit sizes and world markets. Mining activities (exploration, feasibility studies and permitting, development, production, closure, and reclamation) would be staggered as mine development at all four projects is unlikely to occur on the same timeline.
- Mine operators would share roads where feasible and as documented in agreements, but other major components mostly would be separate for each mine, such as airports, treatment facilities, storage facility, or maintenance facilities.
- The proposed road would be the primary access to the District and no other major access roads would be required. Access roads would be expected to individual project sites.
- Fuel for equipment operation would be transported to the respective mine sites over the Ambler Access Road.
- All potentially productive areas would be open to mineral entry except those closed by law, regulation, or executive order. Highly prospective lands in Native ownership would be available for lease.
- The road would be constructed in two or three phases, depending on the selected alternative (see construction phasing description in Chapter 2, Section 2.4.3, Features Common to All Action Alternatives, of the Draft Supplemental EIS). Under the three-phase alternatives, a pioneer road would be constructed in Phase 1 primarily for winter use, followed immediately by Phase 2, a one-lane road for year-round use, and a decade later by Phase 3, a two-lane, year-round road. Under the two-phase alternative (i.e., the combined phasing option), construction of a pioneer road would not occur, and the road would be constructed to Phase 2 standards from the start. While some aspects of mine development could occur without the road (e.g., air exploration), this hypothetical baseline scenario assumes that mine development would not occur until after the Phase 1 pioneer road construction is constructed (under the three-phase alternatives) or until after the Phase 2 road is constructed (under the two-phase alternative).
- The hypothetical baseline scenario mine uses existing active mines of a similar nature in Alaska. All disturbance estimates would be increased or decreased by different terrain, deposit size, ore grade, mine development requirements, and energy and transportation requirements.
- The analysis is based on publicly available information.
- Long-term monitoring of the mines would not require road access via the road. Monitoring would continue beyond the life span of the road. The relatively small amounts of fuel, personnel, and supplies needed for the monitoring effort are assumed to be delivered by air.

- Mitigation and other BMP requirements for individual mines would be determined in conjunction with future NEPA evaluations and permitting processes once specific mine developments are proposed. The various types of permits that could trigger mitigation and BMP requirements throughout the life of a mine are outlined in the hypothetical baseline scenario presented below, and generally include permits related to land use access and easements, federal permits (e.g., Clean Water Act [CWA] Section 404), waste rock disposal, mine water management, water use and discharge, sanitary wastewater treatment, and air quality.

Hypothetical Baseline Scenario

Prospecting and Staking

Prospecting is the first step in mine development. Geological data and maps are reviewed to identify areas that have the potential to contain mineral resources. On government land, once an area is identified, a company stakes rights to explore in a specific location (also referred to as a mineral location claim). Typically, these first two steps do not involve subsurface investigations. Four major mineral deposits within the District have been prospected and staked: Arctic, Bornite, Sun, and Smucker, which are shown in Map 2. The ownership of these deposits includes:

- The Arctic Project is owned by Ambler Metals (formerly Trilogy). The Arctic Project consists of 2,154 contiguous state and federal patented claims located on approximately 231,008 acres (Trilogy 2023a).
- The Bornite Project occurs on land owned by NANA. The Bornite Project is located on a 241,000-acre site (Trilogy 2023b).
- The Sun Project is owned by Valhalla. The Sun deposit is 62,720 acres in size and a total of 392 State of Alaska 160-acre claims (SolidusGold 2022).
- The Smucker Project is owned by Teck Resources Inc.. The project includes 27 State of Alaska claims (Cardno 2015).

While these four major mineral deposits within the District were determined to be reasonably foreseeable to be developed into mines with implementation of the proposed road, there are other mineral deposits that were not considered reasonably foreseeable because their development was more speculative. Sunshine is one such polymetallic deposit that contains copper, zinc, lead, and silver. While other deposits may not yield the quantities estimated in the four existing projects, they could become potential satellite mines as the full extent of the District is explored and developed (NovaCopper Inc. 2012). Further exploration is needed to determine the extent and economic viability of developing these additional areas. Because development of these additional areas is highly speculative, they are not included in the detailed development scenario in this SEIS and cumulative impacts from such development are assessed only in broad terms.

Exploration

Once an area has been prospected (using sediment sampling, airborne geophysics, or outcrop analysis), the owner of the staked claims begins exploration of the area. This is primarily subsurface exploration using drilling and sampling to confirm the presence of a deposit and determine its size, shape, characteristics, and mineral grade. Due to the expense, trenching and drilling is generally limited to the area needed to sufficiently identify the deposit to support the costs of development. After sufficient drilling and trenching has been completed, the owner of the claim completes a delineation of the anticipated extent of the ore deposit within the claim and prepares a preliminary economic assessment (PEA) for development. While an ore body may be present, if it does not appear to be of sufficient quantity and quality, it does not make sense to develop the mine. If the PEA shows promising economics, the owner of the claim will enter into the Feasibility Studies and Permitting process.

Feasibility Studies and Permitting

Prior to mine development, each proposed mine prepares a Feasibility Study (FS). Typically, a Pre-feasibility Study (PFS) is completed first, followed by a Final Feasibility Study (FFS) for large-scale projects. The Feasibility Study defines the extent and type of mining to be conducted, including construction, operation, and reclamation, as well as the capital and operating costs. These studies are often used to assist in establishing financing for mine development.

In addition, easements for access and use of the land, or permits and approvals from a federal entity (e.g., CWA Section 404 permit), will require preparation of an accompanying NEPA document. The NEPA document provides an assessment of the existing conditions and resources at the proposed mining facility and the potential effects to those resources. Mitigation measures to avoid or minimize those effects may be included and a description of the proposed reclamation post-operation is provided. These documents are evaluated by the agency(ies) prior to approval for the mining operation, and include agency and public outreach.

In addition, the mine must receive all necessary approvals and permits from the various resource agencies before mine construction may begin. Moreover, prior to any proposed mining action, the company would be required to provide financial assurance to the State for the reclamation and closure of the mine. While AIDEA has indicated that the Ambler Road construction would not begin until sufficient lease agreements had been signed between AIDEA and mining companies to pay for the road, the road could be completed in advance of other mines having their own approvals.

Of the four most advanced projects in the District, only the Arctic Project has developed a PFS, published by Trilogy in 2018, followed by an updated FS published by Trilogy in 2023. The PFS and FS provide information on the development of the mine that has been incorporated into this hypothetical development scenario.

Other representative mines (e.g., Kensington, Red Dog, Pogo) in operation in Alaska are typical of the size and methods that would be expected in the District for the four known projects and have also been used in development of the hypothetical baseline development scenario. While the following sections provide a qualitative description of mine development and closure and reclamation (Section 2.1.4, Reasonably Foreseeable Mine Development Scenario), quantitative information from typical mines can be found in the Kensington Gold Project Final Supplemental EIS (USFS 2004), Pogo Gold Mine Final EIS (EPA 2003), Red Dog Mine Extension Aqqaluk Project Final Supplemental EIS (EPA 2009), and *Kobuk-Seward Peninsula Resource Management Plan* (BLM 2005). Information from these documents is incorporated by reference into this appendix.

Development

Development of each mine assumes that the proposed road would be completed. Accessory roads from the main access would also be constructed. After completion of the road, additional equipment and supplies and workforce necessary to fully develop the mine could be more efficiently transported. The District would likely develop using two mining methods: open pit and underground mining. Open pit is the most likely method to be used in the District, but the Bornite Project has indicated the use of underground mining methods for the South Reef site.

Open Pit Mining

Open pit mining is a typical surface mining technique of extracting rock and ore from the surface, resulting in an open pit. This style of mining is best for ore found near the surface, where the overburden is relatively thin or the use of tunnels may be structurally unsafe. Arctic Project preliminary designs provide a typical example of the layout of an open pit mine, as shown in Figure 2-1 and Figure 2-2. The mine is slowly enlarged until the ore is exhausted or it is no longer economically feasible to mine the deposit. The layout of an open pit mine includes construction of bench areas set at 4- to 60-meter intervals that are used in the removal of ore and waste rock. The walls of an open pit mine are angled to aid in stabilization of the soils and minimize rock falls. A haul road is also constructed along the side of the pit to form a gradual ramp for equipment and trucks to enter and exit the mine.

Figure 2-1. Arctic Project proposed mine layout*

Source: Trilogy 2023a; adapted from Figure 18-1: proposed site layout

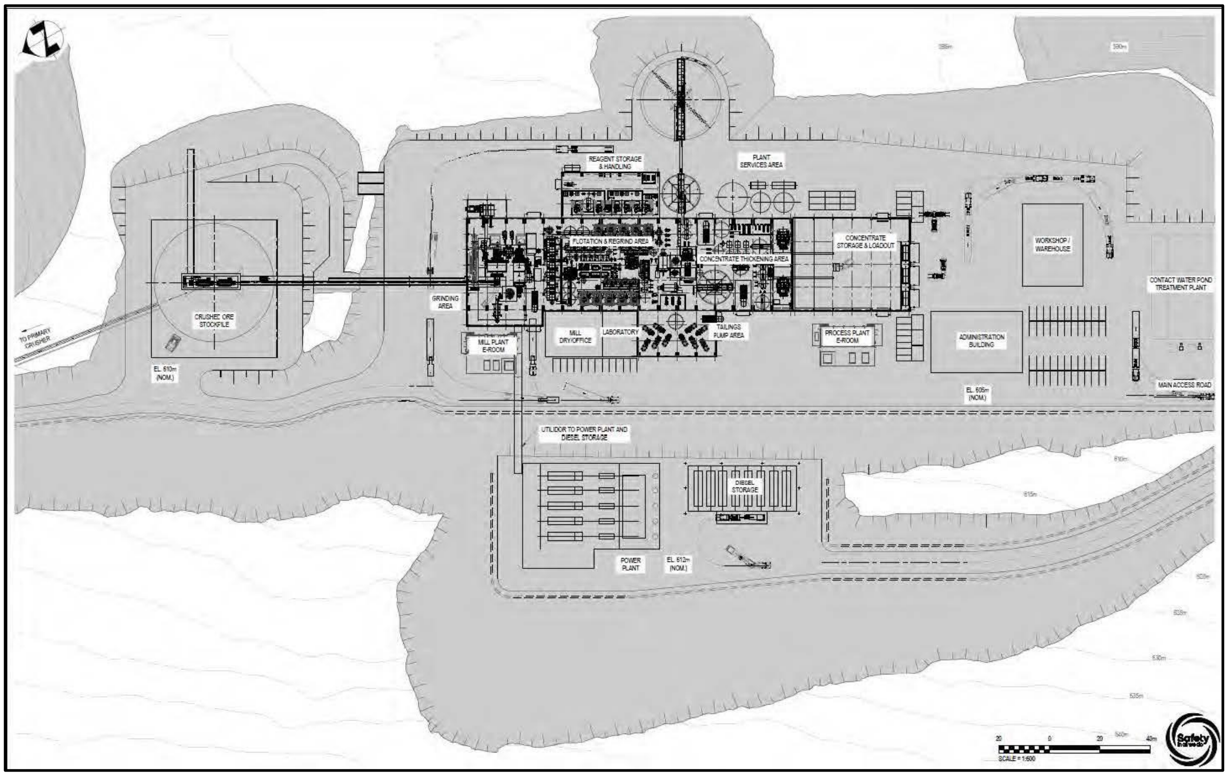

Figure 2-2. Arctic Project proposed ore processing facility*

Source: Trilogy 2023a; adapted from Figure 18-2: proposed location of the processing plant and other buildings

Underground Mining

Underground mining consists of digging tunnels and shafts to access ore deposits. Underground mining is typically done for ore that is located deeper, with a thick overburden, and where the surrounding rock is considered structurally sound enough for tunnels and shafts. The ore and waste rock are extracted and brought to the surface for processing. The tunnels and shafts are slanted to allow for equipment access and extraction and are typically sized to accommodate a 40-ton haul truck (approximately 11 feet wide and 12 feet high). Workers may also use the tunnels and shafts, but an elevator may be installed to provide access to deeper parts of the mine. A key to safety is ventilation shafts to allow contaminated air to escape and fresh air to be drawn in. These can also be used in cases of emergency as ingress and egress points.

Production

The production phase is the time frame during which the ore is extracted from the mine and processed to produce a mineral concentrate for shipment and sale. The processing rate would vary by mine, but could range from 10,000 to 15,000 tonnes of ore per day. The Arctic Project is expected to have a production rate of 10,000 tonnes of ore per day (Trilogy 2023a). The anticipated mineral resource in the District is about 265 million tonnes of ore (see Table 2-1) comprised of copper, zinc, lead, silver, and gold. Production of each mine would vary and the actual amounts of ore processed could differ from the totals shown in Table 2-1, but is estimated the timeframe of production would be between 5 and 35 years based on production rates anticipated for the Arctic Project and applied across the District (Wood 2019), and based on AIDEA's request for a 50-year term for the road ROW authorization. The Arctic Project has indicated a minimum life span of 13 years (Trilogy 2023a). The Red Dog Mine, north of the District, began operations in 1989 and is expected to continue production through 2031 (43 years; Teck 2018).

Blasting

Blasting is necessary to efficiently break rock in the mine to manageable sizes for hauling to the mill. It is typically done using explosives comprised of a mixture of ammonium nitrate, fuel oil, and emulsion blasting agents. A plan is developed to identify appropriate locations for blasting that will yield the highest returns. This is based largely on the geology of the rock and whether it is a hard rock type such as granite or a soft rock such as sandstone. Once the locations are evaluated and marked in the field, a drill is used to create a hole for placement of the explosive and fuse. Blasting is conducted following mine safety and health regulations.

Overburden and Waste Rock Disposal

Overburden and topsoil are the uppermost layers removed before the ore is encountered. Open pit mines generally generate more overburden and topsoil removal than underground mines. These materials could potentially be used during mine closure and reclamation. As such, they are generally stockpiled separately from waste rock.

Waste rock is the material removed to expose the ore body prior to mining and may have an ore content that is not economically recoverable. For underground mines, the waste rock is hauled to the surface for storage, use, or disposal. If the waste rock is suitable, it may be reused to create foundations, drainage, or embankment material at the mine site. During mine reclamation or during the backfill process in underground mining, the waste rock may be used as part of the backfill. Waste rock that is reusable is stockpiled in designated areas. For open pit mining, waste rock stockpile areas are likely adjacent to the pit. Any soils encountered that are suitable for plant growth are separated and stockpiled for later use as a growth medium during reclamation. During mine reclamation, the waste rock stockpiles are likely regraded to a 3-to-1 slope, covered with growing medium, and seeded.

Unsuitable waste rock is taken to a nearby permanent disposal site. To the extent practical, stockpile and disposal sites are located away from streams, wetlands, or other sensitive areas. Rock in the District likely will include some that could produce acid rock drainage. Any waste rock determined to contain acid rock or other hazardous material is stored separately in appropriate containment to prevent contact with workers or the surrounding environment. Permanent disposal of the potentially hazardous waste rock, and treatment of drainage discharges from such rock, must meet all permit requirements.

Equipment

Most mining equipment is diesel-powered and consists of large and small equipment, depending on the task. Technological advancements are being made that allow for the potential use of liquefied natural gas (LNG)–powered haul trucks. As the bottom of the open mining pit is lowered or an underground mine is deepened, additional equipment is required to reflect increased overburden stripping volumes and longer cycle times for removal of materials. Each mine includes a service shop for equipment maintenance. Each piece of equipment is maintained routinely to ensure high performance and minimize equipment failures that could result in safety or environmental risks (e.g., spills). Mobile equipment is serviced at the service shop, while track-bound equipment (i.e., shovels, excavators, drills, dozers) is serviced in the field using spill prevention measures. Auxiliary equipment to support mine maintenance and mine operation is required over life of the mine. This equipment generally includes cranes, forklifts, service trucks, pickup trucks, crew buses, and similar equipment.

Table 2-3 shows the typical equipment expected at each mine required for mine production, regardless of whether it is open pit or underground. Aircraft for transportation for non-production or maintenance activities, such the transport of people, goods, or equipment to and from the mine from nearby towns, are not included.

While equipment needs are similar, the specific model of equipment would differ slightly to accommodate the environment of an open pit versus underground mine. For example, with space more available in an open pit scenario, a larger and taller wheel loader could be used for open pit mining. This larger loader would not be practical in the confined space of an underground mine. A compact loader capable of navigating smaller spaces that is shorter and narrower would be used for underground mining. The Arctic Project FS includes a list of anticipated equipment (including specific models) and quantities for the proposed open pit mining operation. Specifications are included in Table 2-3.

Table 2-3. Estimated equipment to be used at each mine for production purposes*

Equipment Unit	Use	Arctic Project FS proposed equipment
Drill	Drill rigs that are used to drill blast holes.	171 mm Production Drill
Shovel	Used to load blasted waste rock or stripping rock into the haul trucks.	265 t/15 m^3 Hydraulic Face Shovel
Loader	Mobile shovels that can be deployed for specific waste stripping.	124 t/12 m^3 Front End Loader 26t/5 m^3 Front End Loader
Excavator	Primary method for loading blasted ore rock into haul trucks.	68 t/4 m^3 Hydraulic Excavator 35 t/1.4 m^3 Hydraulic Excavator
Haul trucks	Transport the ore and waste rock within the mine facility; larger trucks are used for waste stripper and smaller truck for mining the ore.	144 t Haul Truck 41 t Articulated Truck
Track and wheel dozers	Maintain pit floors, dumps, and stockpile areas, and build roads.	74 t/455 kW Track Dozer 50 t/419 kW Rubber Tired Dozer
Graders	Haul road maintenance.	33 t/217 kW Motor Grader
Water trucks	Spray a layer of water to suppress dust, especially on haul roads and for watering the drills and for fire patrol.	35,000 L Water Truck
Fuel / Lube trucks	Provide fuel and lube supplies to primarily shovel and other tracked field equipment.	41 t Articulated Fuel/Lube Truck
Sand truck	Used primarily in winter to provide traction to roads or high-use areas.	40 t Articulated Sand Truck
Snow plow	Clearing of snow for access.	Equipment type not listed in FS
Explosive trucks	Used to deliver a bulk emulsion product down the borehole for blasting.	2 MMU bulk explosive trucks

Source: Trilogy 2023a

Note: klb = thousand pounds; kW = kilowatt; L = liter; m^3 = cubic meter; mm = millimeter; MMU = mobile manufacturing unit; PFS = Pre-feasibility Study; t = ton

Ore Processing

Ore processing is the method by which target minerals are separated from surrounding material. Figure 2-3 illustrates the typical steps in the process and is not specific to a particular ore. Processing differs for each ore, but in general includes crushing, grinding, flotation, thickening, and filtration. Each mine could have a separate processing facility located near the open pit or ore shaft to minimize transportation costs. It is possible that a mine, especially a satellite mine, would use the processing facility of another for similar ore content. For purposes of the hypothetical scenario, it is assumed that each of the Arctic and Bornite projects would have its own processing facility and that the Sun and Smucker projects would use those facilities as appropriate.

Ore from the mine is hauled to a primary crushing plant to reduce the maximum particle size to approximately 6 inches. The crushed material is conveyed using either a haul truck or conveyor belt to a stockpile before being ground in the grinding plant. The grinding plant uses semi-autogenous grinding mills and ball mills to further reduce the particle size to the consistency of facial powder. As the material is ground, it is typically directed to a hydrocyclone that separates the oversize material from fine material. Oversize material is rerouted through the grinding process until it reaches the proper size range.

Once the grinding process is complete, the fine material is fed into a flotation process. The flotation process differs slightly for each ore; however, the purpose is to separate the ore minerals, such as copper, from the barren material using a water slurry treated with specific chemicals that separates out the desired ore hydrophylically. Once separated, the ore floats to the top of the slurry and is easily skimmed off and collected. The mineral concentrate then flows through additional flotation tanks to further remove impurities and increase the mineral grade of the concentrate. The flotation process is designed to keep most of the chemicals used in the process within the flotation tanks or remove them with the flotation concentrate. The chemicals added during flotation will be in process water, concentrate, and tailings. As an example, the Arctic Project anticipates that the flotation process would include a talc pre-float followed by a bulk copper-lead flotation and zinc flotation, followed by a separation of the copper and lead. Most of the metals would likely be copper and lead concentrates (Trilogy 2023a).

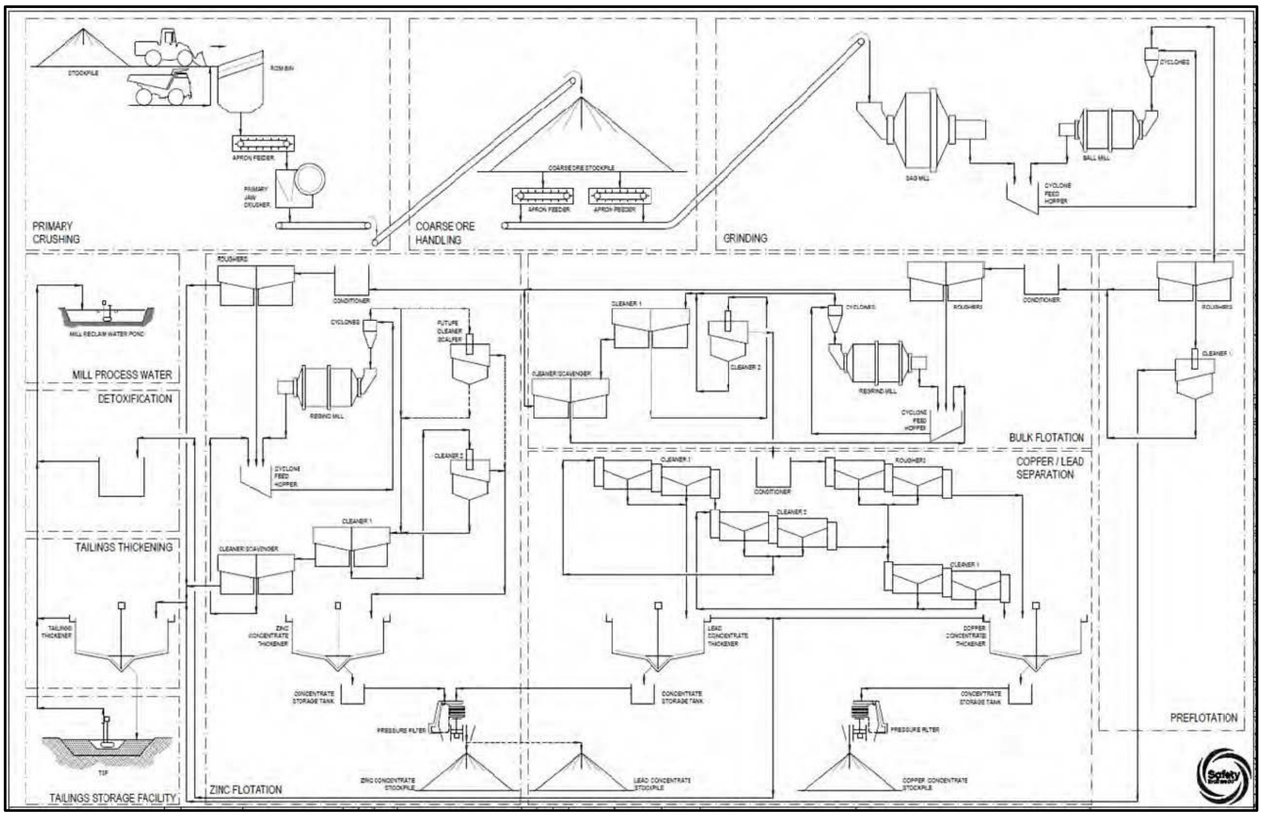

Figure 2-3. Ore processing steps for the Arctic Project mine*

Source: Trilogy 2023a; adapted from Figure 17-1; process plant flowsheet.

Once the concentrated ore has finished the flotation process, it is dewatered and placed in specialized, sealed transport containers for shipment to an existing, off-site processing facility. The containers used are approved for use in trucks, rail, or ship, depending on the transport type and final destination.

Tailings Disposal

Tailings are the material that remains after the concentrated ore has been removed from the flotation process. Tailings are generally thickened with additives to create a slurry that allows solids to settle easily. Once solids are separated, the tailings can be moved to a disposal area or reused as backfill material during mine closure.

Tailings are used to backfill areas of an underground mine once all the ore in a specific section has been removed. Typically, the tailings are mixed with a cement-like mixture to create a paste that can be easily placed inside the mine via a pipeline. The pipe includes secondary containment in the event of a pipeline failure. Backfilling of the mine provides additional stability and increased safety for continued mining activities and following reclamation. Similarly, the tailings can be used in backfilling the open pit mine during reclamation.

For tailings that are not reused, the slurry is moved through a pipeline, with a casing for spill containment, to a tailings management facility (TMF). The TMF design is location- and mine-specific, and many factors are evaluated to determine the appropriate facility design. These include geotechnical information to determine the stability of a given location, proximity to the processing facility and pit, area available to develop the TMF, costs, and environmental concerns.

Using the Red Dog Mine and Arctic Project PFS as examples, the TMF likely would include a lake behind an earthen dam, designed and constructed in accordance with applicable regulations. However, there are other forms for the TMF, such as paste tailings and dry stack that are used at the Pogo Mine (EPA 2003) and Greens Creek Mine (USFS 2003), respectively. The dam can be constructed in part using waste rock generated from the mining process. In simple terms, the slurry is pumped into the containment area behind the dam to allow solids and water to separate. The solids settle to the bottom, which allows the water on top to be reclaimed as processing water at the mill. The dam height is often raised over the life of the mine to provide more capacity in the TMF. Designs often include diversion channels to keep surface water runoff from entering the TMF. During the reclamation process, the amount of water behind the dam is reduced to the extent practicable, but the TMF remains in place for the long term. Water from behind the dam and mined areas is likely to be considered acid rock drainage, based on the geology of the area (see Chapter 3, Affected Environment and Environmental Consequences, Section 3.2.1, Geology and Soils, of the Draft Supplemental EIS), and is likely to need treatment during and after the life of the mining operation.

Mine Water Management

Mining activities encounter water, whether in the mine itself, from intersecting groundwater, or from stormwater and meltwater runoff. Water is generally classified as mine drainage, contact surface water, non-contact surface water, or process water. Mine waters are handled differently depending on whether they are non-contact or contact waters:

- Mine drainage includes surface water and groundwater encountered during excavation and mining activities that outflow from the mine. Mine drainage has interacted with the exposed mineralized rock wall surfaces in the mine and as a result may contain pollutants. Mine drainage is typically captured and either used in the mineral processing or directed to a water treatment facility. At the facility, it is filtered and then treated to remove pollutants to meet surface water discharge permit limits. Proposed surface water mine drainage discharge would be regulated under an Alaska Pollutant Discharge Elimination System Permit managed by the Alaska Department of Environmental Conservation (ADEC). Any proposed groundwater mine drainage or mine drainage not discharging to surface water would be regulated under a Waste Management

Permit (Alaska Statute [AS] 46.03 and 18 Alaska Administrative Code [AAC] 15, 60, 70, and 72) managed by the ADEC.

- Non-contact water is stormwater and meltwater that does not come into contact with the mining operations. This water is collected separately and allowed to settle sediments before being discharged back into a stream or infiltrate to groundwater.
- Contact water is stormwater and meltwater runoff that comes in contact with the mining operations, such as waste rock or tailings, and as a result may contain pollutants. Contact water is minimized through best management practices, including runoff controls. Contact water is typically captured and directed to a water treatment facility where sediments are settled out of the water, and it is filtered and then treated to remove pollutants to meet discharge permit limits.
- Process water is the water used and generated during the ore processing at the mill. While the water is derived from either a groundwater or surface water source originally, once the mill is operational, the water in the TMF is reclaimed, treated, and used as process water to minimize the overall water needs for the mine. Prior to being reused in the facility, the process water is collected and treated to remove sediments and pollutants to meet discharge permit limits. In its role as a cooperating agency, the U.S. Environmental Protection Agency (EPA) indicated that some volume of process water may be discharged if it is commingled (stored) with an allowable source like mine drainage or net precipitation. Then, only the volume of the allowable source may be discharged.

An important impact of a mining operation is the drawdown of the water table, using pumps, in order to access ore at depth. Such water typically would be treated as non-contact water. If it was determined to be contact water, it would be further treated, as described above. This drawdown of water results in a large cone of depression in the groundwater table, which can lower the water table well below natural stream or lake levels and substantially reduce flow into streams. The effects of water drawdown on fish and amphibians are described in Chapter 3, Affected Environment and Environmental Consequences, Section 3.3.2, Fish and Aquatics, of the Draft Supplemental EIS. Mine-induced alterations to the exchange patterns of surface and groundwater also has the potential to create additional pathways for dispersal of potential contaminants.

Sanitary Wastewater

Each mine would maintain a permitted sanitary wastewater treatment plant near the facility to handle sanitary wastewater. Further evaluation is necessary to determine if a septic system would be feasible. Septic systems collect sanitary wastewater in a central septic system that discharges to a leach field. If the groundwater table is too high, it may not be feasible to discharge to a leach field. Treated wastewater would then be discharged into either the tailings impoundment or another permitted alternative.

Water Supply

Each mine requires fresh water for domestic use and ore processing. Water needs would vary by the size of the mining operations. To meet the necessary water demands in the District, each mine would be required to obtain water rights to access groundwater and/or surface waters to meet water supply needs. The Red Dog Mine Final EIS and Arctic Project FS provide representative examples of the water supply needs anticipated for the District (EPA 2009; Trilogy 2023a).

Each mine would treat the water to remove any pollutants prior to use. During construction, before the permanent water supply and treatment facility were operational, water would be treated through a portable treatment plant prior to use. As described in Mine Water Management, treatment would meet permit requirements for discharge and use.

Power Supply and Fuel Use

Each mine would have differing power requirements, but is expected to include either LNG or diesel generators to provide power to the process area, with underground lines used to supply power from the process area to other areas of the mine. A selective catalytic reduction system or similar best available technology would be included in the design for the diesel generators, as required by the ADEC air quality permit. The power supplies would be operated and emission sources controlled according to ADEC's air quality permit requirements.

Each mine would provide on-site storage for diesel, LNG, and gasoline, with secondary containment. Best management practices typically would include concrete-lined, bermed areas, or double-walled tanks for storage. Diesel would be the primary fuel used on site for vehicles, equipment, and power generators. Gasoline would be used for small engine equipment. Certain vehicles and overall power generation for the facility would use LNG. Each mine would prepare a Spill Prevention Control and Countermeasures plan for specific operations. An estimate of power needs was projected for the Arctic Project and provides a quantitative analysis of the potential power needs (Trilogy 2023a).

Reclamation and Closure

Reclamation and closure occur once the mine is no longer producing ore. Typically, the process to formally reclaim and close a mine site takes 2 to 5 years following the termination of production. Reclamation may also take place concurrently with ongoing mining as areas are mined out or if mining waste stockpile storage areas are full and ready to be reclaimed and closed. Reclamation also applies to activities that are undertaken on an interim basis. Interim reclamation would be done to reduce erosion potential by stabilizing road cuts and stockpiles, and other disturbances resulting from exploration, as well as construction and operation of the mine facility. Interim reclamation typically involves the use of seeding and mulching. Reclamation and closure of each mine would need to meet the State of Alaska's requirements for reclamation established under AS 27.19 and 11 AAC 97. This includes a requirement for financial assurance that the reclamation will be completed. Reclamation and closure plans, if approved by the state, are reviewed at a minimum of every 5 years.

The overall closure objective is to establish stable chemical and physical conditions at the mine site. Reclamation usually entails the following activities:

- For an underground mine, the mine facility would be backfilled to stabilize the soils within the mine to prevent erosion or collapses. Fencing and signage would be placed to deter trespassers and limit wildlife access to the area for safety.
- For an open pit mine, the pit walls and backfill would be stabilized as appropriate. As proposed for the Arctic Project, water would be allowed into the pit to create a "pit lake." Water from the pit lake would be treated and discharged to meet permit requirements. An emergency spillway would be constructed in the event of an overflow. Fencing and signs would be placed to deter trespassers and limit wildlife access to the area for safety.
- All waste rock dumps would be regraded to stabilize the slopes, covered with an engineered soil cover, and seeded. Waste rock runoff would also be routed to the pit lake for treatment.
- Tailings impoundments may be closed by such means as maintaining a shallow water cover, dewatering, and covering with an engineered cover. Runoff water or seepage would be collected and routed to the pit lake for treatment and discharge.

- Buildings and equipment would be dismantled and removed. It is possible that concrete foundations would remain in place and be covered, such as is proposed for the Arctic Project (Trilogy 2023a). Rock pads for building structures and equipment would be regraded.
- Access roads, hauls roads, and rock fill pads would be removed, regraded, and reseeded to restore these areas.
- A landfill for non-hazardous materials would likely be placed in the area used for the waste rock disposal. Materials from the closure and reclamation process would be placed in this landfill. The landfill would then be graded and reseeded to restore the area.
- If not economical to remove or sell at closure, mobile or stationary equipment would be stripped of electronics and batteries, and fluids drained and placed in an approved landfill for final disposal.
- Hazardous waste materials would hauled to a licensed disposal facility in a sealed container, while non-hazardous waste would be placed in the landfill.

Structures required for long-term monitoring, as described in the next section, would not be removed during the closure and reclamation process.

Long-Term Monitoring and Management

Long-term monitoring, and associated management and treatment of water, soils, and vegetation, is required to maintain water quality and determine whether reclamation goals are met. Long-term monitoring varies, but could extend 50 or more years beyond the life of the mine and could be perpetual. Long-term financial assurance for conducting the long-term monitoring would be established by each mine for the monitoring activities.

As described in the Arctic Project FS (Trilogy 2023a), shorter duration post-reclamation monitoring could occur for up to 10 years and include:

- Visual inspection for soil stability annually for 3 consecutive years and less frequently thereafter for up to 10 years.
- Annual inspection of the soil covers over the waste rock dump and TMF for up to 10 years to ensure that the physical integrity of the cover is maintained.
- Inspection roughly every 3 years to confirm suitability of the revegetation efforts.

Water quality monitoring and water management is the longest of the post-reclamation requirements. This monitoring and management could be required in perpetuity, and frequency and duration will be determined during the permit process.

With the need to conduct long-term monitoring, the water treatment facility and ancillary power generation for it would remain. An access road to the facility would also remain for inspection and maintenance of the facility. Seasonal housing and required power generators for housing would be established using materials already on site, as practicable. It is assumed that the Ambler Road would no longer be required and that access to the mines for water treatment and long-term monitoring would occur by air, with some delivery by barge if needed. The local road system between Kobuk/Dahl Creek Airstrip and the mines are assumed to remain. It is possible the mining companies would request that portions of the Ambler Road within the District that provide direct access to the mines (e.g., toward Sun and/or Smucker mines) be retained under mining company control and not closed and reclaimed when AIDEA closes the rest of the road.

Employee Housing and Crew Shifts

Employee housing for each mine would be provided at a camp that is self-contained with its own power supply, water treatment plant, sanitary treatment facility, and garbage disposal at a landfill. Each mine could have up to three different camps for exploration, construction, and operation.

Exploration camps are generally smaller and are used to house employees during exploration of the deposit. These camps are often located closer to a nearby road or access point for easier transport of employees, goods, and equipment. These camps can also be used during the construction phase.

A temporary work camp would be created during construction near an access point similar to that described for the exploration camp. The construction camps proposed for the Arctic Project use both the Bornite Exploration Camp (houses 70 people) and a separate work camp (housing 250 people) that would be established closer to the mine and processing facility (Trilogy 2023a). After construction, the temporary work camp would likely be removed. Construction crews would typically work 6 weeks on and 2 weeks off.

For operations, a permanent work camp would be constructed adjacent to the construction camp near the mine site. The permanent camp would likely be constructed as soon as access allowed so that it could be used as a construction camp as well. The Arctic Project anticipates that the permanent work camp would house 400 people and sized to accommodate the peak accommodation requirements during construction (Trilogy 2023a). Once the mine became operational, workers would rotate on a 2-week-on, 1-week-off schedule. On rotation day, workers would be bussed to the local airstrip for flights to either local villages or Fairbanks. The Arctic Project has projected that, during operations, there would be three rotating crews working 12-hour shifts. The crews would overlap between shifts to maintain optimal operations of the mine. The daylight shift would include more staff than the night shift as most operations at the mine, including general maintenance and blasting, would take place during daylight hours (Trilogy 2023a).

Transportation

Employees, supplies, and equipment require different transportation methods depending on the stage of development. Exploration is currently underway at the four projects in the District. During the exploration phase, access from a major city for the transport of supplies, equipment, and people is via nearby airstrips. Except for Bornite, roads from the airstrip to the other deposits are not available, so transport of employees and equipment are delivered to the sites via helicopter or along dirt trails during summer and ice roads during winter. As construction of each mine progresses, equipment and supplies would be transported primarily using the proposed road; however, the transport of employees to and from Fairbanks (the likely transportation hub for employees departing from and arriving at the general region) to each of the project sites would continue via airplane, as it is likely the most economical means of transporting people. Employees from local villages would either take scheduled flights to the Fairbanks hub to get to work or possibly would be picked up by a mining company flight.

Once the proposed road is constructed, continuing exploration activities would use the road. Traffic associated with initial activities would likely be to 10 to 15 trucks per week from May 1 to October 15. After the road is constructed, access roads to work camps, airstrips, and the overall mining facilities would be constructed, but transport of employees would still primarily occur using the airstrips. Closure and reclamation would remove the majority of infrastructure from the District, but established airstrips and some local roads could remain to provide access to each mine for long-term monitoring.

Air Transport

The Bornite Project currently uses the state-owned airstrip at Dahl Creek and a smaller airstrip near the deposit (Trilogy 2023b). These would likely continue to be used during development and production phases of the project. The Arctic Project is anticipating using the Dahl Creek airstrip, as the proposed mining operation location is topographically unsuitable for an airstrip. While the Dahl Creek airstrip currently supports exploration efforts, it would require upgrades in order to support the use of Dash 8 aircraft or an equivalent aircraft for transporting mine crews, equipment, and supplies during construction and operation. Anticipated upgrades include lengthening the runway and adding a lighting system and an automated weather observation system (Trilogy 2023a). The Dahl Creek airstrip is connected via the Dahl Creek Road to Kobuk, which has its own state airport. The road connects Kobuk, the Bornite deposit, and the established airstrip at the deposit.

The Smucker and Sun projects would also use their own airstrips. The Smucker Project is located near the western edge of the District, and no existing airstrips are present near the deposit. The Sun Project is located in the eastern part of the District and has its own airstrip, although it may require updates to accommodate construction and operation activities.

Projected flights to and from the four mining projects have not been published. Using the weekly fixed-wing schedule for the Red Dog Mine published in the Final Supplemental EIS (EPA 2009), an approximation of the weekly flights relative to the expected direct employment numbers during operation of each of the four mining projects is estimated in Table 2-4. Included in the flights is one weekly flight to deliver or pick up freight and materials, and three additional flights for employees or visitors that are not specific to a crew change. Flights for construction activities for mine development would be similar to those for operation.

Table 2-4. Estimated weekly fixed-wing flights for the four mining projects

Project	Direct jobs during operation	Number of weekly fixed-wing flights for freight deliveries or other transport	Number of weekly fixed-wing flights for crew changes	Total number of weekly fixed-wing flights
Arctic	217	4	4–5	8–9
Bornite	157	4	3–4	7–8
Sun	66	4	1–2	5–6
Smucker	55	4	1–2	5–6

Source: HDR 2019a; UA 2019

Transport of Concentrate

Once ore is processed and ore concentrate packaged, the concentrate would be transported along the access road and ultimately to a port for export. With the three access road alternatives, the selected transportation corridor from the District would connect to the surface transportation system in Alaska's Interior: the Dalton Highway. Generally speaking, the logistics train that would serve to supply the District begins with transport from marshalling yards in Canada or on the west coast of the United States by container barge to tidewater ports in Alaska such as Seward, Whittier, Anchorage, or Port MacKenzie. From there, the containers would be transferred to rail and hauled to Fairbanks, transferred again to truck trailer, and then hauled along the Dalton Highway and Ambler Access Road to the mine site. Currently, the use of a pipeline to transport processed ore or provide fuel is not anticipated and not considered in the hypothetical baseline scenario. Mineral concentrates would be loaded into specialized (sealed) intermodal bulk shipping containers, trucked to Fairbanks, hauled by rail to tidewater ports in Southcentral Alaska (such as Seward, Whittier, Anchorage, or Port MacKenzie), and then unloaded into bulk carrier vessels for ocean transport to the smelter. With this containerized system, which is not used at Red Dog Mine, metal releases from the transport of ore concentrate would not be expected if the container systems were well maintained.

Truck Transport and Vehicular Traffic. The Arctic Project has projected production input of 10,000 tonnes per day of raw ore. Output is estimated as 470,586 short wet tons of concentrate per year, or 1,289 short wet tons[3] per day (Trilogy 2023a). AIDEA has noted that each truck would transport two trailers (doubles), each trailer carrying an ore container with a 31-tonne capacity (28 short wet tons) along the proposed road. For the Dalton Highway, the trucks would transition to one trailer with one container. A staging area is assumed at the eastern end of the Ambler Road for staging and reassembling trailers. With up to four mines operating around the clock, the staging area would be expected to have continual activity (e.g., moving trucks, trucks idling, backup bells). One or more similar staging areas would occur at the mine end of the road. Projecting the same technique described above to other mines, and adding ancillary traffic—from fuel deliveries to road security patrols to commercial deliveries for communities—Table 2-5 provides approximate total traffic levels on the proposed road and public highways farther south. The estimate includes traffic related to mining in the District, operations and maintenance of the road and its associated communications system, and deliveries to communities. It does not include road construction or reclamation equipment or associated construction traffic, potential trips associated with emergencies or fighting of wildfires, or potential agency/land manager trips. Table 2-5 estimates the number of trucks anticipated for transport of the mineral ore from the four mining projects to Fairbanks.

Projecting the same technique described above to other mines, and adding ancillary traffic—from fuel deliveries to road security patrols to commercial deliveries for communities—Table 2-5 provides approximate total traffic levels on the proposed road and public highways farther south. The estimate includes traffic related to mining in the District, operations and maintenance of the road and its associated communications system, and deliveries to communities. It does not include road construction or reclamation equipment or associated construction traffic, potential trips associated with emergencies or fighting of wildfires, or potential agency/land manager trips.

Table 2-5. Mine characteristics and resulting traffic generated by the four mining projects during production*

Item	Arctic	Bornite	Sun	Smucker
Mineral resource (tonnes)	40.2 million	202.7 million	11 million	11.6 million
Product recovered in concentrate	Cu, Zn, Pb, Ag, Au	Cu, Co	Cu, Zn, Pb, Ag, Au	Cu, Zn, Pb, Ag, Au
Mill throughput (tonnes/day)	10,000	14,250	5,000	5,000
Production rate (short wet tons/day)	1,289	784	548	548
Mine life (years)	13	35	6	5
Annual/daily concentrate production (short wet tons)	470,586/1,289	286,000/784	200,000/548	200,000/548
Ore concentrate containers filled per day for transport	46	24	16	16
Daily double-trailer trips: Ambler Road (total of full outbound and empty return)	46	24	16	16

[3] A short wet ton is equivalent to a short ton (2,000 pounds) but refers to the weight of materials that are still "wet," in slurry or paste form.

Item	Arctic	Bornite	Sun	Smucker
Daily single-trailer trips: Dalton Highway (total of full outbound and empty return)	92	48	32	32
Annual mill and maintenance supplies (short tons)	11,000	9,000	6,000	6,000
Mill and maintenance daily trips	2	2	2	2
Daily fuel and other supply trips	12	12	6	6
Daily incidental trips	2	2	2	2
Daily trip total: Ambler Access Road	62	40	26	26
Daily trip total: Dalton Highway	108	64	42	42

Source: HDR 2019b; Trilogy 2023a, 2023b; UA 2019; Wood 2019

Note: Ag = silver; Au = gold; Cu = copper; Pb = lead; Zn = zinc; Co=Cobalt

Alaska Highway System legal load limit of 40 tons for tractor-trailer unit, 20 tons for single-trailer. Concentrates are loaded into sealed 30 metric-tonne (33 short ton) containers for truck transport to Fairbanks. Concentrates are hauled in double trailers on the proposed road, then in single trailers on Dalton Highway. It is important to distinguish between containers filled and trips on a road; trips include the empty backhaul trip. Bornite uses the same amount of supplies and fuel as Arctic, but fewer mill reagents. Sun and Smucker mills are half the size of Arctic mills, and use half the supplies and fuel, or use Arctic mill. A trip is a vehicle passing an observer in either direction. Travel in each direction is considered a separate trip. Traffic not included: Ambler Access Road construction/road maintenance and operations vehicles; commercial community deliveries; land management agency traffic; emergency/fire suppression traffic; and any concurrent mining exploration traffic.

Using the traffic information from Table 2-5 and scheduling for development and construction of the proposed road and mines in the District, a projection of traffic by phase is provided in Table 2-6. The range of traffic given is from the low Annual Average Daily Traffic (AADT) in the time period to the high AADT in that time period.

Table 2-6. Traffic projections for Ambler Road and Dalton Highway

Road Phase	Assumed time period	AADT on Ambler Road[a]	Additional AADT on Dalton Highway[b]
Phase 1	2025–2026	7–57	7–57
Phase 2	2027–2036	58–118	58–179
Phase 3	2037–2051	104–168	160–238
Phase 3[c]	2052–2071	83, tapering to 3	123, tapering to 3

Source: HDR 2019b; Wood 2019; and internal calculations for the Supplemental EIS

[a] AADT indicates traffic passing an observer in either direction. Ore concentrate is assumed to be hauled 24 hours/day.

[b] AADT on the Dalton Highway is higher than on the proposed road, because one truck is assumed to haul two ore container trailers on the proposed road, but only one ore container trailer on the public highway, so the number or ore trucks doubles.

[c] Phase 3 is broken into two time periods. The break point is after production at three of the four main mines is assumed to be finished and traffic decreases.

Rail Transport. Once the trucks reach Fairbanks, the containers would be removed from the trailers and compiled into a unit train for transport to the ports in Southcentral Alaska. Table 2-7 summarizes the estimated rail traffic to haul the processed ore for the four mining projects from Fairbanks to a port. A unit train is a train that transports a single commodity directly from producer to consumer. Each rail car is capable of holding of two containers in a single-stack configuration (versus a double-stack configuration). A unit train of approximately 75 cars is typical for Alaska and would result in each unit train carrying 150 containers. Using the 1,289 short wet tons (46 containers) per day production capacity of the Arctic Project, there would be approximately one train southbound every 2 to 3 days, as shown in Table 2-7.

Table 2-7. Estimated rail traffic to haul processed ore for the District from Fairbanks to a port*

Project	Production rate per day (short wet tons)	Number of containers required for 1 day of production (outbound only)	Weekly frequency of 75-car-unit trains (both directions)
Arctic	1,289	46	4.3
Bornite	784	24	2.2
Sun	548	16	1.5
Smucker	548	16	1.5

Source: HDR 2019a; Wood 2019; Trilogy 2023a

Vessel Transport. Upon arrival at a port, the containers would be removed from the rail cars and stored temporarily in a container yard if a ship were not already berthed at the port. Ambler Metals (formerly Trilogy) has indicated that the likely port of choice would be the Port of Alaska at Anchorage. While land-side modifications may be necessary (e.g., creating container staging areas, adding a specialized crane to dump containers into the ship), no in-water construction is anticipated to take place at the port as an indirect consequence of the action alternatives. In-water modification likely would not be necessary at the Seward and Whittier ports, but may be necessary at Port MacKenzie, if those ports were chosen by the mining companies. Table 2-8 estimates the anticipated vessel traffic that would occur for the four mining projects. Ore is generally transported in a Panamax or Handymax-sized ship. An average carrying capacity of 50,000 dead weight tons (DWT; DWT are equivalent to tonnes) accounts for the majority of the ships in the Panamax and Handymax size ranges. Using 50,000 DWT as an average load capacity (55,116 short tons), a port would need storage capacity for a minimum of 1,670 containers in the container yard as well as capacity to hold loaded and empty unit trains to account for rail scheduling timelines. If the volume of containers being delivered to ports exceeds the storage capacity of the container yards, additional container yards may need to be constructed, other ports used, or delivery schedules altered to meet the needs of container storage. Resolution of this issue is undetermined, and impacts cannot be defined at this time.

Table 2-8. Estimated monthly vessel traffic for the District*

Project	Production rate per day (short wet tons)	Number of ships per month	Number of ships per year
Arctic	1,289	0.82	9.8
Bornite	984	0.43	5.1
Sun	548	0.29	3.4
Smucker	548	0.29	3.4

Source: HDR 2019a; Wood 2019; Trilogy 2023a

Existing ports at Anchorage, Seward, and Whittier have businesses and residential areas nearby. Among the issues that may need to be examined in future EISs for mining operations are air quality and health effects from the ship and train traffic and from any dust that may escape during the ore loading process (ore concentrate would be wet, and the cranes contemplated would not open the sealed ore concentrate containers until they were inside the hull of the ship; these measures typically would result in negligible dust). Other issues that may need to be examined more closely are the noise and visual effects of the additional port operations, and effects to automobile traffic. If selected, Port MacKenzie in particular may require examination of in-water work and new vessel traffic patterns on marine mammals in Cook Inlet.

All of these would be dependent on the port(s) selected and the details of the operations proposed by the mining companies, and would be examined in their respective NEPA and permitting analysis.

Projected Timeline for Hypothetical Baseline Scenario

Using the projections from the Arctic Project's timeline, anticipated construction and operational crew shifts, employment numbers, and production output, a general projection of the life of the Arctic Project can be developed. The other three projects would be anticipated to follow a similar development pattern. For purposes of the hypothetical baseline scenario, the Arctic Project would be developed first, followed closely by Bornite and later by Smucker and Sun in succession, which would likely use the mills at Bornite and Arctic. Table 2-9 provides the schedule for development of the District.

Table 2-9. Assumed mine development timing for the District*

Events Sequence	Start	End
Ambler Road EIS Record of Decision	2024	2024
AIDEA completion of business agreements with mine(s), state approvals, and financing	2025	2026
Ambler Road Phase 1 or Combined Phasing Design (AIDEA issue design and construction contracts, and complete design)	2027	2028
Ambler Road Right-of-Way Authorization (50-year term)	2024	2074
Ambler Road Construction, Phase 1, pioneer road, or Combined Phasing Option[a]	2028	2030
Ambler Road Construction, Phase 2, one-lane road	2030	2032
Arctic Mine production	2033	2044
Bornite Mine production	2035	2069
Ambler Road Construction, Phase 3, two-lane road	2040	2042
Sun Mine production	2045	2050
Smucker Mine production	2051	2056
Other mines, production	2045	2068
Last mine closure and reclamation	2068	2071
Ambler Road closure and reclamation[b]	2071	2074

Source: BLM analysis; DOWL 2016; UA 2019; Wood 2019

a Under the combined phasing option, Phases 1 and 2 would be combined into a single phase whereby the road would be initially constructed to Phase 2 standards (year-round one-lane road) from the start, without the construction of a pioneer road. It is estimated that construction of the route to Phase 2 requirements would require a single mobilization of construction equipment and construction time of approximately 2 to 3 years.

b Road closure and reclamation is part of AIDEA's proposed action (see Chapter 2, Alternatives, Section 2.4.3, Features Common to All Alternatives, of the Draft Supplemental EIS, and DOWL 2016 for additional information).

Hypothetical Baseline Scenario Surface Disturbance

The potential for surface disturbance has been estimated for the four mines in the District (Table 2-10). Using the development footprint provided for the Arctic Project (Figure 2-1 and Figure 2-2), including access roads, an approximate acreage of surface disturbance was calculated (Trilogy 2023a). A similar footprint was used for the other three mines in the District. These approximate areas are shown on Map 10. Factors affecting the size of a proposed mine include the amount of ore to be mined, the depth to the ore and the thickness of orebody, the amount of waste and tailings to be disposed of, the distance to powerlines, the distance to employee housing, and the local topography. Only gross estimates of disturbance can be developed. These estimates are based on existing operations elsewhere and generally reflect a moderate stripping ratio of overburden to ore for surface mining, or depth from surface for underground operations. These are order of magnitude estimates, meaning they may be 50 percent higher or lower as the result of unknown or unforeseen circumstances. Variance from these estimates does not reflect on efficiency or management, but is the result of mining and transportation conditions inherent in a given deposit.

Table 2-10 describes the potential surface disturbance resulting from the projects in the District. Current and future exploration activities are anticipated to result in 5 to 15 acres of disturbance in the District. Currently, the Arctic Project has reported 5 acres of disturbance for exploration (Trilogy 2023a). Surface disturbance from exploration is not reflected in the table. No estimate was made of gravel needs required by the individual projects. Local material sources would be used wherever possible, including the use of excavated mine site material.

Table 2-10. Hypothetical surface disturbance within the District*

Project	Mineral Resources (million tonnes)	Mining method	Production disturbed acres
Arctic	40.2	Open pit	1,327
Bornite	202.7	Open pit	1,223
Smucker	11.6	Open pit Underground	837 282
Sun	11	Open pit	837[Te]

Source: Trilogy 2023a, 2023b

2.2. Road Access Scenarios*

AIDEA filed an application for a ROW to construct a private industrial access road and associated facilities from the Dalton Highway, crossing multiple land ownerships, including federal public lands managed by the BLM and the National Park Service, to the Ambler Mining District. AIDEA also proposes that communities would be allowed to use the road for delivery of commercial goods. However, interested communities would need to develop any secondary access means on their own (i.e., any ancillary roads that would be needed to connect the community to the Ambler Road would not be developed by AIDEA). Members of the public and some cooperating agencies have expressed concern over the potential effects of trespass along the private road on subsistence use and cultural resources, and the effects of possible future authorized public use on the region. While the road would not be open to the general public by design, some public use, including trespass, is expected. This section lays out reasonably foreseeable access scenarios associated with commercial use, and public and non-industrial use, including trespass, of the road. The effects of these scenarios are described in Chapter 3.

2.2.1 Commercial Access Scenario*

AIDEA's application indicated that some commercial deliveries may be allowed via the road. This section describes the reasonably foreseeable scenario for commercial deliveries using the proposed alternatives. This section also describes the assumptions used to develop the scenario based on intentions stated by AIDEA. Federal statute and regulations provide that BLM and NPS determine the scope of allowable access through the terms and conditions of any ROW authorizations they may issue; AIDEA would have no independent discretion or permit authority if issued a ROW. The text below provides details about the proximity of communities, mining claims, and private property to the alternatives as a basis for developing assumptions about how communities or other landowners might use the road for "commercial deliveries." Refer to Map 9 for locations of communities, private lands, mining claims, and existing/historic travel routes in relation to the alternatives.

Background from AIDEA

AIDEA has proposed in its application that some commercial deliveries may be allowed under a permit process. AIDEA's application states:

> Other permitted traffic at times could include commercial deliveries of goods for local communities or commercial transport for local residents and emergency response authorized through access permits. Only commercially licensed drivers would be allowed on the road. The traffic level for these local community and emergency response operations would likely total less than 1 truck or bus per week. No additional work outside the approved ROW would occur to accommodate this. – *Revised SF299, June 2016, p. 5*
>
> Although the proposed road would have controlled access, local communities would have the potential to hire commercial transportation providers to deliver fuel or freight to staging areas where the communities could access it, probably in the winter. Alternatively, local residents could instead form their own companies to provide these services. – *Revised SF299, June 2016, p. 16*

An April 2019 presentation by AIDEA to the BLM at a cumulative effects workshop for this project also indicated that agencies (with a permit) could have limited access on the road (e.g., for monitoring or management activities). One slide indicated that the road would have a "limited access designation" and listed state and federal landowners, regional Alaska Native corporations, and "others TBD" as the groups apparently intended to have limited access.

Commercial Deliveries Scenario

All Alternatives

The following assumptions apply to analysis of all alternatives:

- Use of the road would be by authorization only, by drivers who had road-specific training and who were equipped with two-way very-high-frequency radios. Almost all use would be by those with commercial drivers' licenses. Exceptions would be agency access or during emergencies.
- AIDEA's road operator would have authority to allow drivers access under limited terms—vehicles associated with large-scale mines in the District, commercial trucks making deliveries of goods for community residents or landowners along the road, and landowning agency vehicles, including those of Alaska Native regional corporations that own land adjoining the road. Agency access is likely to include those that need access for permit-compliance inspections related to the road and mines, land management, land use planning, scientific research, and, if necessary, firefighting. Alaska State Troopers on official business likely would be authorized. Community emergency medical personnel would be included for emergency response and medical evacuation. Transport of the general public, either by commercial vehicle or public transit, would not be included in the authorization. Commercial vehicles delivering goods or fuel for communities would be subject to insurance requirements and road-use fees/tolls set by AIDEA or its road operator. The cost to drive the road for commercial deliveries has not been determined at this time.
- Owners of the land crossed by the road could decide whether to authorize other individual users under separate decision-making processes. For example, if another mine were proposed outside the District, access could be allowed, but authorization would have to come through the underlying landowner(s) and not from AIDEA or its road operator. Landowners issuing such authorization would do so in consultation with AIDEA and its road operator, though AIDEA

concurrence would not be required, and all drivers would be required to follow AIDEA road safety and operations requirements.[4]

- Landowners could issue a separate authorization for a boat landing, storage shed or warehouse, bulk fuel storage tank, or connecting road or driveway that might aid the transfer of commercial deliveries to communities or private lands. These would be separate environmental analyses and public interest decisions.

In general, the opportunities for less-expensive transportation of goods and people to and from a study area community increase with the proximity of the community to the road. The distance of a particular study area community from the proposed road would differ across the action alternatives. Table 2-11 shows the approximate straight-line distance between the study area communities and the roadway alignment under each action alternative.

Table 2-11. Distance of study area communities from the proposed road under the action alternatives (in miles)

Community	Alternative A	Alternative B	Alternative C
Alatna	35	35	37
Allakaket	34	34	39
Bettles	8	8	77
Evansville	8	8	78
Hughes	68	55	3
Huslia	92	92	47
Ambler	22	22	22
Kobuk	9	9	2
Shungnak	15	15	5
Rampart	105	105	18

All action alternatives would be similar in their proximity to communities at the west end of the road. Maps 10 and 11 illustrate the potential future transportation network between these communities and the three alternatives as described below:

- **Kobuk:** Alternatives A and B are expected to connect directly to the existing 15-mile road that connects Bornite to Kobuk. Bornite is an active mining prospect; it is reasonable to assume that an existing tractor trail would be improved to road standards approximately 2.5 miles to make the connection, which in turn would connect the proposed road to Kobuk. Alternative C would use the alignment of the existing 15-mile road and would connect directly with Kobuk's local road system.

[4] As a practical matter, government landowners have the ability and sometimes a requirement to authorize access across public lands by trail, road, or overland at any time. Native corporation landowners also have this ability. In practical terms, it may make sense if the Ambler Road were in place to authorize new use of the then-existing road rather than authorize a separate parallel access road. The intent of these bullet points is to illustrate the limits of what AIDEA would be able to authorize on its own versus what could be authorized by the underlying landowner through its standard permitting processes.

- **Shungnak:** Shungnak lies about 12 river miles down the Kobuk River from Kobuk (8 overland miles in winter).[5] These additional distances for delivery of goods by boat or snowmobile would apply to all build alternatives.
- **Ambler:** Ambler lies about 38 river miles downstream from the road's end at the Ambler River (approximately 26 miles along the river valley in winter). This compares to 62 river miles or 32 miles overland (winter) from Kobuk.

It is reasonably foreseeable that, once the road is open to commercial deliveries:

- Kobuk would see direct deliveries to the community, which would likely include regular delivery of bulk fuel, groceries, and large loads (e.g., construction materials).
- Shungnak would benefit by transporting road-delivered goods by boat or snowmobile from Kobuk, but these would likely be smaller loads.
- Ambler would desire to get goods by boat or snowmobile, but this would occur less frequently than at Shungnak because of distance.

Alternatives A and B

In addition to the access cited above, Alternatives A and B would likely provide improved commercial deliveries to other communities. In the following text, where Alternatives A and B overlap, the mileposts given are based on Alternative A. The following communities are nearest to the Alternatives A and B alignment:

- Bettles/Evansville lies about 24 river miles south of road Milepost (MP) 45 via the John River, or 8.5 overland miles south of either road MP 38.5 or 45.
- Alatna and Allakaket lie about 85 river miles south of road MP 45 via the John and Koyukuk rivers. Potential winter overland routes could be about 57 miles from road MP 90, via the Alatna River valley, or 52 miles from road MP 39.5, via Evansville and Bettles.

It is reasonably foreseeable that once the road is open to commercial deliveries:

- The Bettles/Evansville community would desire to re-route the winter road (ice road) they build most years to the Dalton Highway to instead access the proposed road (about one-third the length). This would also continue to benefit Alatna and Allakaket. The communities may need to contribute to road maintenance costs, and a separate authorization from land managers would be required. It is not likely the road would be authorized for use by the general public, but it is reasonably foreseeable that it would be authorized for commercial deliveries, which is in keeping with AIDEA's application.
- The ability to pick up commercial deliveries by boat at the road may be desired by Bettles/Evansville, but this would likely involve less freight than winter access. Alatna and Allakaket are sufficiently distant that boat access would be anticipated to be rare.

The Alternatives A and B alignment comes close to several areas that would be anticipated to desire some access for commercial deliveries. The Alternatives A and B alignment would:

- Pass between a collection of state mining claims located 1 to 3 miles north and south of the road route at about road MP 5 to MP 11.

[5] The term "river miles" accounts for bends in the river and is an approximation of the mileage by boat. The term "overland miles" or indications of winter use is based loosely on topography or known existing winter trails and almost always does not follow the bends in the rivers but cuts across them, resulting in shorter winter distances between points.

- Pass south of mining claims near Wild Lake and Flat Creek, about 30 miles up the Wild River, and other claims at Crevice Creek, about 29 miles up Timber Creek and John River. Access for both would originate in the MP 37–39 area via known winter trails (Revised Statute [RS] 2477 routes).
- Pass south of the south end of Iniakuk Lake, about 1.5 miles from road MP 89. The Iniakuk Lake Wilderness Lodge and perhaps other private property owners on the lake are likely to desire occasional commercial delivery of building materials, fuel, or food supplies for transport over snow.
- Pass south of three Native Allotment parcels near Mauneluk River and Avaraat Lake, within about 1 mile of road MP 130 and 133. A material site, which would be accessible by road, is adjacent to 1 of the properties.
- Pass north of the north end of Narvak Lake, about 3.5 miles from road MP 157.5. Peace of Selby Wilderness Lodge is located near the north end of the lake, and a Native Allotment parcel is located near the south end of the lake.
- Pass north of a Native Allotment parcel on the Mauneluk River, about 2.5 miles downstream of road MP 174.
- End 3 to 4 miles from two Native Allotment parcels fronting on both the Ambler River and Lake Anirak. Multiple other allotments occur downstream, mostly nearer to Ambler.
- Where Alternatives A and B split, only Alternative A would pass north of Nutuvukti Lake, where a Native Allotment is located about 1 mile from road MP 133.
- Only Alternative B would pass north of Norutak Lake, about 0.5 mile from the north end of the lake, near road MP 131, where there are three Native Allotment parcels that appear to be currently undeveloped.

It is reasonable to assume that there would be demand by these mining claim holders and landowners for commercial deliveries of supplies, mostly for transport over snow from the road to the final destination.

Over the 50-year life of the proposed road, in addition to Kobuk, it is reasonable to assume that Bettles/Evansville, Shungnak, and/or Ambler would pursue additional permanent roads connecting to the road (Alternative A or B). Bettles/Evansville is on the opposite side of the Koyukuk River and would require a large, expensive bridge of 600 feet or more, so this road is assumed to develop as a replacement winter road or a permanent road that terminates across the river, requiring a boat to make the last connection. It is reasonable to assume that connecting roads would be authorized as public roads, given current ADOT Regional Transportation Planning (DOT&PF 2022) and the assumption that construction of any connecting road would involve some public funding. Therefore, it also reasonable to assume that the public, especially residents of the community, would use the connecting road.

Alternative C

In addition to Kobuk, Shungnak, and Ambler, discussed above for all alternatives, the following communities are nearest to the Alternative C alignment:

- Tanana lies 33 miles south of road MP 76 via an existing Tanana-Allakaket winter trail, an RS2477 route in the Ptarmigan Creek valley.
- Hughes lies fewer than 4 miles south of road MP 197.
- Alatna and Allakaket lie about 71 miles north of road MP 105 via an existing Tanana-Allakaket winter trail, an RS2477 route, and 51 river miles from MP 179 on the Koyukuk River.

- Huslia lies about 207 river miles southwest of road MP 279 (Hughes area) along the Koyukuk River and about 63 overland (winter) miles south of road MP 247 along the Koyukuk and Hogatza river drainages. Also, it is reasonable to assume that a direct road connection to Hogatza's existing mining road network would develop, and thus access to Hog Landing near the confluence of the Hogatza and Koyukuk rivers would occur. Huslia lies more than 100 river miles from Hog Landing via the mainstem Koyukuk River (85 via Cutoff Slough), but lies about 37 overland (winter) miles from Hog Landing.
- Rampart is close in straight-line miles but is located on the opposite side of the Yukon River. Given terrain and the river, it is likely that Rampart would not take deliveries from the proposed road.

It is reasonably foreseeable that once the proposed road is open to commercial deliveries:

- Hughes would desire deliveries year round.
- Alatna and Allakaket would likely continue to depend primarily on air service and the late-winter road to Bettles for deliveries, but would occasionally take delivery by boat or snowmobile from Alternative C.
- Tanana, which has road access to a point across the Yukon River and about 8 miles upstream, likely would not arrange for deliveries via the Alternative C alignment.
- Huslia, which normally has summer barge service, would likely not seek deliveries via the proposed road. The Hog Landing road would provide relatively close winter access, but it presumably is maintained for summer use by barges and not for winter. Occasional delivery by road and boat may occur in summer when a delivery is needed, outside the regular Huslia barge schedule.

In addition, the Alternative C alignment would:

- Pass through a large private parcel near road MP 20.
- Pass south of a set of multiple mining claims in the Ray River valley, located about 8 miles from road MP 23. Because of topography, any road connection would be longer. It is worth noting that some of these claims lie a similar distance from the Dalton Highway, and no road has been developed to them.
- Pass south of a large block of mining claims in the Spooky Valley area, about 11 miles from road MP 63 from up Gishna Creek.
- Pass east of the Utopia airstrip and its associated 10-mile road system supporting the U.S. Air Force's Indian Mountain Long Range Radar Station, about 7 miles from road MP 155.
- Pass near multiple Native Allotment parcels along the Koyukuk River at and upstream of Hughes.
- Pass north of a large block of mining claims near Hogatza. It would be about 8 miles from the proposed road MP 250 to tie into an existing road. The existing 35-mile Hogatza-area road system links mining claims, an airstrip, and Hog Landing near the confluence of the Hogatza and Koyukuk rivers.
- Pass close to multiple Native Allotment parcels near Kobuk, north and south of the Kobuk River.

It is also reasonably foreseeable that:

- The Hogatza mining area could seek a direct connection to the proposed road and, even without an all-season road, would deliver some equipment for overland transport in winter. These would be by separate authorization.
- Other mining claimants may seek direct connection or wish to use the road for delivery of some equipment in winter.
- The Air Force likely may wish to have use the road for access by radar station maintenance personnel and for delivery of equipment.
- Some Native Allotment owners may also seek commercial deliveries of relatively small loads for transport to their sites for final delivery by boat or snowmobile.

Over the 50-year life of the road, it is reasonably foreseeable that Hughes would pursue a direct, year-round road connection to the community along the east side of the Koyukuk River and would receive regular commercial deliveries, including bulk fuel, groceries, and relatively large loads (e.g., construction materials). The other communities may see intermittent deliveries of relatively small loads that would be transported from the road by snowmobile or boat.

2.2.2 Public and Non-Industrial Access*

AIDEA's ROW application expressly requests the ROW for an "industrial-access road," for which access "would be controlled and primarily limited to mining-related industrial uses, although some commercial uses may be allowed under a permit process." AIDEA also acknowledges the potential for government use, such as BLM use for mobilization of equipment and personnel for fire suppression actions or other fire management in the planning area.

For these reasons, the BLM is not considering issuance of a ROW for a public road, and a public road is not among the action alternatives being considered for analysis in the EIS. The proposed road would be closed to the general public. AIDEA, in comments on the original EIS and in published material on its project website, indicates the following combination of legal and contractual requirements that would keep the road from being open to the general public:

- The request is that the landowners (mostly federal and state government) grant only limited-access ROW; the EIS Record of Decision and federal permit stipulations can restrict road uses.
- It is likely that private landowners such as Native corporations would require the road to be closed to the public where the ROW crossed their lands.
- Any proposal to open the road to the public would require all landowners to agree.
- The road ROW (land rights) would be issued to a public corporation, not the general state or federal government.
- The entity seeking to own and manage the road as a public road, including the State of Alaska, would be required to buy out AIDEA's interest in the road.
- There would be restrictions on road use in the contractual terms financing construction and operation.
- Endorsements in insurance policies for the road would be based on restricted road use.
- The identified road users (mine owners/operators) ultimately responsible for paying back road construction costs through road-use fees want road use limited for safety reasons.

ADNR, in its role as a cooperating agency for the project, has stated that it must separately adjudicate an easement for state lands and during that process ADNR will address use of the road and restrictions on use. AIDEA has applied to ADNR for an exclusive easement for a private industrial road with potential commercial use for delivery of goods and services but no public access. Per the State of Alaska, ADNR will address use of the road and restrictions on use when it considers the easement application.

Modifying a restricted access industrial road to one capable of supporting public access would require a new ROW application and authorization process and renegotiation of easements, financing, and insurance. Such a road would have a different purpose and need. Any application to convert an approved, restricted industrial access road to a public road across federal public lands would require additional NEPA, ANILCA (1980) Section 810, and National Historic Preservation Act analyses, including appropriate public involvement and consultation with federal, Tribal, state, and local government entities. No such application has been submitted; however, given the requested ROW time frame of 50 years, it is reasonably foreseeable that once the road is constructed, local residents within the general area of the road, as well as other residents within Alaska, will seek ways to access the road both lawfully and unlawfully.

There are a few examples of existing industrial roads in northern Alaska that have restricted access. Each road in the following discussion is uniquely different in terms of land ownership underlying the road and authorization(s) granted. However, they provide useful examples of past, present and possible future actions regarding public use of industrial access roads.

The Pogo Mine Road is a 56-mile-long restricted access road that begins on the Richardson Highway near Delta Junction and ends at the Pogo Mine. The road is located on state lands and authorized by ADNR under two separate ROWs, one a public ROW with restricted access for the first 23 miles issued to ADNR and the second an exclusive ROW for the remainder of the road to Teck Pogo (Teck-Pogo, Inc. 2003). Access to the road is controlled by a staffed security gate, approximately a half mile from the highway. Public access to the road is strictly controlled. An April 16, 2019, letter from AIDEA to the BLM stated AIDEA's belief that land managers have the authority to limit use of the road, such as ADNR has done with the Pogo Mine Road. AIDEA stated that the Ambler Road would be intended as an industrial access road and specified that their proposal is that "individual miners and recreational miners would not be authorized to use the road" under AIDEA's ROW grant. However, ADNR specifically reserved the ability to grant authorizations on the Pogo Mine Road: "The right-of-way permit will specifically reserve to the State the right to grant additional authorization to third parties for compatible uses (including other rights-of-way) on or adjacent to the land under the right-of way" (Pogo Project Right-of-Way Final Decision, ADL 416809 & ADL 417066, section XI. Economic Benefits). ADNR permits on the Pogo Mine Road are limited to extractive purposes such as mining and forestry uses.

As stated within the ROW, once the useful life of the mine is over, the first 23 miles of the Pogo Mine Road would convert to a public road to provide access to the Tanana Valley State Forest and other State Lands, in accordance with state land plans for this area (Teck-Pogo, Inc. 2003). The remainder would be reclaimed with the decommissioning of the mine. The Northwest Alaska Transportation Plan 2022 Update prepared by the Alaska Department of Transportation and Public Facilities (DOT&PF 2022a) contains key recommendations for improving transportation infrastructure in the next 20 years. Within the report are new potential road linkages that are proposed for planning and environmental linkage studies, including an Ambler-Shungnak-Kobuk connection route envisioned to be connected to the existing Bornite Road. "If the private Ambler Mining District road is developed, these communities could potentially connect to the National Highway System on a permit basis" (DOT&PF 2022a:58). Similarly, the Alaska Moves 2050 Statewide Freight Plan (DOT&PF 2022b) contains key recommendations for improving air, road, rail, pipeline, port, and marine transportation systems throughout the state and speaks to the need to accommodate heavy truck traffic associated with the proposed Ambler Road and other resource development.

The Delong Mountain Transportation System (DMTS) includes a 52-mile-long restricted access road that crosses private land owned by the NANA Regional Corporation (NANA) connecting the Red Dog Mine to port facilities at its terminus on the Chukchi Sea. The entirety of the DMTS, including the associated facilities, is owned by AIDEA and authorized through a lease from NANA. In their 2017 Asset Management Review, AIDEA lists risks and opportunities to the DMTS (AIDEA 2017). Opportunities focused on the potential uses of the DMTS after the current mineral deposit is fully worked and depleted, which is estimated to occur in 2031. Listed opportunities include additional planned exploration by Teck that could increase the life of the mine, other mineral development within the region, or use of the DMTS for other purposes, such as assisting local community development by connecting to the nearby communities of Noatak or Kivalina; continuing to provide lower cost fuel to local residents; or providing support for scientific research, tourism, or Arctic shipping.

The DMTS is currently used by the residents of Kivalina to access subsistence hunting (Arctic Sounder 2015; WACH Working Group Minutes 2019) in compliance with safety best practices and guidelines. In 2018 Teck prepared a draft Environmental Evaluation Document (EED) to support a U.S. Army Corps of Engineers (USACE) Environmental Assessment of the proposed Anarraaq and Aktigiruq Exploration Program, which included construction of 13 miles of new road (Teck 2018b). Although the access road is not open to the public, inadvertent casual use of the road by residents of Kivalina and Noatak was expected to occur and analyzed as part of the proposed action. Similarly, The North Slope oilfield contains an extensive road network on both state and federal lands that is closed to the general public and access is controlled by industry. However, North Slope residents have successfully negotiated access to and use of the road network through a Good Neighbor Agreement, allowing them the ability to use the oilfield roads to access the public Dalton Highway.

Many comments on the original EIS and in the development of this Draft Supplemental EIS question the ability of the BLM and AIDEA to keep the Ambler Road private, basing their comments on the opening of the Dalton Highway to the general public after nearly 20 years of its north end being open to industrial traffic only. While the situations differ, given the dearth of developed infrastructure in Alaska, and the value of the road and associated facilities, it is reasonably foreseeable that ultimately, efforts will be taken to convert the Ambler Road to a public-accessible road, not unlike opportunities contemplated for the DMTS. During the initial EIS process, the Alaska Outdoor Council stated that they will pursue all channels to ensure the road is permanent and open to the public (AOC 2019). Further, once communities are connected to the road for commercial purposes, it is unlikely that those commercial uses would be discontinued.

AIDEA has proposed that public access to the Ambler Road would be restricted by means of a staffed gate facility near the eastern end of the road and another near the western end. The gate facilities would be staffed 24 hours per day for the life of the road. AIDEA proposes to hire others to provide road security and maintenance. Security personnel and authorized drivers would be in continual radio contact as they traversed the road and would report unauthorized use of the road.

Crossing of the proposed road by the general public would be allowed for traditional overland transportation (i.e., snowmobile, dog team, on foot). AIDEA may specify certain areas for safe crossing. Use of the road by the general public for purposes other than to cross would not be allowed. Area residents and landowners would have the ability to take delivery of goods by commercial carrier as described in Section 2.2.1, Commercial Access Scenario.

Given the above discussion, the following assumptions are reasonably foreseeable with regard to public and non-industrial access of the Ambler Road:

- Local residents will use portions of the Ambler Road in conjunction with subsistence use of the area, traveling by snowmachine, off-highway vehicle (OHV), or on foot, including using the road to facilitate boat access.
- Should commercial access result in connecting roads to local communities, those communities will negotiate access for local residents to use the road to connect to the Dalton Highway.
- Individuals with valid existing land use rights within the area (such as miners wanting to access their state or federal mining claims) may apply for road access.
- After the road is constructed, efforts may be made to convert the road to a public road. This would require a new application, additional NEPA analysis, and the issuance of new authorizations. The road would need to be constructed to appropriate standards for public health and safety.

2.2.3 Trespass Scenario*

Members of the public and some cooperating agencies have expressed concern over the potential effects of trespass along the Ambler Road and the impacts of trespass on subsistence use and cultural resources. For the portions of the road that cross public lands, the road would not be open to the general public, including people who live in the project area, by design and general public access would not be authorized under the BLM’s ROW permit; however, there is potential that use of the road and associated facilities, such as airstrips, by unauthorized users (i.e., trespass) will occur. The following assumptions are reasonably foreseeable with regard to unauthorized use associated with the Ambler Road:

- Unauthorized use of the road and airstrips would occur by both regional residents and non-local visitors in pursuit of hunting, angling, or other recreational opportunities.
- Overland unauthorized use of the road would primarily occur by people on snowmobiles and OHVs, and points of access would be focused at locations where existing OHV trails or roads intersect the road alignment and away from staffed gates and entrances, which unauthorized users would avoid due to the presence of security personnel.
- Unauthorized use would be sporadic and isolated. It could occur at any time but would be most likely to occur during hunting season.
- Unauthorized use could also occur via boat access where bridges intersect with the road.
- The public Dahl Creek airstrip is located approximately 10 miles south of the proposed road and could serve as an access point for unauthorized use of the road, given existing trails.
- The three new airstrips are proposed for each alternative road route also provide potential unauthorized access to the road and the adjacent lands.

2.2.4 Fiber-Optic Communications and Related Issues*

AIDEA has applied for placement of a fiber-optic communications line for Internet and telephone service along the proposed road. This is intended first to serve the road maintenance stations and operations along the length of the road. AIDEA notes that District customers and communities also are likely to desire connection to the fiber-optic line. It is reasonable to assume that residents of the area would desire connection if it would result in better Internet connection (greater bandwidth and speed) for equal or less cost than currently available via satellite. Over the 50-year life of the proposed road, the following are considered reasonably foreseeable:

- Alternatives A, B, and C may result in fiber-optic connection to Kobuk and Shungnak (the two already are connected by power transmission line).
- Alternatives A and B, in addition, may result in fiber-optic connection to Bettles/Evansville.
- Alternative C, in addition, may result in fiber-optic connection to Hughes and to a mining operation at Hogatza and possibly to the military's Long Range Radar site on Indian Mountain.

Given the dearth of utility infrastructure in the project area, and the potential value of improved Internet and phone connections for communities, it is reasonably foreseeable that communities would negotiate for AIDEA's fiber-optic lines and associated connections to remain in place in perpetuity, in lieu of reclaiming these facilities at the end of the ROW term.

Construction of spur line connections to AIDEA's proposed fiber-optic line would be projects that are separate from AIDEA's Ambler Road Project and would need to be paid for by communications companies or others outside of AIDEA. These projects would require additional authorization from agencies that manage lands the fiber-optic spur line would cross.

2.3. Past, Present, and Other Reasonably Foreseeable Actions*

This chapter identifies past, present, and other reasonably foreseeable future actions that establish the basis for the cumulative effects analysis. The method for determining the cumulative impacts of the proposed project is based on *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997) and Chapter 6.8.3 (Cumulative Effects) of the BLM NEPA Handbook (BLM 2008a). It includes:

- Definition of spatial (geographic) and temporal (time frame) boundaries of the analysis
- Identification of past, present, and reasonably foreseeable actions within the spatial and temporal boundaries and their potential environmental effects on resources directly or indirectly affected by alternatives

2.3.1 Geographic Scope and Time Frame for Cumulative Impacts Analysis

The spatial scope for analysis of cumulative effects is considered the same as the affected environment for each resource and is shown on maps in the EIS for each resource. Generally, the area in question is the proposed road corridor for each alternative and the area described in Section 2.1, Mining Development Scenario in the Ambler Mining District, and Section 2.2, Road Access Scenarios, for the mining scenario. For some resources, such as subsistence and wildlife, the areas are much larger because of the range of the affected subsistence hunters and of species such as fish and caribou.

The time frame for the cumulative impacts analysis is the same for all resources and includes past, present, and future actions. The temporal boundary extends back to when the area's human activities were primarily traditional uses by Indigenous people. Mining exploration activities have occurred in the region stretching back to the late 1800s. The period for road impacts analysis extends through 2072, which encompasses the 50-year life of the proposed BLM ROW; however, water treatment at potential mines could extend the cumulative impacts much longer. See the assumed development schedule in Table 2-8.

2.3.2 Past and Present Actions*

The following lists past and present actions that have shaped baseline conditions presented in the Affected Environment sections of the EIS. Baseline conditions are a combination of natural conditions and conditions created by the past and present actions. The actions may be considered collectively as past and present actions—that is, actions of increased access and human activity and increased land management that create trends. The trends have formalized land ownership and management for both development and conservation and for managing human activity. Past and present actions include:

- Placer and hard rock mineral exploration and mining development, including gold rushes in Nome, Klondike/Yukon Territory, and Interior Alaska, that brought people from outside Alaska to and through the study area in the late 1800s and early 1900s, and specific exploration and staking of claims in the District and other parts of the study area. Mineral exploration has been occurring within the Ambler District since the 1950s (Cardno 2015). Small-scale mining development and ore exploration still occurs within the Ambler District and is currently supported by air since there is no road access to the District.
- East of the District, over 300,000 acres of mining claims have been staked, including mining claims owned by Trilogy Metals for the Helpmejack and Malamute projects, as well as mining claims owned by South32 for the Roosevelt project (see Map 1). Exploration activities for these mining claims are currently supported by air.
- Collective actions of government, businesses, and individuals that resulted in a transition in rural Alaska communities from traditional subsistence economies to partial cash economies, with associated cultural changes, including shifts in sovereignty, housing, heating, food, sanitation, education, transportation, communication, and health. These trends could potentially extend into the future.
- Use of historic travel routes by area residents and explorers, originally by dog sled, but over time by larger or faster equipment (e.g., snowmobiles, cat trains, ice roads); clearing of some routes; invoking of RS2477 ROWs by the State of Alaska. Such transportation uses are expected to continue into the future.
- A myriad of actions on a global scale that emit greenhouse gases (GHGs) and contribute to climate changes and to associated noticeable effects on the ground in the project area, including permafrost degradation or warming and seasonal changes (e.g., shorter winters).
- Recreational exploration of the Brooks Range and area rivers, along with recent efforts to expand Interior Alaska tourism (e.g., Explore Fairbanks marketing efforts; former Governor Bill Walker's delegation to China) and popularization of Alaska's wildlife, wilderness areas, and aurora borealis, leading to further recreational use and to land conservation. This growing recreation trend could continue into the future.
- Increasing levels of hunting in rural portions of Alaska by nonlocal hunters including nonresident, foreign and urban Alaskan hunters since roughly the 1950s has resulted in the growth of commercial hunting services, e.g., booking agents, guides and transporters who support hunters.
- Adoption of land legislation and land use and plans, including:
  - Alaska Statehood Act of 1959, resulting in large areas of federal land being transferred to the new state.
  - Alaska Native Claims Settlement Act (1972), resulting in formal land ownership of large tracts by Alaska Native regional and village corporations.

  - ANILCA, resulting in the creation of national parks, national wildlife refuges, wild and scenic rivers, and other conservation system units in the project area and statewide. Additionally, ANILCA identified subsistence uses of fish and wildlife as the priority consumptive use on public lands in Alaska.
  - Land and resource management plans by large-scale landowners.
- Transportation changes, including:
  - Construction of the Trans-Alaska Pipeline System (TAPS), the Dalton Highway, the Alaska Railroad, and the Tanana Road, and the opening of the Dalton Highway to the public.
  - Construction of roads and airports in rural Alaska communities. Additional road and airport work would likely continue.
  - Establishment of barge/boat services on rivers and streams, and widespread use of motorized personal boats. Such boat use is expected to continue into the future.
  - End of dog teams as a primary means of travel with widespread, common use now of snow machines, all-terrain vehicles, prop- and jet-drive boats, and fixed-wing airplanes for travel between communities and transport of hunters into remote areas.
  - Use of helicopters for industrial exploration and mining activities, wildlife and fish surveys, and many other applications.
  - DOT&PF is currently implementing several reconstruction projects along the Dalton Highway (from MP 0 to 414) to ensure design standards are met and to improve conditions related to safety, efficiency, performance, longevity, and maintenance costs.
- Oil and gas exploration and development on the North Slope, starting in earnest in the 1960s and 1970s. Current developments include the Prudhoe Bay, Greater Mooses Tooth I and II, and Liberty (offshore) projects.

In 2018, ADNR requested priority conveyance of BLM-managed lands to the State of Alaska in the area AIDEA has proposed for the road, near the intersection of Alternatives A/B and the Dalton Highway at MP 161. The conveyance would be part of Alaska’s selections under the Alaska Statehood Act. The lands are currently withdrawn by Public Land Order 5150 as part of the TAPS corridor and are not eligible for state selection until and unless the Public Land Order is revoked or modified. ADNR, as a cooperating agency for this Supplemental EIS, requested that the state’s top-filing on these lands be disclosed in the EIS. The BLM has determined that such conveyance is not reasonably foreseeable, so this is not listed as a past, present, or reasonably foreseeable action; however, it is acknowledged as an ADNR request.

2.3.3 Other Reasonably Foreseeable Actions*

This section describes other RFAs regardless of the agency (federal or non-federal) or person who undertakes such other actions. Per the BLM’s NEPA Handbook (H-1790-1), RFAs are those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends. The following are RFAs identified within the temporal and geographic boundaries of the analysis:

- **North Slope Development.** Further Arctic oil and gas development in new areas: Potential locations include the Arctic National Wildlife Refuge Coastal Plain, National Petroleum Reserve in Alaska (NPR-A), and offshore. Construction of a natural gas pipeline and production of natural gas also is possible. Any of these would affect Dalton Highway use. One development in the NPR-A, known as the Willow Master Development Plan Project, was approved by the BLM in March 2023. Development in the Coastal Plain, offshore, or development of natural gas infrastructure is currently not reasonably foreseeable, but new development could feasibly occur in the next 50 years, which is the requested ROW time frame. Over the same period, it is reasonably foreseeable that some existing North Slope oil fields will close and that jobs will be lost in those areas. The entire TAPS could close (Magill 2012), but this is not considered reasonably foreseeable. In addition to oil and gas development, the State of Alaska and North Slope Borough are partnering on an Arctic Strategic Transportation and Resources (ASTAR) project that could connect most borough communities and the Red Dog Mine and provide access for oil and hard rock mineral exploration and development. State funds ($7.7 million) were obligated in 2017 and currently are being spent on background data collection and planning.

- **Mineral exploration**. Mineral exploration supported by air is expected to continue at existing or increased levels in the future. This includes mineral exploration currently occurring east of the District where the geology is thought to be similar to the Ambler Mining District (e.g., for the Roosevelt, Malamute and Helpmejack projects). Interest in mineral exploration is expected to increase over time in response to a growing demand for critical minerals at state, national, and global levels. This projection is further supported by recent increases in the number of mining claims both within and outside of the District. Since existing mining claims in the District and surrounding region lack the access needed for development, there is a potential for interest in mining claims to decrease in the future if the proposed Ambler road is not constructed. However, given the District's significant mineral potential, longstanding history of mineral exploration, and high number of existing mining claims (both within and surrounding the District), interest in mineral exploration is expected to persist regardless of the outcome of the proposed Ambler Road, and alternative means of access (whether by surface, air, or other emerging technologies) would likely be pursued by the industry.
- **Extension and Eventual Closure of Red Dog Mine.** Red Dog Mine originally was slated to close by 2031, but currently is undergoing permitting for a road extension and underground exploration program estimated to last 4 years. Whether that exploration results in further long-term mining is unclear. However, within the 50-year life of the proposed road, Red Dog Mine would be expected to close, accompanied by reduction in regional jobs and borough income.
- **Climate Change Actions and Responses.** Actions related to climate change, including actions globally that result in emissions of GHG (primarily actions that result in the burning of fossil fuels) and in-state actions in response to climate change, such as relocations of facilities due to permafrost thawing or water level changes, and TAPS and Dalton Highway projects related to addressing permafrost issues. These are simply examples; no specific projects are reasonably foreseeable.
- **Dalton Highway Improvements.** Actions to widen and otherwise improve the Dalton Highway will be implemented by DOT&PF, which has invested $175 million to construction projects planned along the Dalton Highway corridor over the next 5 years.
- **OTZ Communication Towers.** OTZ is planning to construct 13 new communication towers in the vicinity of the Ambler Road. AIDEA has indicated that utilizing some of these towers for the Ambler Road project would not be reasonable due to reliability, cost, and capability concerns. However, collaboration between AIDEA and OTZ would be possible to look for opportunities for their mutual benefit and public benefit.
- **Fiber-Optic Development Funding:** Tanana Chiefs Conference was recently awarded $303 million to provide fiber-optic cable connectivity to the communities of Alatna, Allakaket, Hughes, and Huslia.

- **ANCSA 17(d)(1) Withdrawals EIS.** The BLM is analyzing the revocation of existing 17(d)(1) withdrawals in five planning areas, including the Kobuk-Seward Peninsula Planning Area, which overlaps the Ambler Road project area.
- **Port of Nome Expansion Project.** The Port of Nome Expansion Project is being proposed by the USACE and City of Nome to alleviate existing vessel restrictions that are imposed by insufficient channel depths and harbor area. The project aims to provide larger vessels improved access to Nome's existing harbor by enlarging the outer basin and creating a new deep-water basin with a depth of minus 40 feet. Dredging would be required to deepen and maintain both basins and associated navigation channels (USACE 2023). The project has an estimated completion date of 2030.
- **Port of Alaska Modernizations.** The Port of Alaska's Modernization Program was created in 2014 to provide four new terminals via a phased program comprised of multiple projects. The program aims to replace aging docks and related infrastructure, improve operational safety and efficiency, accommodate modern shipping operations, and improve resiliency. Four projects (of eight total) are planned for future construction between 2025-2032, contingent on available funding (Port of Alaska 2023).
- **Cape Blossom Road.** The Alaska DOT&PF has secured funding to construct a gravel road from Kotzebue, Alaska, south across the Baldwin Peninsula to a beach access area near Cape Blossom. The project is intended to connect Kotzebue, the shipping hub for the Northwest Arctic region, to a viable arctic port at Cape Blossom with access to deeper water. The Cape Blossom Road is being designed for commercial freight transport and recreational uses with an estimated volume of 100 vehicles per day or less. The project is expected to be completed in the 2025 (DOT&PF 2022b, 2023).
- **Manh Choh Mine.** The Manh Choh project plan includes small open pit mining near the traditional Alaska Native village of Tetlin from which rock will be trucked about 240 miles one-way for processing at the existing Kinross Fort Knox mine, located about 25 road miles northeast of Fairbanks. Access road construction for the proposed mine, a twin road and a site road, and site preparation started in 2022 with completion by the end of 2023. The mine is estimated to produce for about 4 to 5 years (Kinross 2023). This new mine would add truck traffic along parts of the Alaska, Richardson and Steese Highways (Alaska Journal of Commerce 2022).
- **Graphite One Mine.** Graphite One Inc. is proposing to develop the Graphite One Mine on the Seward Peninsula of Alaska, near Nome, Alaska. The project would mine approximately 4 million tonnes of graphite material annually which would be processed in a plant adjacent to the mine. After initial processing, the graphite concentrate would be shipped to Washington state for secondary processing. Exploratory drilling for the project has been occurring since 2011 and many environmental studies are currently underway. The life of the mine is expected to be 23 years (JDS Energy & Mining Inc.2022).

The BLM acknowledges that other non-physical actions also are likely to influence human uses of land in northwest Alaska. For example, the Central Yukon Field Office currently is working on a new management plan for BLM-managed lands between the Brooks Range and Yukon River, and the Anchorage Field Office is working on a Squirrel River Special Recreation Management Area plan for lands near the lower Kobuk River. Similarly, the National Park Service, U.S. Fish and Wildlife Service, and State of Alaska are likely to update their land management plans over the life of the Ambler Road project, affecting all government lands across the region. While these plans would affect how people may use the lands for recreation, subsistence, hunting and fishing, transportation, and commercial ventures, it is not reasonably foreseeable how land management will change based on those updates at this point in time.

3. Indirect and Cumulative Impacts*

3.1. Effects of Reasonably Foreseeable Actions—Applicable to All Alternatives*

As described in Section 2.3.3, Other Reasonably Foreseeable Actions, certain future activities would occur regardless of the outcome of the Ambler Road project, including under the No Action Alternative. Table 3-1 presents the 11 RFAs from Section 2.3.3, Other Reasonably Foreseeable Actions, and summarizes their potential impacts on resources in the project area. This includes transient resources in the project area, such as waters that flow through it and caribou that migrate through it.

These are impacts that are assumed to occur under the No Action Alternative and Alternatives A, B, and C. Under the No Action Alternative, these are the primary impacts that would occur, as no road would be built and little to no mine development would be anticipated. Under the action alternatives, these impacts are part of the baseline (along with past and present actions).

Table 3-1. Effect of reasonably foreseeable actions on project area resources for all alternatives*

Resource category	North Slope development	Red Dog Mine extension/closure	Climate change	Dalton Highway improvements	Mineral exploration	OTZ communication towers	Fiber-optic development funding	ANCSA 17(d)(1) Withdrawals EIS	Port of Nome expansion	Port of Alaska modernization	Manh Choh Mine	Graphite One Mine	Cape Blossom Road
Geology and Soils	No contributing effect in the project area.	No contributing effect in the project area.	Could contribute to permafrost degradation.	May contribute to localized permafrost degradation along the highway.	Could contribute to localized soil disturbance, permafrost degradation, increased erosion and sedimentation, dust deposition, and release of NOA into waterbodies.	Could cause permafrost degradation and increased erosion and sedimentation.	Development projects could cause permafrost degradation and increased erosion and sedimentation.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.
Sand and Gravel Resources	No contributing effect in the project area.	No contributing effect in the project area.	May require use of sand and gravel resources for construction of response projects.	Requires use of sand and gravel resources for construction.	No contributing effect in the project area.	Requires use of sand and gravel resources for construction.	Development projects would require use of sand and gravel resources for construction.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.
Hazardous Waste	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	Could result in spills during construction and operation.	Could result in spills near existing airfields and roads in project area.	Could result in spills during construction and operation.	Development projects could result in spills during construction.	Development on revoked withdrawals could increase the risk of spills.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.
Paleontological Resources	No contributing effect in the project area.	No contributing effect in the project area.	Thawing permafrost would impact resources. Response could include documenting these resources.	Could impact resources from excavation or fill.	Could impact resources from excavation or fill.	Could impact resources from excavation or fill.	Development projects could impact resources from excavation or fill.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.
Water Resources	Little to no contributing effect in the project area.	No contributing effect in the project area.	Could contribute to changes in hydrology and water quality.	Could impact stream/rivers that continue through the Ambler Road study area.	Could impact water quality, drainage patterns, connectivity, water levels, and velocity.	Little to no contributing effect in the project area.	Little to no contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.
Air Quality and Climate	Contributes GHG emissions during extraction and during end-use of petroleum products. See Climate Change column.	Closure would contribute slightly to reduction in GHG emissions. No substantial contributing effect in the project area.	Actions that emit GHG could contribute to shorter, milder winters and changing weather patterns.	Could contribute to localized air quality impacts during construction along the Dalton Highway and may attract more traffic, contributing to GHG emissions.	Would contribute to GHG emissions through fossil fuel combustion. See Climate Change column.	Could contribute to localized air quality impacts during construction.	Development projects could contribute to localized air quality impacts during construction.	No contributing effect in the project area.	Contributes GHG emissions during construction. See Climate Change column.	Contributes GHG emissions during construction. See Climate Change column.	Contributes GHG emissions during construction and operation. See Climate Change column.	Contributes GHG emissions during construction and operation. See Climate Change column.	Contributes GHG emissions during construction and operation. See Climate Change column.
Noise	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	Contributes to localized noise impacts during construction along the Dalton Highway.	Contributes to localized and intermittent noise impacts.	Contributes to localized noise impacts during construction.	Development projects could contribute to localized noise impacts during construction	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.

Resource category	North Slope development	Red Dog Mine extension/closure	Climate change	Dalton Highway improvements	Mineral exploration	OTZ communication towers	Fiber-optic development funding	ANCSA 17(d)(1) Withdrawals EIS	Port of Nome expansion	Port of Alaska modernization	Manh Choh Mine	Graphite One Mine	Cape Blossom Road
Vegetation and Wetlands	Little or no contributing effect in the project area.	No contributing effect in the project area.	Projects that emit GHG could contribute to changing vegetation communities through increasing temperatures and permafrost thaw.	Highway widening would affect vegetation and wetlands within watersheds that drain through the Ambler Road study area.	Ground disturbing activities could impact vegetation or wetlands and contribute to the introduction and spread of non-native invasive species.	Ground disturbing activities could impact vegetation or wetlands and contribute to the introduction and spread of non-native invasive species.	Ground disturbing activities could impact vegetation or wetlands and contribute to the introduction and spread of non-native invasive species.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.
Fish and Amphibians	Little or no contributing effect in the project area.	No contributing effect in the project area.	Projects that emit GHG could contribute to changes to hydrology, water quality/temperature, and riparian vegetation, which could contribute to effects on fish.	Could impact fish habitat in streams that continue through the Ambler Road study area.	Could impact fish habitat in streams that run through the Ambler Road study area.	Could impact fish habitat in streams that run through the Ambler Road study area.	Could impact fish habitat in streams that run through the Ambler Road study area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.
Birds	Little or no contributing effect in the project area.	Little or no contributing effect in the project area.	Projects that emit GHG could contribute to changes to hydrology, water quality, and vegetation, which could contribute to effects on birds and their habitat.	Highway widening would contribute to effects on bird habitat at the eastern edge of the project area.	Aircraft use would impact birds through disturbance, displacement, and direct injury or mortality. Could contribute to habitat loss and fragmentation in project area.	Ground disturbing activities could contribute to habitat loss and fragmentation in project area.	Ground disturbing activities could contribute to habitat loss and fragmentation in project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.
Mammals	Would increase disturbance and habitat effects on the Western Arctic Caribou Herd. (WAH) Additional Dalton Highway traffic could affect caribou travel.	Closure and substantially reduced activity on road could reduce conflicts with and disturbance to the WAH.	Projects that emit GHG could contribute to changes to hydrology, water quality, and vegetation, which could contributes to effects on mammals and their habitat.	Construction would reduce wildlife habitat, and activity would disturb animals. Potential increased traffic could affect caribou and other animal movements.	Air traffic could cause disturbance and displacement of caribou.	Construction activities could result in disturbance to mammals and their habitats.	Construction activities could result in disturbance to mammals and their habitats.	Could increase disturbance and habitat effects on the WAH.	No contributing effect in the project area.	No contributing effect in the project area.	Construction would reduce wildlife habitat and operations would disturb animals and result in displacement. Roads and traffic may disrupt animal movements and migrations.	No contributing effect in the project area.	No contributing effect in the project area.
Land Ownership, Management and Special Designations	No contributing effect in the project area.	No contributing effect in the project area.	Little or no contributing effect in the project area.	No contributing effect in the project area.	Could change the demand for industrial land uses associated with mineral development, depending on the outcome of exploration.	No contributing effect in the project area.	No contributing effect in the project area.	Future industrial development may be allowed on revoked lands.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.

Resource category	North Slope development	Red Dog Mine extension/closure	Climate change	Dalton Highway improvements	Mineral exploration	OTZ communication towers	Fiber-optic development funding	ANCSA 17(d)(1) Withdrawals EIS	Port of Nome expansion	Port of Alaska modernization	Manh Choh Mine	Graphite One Mine	Cape Blossom Road
Transportation and Access	Would maintain and likely increase traffic levels on the Dalton Highway. ASTAR and oil and gas development could extend industry and public roads across the North Slope Borough.	Closure of mine could reduce traffic levels in regional area.	Would likely make it harder to maintain winter trails. Could make it harder to maintain river navigation. Could result in transportation infrastructure needing more maintenance.	Would contribute to safety and accommodating increased traffic/demand. Construction impacts could contribute to traffic delays.	Would contribute to regional air traffic and Dalton Highway traffic levels.	Improved communication between vehicles and aircraft would result in improved operations and safety in the project corridor.	Development projects would contribute to regional air traffic and/or Dalton Highway traffic levels.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	Would increase heavy truck traffic on the Steese Highway between the Elliott Highway and Fairbanks.	No contributing effect in the project area.	No contributing effect in the project area.
Recreation and Tourism	Increased industrial traffic and increased recreation/tourism traffic could conflict on Dalton Highway, Elliot Highway, and Steese Highway.	No contributing effect in the project area.	No contributing effect in the project area.	Would contribute to safety and to accommodating increased traffic/ demand.	Would contribute to ongoing visual and noise impacts for recreationists and tourists.	Construction activities could result in traffic, visual, and noise impacts for recreationists and tourists.	Construction activities could result in traffic, visual, and noise impacts for recreationists and tourists.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.
Visual Resources	Little contributing effect in the project area. A new parallel pipeline could add to industrial character of Dalton Highway corridor.	No contributing effect in the project area.	Projects that emit GHG could contribute to vegetation changes over time; minor visual effects.	Would contribute minor visual changes.	Would contribute minor visual changes.	Would contribute minor visual changes.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.	No contributing effect in the project area.
Socioeconomics and Communities	Could increase job options in the region or forestall oil job losses. Could contribute to poorer health in communities if subsistence caribou harvest affected.	Closure would reduce regional employment. Reduction in jobs in the project area could reduce food security in local communities.	Thawing permafrost, reduced ice, changes in subsistence resource availability, and rising water levels could undermine community infrastructure, change winter transportation, affect public health, and require cultural adaptation. Response projects could inject funding/jobs into communities.	Construction may offer some job opportunities in the region.	Little contributing effect in the project area.	Construction may offer some job opportunities in the region. Improved communications systems would benefit local communities.	Construction may offer some job opportunities in the region. Improved utility systems would benefit local communities.	Little contributing effect in the project area.	Construction may offer some job opportunities in the region.	Construction may offer some job opportunities in the region.	Would alter job availability and level of economic activity in the project area.	Would alter job availability and level of economic activity in the project area.	Construction may offer some job opportunities in the region.

Resource category	North Slope development	Red Dog Mine extension/closure	Climate change	Dalton Highway improvements	Mineral exploration	OTZ communication towers	Fiber-optic development funding	ANCSA 17(d)(1) Withdrawals EIS	Port of Nome expansion	Port of Alaska modernization	Manh Choh Mine	Graphite One Mine	Cape Blossom Road
Environmental Justice	Could increase jobs for EJ communities, or forestall job losses.	Extension would extend jobs, and closure would reduce jobs in the region, affecting EJ communities.	Climate changes, rising water levels, changes in subsistence resource availability, and permafrost/ice cover changes affect EJ communities.	Little contributing effect in the project area.	Effects of air exploration on subsistence uses and resources would have continued effects on EJ populations.	Improved communications systems would benefit local EJ communities. Construction activities could result in temporary beneficial (i.e., jobs) or adverse (i.e., disturbance to subsistence resources and uses) effects.	Improved utility systems would benefit local EJ communities. Construction activities could result in temporary beneficial (i.e., jobs) or adverse (i.e., disturbance to subsistence resources and uses) effects.	Little contributing effect in the project area.	Little contributing effect in the project area.	Little contributing effect in the project area.	Little contributing effect in the project area.	Little to no contributing effect in the project area.	Little to no contributing effect in the project area.
Subsistence Uses and Resources	Could affect caribou movements, which in turn could affect availability caribou for harvest.	Closure would reduce conflicts with and disturbance to the WAH.	Projects that emit GHG could contribute to vegetation and climate changes that could affect availability of and access to berries, wood, and game. Effects on subsistence could affect public health in project area communities.	Minor changes to an existing road would not have substantial new effects on subsistence.	Air traffic could cause disturbance to subsistence uses and resources such as caribou and hunting.	Construction activities and presence of new infrastructure may affect subsistence uses and resources.	Construction activities may affect subsistence uses and resources.	Could result in changes in subsistence management including the loss of Federal subsistence priority for residents in the project area.	Little contributing effect in the project area.	Little contributing effect in the project area.	No contributing effect in the project area.	Little to no contributing effect in the project area.	Little to no contributing effect in the project area.
Cultural Resources	Construction and presence of new infrastructure could affect cultural resources directly or indirectly.	Closure would have no additional impacts, whereas extension could affect cultural resources directly or indirectly.	Projects that emit GHG could contribute to thawing permafrost, which can impact resources (e.g., through increased stream bank erosion).	Construction could affect cultural resources, including the NRHP-eligible Dalton Highway itself.	Air traffic could affect cultural resources indirectly (i.e., audio/visual effects).	Construction and presence of new infrastructure could affect cultural resources directly or indirectly.	Construction could affect cultural resources directly or indirectly.	Could result in fewer regulatory protections for cultural resources resulting in increased impacts to resources in those areas.	No contributing effect in the project area.	No contributing effect in the project area.	Construction and operation could affect cultural resources directly or indirectly.	No contributing effect in the project area.	No contributing effect in the project area.

Note: EJ = Environmental Justice; GHG = greenhouse gas; NOA = naturally occurring asbestos.

3.2. No Action Alternative*

Under the No Action Alternative, an access road to provide transportation to the District would not be provided. Without the access road, it is assumed that there would be no major induced development of the mines in the District, so there would be little to no beneficial or adverse impacts from mining. While the District contains sizable deposits for development, the lack of a road makes development of mines cost-prohibitive. Under the No Action Alternative, exploration of the deposits and additional staking of claims would continue as possible alternatives to the proposed road were evaluated.

Cumulative impact is the incremental impact of an action when combined with other past, present, and reasonably foreseeable future actions. Since no road would be built under the No Action Alternative, there would be no incremental impact to accumulate with other impacts. However, the impacts of the RFAs outlined in Table 3-1 would occur.

Table 3-1 is essentially a no-action analysis, describing effects expected to occur even if the BLM decided not to issue a ROW authorization for the Ambler Road. As noted in the table, many of the RFAs would likely result in little or no effect in the Ambler Road project area. Actions that affect climate change or in response to a changing climate would be most likely to continue to affect conditions in the study area. Actions to improve the Dalton Highway corridor likely would be an ongoing series of projects that would incrementally use relatively scarce area resources (gravel) and eliminate or change relatively small additional amounts of vegetation, wetlands, and watercourses that serve as habitats (e.g., when highway curves were realigned).

Some specific and potentially prominent impacts could affect caribou, subsistence, and socioeconomics. The synergistic effects of arctic development, Dalton Highway additions, climate change actions, and Red Dog Mine changes could affect caribou calving and wintering grounds, the caribou life cycle, and movement patterns of caribou, potentially threatening the population or altering access to and use of caribou as a subsistence resource. Arctic development and extension of the Red Dog Mine could provide a steady supply of relatively high-paying jobs, some of which likely would be taken by residents of the Ambler Road study area. Eventual closure of the Red Dog Mine and likely closure of some oil fields on the North Slope would reduce such jobs. The closure of Red Dog Mine, in particular, would affect residents of the western part of the Ambler Road project area. This is because the Red Dog Mine is on NANA land and provides substantial employment assurances to NANA shareholders and pays the corporation a steady annual income that has been used to improve villages in the region. The mine also makes substantial payments in lieu of taxes to the NAB that have benefited the people of the region. Neither the village improvement funds nor the payments in lieu of taxes would occur after mine closure, which could result in loss of substantial funds to the region. Table 3-1 provides information about effects in other resource categories.

3.3. Action Alternatives*

Additional analysis of indirect and cumulative effects for the action alternatives are included in Chapter 3 of the Supplemental EIS, under the sections titled Mining, Access, and Other Indirect and Cumulative Impacts within each resource analysis. These sections describe how the Ambler Road project’s action alternatives would add to or change the effects noted in Table 3-1 that are expected to occur under the No Action Alternative and includes the mining actions and community access actions induced by the opening of the Ambler Road. Together, the impacts of these past, present, and RFAs and the incremental additional impacts of the road are the cumulative impacts of Alternatives A, B, and C. While the effects of past actions are known, the RFAs are principally not formal proposals at this time, so the cumulative and indirect analysis in Chapter 3 of the Supplemental EIS is necessarily based on reasonably foreseeable scenarios and not on detailed plans or proposals.

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Maps

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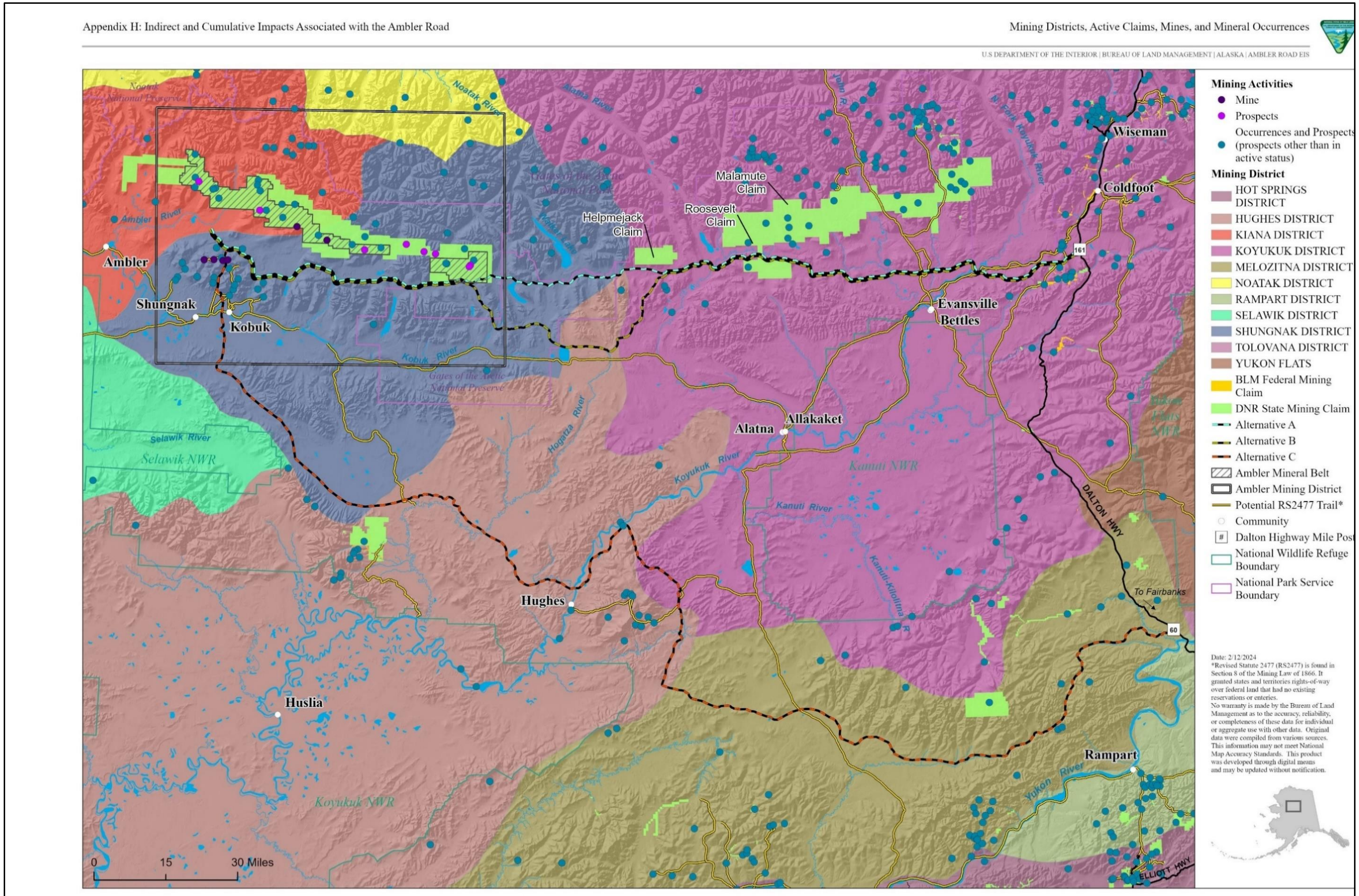

Map 1. Mining districts, active claims, mines, and mineral occurrences *

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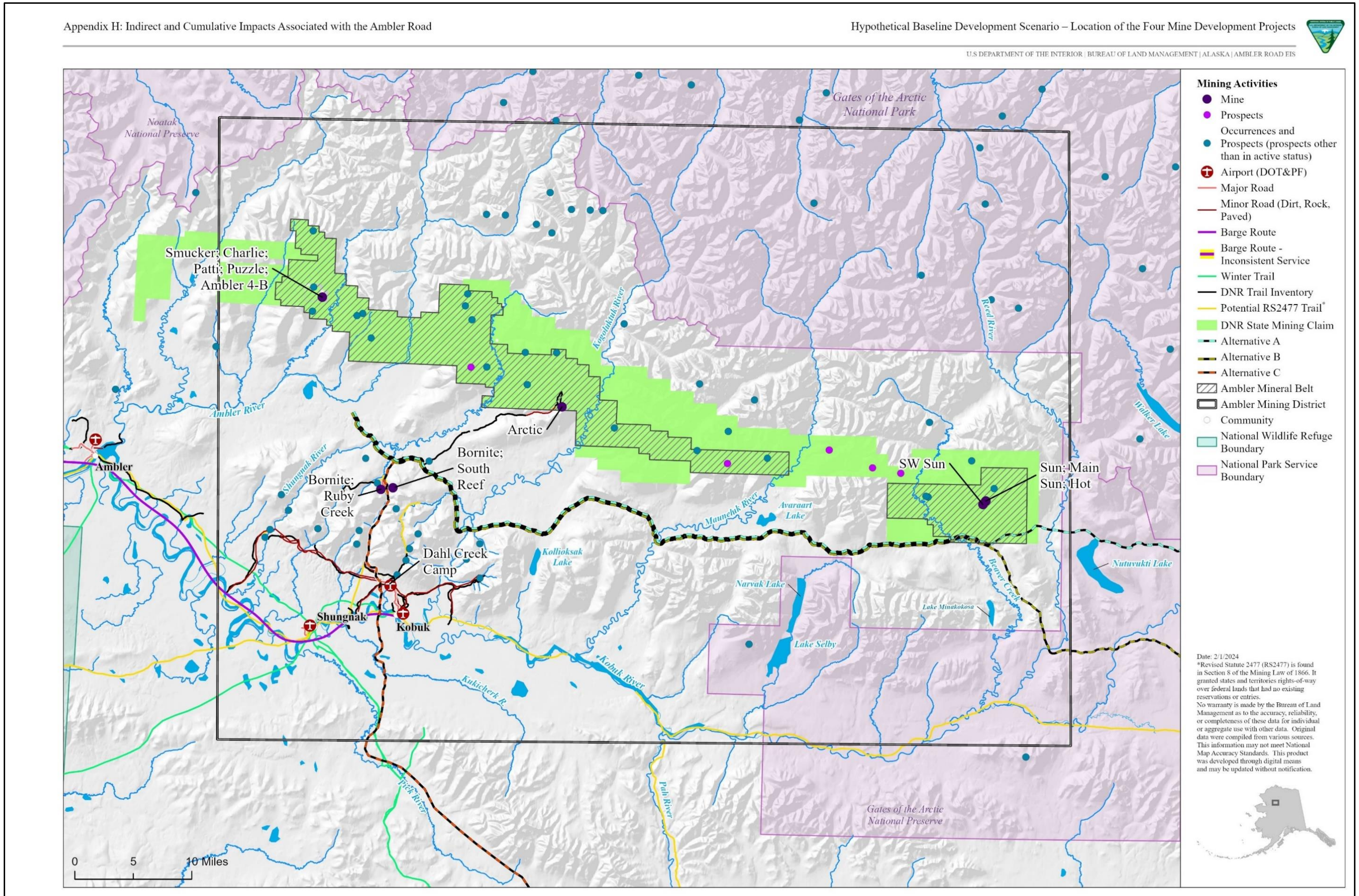

Map 2. Hypothetical baseline development scenario – location of the four mine development projects*

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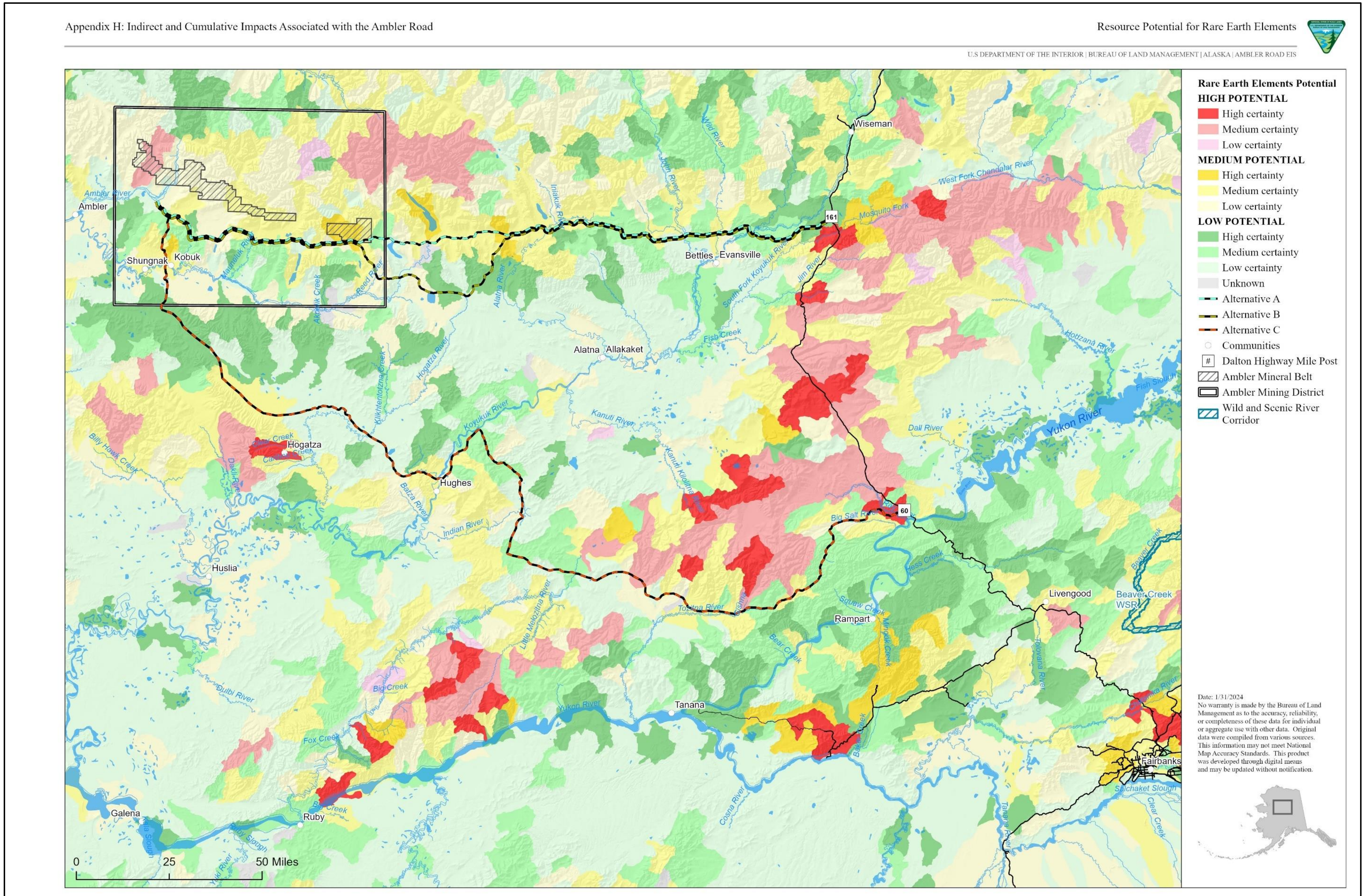

Map 3. Resource potential for rare earth elements *

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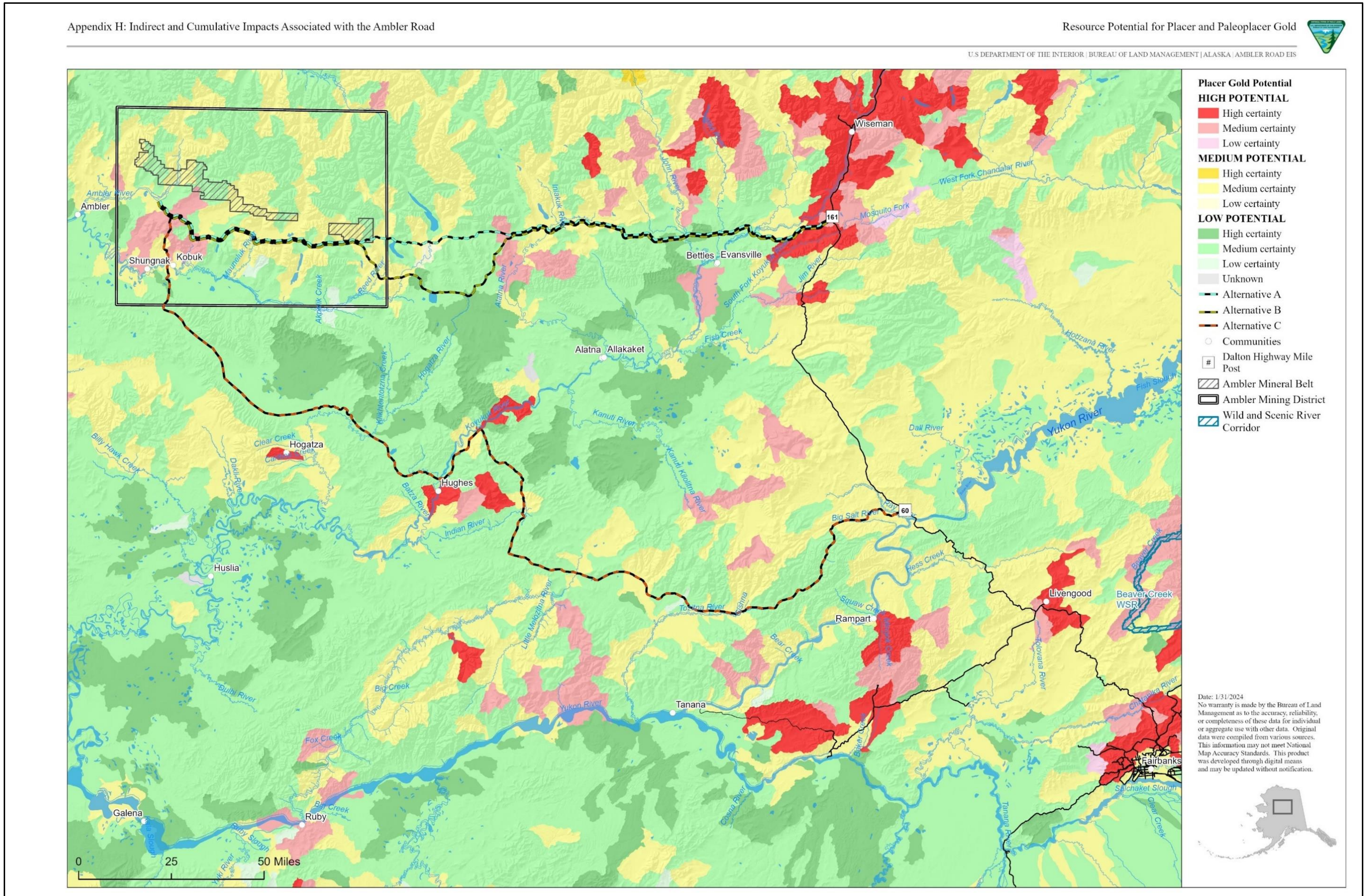

Map 4. Resource potential for placer and paleoplacer gold*

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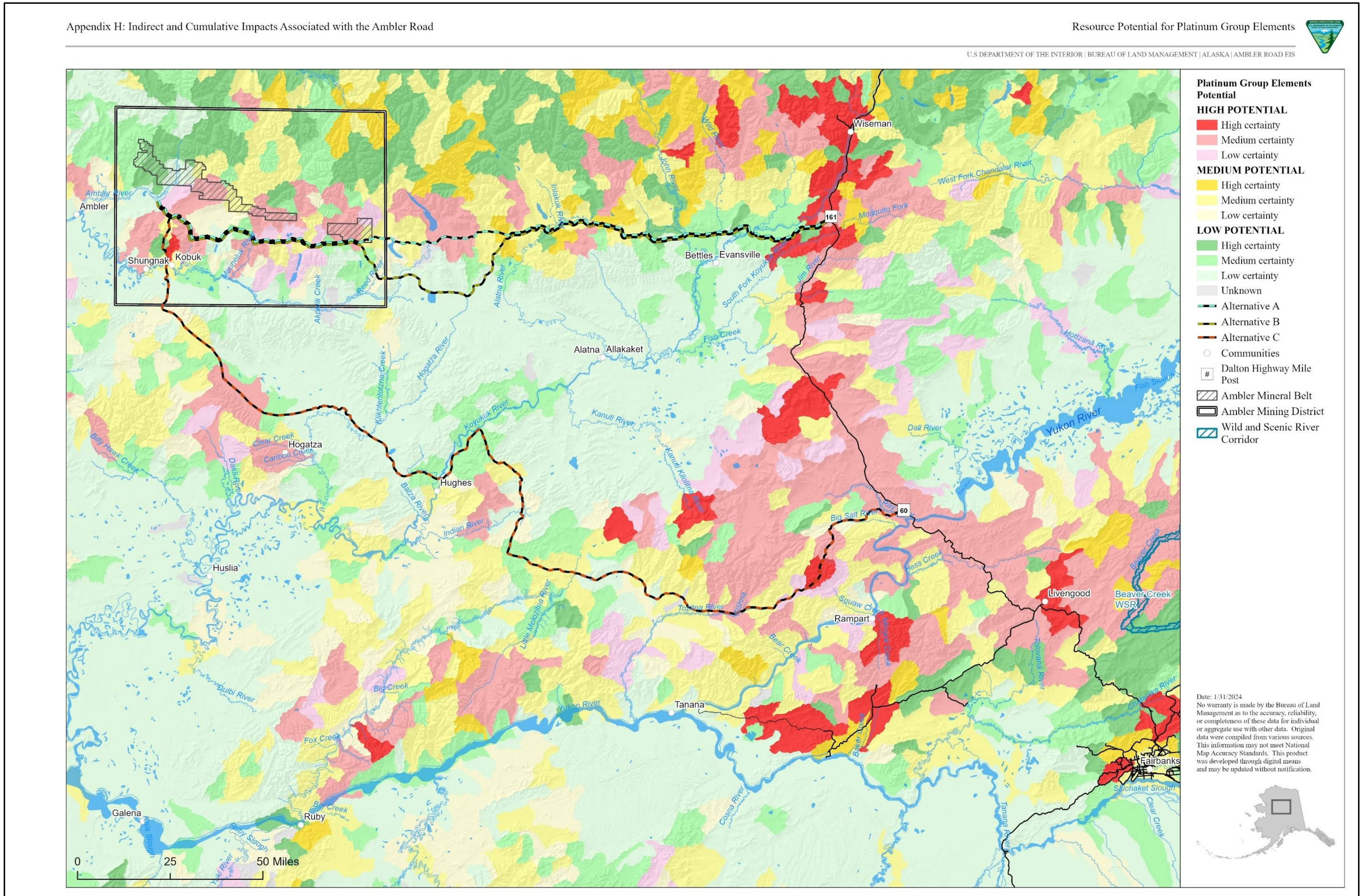

Map 5. Resource potential for platinum group elements*

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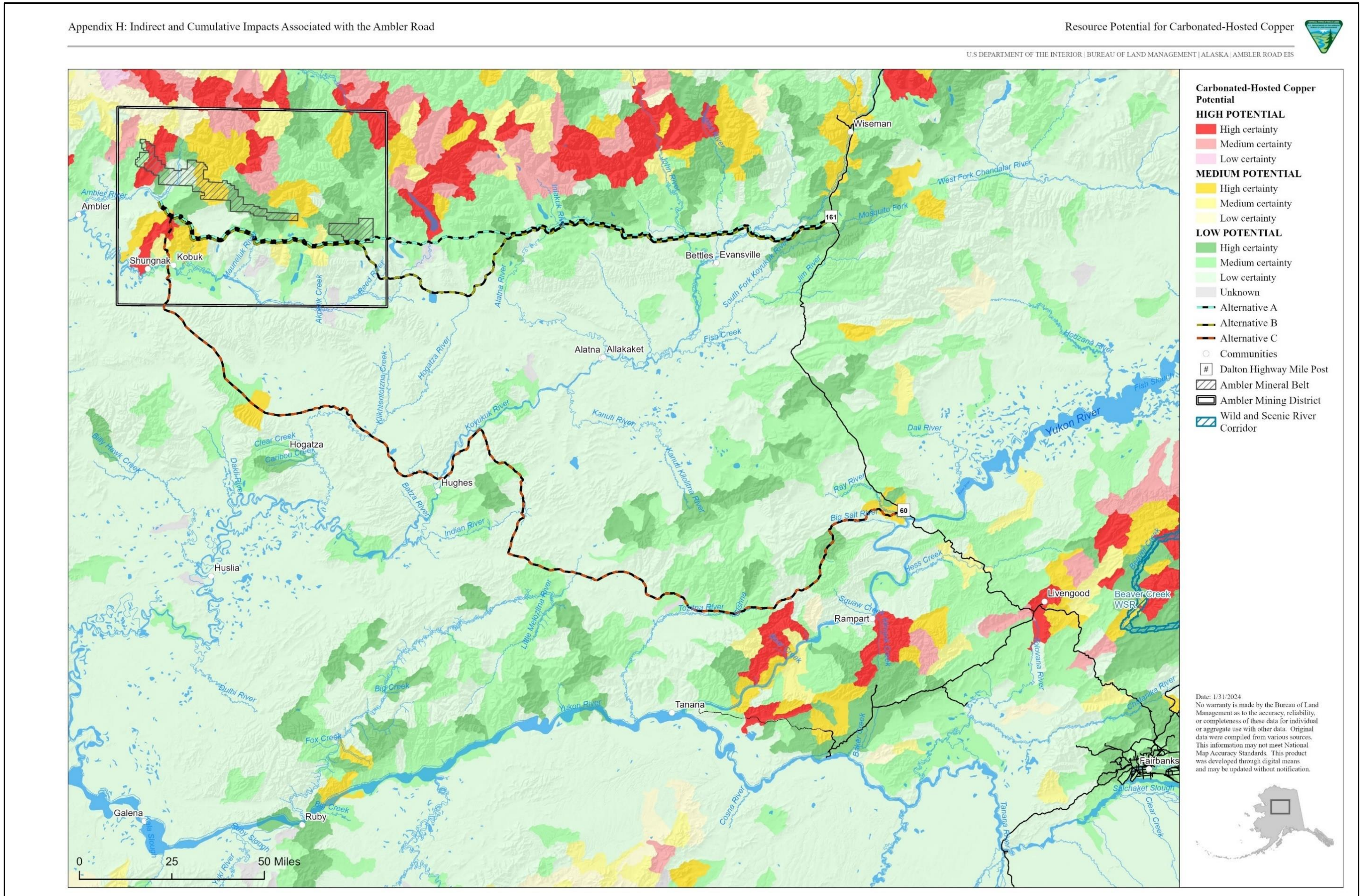

Map 6. Resource potential for carbonated-hosted copper*

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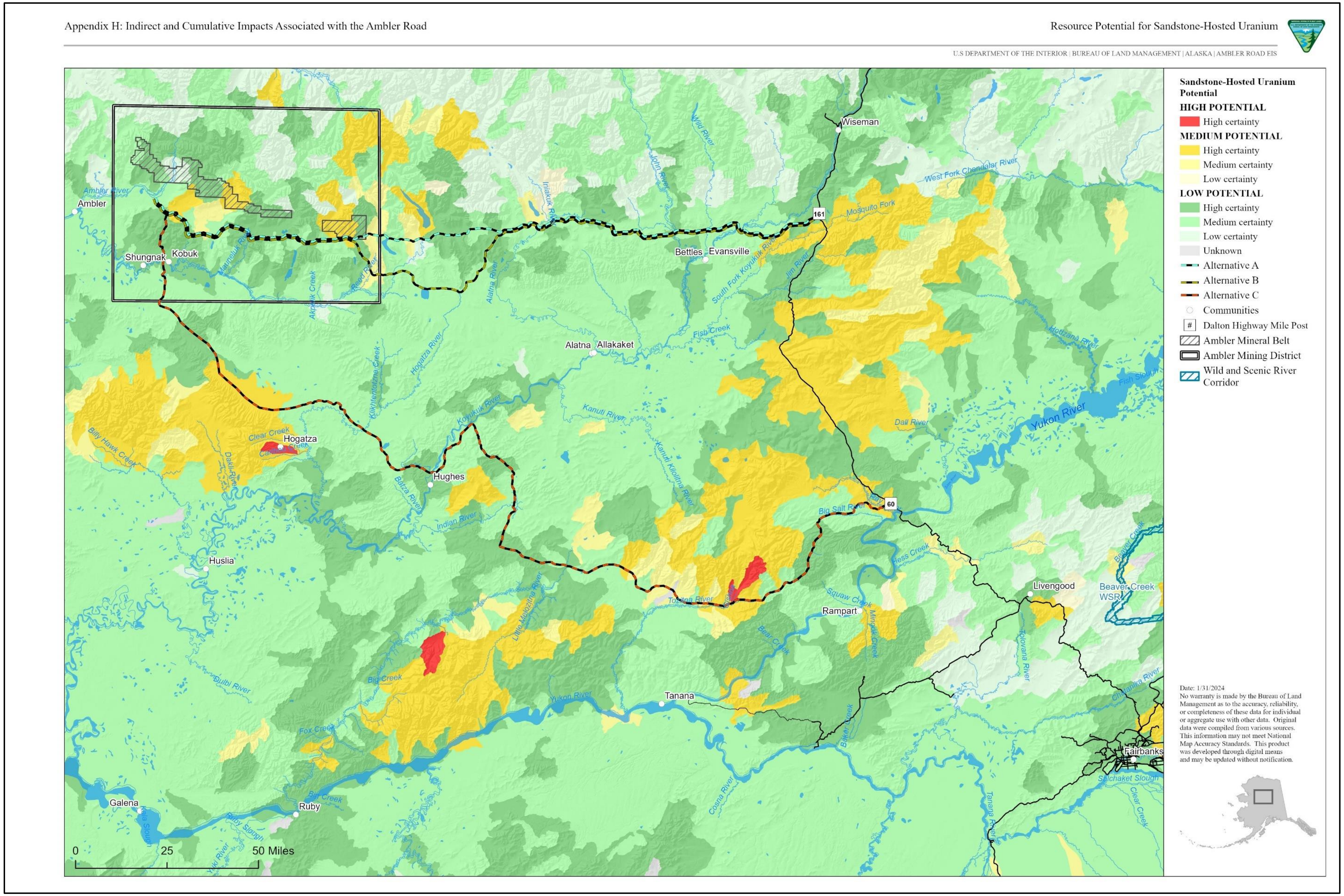

Map 7. Resource potential for sandstone-hosted uranium*

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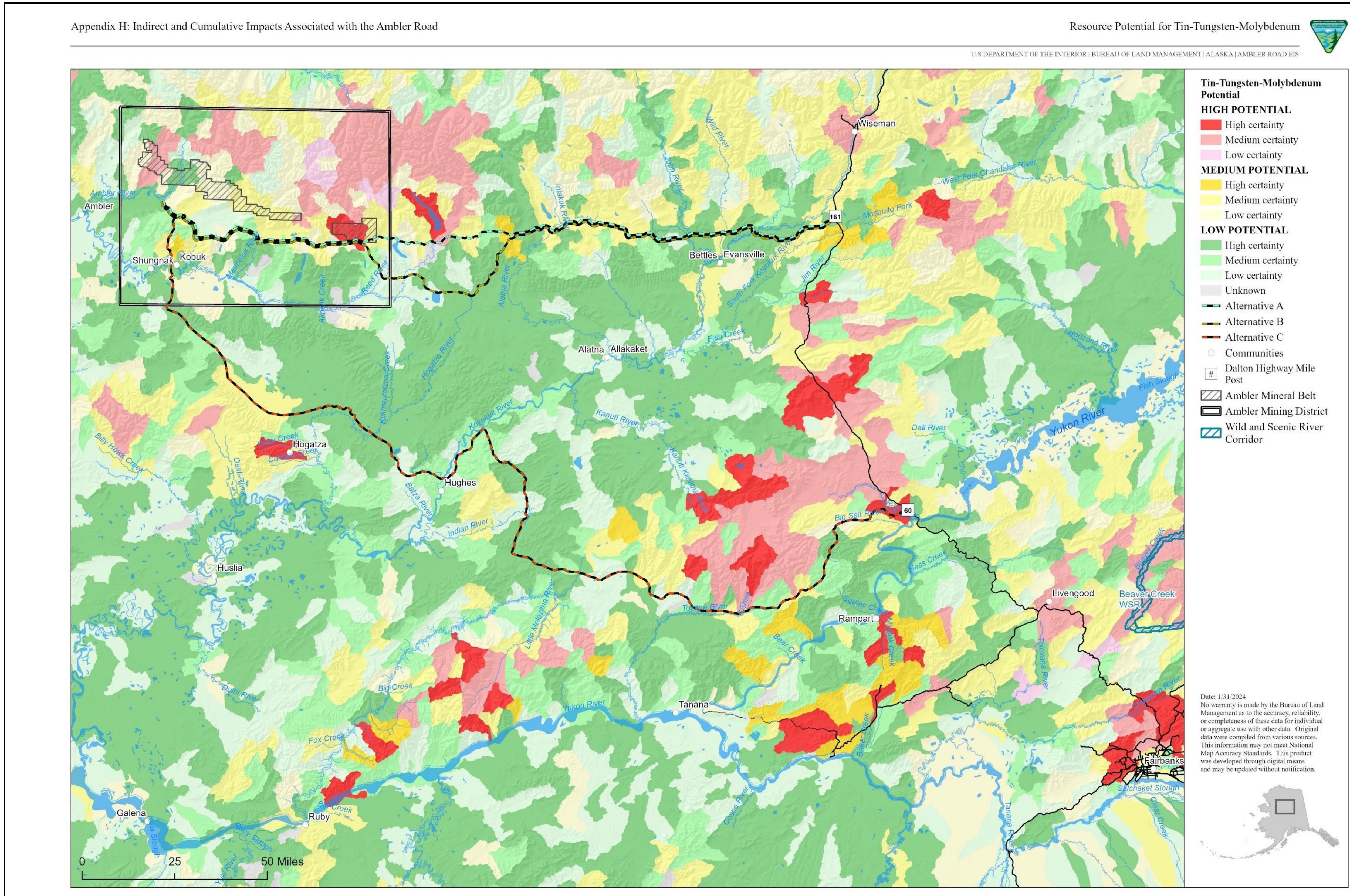

Map 8. Resource potential for tin-tungsten-molybdenum*

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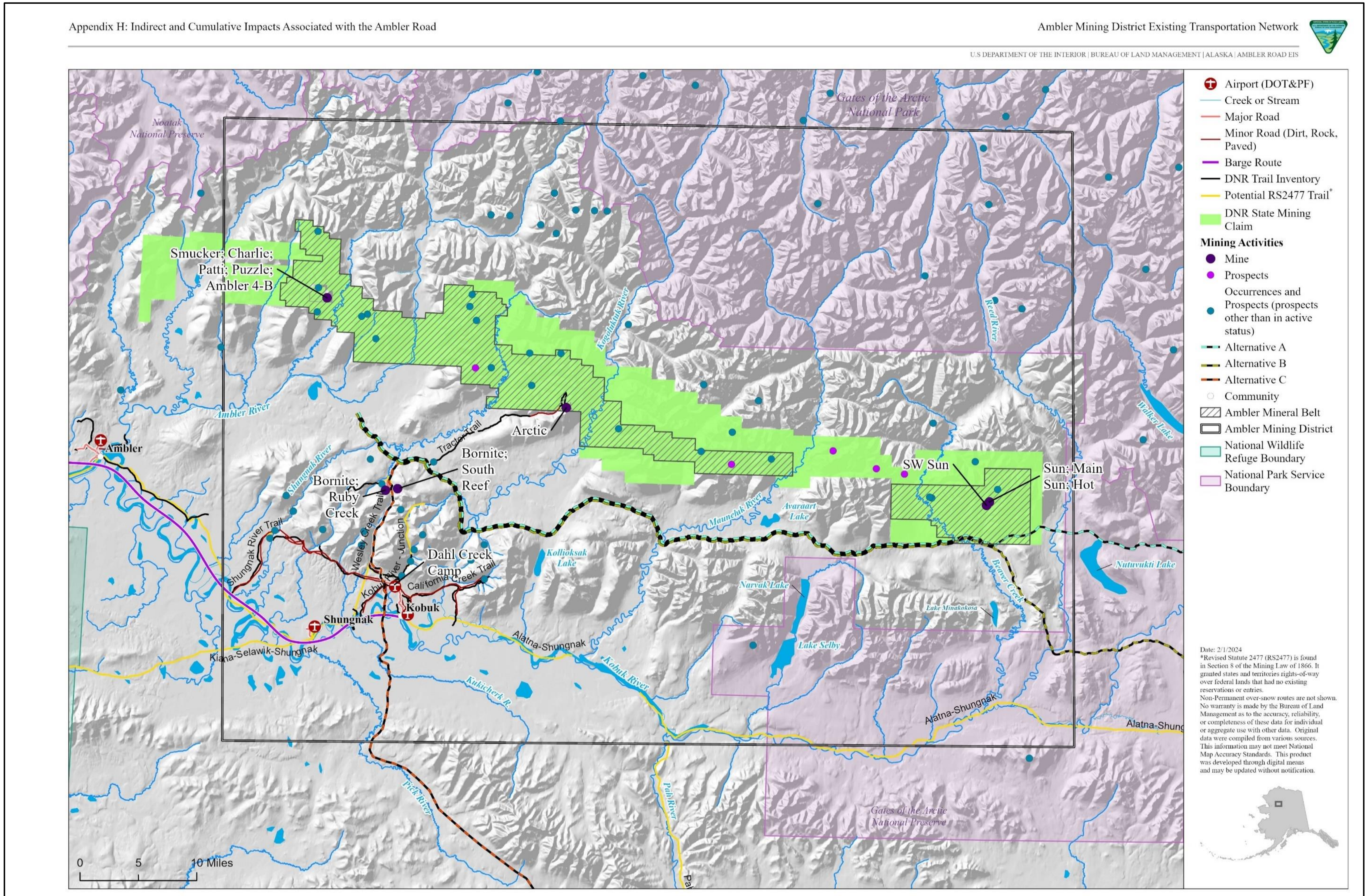

Map 9. Ambler Mining District existing transportation network *

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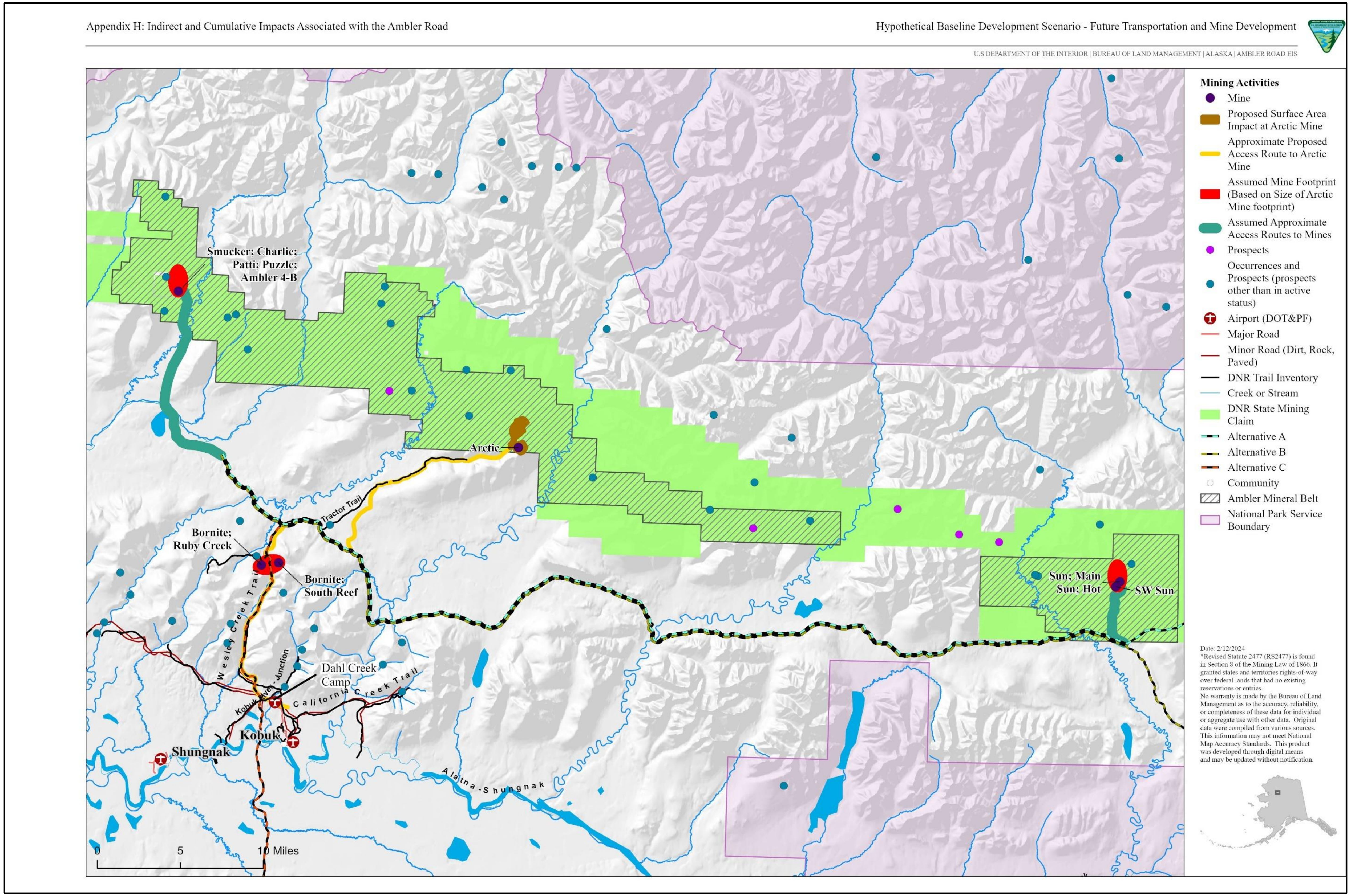

Map 10. Hypothetical baseline development scenario – future transportation and mine development*

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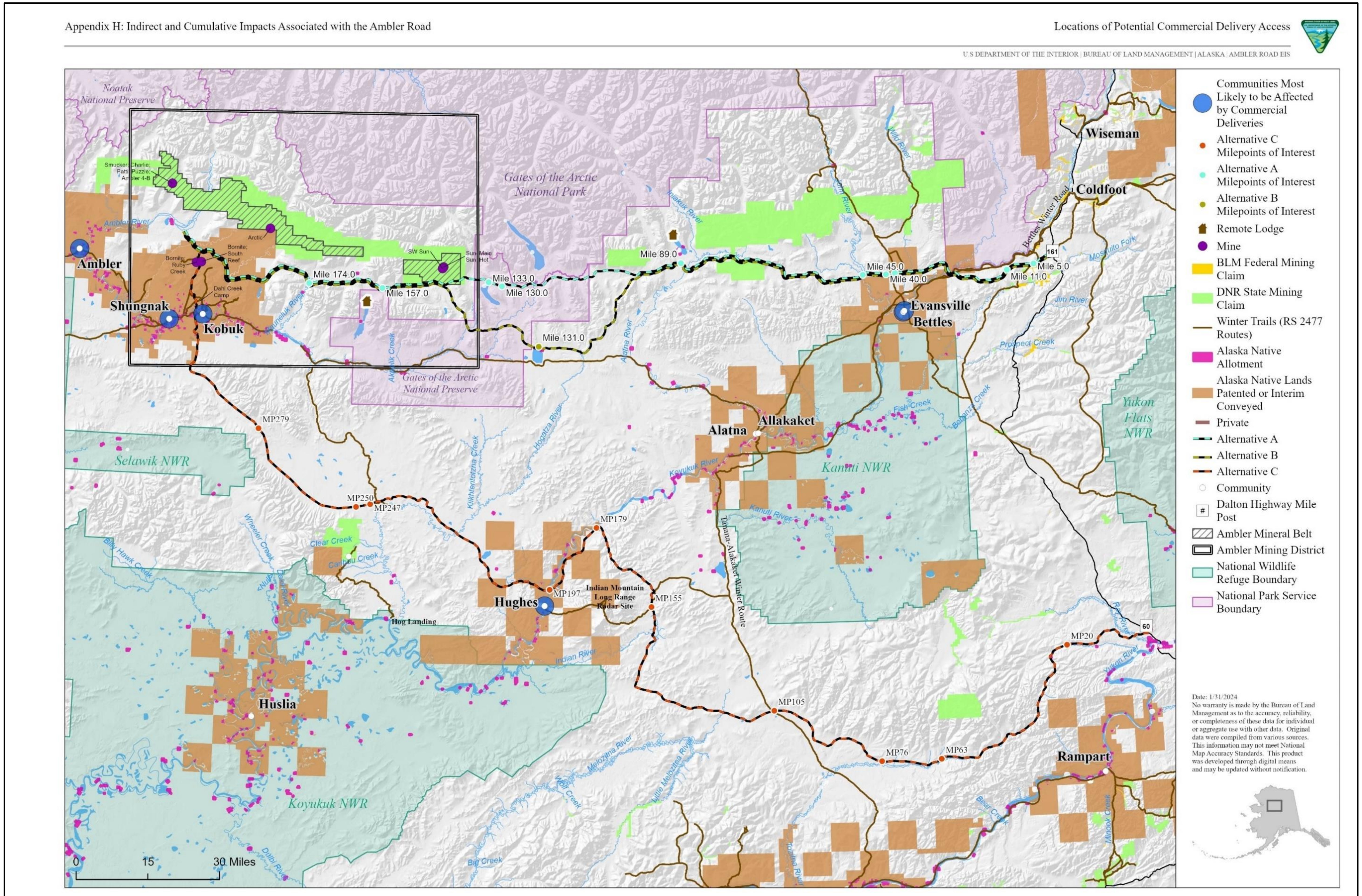

Map 11. Locations of potential commercial delivery access*

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Appendix I. Preparers, Consultation and Collaboration

Note: This entire Appendix has been revised from the previous version and replaced with new content that is specific to the Supplemental EIS process only. Therefore, none of the text has been highlighted to indicate new or substantially revised text.

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Table of Contents

Tables

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1. Preparers

Table 1 is a list of team members involved in the preparation of this Supplemental Environmental Impact Statement (EIS), the organizations where they work, and their roles in its development.

Table 1. List of preparers

Organization	Name	Role
BLM	Geoff Beyersdorf	Authorized Officer
BLM	Stacie McIntosh	Project Manager
BLM	Serena Sweet	Alaska State Office Planning; EIS Oversight
BLM	Bill Hedman	Quality Control/Quality Assurance, Mitigation
BLM	Sheri Wilson	Land Use/Land Management
BLM	Cindy Hamfler	Geographic Information Systems
BLM	Erin Julianus	Subsistence Uses and Resources, Terrestrial Mammals, ANILCA Section 810 Evaluation
BLM	Noel Turner	Water Resources, Hydrology, Wetlands
BLM	John Barefoot	Geology and Minerals
BLM	Dougless Skinner	Cultural Resources, National Historic Preservation Act Section 106
BLM	Crystal Glassburn	Paleontological Resources
BLM	Jessica Tighe	Hazardous Materials
BLM	David Esse	Fish and Aquatic Species, ANILCA Section 810 Evaluation
BLM	Willie Branson	Fire Management
BLM	Steve Taylor	Recreation and Tourism, Visual Resources, Wilderness Characteristics Wild and Scenic Rivers
BLM	Garrett Jones	Recreation and Tourism, Travel Management
BLM	Martin Maricle	Realty, Consultation
BLM	VJ Maisonet-Montanez	Air Quality
BLM	Stewart Allen	Socioeconomics
BLM	Teri Balser	Public Affairs
SWCA	Chad Ricklefs	Project Manager
SWCA	Brittany Sahatjian	Assistant Project Manager
SWCA	Julia Aaronson	Project Coordinator
SWCA	Matt Peterson	Alternatives Facilitator
SWCA	Catherine Chatfield	Geographic Information Systems
SWCA	Amanda Childs	Quality Assurance/Quality Control, Realty/Non-Renewable Resources Team Lead
SWCA	Linda Tucker Burfitt	Publication and Section 508 Specialist
SWCA	Kelcie Witzens	Publication and Section 508 Specialist
SWCA	Diane Bush	Technical Editor
SWCA	Stephanie Graham	Natural/Renewable Resources Team Lead
SWCA	Karen Lange	Administrative Record/Decision File Specialist
SWCA	Matt Westover	Comment Analysis and Response Specialist

Organization	Name	Role
SWCA	Brad Sohm	Air Quality, Noise, Climate Change
SWCA	Ariana Porter	Wildland Fire Ecology, Forestry and Woodland Products
SWCA	Rachel Carlson	Wildland Fire Ecology, Forestry and Woodland Products
SWCA	Kelly Beck	Cultural and Historic Resources, Tribal Consultation
SWCA	Georgia Knauss	Paleontological Resources
SWCA	Matthew Harper	Outdoor Recreation, Travel Management
SWCA	Emma Clinton	Outdoor Recreation, Travel Management
SWCA	Kevin Rauhe	Visual Resources
SWCA	Matthew Robinson	Visual Resources
SWCA	Brooke Crockett	Land Use/Special Designations
NEI	Leah Cuyno	Socioeconomics Lead
NEI	Don Schug	Environmental Justice Lead
NEI	Melissa Errend	Socioeconomics, Environmental Justice
SRBA	Stephen Braund	Subsistence, ANILCA 810 Evaluation, Cultural Resources Lead
SRBA	Liz Sears	Subsistence, ANILCA 810 Evaluation
SRBA	Paul Lawrence	Cultural and Paleontological Resources, Subsistence, ANILCA 810 Evaluation, Tribal Consultation
SRBA	Randy Tedor	Cultural and Historic Resources, Tribal Consultation
ABR, Inc.	Alex Prichard	Wildlife, Special Status Species Lead
ABR, Inc.	Wendy Davis	Vegetation, Special Status Plants, Non-Native Plant Species, Landscape Ecology
ABR, Inc.	John Seigle	Fish and Aquatic Species
ABR, Inc.	Rebecca McGuire	Birds/Avian Species Lead
ABR, Inc.	Lauren Attanas	Birds/Avian Species
DOWL	Keri Nutter	Soils, Geology, Permafrost, Locatable Minerals, Mineral Materials Lead
DOWL	Paul Pribyl	Soils, Geology, Permafrost, Locatable Mineral, Mineral Materilas
DOWL	Rich Pribyl	Water Resources Lead
DOWL	Dana Brunswick	Water Resources
DOWL	Adam Morrill	Hazardous Materials Lead

Note: ANILCA = Alaska National Interest Lands Conservation Act; BLM = Bureau of Land Management; NEI = Northern Economics, Inc.; SRBA = Stephen R. Braund & Associates.

2. Tribal and Alaska Native Corporation Consultation

Table 2 presents the dates, locations, and attending agencies and other entities involved in government-to-government consultation meetings with federally recognized Tribes associated with the Supplemental EIS and Section 106 process pursuant to the requirements found in Department of the Interior Policy on Consultation with Indian Tribes (512 DM 4) and Procedures for Consultation with Indian Tribes (512 DM 6).

Table 2. Tribal consultation meetings

Date	Location	Attendance
June 8, 2022	Allakaket	Allakaket Traditional Council, BLM
June 9, 2022	Alatna	Alatna Tribal Council
July 7, 2022	Hughes	Hughes Village Council, BLM
July 21, 2022	Evansville	Evansville Village Council, BLM
October 14, 2022	Kobuk	Native Village of Kobuk, BLM
November 22, 2022	Huslia	Huslia Tribal Council, BLM
January 19, 2023	Alatna	Alatna Tribal Council, BLM
January 20, 2023	Allakaket	Allakaket Traditional Council, BLM
March 1, 2023	Evansville	Evansville Village Council, BLM
April 25, 2023	Shungnak	Native Village of Shungnak, BLM
April 26, 2023	Noorvik	Noorvik Native Community, BLM
April 27, 2023	Kiana	Native Village of Kiana, BLM
April 27, 2023	Kotzebue	Native Village or Kotzebue, BLM
April 28, 2023	Noatak	Native Village of Noatak, BLM
May 4, 2023	Anaktuvuk Pass	Naqsragmiut Tribal Council, BLM
June 5, 2023	Kotzebue	Native Village of Kotzebue, BLM
July 31, 2023	Teleconference	Native Village of Kobuk, BLM
December 5, 2023	Teleconference	Native Village of Shungnak, BLM
January 31, 2024	Kobuk	Kobuk Community, BLM
February 22, 2024	Shungnak	Shungnak Community, BLM
March 27, 2024	Ambler	Ambler Community, BLM

Note: BLM = Bureau of Land Management.

Table 3 presents the dates, locations, and attending agencies and other entities involved in consultation meetings with Alaska Native Corporations associated with the Supplemental EIS and Section 106 process pursuant to the requirements found in Department of the Interior Policy on Consultation with Alaska Native Claims Settlement Act Corporations (512 DM 6).

Table 3. Alaska Native Corporation consultation meetings

Date	Location	Attendance
October 18, 2022	Videoconference	NANA, BLM
January 9, 2023	Videoconference	NANA, BLM
January 13, 2023	Videoconference	Doyon, BLM
March 13, 2023	Videoconference	NANA, BLM
April 10, 2023	Videoconference	NANA, BLM
June 05, 2023	Kotzebue	Kikiktagruk Inupiat Corporation, BLM
June 6, 2023	Fairbanks	Doyon, BLM
June 12, 2023	Videoconference	NANA, BLM
July 10, 2023	Videoconference	NANA, BLM

Date	Location	Attendance
August 14, 2023	Videoconference	NANA, BLM
September 11, 2023	Videoconference	NANA, BLM
October 16, 2023	Videoconference	NANA, BLM
November 13, 2023	Videoconference	NANA, BLM
December 19, 2023	Videoconference	Doyon, BLM
February 12, 2024	Videoconference	NANA, BLM
February 12, 2024	Videoconference	Doyon, BLM

Note: BLM = Bureau of Land Management.

3. Section 106

Upon completion of the original EIS process with the release of the Ambler Road Project Joint Record of Decision (July 2020), the National Historic Preservation Act Section 106 process continued, guided by the requirements of the Section 106 Programmatic Agreement (PA). Consultation pursuant to the PA includes both individual meetings, as well as ongoing, recurring meetings that provide the opportunity to address immediate issues or questions related to implementation of the PA.

Table 4 presents the dates, locations, and attending agencies and other entities involved in Section 106 consultation meetings that have occurred since July 2020.

Table 4. Section 106 individual meetings

Date	Location	Attendance
November 18, 2020	Virtual	ACHP, AIDEA/DOWL; ALTC, ATC; BLM; Dinyea Corp; Doyon, EVC; HUTC; NANA; KTC; NWAB; NPS; TCC; USACE
March 21, 2021	Virtual	ACHP, ATC, ALTC, ADNR, AIDEA/DOWL, BLM, Doyon, EVC, HTC, HUTC, NANA, NNC, NWAB, NPS, NVS, SHPO, TCC, USACE
April 16, 2021	Virtual	TCC, BLM
July 30, 2021	Virtual	TCC, ALTC, ATC EVC, HUTC, BLM
November 10, 2021	Virtual	BLM, AIDEA/DOWL, NLURA, NPS, SHPO, ACHP, USACE
December 30, 2021	Virtual	TCC, BLM
February 25, 2022	Virtual	TCC, BLM
April 28, 2022	Fairbanks and via phone	ACHP, ADNR, AIDEA, ATC, BLM, City of Ambler, City of Shungnak, Doyon, HUTC, NANA, NPS, NVA, NWAB, SHPO, TCC, USACE
July 15, 2022	Virtual	NANA, BLM
October 18, 2022	Virtual	NANA, BLM
November 9, 2022	Virtual	ACHP, ADNR, AIDEA, BLM, NPS, SHPO
November 15, 2022	Virtual	ACHP, ADNR, AIDEA, BLM, NPS, SHPO
March 24, 2023	Fairbanks and virtual	ACHP, ADNR, AIDEA, ALTC, BLM, NVA, NPS, SHPO
March 28, 2023	Fairbanks and virtual	ACHP, ADNR, AIDEA, ALTC, ATC, EVC, NANA, NVA, NVK, NPS, SHPO, TCC, USACE
May 14, 2023	Anchorage	AIDEA, BLM, SHPO
May 24, 2023	Anchorage	AIDEA, BLM, NPS, SHPO

Date	Location	Attendance
December 18, 2023	Virtual	ACHP, ADNR, AIDEA, BLM, NPS, SHPO
January 22, 2024	Virtual	ACHP, ADNR, AIDEA, BLM, NPS, SHPO

Note: ACHP = Advisory Council on Historic Preservation; ADNR = Alaska Department of Natural Resources; AIDEA = Alaska Industrial Development and Export Authority; ALTC = Alatna Tribal Council, ATC = Allakaket Tribal Council; BLM = Bureau of Land Management; EVC = Evansville Village Council; HTC = Hughes Traditional Council; HUTC = Huslia Tribal Council; KTC = Kobuk Traditional Council; NAB = Northwest Arctic Borough; NANA = NANA Native Corporation; NLURA = Northern Land Use Research Alaska; NNC = Noorvik Native Community; NPS = National Park Service; NVA = Native Village of Ambler; NVS = Native Village of Shungnak; SHPO = State Historic Preservation Officer; TCC = Tanana Chiefs Conference; USACE = U.S. Army Corps of Engineers.

Table 5 presents the information regarding the regularly recurring meetings held to assist with implementation of the PA and to ensure stakeholders are updated on the progress of the Supplemental EIS.

Table 5. Section 106 recurring meetings

Frequency	Location	Purpose/Attendance
Weekly	Virtual	AWP technical expertise meetings to discuss cultural resource survey methods, process, and deliverables. NLURA, BLM, NPS, SHPO
Biweekly	Fairbanks and Virtual	AIDEA meeting to discuss PA requirements and implementation including project, fieldwork, and deliverables. AIDEA, BLM, contractors
Biweekly	Fairbanks and Virtual	Interagency coordination meeting to keep federal partners updated regarding Section 106 implementation. BLM, NPS, USACE
Monthly	Virtual	NANA meeting (began January 2023) to provide project updates and inform them of consultation efforts occurring within the NANA region.
Monthly	Virtual	PA signatory meetings (beginning September 2023) to provide project updates and discuss Section 106 PA needs.
Quarterly	Fairbanks	Doyon meeting (began in 2022) to provide project updates and inform them of consultation efforts occurring within the Doyon region.
Quarterly	Fairbanks	TCC meetings (began July 2023) to provide project updates and inform them of consultation efforts occurring within the TCC region.

Note: ACHP = Advisory Council on Historic Preservation; AIDEA = Alaska Industrial Development and Export Authority; BLM = Bureau of Land Management; NANA = NANA Native Corporation; NLURA = Northern Land Use Research Alaska; NPS = National Park Service; SHPO = State Historic Preservation Officer; TCC = Tanana Chiefs Conference; USACE = U.S. Army Corps of Engineers

4. Cooperating Agencies

The CEQ regulations implementing National Environmental Policy Act (NEPA) govern the cooperating agency relationship for all federal agencies preparing EISs. The relationship is distinctive, moving beyond consultation to engage officials and staff of other agencies and levels of government in working partnerships. Cooperating agencies share skills and resources to help shape BLM environmental analyses that better reflect the policies, needs, and conditions of their jurisdictions and the citizens they represent. State agencies, local governments, Tribal governments, and other federal agencies may serve as cooperating agencies when they have federal authorization decisions that require compliance with NEPA and/or they have special expertise.

The following are cooperating agencies for the Ambler Road Supplemental EIS:

U.S. Army Corps of Engineers (USACE). The USACE has jurisdiction over activities that would include the discharge of dredge or fill material into waters of the United States, including wetlands (as regulated under the Clean Water Act Section 404), and work or structures constructed in, on, over, or under navigable waters (as regulated under the Rivers and Harbors Act Section 10).

U.S. **Fish and Wildlife Service (USFWS).** The USFWS is participating as a cooperating agency due to the agency's expertise related to fish and wildlife.

U.S. Environmental Protection Agency (EPA). The EPA is a cooperating agency to maximize use of available resources and special expertise, and minimize duplication in those areas of overlapping responsibilities.

State of Alaska. The Alaska Department of Natural Resources (ADNR) Office of Project Management and Permitting is serving as the lead state agency to coordinate input from other state agencies, including the Alaska Department of Environmental Conservation (ADEC); Alaska Department of Fish and Game (ADF&G); Alaska Department of Family and Community Services; and Alaska Office of History and Archaeology, State Historic Preservation Officer. ADNR would make land management decisions for ROW access across State-managed lands.

Alatna Village Council. Is the federally recognized tribe for the community of Alatna, representing all Tribal members. The Altana Village Council has specialized expertise regarding, but not limited to, land use, subsistence use, wildlife, fisheries, cultural resources, and indigenous knowledge.

Allakaket Tribal Council. Is the federally recognized tribe for the community of Allakaket, representing all Tribal members. The Allakaket Tribal Council has specialized expertise regarding, but not limited to land use, subsistence use, wildlife, fisheries, cultural resources, and Indigenous Knowledge. The Allakaket Tribal Council signed on as a cooperating agency in January 2024, prior to release of the Final Supplemental EIS.

Evansville Tribal Council. Is the federally recognized tribe for the community of Evansville, representing all Tribal members. The Evansville Tribal Council has specialized expertise regarding, but not limited to, land use, subsistence use, wildlife, fisheries, cultural resources, and indigenous knowledge.

Huslia Tribal Council. Is the federally recognized tribe for the community of Huslia, representing all Tribal members. The Huslia Tribal Council has specialized expertise regarding, but not limited to, land use, subsistence use, wildlife, fisheries, cultural resources, and indigenous knowledge.

Tanana Tribal Council. Is the federally recognized tribe for the community of Tanana, representing all Tribal members. The Tanana Tribal Council has specialized expertise regarding, but not limited to, land use, subsistence use, wildlife, fisheries, cultural resources, and indigenous knowledge.

Additionally, the **National Park Service** is serving as a participating agency in the development of this Supplemental EIS to coordinate it with their EEA and proposed right-of-way through Gates of the Arctic National Park and Preserve.

For this Supplemental EIS, the BLM held a cooperating agencies' alternatives development and scope of analysis workshop on May 9–10, 2023, in Fairbanks, Alaska. The BLM and cooperating agencies re-examined alternatives concepts that were proposed during the previous EIS process and considered new alternatives concepts that would reduce overall potential impacts, especially impacts to subsistence uses and resources. The BLM held two virtual meetings with cooperating agencies during the Draft Supplemental EIS comment period on November 1 and December 11, 2023. The cooperating agencies have played an active role in preparing the Supplemental EIS, and have reviewed, suggested edits, and commented on all sections of the document.

Appendix J. Section 106 Programmatic Agreement

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PROGRAMMATIC AGREEMENT

BY AND AMONG THE

BUREAU OF LAND MANAGEMENT,

ALASKA STATE HISTORIC PRESERVATION OFFICER, AND

ADVISORY COUNCIL ON HISTORIC PRESERVATION

REGARDING THE

AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD,

ALASKA

Executed the 27th of April, 2020

Expires 2045

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WHEREAS, the Department of the Interior, Bureau of Land Management (BLM) may issue a right-of-way (ROW) grant authorization across federal lands for an all-season, private industrial access road, to the Ambler Mining District, pursuant to the Federal Lands Policy and Management Act of 1976 (43 United States Code [USC] 1701); and

WHEREAS, the Alaska Industrial Development and Export Authority (AIDEA) is the Permittee and has proposed to construct, operate, maintain, and eventually remove the road and related features (Project). The Project will include construction of bridges, material sites, maintenance stations, airstrips, and related ancillary features, and will be built in Phases, beginning with a seasonal, single-lane, gravel pioneer road (Phase I), which will be upgraded in Phase II, and expanded into a 2-lane gravel road in Phase III. AIDEA anticipates the road will have a life of approximately 50 years, at which point the road will be removed and reclaimed; and

WHEREAS, the BLM has determined through consultation with the Alaska State Historic Preservation Officer (SHPO) that the Project is an Undertaking and subject to compliance with Section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended (54 USC 300101 et seq.), and the implementing regulations found at 36 Code of Federal Regulations (CFR) 800; and

WHEREAS, Section 106 requires federal agencies to take into account the effects of their Undertakings on historic properties[1] and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment, prior to any federal authorization or expenditure of federal funds. Furthermore, Section 106 requires consultation with Tribes, other agencies, local governments, interested parties, and the public, for the purpose of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement with them regarding matters arising in the Section 106 process; and

WHEREAS, the BLM has prepared an Environmental Impact Statement (EIS) for the Project pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 USC 4321 et seq.), with a Record of Decision anticipated in May 2020, and has identified Alternative A/B the preliminarily preferred route for the Project. Alternative A is a 211-mile-long alignment, originating at Milepost 161 of the Dalton Highway, and extending west to the Ambler Mining District. Alternative B is a 228-mile-long alignment with the same origination and terminus points as Alternative A, but it crosses Gates of the Arctic National Preserve (GAAR) at a more southerly point. Maps of the alternatives are found in Attachment A and discussed in detail in the EIS (DOI-BLM-AK-F030-2016-0008-EIS); and

WHEREAS, the Alaska National Interest Lands Conservation Act 201(4)(b) states that the Secretaries of the Interior and Transportation shall permit access for surface transportation purposes across GAAR, managed by the National Park Service (NPS). Portions of Alternatives A and B would cross GAAR, making the Project an Undertaking, and the NPS is an Invited Signatory; and

WHEREAS, the U.S. Army Corps of Engineers (USACE) has jurisdiction over activities that would discharge dredge or fill material into waters of the U.S., including wetlands, and has determined that the Project will require a permit, pursuant to Section 404 of the Clean Water Act (33 USC 1251 et seq.), making the Project an Undertaking and the USACE is an Invited Signatory; and

WHEREAS, the BLM, in agreement with all participating agencies, has agreed to carry out lead federal agency responsibilities for Section 106, pursuant to 36 CFR 800.2(a)(2); and

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[1] The term "historic properties" is consistent with 36 CFR 800.16(l)(1) and is defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). This includes artifacts, records, and remains that are related to and located within such properties, and includes properties of traditional religious or cultural importance to Tribes or other entities, and that meet the NRHP criteria.

WHEREAS, the BLM, in consultation with the Consulting Parties, established the Undertaking's Area of Potential Effects (APE), pursuant to 36 CFR 800.4(a) and 36 CFR 800.16(d), which encompasses direct, indirect, and cumulative effects on historic properties for the permitted alternative. The APE is described in Attachment B; and

WHEREAS, the Signatories and Invited Signatories, collectively "PA Signatories," recognize that future mining activities within the Ambler Mining District may be a reasonably foreseeable result of this Project; however, no mining activities are proposed or known at this time. The PA Signatories agree that any potential effects on historic properties that may result from future mining activities will be subject to independent Section 106 review as appropriate. The PA Signatories agree to share information on historic properties collected for this Undertaking to the extent practicable, and in accordance with relevant confidentiality restrictions, at such time; and

WHEREAS, as of December 2019, the Alaska Heritage Resources Survey (AHRS) database[2] lists 15 known resources located within the Direct APE and 64 known resources within the Indirect APE for Alternative A; and 10 known resources within the Direct APE and 43 known resources within the Indirect APE for Alternative B. A table of these resources is provided in Attachment C; and

WHEREAS, the BLM has determined that the Undertaking may have an adverse effect on historic properties, pursuant to 36 CFR 800.5. There are total of 18 known AHRS resources within the Direct APE and 87 additional known AHRS resources within the Indirect APE that may be adversely affected by the Undertaking (this includes resources in both the A and B Alternatives) and include prehistoric and historic archaeological resources, trails, camps, and mining features. Of these resources, only 1 has been determined eligible for listing in the National Register of Historic Places (NRHP), while the remaining 104 known resources have not been evaluated (listed in Attachment C); and

WHEREAS, the Permittee has proposed to construct the Project in Phases, and each Phase will consist of individual Components, Stages, and Segments[3], and the BLM has determined that effects to historic properties cannot be fully accounted for prior to issuance of the EIS Record of Decision. Therefore, this Programmatic Agreement (PA) was developed in consultation with the Consulting Parties to establish an alternative process for implementing Section 106 in a phased approach, pursuant to 36 CFR 800.14(b); and

WHEREAS, the SHPO has participated in the development of this PA and is a Signatory, pursuant to 36 CFR 800.6(c)(1)(ii); and

WHEREAS, the ACHP has participated in the development of this PA and is a Signatory, pursuant to 36 CFR 800.6(c)(1)(ii); and

WHEREAS, the BLM recognizes that the Federal Government has a unique legal relationship with Tribes set forth in the U.S. Constitution, and the PA outlines the process by which the BLM will complete a good

[2] The AHRS database is maintained by the Alaska Office of History and Archaeology, and includes buildings, objects, structures, archaeological and historic sites, districts, shipwrecks, travel ways, traditional cultural properties, landscapes, and other places of cultural importance.

[3] Project Phases include a Pre-Construction Phase, a pioneer road (Phase I), an all-seasons road (Phase II), and a 2-lane all-seasons road (Phase III) as well as Operations and Maintenance and Reclamation Phases. See Attachment G for more detailed descriptions. Components are defined as types of ancillary feature, such as bridges or materials sites. Segments are defined as geographical sections of the Project. Stages are defined as the specific construction activities that would occur for each construction Phase or Component.

faith effort to consult with Tribes[4] to identify concerns about historic properties, to advise on the identification and evaluation of historic properties, including those of traditional religious, spiritual, or cultural importance, to articulate views on the Undertaking's effects on such properties, and to participate in the resolution of adverse effects, pursuant to 36 CFR 800.2(c)(2)(ii); and

WHEREAS, the BLM invited 78 Tribes, listed in Attachment D, to participate in the Section 106 process as Consulting Parties, and Alatna Village Council; Allakaket Village Council; Dinyea Corporation; Doyon, Limited; Evansville, Incorporated; Evansville Village; Gana-A'Yoo, Limited; Hughes Village Council; Huslia Village Council; K'oyitl'ots'ina, Limited; NANA Regional Corporation; Native Village of Ambler; Native Village of Kobuk; Native Village of Noatak; Native Village of Selawik; Native Village of Shungnak; Native Village of Stevens; Native Village of Tanana; Noorvik Native Community; and the Village of Anaktuvuk Pass have consulted with the BLM during development of the PA and may sign as Concurring Parties; and

WHEREAS, the BLM consulted with private landowners for lands within the APE for Alternatives A and B, including Doyon, Limited; NANA Regional Corporation; and Evansville, Incorporated; and these entities participated in PA development. In addition, the BLM consulted with the Bureau of Indian Affairs regarding 2 allotments (AKFF 018439D, AKFF 018992C) located within the APE for Alternatives A and B, and another 3 allotments (AKFF 017613A, AKFF 017613B, AKFF 017614A) located within the APE for Alternative B; and

WHEREAS, the BLM has made a good faith effort to consult with local governments and other interested parties pursuant to 36 CFR 800.2(c)(3) and 36 CFR 800.2(c)(5), and the City of Allakaket, the Northwest Arctic Borough and Tanana Chiefs Conference have participated in the development of this PA as Consulting Parties and may sign as Concurring Parties; and

WHEREAS, the BLM has coordinated Section 106 and NEPA, pursuant to 36 CFR 800.8 and consistent with guidance from the Council on Environmental Quality and ACHP *Handbook for Integrating NEPA and Section 106*, and has provided opportunities for the public to comment on, discuss, or share information or concerns about the Undertaking during public scoping and comment periods for the EIS and has considered all comments received; and

WHEREAS, the BLM has consulted with AIDEA (Permittee) on the development of this PA pursuant to 36 CFR 800.2(c)(4), and the Permittee has agreed to carry out Stipulations in this PA and is an Invited Signatory; and

WHEREAS, the Alaska Department of Natural Resources is a landowner and to address its obligations to protect state-owned historic, prehistoric, or archaeological resources as provided under Alaska Statute (AS) 41.35, has participated in the development of this PA and is an Invited Signatory; and

NOW THEREFORE, the BLM, the SHPO, and the ACHP agree that the Project shall be implemented in accordance with the following stipulations in order to take into account the effect of the Undertaking on historic properties.

STIPULATIONS

The BLM shall ensure that the following stipulations are carried out:

[4] Throughout this document, the term "Tribe" or "Tribes" is consistent with the definition found at 36 CFR 800.16(m) and refers to a tribe, band, nation, or other organized group or community, including a native village, regional corporation or village corporation, formed pursuant to Section 3 of the Alaska Native Claims Settlement Act (43 USC 1602).

I. STANDARDS

A. The BLM shall ensure that all work carried out pursuant to this PA meets the Secretary of the Interior (SOI) Standards for Archaeology and Historic Preservation (found at http://www.nps.gov/history/local-law/arch_stnds_9.htm), taking into account the suggested approaches to new construction in the SOI's Standards for Rehabilitation.

B. The BLM shall ensure that all work carried out pursuant to this PA shall be done by or under the direct supervision of historic preservation professionals who meet the SOI's Professional Qualifications Standards. The BLM and the Permittee shall ensure that contractors retained for services pursuant to the PA meet these standards.

C. The BLM recognizes that Tribes or other groups may have special expertise regarding places of traditional religious, spiritual, or cultural significance, or Traditional Cultural Properties (TCPs), but these individuals or groups may not meet the standards in I.A and I.B. However, the BLM will equally consider and incorporate special expertise into decisions regarding the implementation of this PA, consistent with 36 CFR 800.2(c)(2).

II. ADMINISTRATIVE STIPULATIONS

A. This PA shall apply to the Project and all of its Phases, Components, and Stages, including those not known at this time, not defined in the EIS, or not specified in the permits, permit applications, or other Project documents, so long as the activities occur within the jurisdiction of a state or federal agency.

B. The BLM, the NPS, the USACE, and State shall enforce the terms of this PA within each agency's scope and shall incorporate this PA and its terms into any decision document, permit, or authorization they issue. Each shall notify the others within 5 business days if any of them becomes aware of an instance of possible non-compliance with the terms and conditions of this PA or permit conditions as they relate to this PA. If this occurs, the BLM shall ensure that measures are taken to resolve non-compliance issues, consistent with its legal authorities, and will consult with the other PA Signatories, as needed.

C. The PA Signatories recognize that certain information about historic properties or archaeological resources are protected from public disclosure under the NHPA (54 USC 307103), the Archaeological Resources Protection Act (ARPA; 43 CFR 7.18), and Alaska State law, as required by Public Law 96-95, AS 40.25.120(a)(4), and Policy and Procedure No. 50200. Parties to this agreement shall ensure that all actions and documentation prescribed by this PA are consistent with the non-disclosure requirements of these laws.

D. Any of the PA Signatories may seek qualified independent expert consultation through a contractor, in order to fulfill the responsibilities under this PA, provided the contractor meets Stipulation I, Standards.

E. Email will be an acceptable form of communication between the Consulting Parties and is an appropriate method of "notification" or "in writing" where it is called for in this PA, unless otherwise described. If a Consulting Party does not have access to email or consistently available internet service, then the BLM will ensure that other forms of communication are made available. All the Consulting Parties should immediately notify the BLM if a point of contact within their organization changes and provide updated information. The BLM will maintain an updated list of current contact names, organizations, and email addresses as a component of Attachment E, Cultural Resource Management Plan. Updates to the contact list will not require an amendment.

F. In the event that another federal agency, not initially a party to this PA, receives an application for funding/license/permit for the Undertaking, as it is described in this PA, that agency may fulfill its Section 106 responsibilities by stating in writing that it concurs with the terms of this PA and by notifying the Signatories that it intends to do so. Such agreement shall be evidenced by execution of a Signature Page and filing it with the ACHP, and implementation of the terms of this PA.

G. This PA will not supersede or replace any guidelines, stipulations, or requirements in the BLM national PA and associated Alaska Protocol[5]; or the PA on Protection of Historic Properties During Emergency Response and associated Alaska Implementation Guidelines[6].

III. AGENCY ROLES AND RESPONSIBILITIES

A. The BLM, the NPS, the USACE, and State shall attach this PA or its stipulations to any agency-specific permits or authorizations for the Project. Those agencies shall ensure that requirements of this PA have been met for the Undertaking under their respective jurisdictions. Failure by the Permittee to comply with the stipulations could result in suspension, modification, or revocation of permits or authorizations.

B. The BLM, the NPS, the USACE, and State shall ensure that no ground disturbance, including brush clearing, geotechnical surveys, or any other activity associated with the Project that may affect historic properties, takes place within a Project Segment, Stage, or Component until identification, evaluation, and on-site measures for resolution of adverse effects have been completed for that Segment, Stage, or Component. The NPS, the USACE, and State will inform the BLM in writing once the stipulations within each agency's scope, as outlined in this PA, have been satisfied by the Permittee. The BLM will then provide written notice to the Permittee that Section 106 requirements have been satisfied for that Segment, Stage, or Component.

C. The BLM, the NPS, the USACE, and State shall consult, at a minimum, during the Annual Meeting to ensure that each agency independently satisfies its respective regulatory requirements under 36 CFR 800 and AS 41.35.200(a). If any PA Signatory fails to comply with the PA, the BLM shall implement the procedures outlined in Stipulation XVI, Dispute Resolution.

IV. PERMITTEE RESPONSIBILITIES

A. If the Project is permitted, this PA and all its requirements will be binding on AIDEA as the Permittee, and any heirs, successors, assigns, joint ventures, and any contractors acting on behalf of the Permittee. The Permittee will include a provision requiring compliance with the PA in any contract of sale or transfer of ownership or management of the Project.

B. The Permittee shall be responsible for funding and implementing, either directly or through qualified contractors, the work necessary to ensure compliance with the terms of this PA. This work will be completed on behalf and at the direction of the BLM.

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[5] BLM PA: https://www.blm.gov/sites/blm.gov/files/National%20Programmatic%20Agreement.pdf
Protocols for Alaska: https://www.blm.gov/sites/blm.gov/files/AK%20Protocol.pdf

[6] Emergency Response PA: https://www.nrt.org/sites/2/files/Programmatic_Agreement_on_Protection_of.pdf
Alaska Guidelines: http://dnr.alaska.gov/parks/oha/oilspill.htm

C. The Permittee shall ensure that any persons conducting or supervising cultural resources work on their behalf hold all appropriate federal or state permits and/or authorizations for that work, and meet Stipulation I, Standards, for the applicable discipline.

D. The Permittee shall ensure all necessary federal, state, and private landowner permits and/or authorizations are obtained for conducting archaeological survey, excavation, and monitoring, consistent with the permitting process for the applicable agency and/or landowner. Applicable permits include Permits for Archaeological Investigations from the BLM and/or the NPS, the Alaska State Cultural Resource Investigation Permit from the State, and authorizations from the Northwest Arctic Borough; NANA; Doyon, Limited; Evansville, Limited; and/or other private landowners.

E. Prior to the initiation of ground disturbing activities for each Project Phase, the Permittee shall provide a technical design plan for that Phase (Phase Plan) to the BLM that contains detailed descriptions of the locations of all Segments and Components, detailed descriptions of the planned work Stages, and anticipated work schedules for all activities that will occur during that Phase. The Plan must contain detailed maps and a GIS deliverable with the spatial locations of the planned work. The BLM will distribute Phase Plans to Consulting Parties for informational purposes and will append them to Attachment G, Project Plans. Each Phase Plan will contain all information known at that time for that Phase; however, changes to the technical designs, methods, or schedules may be incorporated into the Annual Work Plan (VII.B.i), rather than necessitating a revision of the Phase Plan.

F. The Permittee may carry out the stipulations of this PA in a phased approach for identification and evaluation per 36 CFR 800.4(b)(2), based on Project Segments, Stages, and Components, but will not initiate any ground disturbance, or other types of activities that could adversely affect historic properties, before inventory, evaluation, assessment, and on-site measures for resolution of adverse effects has been completed for that Segment, Stage, or Component. Prior to commencement of any activities that could affect historic properties, the Permittee must receive written notice from the BLM that Section 106 requirements have been satisfied for that Segment, Stage, or Component.

G. The Permittee shall develop a tribal liaison/representative program in collaboration with Tribes. The program may be a component of other Project-wide efforts (subsistence advisory committees or similar) but must provide an opportunity for Tribal representatives to participate in and share information for cultural resource management activities. To the extent practicable, the Permittee will make opportunities available for Tribal liaisons/representatives to accompany cultural resource personnel during fieldwork and/or monitoring activities. The Permittee will provide a description of the program and identify Tribal liaisons/representatives and roles for the upcoming year in the Annual Work Plan (VII.B.i); the Permittee will report on all activities under the program as part of the Annual PA Report (XV.B). The BLM will ensure the program is reviewed as part of the Annual Meeting (XV.A) and will require the Permittee to make adjustments to the program as necessary, to ensure adequate opportunities are provided for Tribal participation and input during cultural resource management activities.

H. The Permittee, and any contractors hired on their behalf, will not retain sensitive information[7] that Tribes or Consulting Parties authorize them to collect, except as required for compliance with the terms of the PA and Cultural Resources Management Plan (CRMP), Attachment E. Sensitive information includes information covered under Section 304 of the NHPA (54 USC 307103), ARPA (43 CFR 7.18), or AS 40.25.120(a)(4).

I. The Permittee shall create a password-protected file sharing platform to allow PA Signatories to easily share data associated with implementation of the PA. All reports and deliverables shall be transferred to the BLM, other PA Signatories, and/or Consulting Parties through this platform. Access will be restricted consistent with the terms of the PA. If a Consulting Party does not have access to email or consistently available internet service, then the BLM will ensure that other forms of delivery are made available.

J. The Permittee shall ensure that any Project personnel found vandalizing, moving, or taking cultural materials, or violating any portion of ARPA (16 USC 470aa) or AS 41.35.200, will be subject to appropriate disciplinary action up to and including immediate termination. In each instance, the Permittee shall consult with the BLM, the SHPO, and the landowner/manager to determine whether a report to appropriate law enforcement authority is warranted.

K. The Permittee is responsible for gaining access to private property for the purposes of implementing this PA and will notify the BLM when access has been granted. In cases where the Permittee cannot gain access, identification efforts on that property may be deferred until access is gained. If a private landowner refuses entry, the BLM, the SHPO, and Permittee will consult on a case-by-case basis and consider alternative survey methods. The Permittee will be responsible for ensuring efforts are commensurate with cultural resource management industry standards and meet a good faith intent for carrying out inventory, evaluation, assessment of effects, and resolution of adverse effects on all private property consistent with the terms of this PA; failure to meet the good faith standard for inventory could result in suspension, modification, or revocation of permits or authorizations.

V. CONSULTATION

A. The BLM shall use the Secretary's *Standards and Guidelines for Federal Agency Preservation Programs* as a guide for consultation. Consultation means the process of seeking, discussing, and considering the views of other participants, and, when feasible, seeking agreement with them regarding matters arising in the Section 106 process. Additional details regarding consultation are provided in the CRMP, Attachment E.

B. The BLM shall conduct government-to-government consultation with Tribes located near the permitted route, or with Tribes that have traditionally used that area in the past. The BLM will use Handbook 1780-1, *Improving and Sustaining BLM-Tribal Relations*, as a guideline for Tribal consultation. The BLM will consult with Tribes to identify places that may be of traditional religious, spiritual, or cultural importance to them. The BLM, in consultation with the SHPO and Tribe(s), shall determine whether those places are historic properties, whether there would be an adverse effect from the Undertaking, and, if so, appropriate measures to resolve the adverse effect(s). Information shared by Tribes that is of a culturally sensitive nature will be respected and treated in a confidential manner. The

[7] Sensitive information is defined as including information about the location, character, or ownership of a historic property if disclosure to the public may cause a significant invasion of privacy, risk harm to the historic property, or impede the use of a traditional religious site by practitioners (54 USC 307103).

BLM will consult early in the identification process with Tribes to determine what is considered sensitive information, and the means by which that information will be collected, shared, and returned and/or destroyed, consistent with Stipulation II.C. The BLM will continue to consult on a government-to-government basis with Tribes throughout the duration of this PA. Further details on Tribal consultation are provided in the CRMP, Attachment E.

C. The BLM shall ensure the SHPO receives all technical reports, in keeping with the SHPO's mission to identify and maintain inventories of cultural resources and historic properties per Section 101 of NHPA (54 USC 302301) and AS 41.35.070. The SHPO will retain location information about all cultural resources and historic properties, including properties of religious, spiritual, or cultural significance to Tribes; however, at the request of one or more Tribes, the SHPO will treat information regarding specific historic properties of traditional religious, spiritual, or cultural significance as sensitive information subject to Section 304 of the NHPA, 36 CFR 800.11(c), and/or applicable state laws.

D. The BLM shall consult with the Permittee regularly or at the Annual Meeting (XV.A) to share information, gathered during consultation with Tribes or other entities, that may be relevant to the Permittee's responsibilities under this PA. This includes, but is not limited to, information relevant to training curriculum, information relevant to inventory efforts, requests to participate in monitoring activities, requests to accompany crews in the field, and requests to participate in Tribal liaison activities.

E. The BLM shall ensure that the Consulting Parties are kept informed on the Undertaking and implementation of this PA and shall provide opportunities for review and comment on all pertinent documents. The BLM's consultation will, at a minimum, include distribution of the Annual PA Report (XV.B) to Consulting Parties via email and facilitation of the Annual Meeting (XV.A).

F. The BLM shall consult with and provide information to the public, pursuant to 36 CFR 800.2(d). The BLM and the Permittee will post the Annual PA Report (XV.B), with confidential information redacted as necessary, on their respective websites for the Project. The Permittee will mention the availability of the Annual PA Report in newsletters or similar forms of communication that are sent to the public and other interested parties.

G. The BLM delegates responsibilities to the Permittee for consultation with private landowners, unless the landowner requests to consult with the BLM, at which point the BLM will assume consultation responsibilities to the extent requested by the landowner. The Permittee will notify landowners that consultation with the BLM is an option.

VI. CULTURAL RESOURCES MANAGEMENT PLAN

A. The BLM, in consultation with the PA Signatories, has prepared a Cultural Resources Management Plan to guide compliance with the stipulations in this PA and is included as Attachment E. At the time of PA execution, all sections of the CRMP are considered complete, except for Chapter 6, Historic Property Treatment and Mitigation, and guidance for the Operations and Maintenance Phases and Reclamation Phase of the Project. The BLM shall ensure that content is developed and incorporated into the CRMP in accordance with the following timeline:

i. 12 months following PA execution, the BLM will submit standard mitigation guidance for archaeological sites, historic trails, and other property types that are common in the APE (Chapter 6 of the CRMP).

ii. No later than 1 year prior to the Project transitioning into the Operations and Maintenance Phase, the CRMP will contain finalized guidance for that Phase, which may include a streamlined Section 106 and/or Alaska Historic Preservation Act review process.

iii. No later than 1 year prior to the Project transitioning into Reclamation, on any portion of the Project, the CRMP will contain finalized guidance for reclamation activities, which may include streamlined Section 106 and/or Alaska Historic Preservation Act review processes.

B. The BLM will facilitate monthly consultation meetings with the other PA Signatories, and other Consulting Parties that provide written notification they wish to participate, for drafting the remaining CRMP guidance, either via phone or in person, or as determined necessary by the PA Signatories. The BLM will provide the PA Signatories with revisions to the CRMP at least 15 working days prior to any meetings. The BLM will incorporate comments received and provide updated drafts to the PA Signatories. The first review and last review will be a 30-day[8] period.

C. The BLM will solicit comments from Consulting Parties at the beginning of each new content development process (steps VI.A.i through VI.A.iii) and provide each draft final CRMP to Consulting Parties for a 30-day review and comment period and will consider all timely comments received. The CRMP will be finalized when the SHPO, the BLM Central Yukon Field Office Manager, and the NPS GAAR Superintendent sign Exhibit F of the CRMP. The BLM will distribute the final CRMP to the Consulting Parties and incorporate it as the finalized version of Attachment E.

D. Amendments or addendums to the CRMP will follow Stipulation XVII.B.ii, Amendments and Addendums.

VII. ALTERNATIVE FOUR STEP PROCESS

A. The BLM shall use the following phased process for the Undertaking, to complete inventory, evaluation, assessment of effects, and resolution of adverse effects, consistent with 36 CFR 800.3-800.6, and will direct the Permittee to gather sufficient data to fulfill documentation standards consistent with 36 CFR 800.11, in a manner that will accommodate the Permittee's phased construction and development of the Project.

B. Reporting Process – The Permittee will provide the following plans and reports for compliance with the Alternative Four Step Process, and will ensure they are commensurate with cultural resource management industry standards and meet a good-faith intent for carrying out inventory, evaluation, assessment of effects, and resolution of adverse effects in a phased approach. See also the steps outlined in Stipulation XIV, Document Submission and Review, and Attachment F, Reporting Table:

i. Annual Work Plan – The Permittee will provide the BLM with an Annual Work Plan, no later than March 1 of each year, or at least 60 days prior to fieldwork initiation for the first year. The BLM will submit the Annual Work Plan to Consulting Parties at least 15 days prior to the Annual Meeting (XV.A). The Annual Work Plan will contain detailed information about the anticipated work for the upcoming year, where it will occur, how it will be phased within Project Segments, Stages, and/or Components, and how the Permittee will meet the PA

[8] Unless otherwise noted, days refers to calendar days throughout this document.

requirements. Other submissions with the Annual Work Plan may include updates to the Phase Plan (IV.E), Historic Themes (VII.C.ii.a), Ethnographic Resources (VII.C.iii), the Monitoring Plan (X.D), and Contractor Training curriculum (XI.B). The Plan must contain detailed maps and a GIS deliverable with the spatial locations of the planned work. Consulting Parties will have a 30-day review and comment period for the Annual Work Plan, which will follow the steps described in Stipulation XIV, Document Submission and Review. The BLM and the SHPO must approve of the Annual Work Plan before it can be implemented; any work that will occur under NPS jurisdiction will also require approval by the NPS.

ii. Interim Report for Indirect APE – Within 30 days following completion of fieldwork each year, the Permittee will submit an Interim Report for the Indirect APE to the BLM, providing a brief description of cultural resources identified in the Indirect APE during that reporting period. Within 5 days of receipt, the BLM will submit the Interim Report to the Consulting Parties for a 15-day review period to seek comments on which resources within the Indirect APE should be evaluated for the NRHP. The BLM will consult with the SHPO, and the NPS as appropriate, within 7 business days following the 15-day review to consider all timely comments received, and then will direct the Permittee to make recommendations of eligibility, assessment of effects, and measures for resolution of adverse effects for specific resources in the Indirect APE, which the Permittee will include in the Annual Fieldwork Report (VII.B.iii).

iii. Annual Fieldwork Report – The Permittee will submit a Fieldwork Report to the BLM within 90 days following completion of fieldwork each year that will fulfill documentation standards consistent with 36 CFR 800.11. The Report will contain 1) a description of inventory efforts completed since the last report, including monitoring results; 2) NRHP eligibility recommendations; 3) finding of effect recommendations for resources that may be eligible; and 4) recommended resolution measures for resources that may be adversely affected. The Report must contain detailed maps and a GIS deliverable with the spatial locations of the completed work. The BLM will distribute the Annual Fieldwork Report to Consulting Parties for a 45-day review and comment period, which will follow the steps listed in Stipulation XIV, Document Submission and Review. The BLM and the SHPO must approve of the Annual Fieldwork Report before it will be considered complete; relevant portions of the report for cultural resources under NPS jurisdiction will also require approval by the NPS.

a. Within 15 days following the 45-day Consulting Party review, the BLM will consider any timely comments received and will submit Determinations of Eligibility (DOEs), assessment of effects, and proposed mitigation measures to the SHPO, consistent with 36 CFR 800.4-6. If no response is received from the SHPO within 30 days, the BLM shall move forward with their determinations and findings. The BLM's documentation will cite the Project design date/version used to assess adverse effects.

b. If the BLM, through consultation with other Consulting Parties during the 45-day report review period, determines that adequate information has not been provided for a DOE or finding of effect, the BLM will require the Permittee to provide additional information or conduct additional fieldwork as necessary. After the Permittee has gathered the additional information, the Permittee will submit it as a report addendum to the BLM, which the BLM will distribute to Consulting Parties for another 30-day review. The BLM will take into consideration any timely comments received and will provide a DOE, assessment of effects, and proposed mitigation measures to the SHPO within 15 days. If no response is received, the BLM shall move forward with their determination.

c. If the BLM and the SHPO do not agree on NRHP eligibility of a resource, the BLM shall forward all documentation to the Keeper of the National Register, pursuant to 36 CFR 63.2(d), for an official determination.

d. If a Consulting Party objects to a finding of effect within the 45-day review period, and provides reasons for the disagreement, the BLM shall either consult with the objecting party or forward the finding and supporting documentation to the ACHP for comment, consistent with 36 CFR 800.5(c)(2).

e. The BLM may determine that evaluation of a historic property(ies) may be necessary outside of the annual report cycle. In these instances, the same review process will be followed but may be reduced to a 15-day review and comment period for Consulting Parties, and a 7-day period for the BLM to incorporate timely comments received and submit to the SHPO. If no response is received from SHPO within 30 days, the BLM shall move forward with their determination(s) and finding(s).

iv. Treatment Plans – Within 120 days following Stipulation VII.B.iii.a, the conclusion of the SHPO's 30-day review of DOEs and assessment of effects, the Permittee will develop proposed property-specific Treatment Plans and submit them to the BLM. The Treatment Plans will contain detailed information on treatment measures, a schedule for when the measures will be implemented, and a schedule for when deliverables will be finalized and distributed. The BLM will distribute the Treatment Plans to the Consulting Parties for a 30-day review and comment period, which will follow the steps outlined in Stipulation XIV, Document Submission and Review. The Permittee, or contractors hired on their behalf, will implement the Treatment Plans, following approval of the Plans by the BLM and the SHPO; Treatment Plans for historic properties under NPS jurisdiction will also require approval by the NPS.

a. The BLM may determine that development of a Treatment Plan will require additional time beyond the timelines described above, due to the need for additional consultation, unique characteristics of the property, or other factors. In these instances, the BLM, in consultation with Consulting Parties, will determine what steps must be taken for the Permittee to develop and implement appropriate mitigation measures. Subsequent Treatment Plan reviews will include a 30-day review and comment period, and will follow the steps outlined in Stipulation XIV, Document Submission and Review.

v. Final Implementation Report – The Permittee will submit a Final Implementation Report for each historic property to the BLM, within 180 days after implementation of the Treatment Plan is complete, or within a timeframe specified in the Treatment Plan. The Final Implementation Report will be a comprehensive record of all activities that occurred at that historic property, from inventory through implementation of treatment measures, and will describe all completed steps, analyses, methods, and results, including collections and datasets generated. The BLM will provide the Report to the Consulting Parties for a 30-day review and comment period, which will follow the steps outlined in Stipulation XIV, Document Submission and Review. The BLM and the SHPO must approve of all Final Implementation Reports before they will be considered complete; Final Implementation Reports for historic properties under NPS jurisdiction will also require approval by the NPS.

vi. Technical Reports – The BLM, in consultation with the other PA Signatories, may determine that technical reports are necessary to summarize the results of background research, fieldwork activities, and laboratory analyses in order to fully understand Project effects to historic properties, or may be useful as mitigation measures for broad-scale effects. Technical Reports should not require extensive efforts to gather new information, but rather be a compilation of existing information. The BLM will consult with the other PA Signatories at the Annual Meeting to consider whether a technical report(s) may be needed, and if so, what content it should contain and subsequent review process. The Permittee will be responsible for compiling the report(s) and submitting to the BLM. The BLM will provide the report to Consulting Parties for at least a 30-day review period, which will follow the steps outlined in Stipulation XIV, Document Submission and Review. The BLM and the SHPO must approve of Technical Reports before they can be considered finalized.

C. **Inventory Process** – Based on a Data Gap analysis for the Project[9], the cultural resources that are likely to be encountered during inventory, and may meet the definition of historic properties, fit into 3 broad categories: archaeological resources, historic resources, and ethnographic resources. Through consultation, the BLM determined that a reasonable and good faith effort, pursuant to 36 CFR 800.4(b)(1), requires separate inventory[10] methods to account for archaeological, historic, and ethnographic resources, which will include background archival research as well as pedestrian survey, consistent with the SOI's Standards for Identification. The BLM shall ensure that inventory for archaeological, historic, and ethnographic resources occurs as follows:

i. Archaeological Resources – The Permittee shall employ a qualified contractor to create a Geographic Information System (GIS) model of prehistoric and protohistoric archaeological resource potential within the APE for the permitted alternative. The model will categorize areas within the APE for the potential presence of prehistoric and protohistoric archaeological resources. The Permittee will provide the model, summary documentation regarding the variables used to create it, and how the model will be tested during implementation to the BLM within 6 months after the PA is executed. The BLM will distribute the model and documentation to the other PA Signatories for a 30-day review and comment

[9] Ford et al. 2018. Ambler Road Environmental Impact Statement: Cultural Resources Data Gap Analysis Report. Prepared by HDR, for the Bureau of Land Management, Central Yukon Field Office, Fairbanks, Alaska.

[10] The term "inventory" is used throughout this document to refer to all efforts to compile information on historic properties, including consultation, archival research, and fieldwork. The term "survey" refers to inventory efforts that are field based only.

period. The BLM shall require the Permittee to make changes and modifications as necessary, based on comments received. Annually throughout Phase I of the Project, or as determined necessary by the PA Signatories, the model will be refined based on new data obtained through fieldwork and/or updated environmental datasets. Based on model results, pedestrian survey will be required for portions of the APE, per Stipulation VII.D. Additional details are provided in the CRMP, Attachment E.

ii. Historic Resources – The Permittee will employ qualified contractors to develop Historic Theme reports relating to historic period resources, such as (but not limited to) traditional subsistence economy; traditional hunting, trapping, and guiding economies; traditional trade networks; historic exploration and travel corridors; and prospecting and mining. The purpose of the Historic Themes is to gather information on historic-era resources or places associated with historic events that may be present within the APE, and to identify areas that are high potential and require pedestrian survey. The documentation efforts will include a comprehensive summary of available data sources and will include GIS mapping of any relevant spatial information. Additional details are provided in the CRMP, Attachment E, including a list of potential data sources (Chapter 4.1.2).

a. The Permittee will submit the Historic Theme reports to the BLM 60 days prior to initiation of the first season of fieldwork, and any updates to the Themes with the Annual Work Plan each year thereafter. The BLM will share the reports with Consulting Parties for a 30-day review and comment period, which will follow the steps outlined in Stipulation XIV, Document Submission and Review. The BLM and the SHPO must approve of the Historic Themes.

b. The Permittee, or contractors hired on their behalf, will conduct pedestrian survey in areas identified in the Historic Themes as high potential for historic resources, per Stipulation VII.D.i.

c. Historic Themes may be further developed as Historic Contexts for NRHP eligibility considerations, consistent with Stipulation VII.E.

iii. Ethnographic Resources – The BLM shall make a good faith effort to provide Tribes, local governments, and other communities with an opportunity to identify ethnographic resources, including places of traditional religious or cultural importance, within the APE, consistent with Stipulation V, Consultation. Ethnographic resources are likely present but are generally only identifiable by the community sharing the values, traditions, beliefs, or social institutions associated with such places, but could also be identified through archival research or other means. The BLM shall consider the nature and location of ethnographic resources identified, and determine through consultation with the party(ies) that identified the resource and the SHPO if additional work, in the form of oral interviews, research, GIS mapping, site visits, or other culturally-appropriate methods, are necessary to document the ethnographic resource(s). Additional details are provided in the CRMP, Attachment E.

a. As necessary, the BLM shall gather sufficient information to complete a determination of NRHP eligibility for identified resources if it is identified as a sensitive resource, or shall direct the Permittee to gather information and make a recommendation of NRHP eligibility for the BLM to consider, if the resource is not considered sensitive. The Permittee shall integrate the results of the ethnographic investigation into the Annual Fieldwork Report, unless the resource needs to be treated confidentially.

b. At the time of PA execution, the following Tribes and local governments have indicated areas of cultural importance and/or ethnographic resources that may be affected by 1 or more alternative, and for which the BLM will consult further:

Alatna Village Council
Allakaket Village Council
City of Allakaket
City of Anaktuvuk Pass
Dinyea Corporation
Evansville Village
Evansville, Incorporated
Hughes Village Council
Huslia Village Council
Native Village of Kobuk
Native Village of Noatak
Native Village of Selawik
Native Village of Stevens
Native Village of Tanana
Northwest Arctic Borough
Noorvik Native Community
Village of Anaktuvuk Pass

D. Survey Process – As a component of the inventory process and consistent with 36 CFR 800.4, the BLM shall ensure the Permittee, or contractors hired on their behalf, complete a reasonable and good faith effort for pedestrian survey and testing within the APE. This will include survey and/or testing in areas that are likely to contain archaeological, historic, and ethnographic resources, but will not require 100 percent survey coverage of the APE. To determine where survey is required, the Permittee will incorporate the archaeological model (VII.C.i), Historic Theme reports (VII.C.ii.a), and ethnographic information (VII.C.iii) to categorize the APE as high, medium, and low potential for the presence of cultural resources (see additional details in Attachment E, CRMP). The level of effort for survey will vary based on the APE categorization but will use standard field methods described in Chapter 4 of the CRMP. This effort, collectively, will be known as the Survey Strategy[11]. The Permittee will provide a detailed description of the Survey Strategy as part of the Annual Work Plan (VII.B.i), and will update and refine it annually to incorporate the results of the previous year's inventory efforts and/or any new or updated datasets. The BLM will provide the Permittee with information that is relevant to the inventory process on a regular basis, or at least by December 30 of each year, so that the Permittee can incorporate it into the Survey Strategy. Based on the Survey Strategy, the Permittee, or

[11] The term "Survey Strategy" is used throughout the document to refer to required field efforts to identify archaeological, historic, and ethnographic resources within the APE. The Survey Strategy will be developed by compiling multiple data sources for those resources, which will then be used to classify the APE into areas of high, medium, or low potential for cultural resources.

contractors hired on their behalf, will complete pedestrian survey and testing in the APE according to the following requirements:

i. High Potential: Defined as landforms adjacent to wetlands, riparian areas, watershed confluences, lakes, streams, Revised Statute 2477 trails, villages, and AHRS sites, or identified as high potential through consultation, research, and or/field evaluation. Pedestrian survey and testing is required for 100 percent of high potential areas within the Direct APE. If the Field Crew Chief determines that subsurface testing within these areas is not necessary, he/she will document how and why that determination was made.

ii. Low Potential: Defined as areas that are wetlands, perennially inundated, areas of tussock tundra, or slopes over 25 degrees, unless identified as a high potential through consultation, research, and/or field evaluation. Pedestrian survey and testing is required for 10 percent of low potential areas within the Direct APE. Otherwise, areas that are identified as low potential will not require pedestrian survey or subsurface testing. If the Field Crew Chief determines that subsurface testing within these areas is not necessary, he/she will document how and why that determination was made.

iii. Medium Potential: Areas not defined as either low potential or high potential. Pedestrian survey and testing is required for 50 percent of medium potential areas within the Direct APE. If the Field Crew Chief determines that subsurface testing within these areas is not necessary, he/she will document how and why that determination was made.

iv. Previously Surveyed Areas: The Permittee will not be required to conduct pedestrian survey and testing in areas of the APE that have been previously inventoried in the past 10 years via methods that are commensurate with, or meet, the PA Stipulations and CRMP Guidelines. However, it may be necessary for the Permittee or their contractors to revisit known resources to collect adequate data for NRHP eligibility recommendations. The Permittee will evaluate previous pedestrian surveys and provide recommendations on whether those areas need to be revisited as part of the Survey Strategy.

v. Indirect APE: Survey for subsurface resources in the Indirect APE is not required, unless there are reasonably foreseeable adverse effects from the Undertaking. Survey for surface resources may be required; however, the BLM cannot make informed decisions on the extent of the effects until Project design plans, footprints, construction methods, and schedule are finalized and submitted as Phase Plans (IV.E) and/or Annual Work Plans (VII.B.i). Potential direct, indirect, or cumulative effects may occur from increased access along or across the proposed road corridor, soil erosion or deposition downstream of water crossings and bridges, or other visual, audible, or atmospheric factors. Additional inventory and/or monitoring may be required, particularly in areas vulnerable to erosion, including water crossings, downstream of water crossings, hillside cuts, and trail or access crossings. The Permittee will provide new or updated Project plans to the BLM as part of the Annual PA Report (XV.B) and the PA Signatories will review and consider whether the Permittee will be required to complete additional inventory and/or monitoring within the Indirect APE during the Annual Meeting (XV.A).

E. Evaluation Process: Per 36 CFR 800.4(c) and 36 CFR 60.4, the BLM shall ensure that the Permittee, or contractors hired on their behalf, evaluate all identified cultural resources within the Direct APE and Indirect APE to determine if they are eligible for the NRHP. Evaluation will follow 36 CFR 63, NPS Bulletin 15, *How to Apply the National Register Criteria for Evaluation*, and/or other appropriate guidelines, and will consider both individual and district-level eligibility. Resources of a similar nature may be evaluated as a multiple property listing or as a district to create more efficiencies in the process. The Permittee will provide all recommendations of eligibility to the BLM as part of the Annual Fieldwork Report (VII.B.iii). The BLM will submit final DOEs to SHPO following Stipulation VII.B.iii.a. Additional details on evaluation are provided in Attachment E (CRMP). Cultural resources that are not eligible for the NRHP will no longer be subject to the terms of this PA.

F. Assessment and Resolution of Adverse Effects: The BLM shall ensure adverse effects to historic properties are assessed per 36 CFR 800.5 and resolved through avoidance, minimization, or mitigation, per 36 CFR 800.6. To the extent practicable, the Permittee will develop or modify Project design and construction methods to avoid historic properties. For historic properties that cannot be reasonably avoided, the Permittee will submit assessments of effects and recommended resolution measures to the BLM as part of the Annual Fieldwork Report (VII.B.iii).

i. The BLM shall ensure the Permittee, or contractors hired on their behalf, resolve all adverse effects that cannot be avoided or minimized through implementation of appropriate mitigation measures that are commensurate with the significance of the historic property and the Project's effect on the historic property. Proposed mitigation measures will be submitted to the BLM as part of the Annual Fieldwork Report (VII.B.iii) and approved mitigation measures will be fully developed as Treatment Plans (VII.B.iv), which the Permittee will be required to implement, following approval of the Plans. In certain cases, the BLM may determine that additional consultation is necessary to develop appropriate mitigation measures for certain historic properties. The Permittee will provide a Final Implementation Report (VII.B.v) to the BLM when mitigation is complete for each historic property.

ii. Approved mitigation measures may include, but are not limited to, the following list (see Attachment E, CRMP for additional details).

1. Oral history interviews, placenames studies, GIS mapping, development of media, archival searches, and report preparation and publication; generally associated with properties eligible under Criterion A or B;

2. HABS/HAER/HALS documentation or rehabilitation and reporting; generally associated with properties eligible under Criterion C;

3. Data recovery and analysis, reporting, and curation of resulting collections and records; generally associated with properties eligible under Criterion D;

4. Assisting in the development of Tribal or community historic preservation plans;

5. Nominating and listing properties for the NRHP;

6. Public interpretation or public reports on regional history or prehistory;

7. Providing improvements to or maintenance for historic trails;

8. Creation of K-12 school curriculum or other projects for local schools related to the history or prehistory of the region; and

9. Cultural resource management internship opportunities.

iii. The BLM will generally consider approval of a Final Implementation Report (VII.B.v) to satisfy the requirements of 36 CFR 800.6 for each historic property. However, to account for potential Project modifications that could change the assessment of effects, the BLM shall ensure the criteria of adverse effect is applied using the most recent Phase Plan (IV.E) prior to providing the Permittee with written notification that the Section 106 requirements have been met.

G. Long-Term Considerations:

i. After the initial inventory is completed, the PA Signatories may determine that mitigation measures are needed to account for broad-scale indirect or cumulative adverse effects to regional or national history and prehistory. Within 3 years following completion of initial inventory, the BLM will consult with the PA Signatories during the Annual Meeting (XV.A) to determine if broad-scale mitigation is appropriate, and if so, to identify measures for the Permittee to implement. The PA Signatories will also consider the Project's indirect and cumulative effects in advance of the Project transitioning from one Phase to another (see Attachment G, Project Plans).

ii. If the Permittee expands, revises, or alters Project Segments, Components or footprints, and the area was inventoried more than 10 years prior, the BLM will consider whether the Permittee will be required to re-survey the area that would be affected by the changes, using methods determined appropriate by the BLM and other PA Signatories. The Permittee will provide any proposed changes in the Annual Work Plan (VII.B.i) and the BLM will consult with the Consulting Parties at the Annual Meeting (XV.A) to determine appropriate levels of effort for re-survey. Considerations should include environmental changes that occurred that could affect the identification of historic properties, resources that could have reached the 50-year threshold, new information that may be available regarding historic or traditional uses of the area, new survey methods or technology, or other factors.

iii. Reevaluation of eligibility for listing in the NRHP may be necessary for certain cultural resources. The BLM will consult every 5 years with the Consulting Parties during the Annual Meeting (XV.A), or following substantive changes to Project Components or Phases, to determine if reevaluation of certain resources is necessary.

iv. The BLM reserves the right to reevaluate the assessment of effects to historic properties if there are changes in design, construction methods, maintenance requirements, reclamation activities, or any other aspect related to the Undertaking that could adversely affect historic properties.

VIII. COLLECTION AND CURATION

A. Any materials[12] collected as a result of implementing this PA, and not subject to the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA), are the property of the applicable state or federal land-managing agency, or landowner if collected from privately owned property. On federal lands, any human remains, funerary objects, sacred objects, or objects of cultural patrimony, as defined in 43 CFR 10.2(d), will follow disposition to lineal descendants or Tribe(s), following the procedures set forth in 43 CFR 10, Subpart B.

B. Pursuant to 36 CFR 79.7(b) and applicable permit(s), the Permittee will assume all costs associated with the curation of any materials that are collected during the implementation of this PA, in perpetuity. Curation costs may include, but are not limited to, curation fees charged by approved institutions, acquisition of archival materials, shipping, cleaning, rehousing, and any other conservation action determined necessary by a qualified conservator or considered common/ethical practice by the industry.

C. The BLM and the NPS shall ensure that curation of materials collected from federal lands, and not subject to the provisions of the NAGPRA, is completed in accordance with 36 CFR 79, *Curation of Federally-Owned and Administered Archaeological Collections*. The Permittee will submit all materials from federal lands for curation at the University of Alaska Museum of the North (UAM) in Fairbanks, Alaska, but the materials will retain federal ownership. During the permitting process, the Permittee will establish a provisional curation agreement with the UAM for collections, which the Permittee will finalize prior to submission of collections to the UAM.

D. Collections made on state land will comply with AS 41.35.020. The Permittee will submit all materials from state lands for curation at the UAM, but the materials will retain state ownership. During the State Archaeological Permitting process, the Permittee will establish a provisional curation agreement with the UAM for collections, which the Permittee will finalize prior to submission of collections to the UAM.

E. The Permittee, and any contractors hired on their behalf, will be responsible for submitting all materials recovered from state and/or federal lands to the UAM within 6 months following approval of the Final Implementation Report (VII.B.v), or within 1 year following completion of the fieldwork that generated the collection if the property will not require mitigation. All collections will be curation-ready, as determined by UAM requirements. Prior to disposition, the Permittee, or any contractors hired on their behalf, will safeguard all materials from theft or damage by providing appropriate interim storage facilities and conservation actions, consistent with the requirements in 36 CFR 79.9. The Permittee shall consult with UAM staff regarding interim storage facilities and necessary conservation actions to be consistent with 36 CFR 79.9 (b)(4). Within 30 days following disposition, the Permittee will provide the BLM with all accession records and documentation associated with the transfer and curation of materials. The BLM will share the documentation with other landowners or managers, as appropriate.

F. For collections recovered from private lands, the Permittee will work with private landowners to arrange for the disposition of materials. The Permittee will provide private landowners with information on the value of curation and will assume all costs of the materials, not to exceed standards set forth in 36 CFR 79. If a landowner chooses to donate

[12] The term "materials" is consistent with the definition found at 36 CFR 79.4(a)(1), and refers to any objects, artifacts, specimens, records, or remains associated with historic properties. This includes all documentation generated during the implementation of this PA, with the exception of information that is subject to confidentiality clauses of NHPA, ARPA, and/or Alaska State law.

or loan the materials to the UAM or another repository, the Permittee will provide the BLM with documentation of the transfer within 30 days following the transfer. In the event that a landowner chooses to retain a collection, the Permittee will provide documentation of this to the BLM.

IX. INITIATION OF CONSTRUCTION ACTIVITIES AND STOP WORK ORDERS

A. The BLM shall ensure the Permittee does not initiate work on any Project Phase, Component, Stage, or Segment, until on-site actions to carry out the Alternative Four Step Process (VII) have been completed, and the BLM provides the Permittee with written notification that the Section 106 requirements have been met.

B. The BLM may provide written notification to the Permittee, indicating that Section 106 requirements for individual Project Segments have been met, under the following conditions:

i. Project activities within that Segment would not restrict subsequent rerouting of other Segments or Components to avoid, minimize, or mitigate adverse effects to historic properties; and

ii. The BLM, in consultation with the PA Signatories, determines that all inventory has been completed and there are no historic properties within the APE for that Segment and that cultural resource monitoring or other methods will account for potential unknowns.

C. The BLM may issue a Stop Work Order if it, or any PA Signatory, determines that Stipulation VII or IX.B has not been fulfilled, or if additional information regarding a historic property(ies) becomes available after the BLM notifies the Permittee that Section 106 requirements have been met. If a PA Signatory determines this, it shall notify the BLM in writing of the issue and the BLM shall subsequently issue a Stop Work Order to the Permittee. The BLM will then consult with the appropriate PA Signatories to determine what steps must be completed to allow for the work to be reinstated.

D. Monitors have the authority to issue a Stop Work Order if there is an inadvertent discovery found during monitoring activities. See also Stipulation X, Monitoring; Stipulation XII, Inadvertent Discovery and Unanticipated Effects; and the CRMP, Attachment E.

X. MONITORING REQUIREMENTS

A. Monitoring shall be required throughout the duration of this PA but may require differing levels of effort depending on the Project Phase, Component, or Stage. The BLM shall consult with Consulting Parties about where and to what extent monitoring will occur. At a minimum, the PA Signatories will consult regarding the need for monitoring during review of the Annual Work Plan (VII.B.i) and consider it during review of the Annual Fieldwork Report (VII.B.iii). The Permittee will ensure that monitoring plans are consistent with the Alaska Office of History and Archaeology Historic Preservation Series 15, *Monitoring Guidelines*. Additional details are provided in the CRMP, Attachment E.

B. The BLM shall ensure the Permittee employs qualified Monitors and Supervisory Monitors, consistent with Stipulation I.B and the professional qualifications outlined in the Alaska Office of History and Archaeology Preservation Series No. 15 *Monitoring Guidelines,* to be present for Project work as determined necessary through consultation with the Consulting Parties. The Permittee must make opportunities available for Tribal liaisons/representatives to participate in monitoring, consistent with Stipulation IV.G.

Typical considerations for monitoring include but are not limited to: all ground-disturbing work within 500 feet of the boundary of a known historic property, within 1,000 feet of anadromous river crossings, and in high potential areas where testing may not have been adequate. Monitors may also be appropriate at historic properties previously subjected to data recovery, since there is a possibility for discovery of significant features or other cultural materials in previously unexcavated areas. Post-construction monitoring may be necessary to evaluate whether effects are occurring to historic properties that were avoided, whether historic properties are being indirectly or cumulatively affected, or to complete a reasonable and good faith effort in areas that were identified as high potential to encounter cultural resources. Monitors will be authorized to issue Stop Work Orders, consistent with Stipulation IX.D.

C. The Permittee shall develop a Monitoring Plan, which will be updated annually. The Monitoring Plan will include, but not be limited to:

i. Areas to be monitored;
ii. Reporting requirements and schedule to track progress and results;
iii. Stop Work protocol for Monitors;
iv. Collection and curation protocols;
v. Hand signals for Monitors and equipment operators;
vi. Procedures and safety around heavy equipment; and
vii. Qualification standards and number of Monitors needed.

D. The Permittee shall provide a Monitoring Plan to the BLM each year as part of the Annual Work Plan (VII.B.i). The Monitoring Plan will describe how Project activities during the upcoming year will be monitored. Consulting Parties will review the Monitoring Plan concurrently with the Annual Work Plan.

E. The Permittee shall provide a Monitoring Report to the BLM each year as part of the Annual Fieldwork Report (VII.B.iii). The Monitoring Report will describe the results of the monitoring activities during the previous year. Consulting Parties will review the Monitoring Report concurrently with the Annual Fieldwork Report.

XI. CONTRACTOR TRAINING REQUIREMENTS

A. The Permittee shall provide cultural resource awareness training to all Project personnel, contractors, and subcontractors on an annual basis. The training will inform Project personnel of their responsibilities under the law, and clearly list procedures to follow in the event that previously undiscovered cultural resources are encountered. Additional details are provided in Attachment E (CRMP).

B. The Permittee is responsible for creating the training curriculum and shall make a good faith effort to seek input and collaborate with Tribes and other stakeholders to develop and teach the curriculum. Creation of the curriculum may be an iterative process. The Permittee will provide a copy of the curriculum to the BLM with the Annual Work Plan (VII.B.i), which will be shared with Consulting Parties for review and comment. The BLM will consider any timely comments received, and as necessary, require the Permittee to make changes and submit a revised version for review. The BLM and the SHPO will review the curriculum for approval, either within 15 days following the 30-day Consulting Party review, or within 15 days following receipt of any revisions. The curriculum must be approved by the BLM and the SHPO before it can be used for training purposes. The BLM will provide a copy of approved curriculum to the Consulting Parties for informational purposes.

C. It may be appropriate for contractors to receive differing levels of training depending on Project Phase or job role. The BLM, along with Consulting Parties, will evaluate the effectiveness of the curriculum at the Annual Meeting and determine if modifications should be made to improve or clarify content. The Permittee may provide training suggestions based on contractor roles and responsibilities at different stages of the Project.

D. At a minimum, the curriculum will provide information on the following topics:

i. Traditional cultural practices and subsistence uses along the Project corridor;

ii. Legal context for cultural resources protection and applicable federal, state, and local laws;

iii. Penalties for disturbing cultural resources and human remains;

iv. Cultural resources likely to be found in the Project area;

v. Monitoring procedures, including safety around heavy equipment, buffer areas, and hand signals between monitors and equipment operators;

vi. The Inadvertent Discovery of Cultural Resources Plan (Exhibit A of the CRMP, Attachment E); and

vii. The Inadvertent Discovery of Human Remains Plan (Exhibit B of the CRMP, Attachment E).

XII. INADVERTENT DISCOVERY AND UNANTICIPATED EFFECTS

A. The Permittee shall ensure that the Inadvertent Discovery of Cultural Resources (IDCR) Plan, found in Exhibit A of the CRMP, is implemented if there is an inadvertent discovery of a cultural resource(s) during any Project-related work.

B. The Permittee shall ensure all project personnel receive training on the IDCR Plan as part of Stipulation XI, Contractor Training Requirements, shall make the Plan available to all Project personnel, and shall ensure that all worksite supervisors have copies of the Plan with them at the worksite. The Permittee or their designee (such as worksite supervisors) is responsible for ensuring the following 2 steps are immediately implemented following an inadvertent discovery (refer to the IDCR Plan for full details):

i. Stop Work – as soon as it is safe to do so, work will cease in the immediate vicinity of the discovery and a 100-foot radius buffer around the discovery will be flagged or fenced off. The discovery must be secured and protected from further disturbance to the extent possible.

ii. Notify Officials – as soon as possible following discovery, and no later than 1 business day, the Permittee or their designee will notify the BLM, the SHPO, and the landowner or manager of the discovery (contacts are listed in the IDCR Plan).

C. Within 5 business days of notification, the BLM, the SHPO, the Permittee, landowner or manager will consult by telephone or other means on the nature of the discovery and potential significance and determine if any additional investigation is warranted or if other parties should be notified. The resource(s) will be treated as eligible until a full assessment of eligibility can be completed.

D. If the BLM determines through consultation with the other parties that the discovery is not significant and the SHPO concurs, the BLM shall provide the Permittee with written authorization to proceed with construction activities within 1 business day of this determination and concurrence.

E. If the BLM determines that additional investigation is warranted, the Permittee shall ensure the discovery is investigated by a professional meeting Stipulation I, Standards, to evaluate for NRHP eligibility. The field investigation and DOE report will be completed within 10 days following the BLM's determination. The BLM will consult with the SHPO, and other Consulting Parties as appropriate, on the eligibility of the discovery, within 3 business days of receipt of the DOE. The SHPO will provide a determination to the BLM within 5 business days from consultation. If no response is received within 5 business days, the BLM will move forward with their determination.

F. If the discovery is determined eligible, and the Project cannot avoid further effects or has already caused an adverse effect, the Permittee will prepare a Treatment Plan based on mitigation measures developed in the CRMP, Attachment E, and modified to fit the affected historic property. The Permittee will submit the Plan to the BLM within 5 business days of the end of the SHPO comment period. The BLM will distribute the Plan to the other Consulting Parties as appropriate, for a 5 business-day review. The BLM will take into consideration any timely comments received, and require any changes to be incorporated, before approving of the Treatment Plan. The Permittee must implement the on-site measures of the Treatment Plan and receive written notification from the BLM that on-site Section 106 requirements have been met for the discovery, prior to Project activities resuming.

G. The Permittee will report on any discoveries, and the actions that were taken to resolve them, as part of the Annual PA Report (XV.B). The Permittee will also provide a Final Implementation Report to the BLM before moving forward.

XIII. TREATMENT OF HUMAN REMAINS

A. The Permittee shall ensure that the Inadvertent Discovery of Human Remains (IDHR) Plan, found in Exhibit B of the CRMP, Attachment E, is followed if human remains are discovered during Project work, regardless of cultural origin or age, and also including funerary objects, sacred objects, or objects of cultural patrimony, as defined in 43 CFR 10.2(d).

B. The Permittee shall ensure all project personnel receive training on the IDHR Plan as part of Stipulation XI, Contractor Training Requirements, shall make the Plan available to all Project personnel, and shall ensure that all worksite supervisors have copies of the Plan with them at the worksite. The Permittee or their designee (such as worksite supervisors) is responsible for ensuring the following steps are immediately implemented following an inadvertent discovery (refer to the IDHR Plan for full details):

i. Stop Work – As soon as it is safe to do so, work will cease in their immediate vicinity of the discovery and a 100-foot radius buffer will be flagged or fenced off to protect the remains. The remains will be treated with dignity and respect and covered or protected from further disturbance;

ii. Notify Officials – The Permittee will immediately notify, and no later than 1 business day, the Alaska State Troopers, the Alaska State Medical Examiner, local law enforcement, and the Alaska State Troopers/Missing Persons Clearinghouse as stipulated in AS 12.65.005. The Permittee will also notify the BLM, the landowner/manager, the SHPO, and Tribes of discovery per the contact list in the IDHR Plan.

C. The PA Signatories will defer to local law enforcement or the Alaska State Troopers for a determination of whether the remains are of a forensic nature and/or subject to criminal investigation. Remains that are of a forensic or criminal nature will no longer be subject to the terms of this PA.

D. If the discovery is on private or state lands, the Permittee will be responsible for facilitating consultation among the BLM, the SHPO, landowner, and Tribes to determine appropriate treatment, removal, and/or disposition measures for the remains or objects. The Permittee is responsible for covering costs associated with the consultation and treatment, removal, and disposition measures.

E. If the discovery is on federal lands, and includes human remains, funerary objects, sacred objects, or objects of cultural patrimony, the managing agency (the BLM or the NPS) will follow the provisions of the NAGPRA, pursuant to 25 USC 3001 et seq., and the implementing regulations found at 43 CFR 10.4(d). The managing agency will consult with the appropriate Tribe(s) and develop a plan of action within 30 days, as required by 43 CFR 10.5. Consultation for the plan of action will determine appropriate treatment of the remains or objects and a course of action for excavation, custody, and other factors, to complete the disposition process. The Permittee is responsible for covering costs associated with the development of the plan of action and the disposition of the remains or objects.

F. Project construction that would not affect the discovery site may continue, as directed by the BLM through written notification to the Permittee, while documentation and assessment of the human remains at the discovery site proceeds and/or while the NAGPRA plan(s) of action is developed. When the BLM determines that the protocols outlined in the IDHR Plan have been followed, and that compliance with state and federal cultural resources laws has been completed, the BLM will provide the Permittee with written notification that the requirements have been met, and that Project activities may resume at the discovery site.

G. The Permittee will report on any discoveries, and the actions that were taken to resolve them, as part of the as part of the Annual PA Report (XV.B).

XIV. DOCUMENT SUBMISSION AND REVIEW

A. Consistent with the terms and conditions of this PA, the Permittee will prepare numerous document deliverables that will require review by the PA Signatories. These deliverables will include summaries, plans, reports, and curriculum, referred to collectively as “reports”; additional details for reporting are provided in the CRMP, Attachment E. All required reports for PA implementation are displayed in tabular format in Attachment F, Reporting Table.

B. The review, comment, and approval process for all reports will follow the same steps (unless otherwise described) and are cross-referenced with columns in Attachment F, Reporting Table, as follows:

i. The Permittee will submit the report to the BLM within the specified timeframe (Submittal Due).

ii. Within 7 business days of receipt, the BLM will submit the report to the Consulting Parties for a review and comment period, which will occur within the timeframe specified (Review Period).

iii. If no comments are during the Review Period, the BLM will move forward with the report. If timely comments are received, the BLM will consider them and require the Permittee to incorporate changes to the report, and (if necessary) submit a revised version to the BLM within 30 days.

iv. Within 7 business days of receipt of revised reports, the BLM will submit them to agencies for approval within the timeframe specified (Required Report Approvals). If approval of a report is denied for any reason, the party must notify the BLM of this in writing during the review period and provide information regarding the necessary corrections to allow for approval of that report. The BLM will then direct the Permittee to make the necessary changes and then resubmit the revised report to that party for approval.

v. After approval, the BLM will share the final version of reports with Consulting Parties for informational purposes.

vi. The BLM will append finalized Annual Work Plans, Monitoring Plans, and Treatment Plans to Attachment G, Project Plans, consistent with Stipulation XVII.B.iii.

C. Any Consulting Party may submit a request in writing to the BLM for an additional 30-day extension for report review and comment periods. The Permittee may also submit a request in writing to the BLM for up to a 30-day extension on report submission deadlines. All requests will be considered, and the BLM will notify the other PA Signatories and Consulting Parties as appropriate, if a request is granted. Deadline extensions will not require an amendment.

D. The Permittee may be required by the BLM to redact versions of reports for sensitive information, such as site-specific locations and names, in order for the BLM to distribute the reports to Consulting Parties who do not fall under the applicable professional qualification standards set forth in Stipulation I, Standards, and the public.

XV. AGREEMENT TRACKING AND MONITORING

A. Annual Meeting – The BLM will facilitate an Annual Meeting among the Consulting Parties, no later than March 31 of each year, to consult on the previous year's activities and the activities scheduled for the upcoming year. Items to be discussed at the Annual Meeting may include, but are not limited to:

i. The Permittee will provide detailed descriptions or presentations on work that occurred over the past year, including the following:
1. Construction, operations, or maintenance activities;
2. Inventory work within the APE, including consultation, archival research, and field survey;
3. Cultural resources identified and evaluated;
4. Historic properties assessed for effects and resolution measures implemented (or proposed); and
5. Monitoring results;

ii. The Permittee will provide detailed descriptions or presentations on work that will occur over the upcoming year, including the following:
1. Any changes to Phase Plans and whether that may change inventory, evaluation, assessment, or resolution requirements, per the PA;
2. Construction, operations, or maintenance activities and schedules;
3. Planned Inventory work within the Direct APE;
4. A schedule for activities;
5. Contractor Training Curriculum, effectiveness and/or modification; and
6. Other plans or descriptions of how the Permittee will meet PA terms and conditions;

iii. The BLM, together with the other PA Signatories, will consider:
1. Whether each agency (BLM, NPS, USACE, State) has met its respective responsibilities under the PA and any possible issues of non-compliance;
2. PA and CRMP effectiveness and amendments, revisions, or addendums, as necessary;
3. The APE and revisions, as necessary;
4. Inventory needs within the Indirect APE;
5. Need for re-inventory, reevaluation of eligibility, or assessment of effects if Projects footprints or plans change;
6. Monitoring needs, results, and effectiveness;
7. The need for Project-wide mitigation to account for indirect or cumulative effects;

8. The need for Technical Reports, Construction and Operations Summary Reports, or Reclamation and Project Closure Report;
9. PA requirements that have been completed in full; and
10. Feasibility of timelines;

iv. The BLM will share non-sensitive information gathered during consultation that may be relevant to implementation of the PA and any updates to the Contact List or Maps.

B. Annual PA Report – The Permittee will provide an Annual PA Report to the BLM, no later than March 1 each year. This report will summarize all activities resulting from PA implementation over the previous year. The BLM will submit the Annual PA Report to the Consulting Parties at least 15 days prior to the Annual Meeting. Consulting Parties will have a 30-day review and comment period for the Annual PA Report, which will follow the steps described in Stipulation XIV, Document Submission and Review. After review by the Consulting Parties, the Report will be made available to the public, consistent with Stipulation (V.F). Additional details are discussed in the CRMP, Attachment E.

C. Summary Construction and Operations Reports – The BLM shall ensure the Permittee provides summary Construction and Operation Reports, to assist with tracking the implementation of the PA within 2 years following completion of construction for Phases I, II, and III, and/or every 10 years. At least 1 year before the report is due the BLM will consult with the PA Signatories during the Annual Meeting, to determine additional required report content, due date, and review schedule. The Construction and Operation Reports will, minimally, include a summary of the work that has occurred during that Phase or period, the resources found, measures implemented, changes and updates in project designs/plans, changes in management or roles, and other relevant information. Some or all of the content may be summarized from the Annual Work Plans, Annual Fieldwork Reports, Annual PA reports, or other reports and documents. The Permittee will provide the report to the BLM within the determined timeframes, and the BLM will share the report with Consulting Parties for, minimally, a 30-day review and comment period which will follow the steps described in Stipulation XIV, Document Submission and Review.

D. Summary Reclamation and Closure Report – The BLM shall ensure the Permittee provides a summary report at the conclusion of the reclamation and closure Phase of the Project. The required content and due date will be determined through consultation with the PA Signatories and will be provided to the Permittee at least 2 years before the report is due.

E. If any PA Signatory deems an additional meeting with the other PA Signatories is necessary in addition to the Annual Meeting described above, that party shall inform the BLM in writing. The BLM shall consider all requests and will inform the other PA Parties if the BLM determines that the additional meeting is necessary.

F. Any of the PA Signatories or Concurring Parties may request informal meetings with the BLM, or other parties, regarding the implementation of the PA without requiring notification of the other PA Signatories. However, no changes or decisions regarding the implementation of the PA can be made without following Stipulation XVII, Amendments and Addendums, with the exception of requests to extend report submission or review deadlines (XIV.C).

G. The BLM will ensure that no less than every 5 years, the PA is reviewed with the Consulting Parties to evaluate the efficacy and consider changes, if necessary.

H. If the Project is delayed or put on hold at any stage for more than 12 consecutive months, the Permittee will be responsible for funding all costs associated with re-familiarizing all Consulting Parties with the Project, the Section 106 process, the PA Stipulations, and any work that has already occurred under the terms of the PA. The BLM shall ensure this effort includes, but is not limited to, sending notification letters to the Consulting Parties to notify them that the Project will be moving forward and provide a brief summary of the PA implementation to date; facilitation of 1 or more meetings with Consulting Parties; and facilitation of 1 or more meetings among the PA Signatories to discuss PA implementation work to date and consider any necessary revisions to the PA and CRMP, and to ensure all parties are informed of their responsibilities under the terms of the PA; and any in-person consultation between the BLM and Tribes. The Permittee will provide at least 60 days advance notice to the BLM to ensure these steps can be adequately accomplished.

XVI. DISPUTE RESOLUTION

A. Should any PA Signatory object at any time to any proposed work or the manner in which the terms of this PA are implemented, the BLM shall consult with the party to resolve objection. If the BLM determines that such objection cannot be resolved, the BLM will:

i. Forward all documentation relevant to the dispute, including the BLM's proposed resolution, to the ACHP. The ACHP shall provide the BLM with its advice on the resolution of the objection within 30 days of receiving adequate documentation. Prior to reaching a final decision on the dispute, the BLM shall prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, PA Signatories, and Consulting Parties, and will provide the parties with a copy of the written response. The BLM will then proceed according to its final decision.

ii. If the ACHP does not provide its advice regarding the dispute within the 30-day time period, the BLM may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the BLM shall prepare a written response that takes into account any timely comments received from the PA Signatories and Consulting Parties regarding the dispute and provide those parties and the ACHP with a copy of such written response.

B. The BLM's responsibility to carry out all other actions subject to the terms of this PA that are not the subject of the dispute remain unchanged.

XVII. AMENDMENTS AND ADDENDUMS

A. Any PA Signatory may request an amendment to the PA by providing the proposed changes in writing to the BLM. The BLM will notify all Consulting Parties of the proposed amendment and consult with them to reach agreement within 30 days. The amendment will be effective on the date the amendment is signed by the Signatories and filed with the ACHP. If the amendment is not signed within 60 days of receipt, the BLM will reinitiate consultation for another 30 days. If the Signatories do not agree to the amendment, the BLM will determine that the PA will stand as is.

B. PA Attachments may be amended with a streamlined process as follows, except for Attachments A, E, and G. Any PA Signatory may propose an amendment to an Attachment by submitting a request in writing to the BLM. If the BLM concurs that the amendment improves or updates the Attachment(s), the BLM will share the proposed amendment with the Consulting Parties for a 30-day review and comment period. If no comments are received at the end of the review period, the BLM will move forward with the proposed amendment and will provide Consulting Parties with a revised version of the Attachment(s).

i. The BLM may revise Attachment A, Maps, at any time without necessitating an amendment. The BLM will notify the Consulting Parties of any updates and provide the revised version of Attachment A at the Annual Meeting (XV.A).

ii. Attachment E, CRMP, may be updated without necessitating a PA amendment, but requires written approval from the BLM, the SHPO, and the NPS in a revised version of Exhibit F (Signature Page for CRMP Finalization). Any PA Signatory may propose an amendment to the CRMP by submitting a request in writing to the BLM. If the BLM concurs that the amendment improves or updates the CRMP, the BLM will share the proposed amendment with the Consulting Parties for a 30-day review and comment period. The BLM will consider all timely comments received, in consultation with the SHPO and the NPS, and incorporate changes. The BLM will send a revised version of the CRMP to the Consulting Parties following written approval. If a Consulting Party objects to the changes, the BLM will follow the steps in Stipulation XVI, Dispute Resolution.

1. The BLM may update CRMP Exhibit D (Mapbook of AHRS Sites within the APE) and Exhibit E (Contact List) at any time without necessitating written approval from the BLM, the SHPO, and the NPS. The BLM will provide any revisions to the Exhibit(s) at the Annual Meeting (XV.A).

iii. The BLM may append documents to Attachment G, Project Plans, at any time without necessitating an amendment, as long as the documents are required by and/or developed under the terms of the PA, such as Phase Plans, Annual Work Plans, Monitoring Plans, and Treatment Plans, and the addition is documented in Attachment H, Amendment and Addendum Log. Final reports do not need to be appended to the PA.

C. The BLM will document all amendments and addendums to the PA in Attachment H, Amendment and Addendum Log. The BLM will provide revised versions of the PA or PA Attachments to the Consulting Parties within 30 days of finalization, unless otherwise noted.

XVIII. TERMINATION

A. If any of the PA Signatories determine that its terms will not or cannot be carried out, that party shall immediately consult with the other PA Signatories to attempt to develop an amendment per Stipulation XVII, above. If, within 30 days (or another time period agreed to by all PA Signatories), an amendment cannot be reached, any PA Signatory may terminate the PA upon written notification to the other PA Signatories.

B. Once the PA is terminated, and prior to work continuing on the Undertaking, the BLM must either (a) execute a Memorandum of Agreement pursuant to 36 CFR 800.6 or (b) request, take into account, and respond to the comments of the ACHP under 36 CFR 800.7. The BLM shall notify the Consulting Parties as to the course of action it will pursue.

XIX. FINANCIAL SECURITY

A. The Permittee will post a financial instrument approved under the ROW regulations (43 CFR 2800) with the BLM in an amount sufficient to cover all post-fieldwork costs associated with implementing the PA, or other mitigative activities such as data recovery, curation, and report completion, as negotiated by the Permittee where they contract for services in support of this PA.

B. The BLM will determine through consultation with the other PA Signatories the extent and duration of additional data collection activities and analysis, taking into account the need for completing post-fieldwork activities, should the Permittee abandon the Project.

XX. ANTI-DEFICIENCY ACT

The BLM's obligations under this PA are subject to the availability of appropriated funds, and the stipulations of this PA are subject to the provisions of the Anti-Deficiency Act. The BLM shall make reasonable and good faith efforts to secure the necessary funds to implement this PA in its entirety. If compliance with the Anti-Deficiency Act alters or impairs the BLM's ability to implement the stipulations of this agreement, the BLM shall consult in accordance with the amendment and termination procedures found at Stipulations XVII and XVIII of this PA.

XXI. DURATION OF THIS PA

A. Unless otherwise amended or terminated in accordance with Stipulation XVII or XVIII, this PA will expire 25 years from the date of Execution.

B. The Project is proposed to last 50 years, but because Project design plans are not fully developed at this time, this PA cannot account for all anticipated effects. The PA Signatories recognize that an amended extension of this PA or another agreement document will be needed to ensure compliance with the NHPA throughout the Operations and Maintenance and Reclamation Phases of the Project. Therefore, at least 2 years prior to expiration, the PA Signatories will consult to determine whether a new PA will be developed or if this PA will be amended and extended.

C. The BLM and Consulting Parties will review all sections of this PA every 5 years and at shifting of Project Phases to update outdated statutes, best practices, and contact information, and to consider whether organizations who may have originally declined participation may wish to participate as a Consulting Party. If the BLM determines the PA needs to be updated, the BLM will notify the PA Signatories, Consulting Parties, and other interested parties and invite them to consult on the proposed changes. Amendments to the PA would be consistent with Stipulation XVII, Amendments and Addendums.

EXECUTION of this PA by the BLM, the SHPO, and the ACHP, and implementation of its terms, evidences that the BLM has taken into account the effects of this Undertaking on historic properties and afforded the ACHP an opportunity to comment.

This PA may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. The BLM may consolidate the original signature pages to produce the final copies. The BLM will distribute copies of all pages to all Consulting Parties once the PA is signed.

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

SIGNATORY

U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT

By: Chad B. Padgett
(Chad Padgett, State Director, BLM Alaska)

DATE: 4/17/2020

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

SIGNATORY

ALASKA STATE HISTORIC PRESERVATION OFFICER

By: Judith Bittner
(Judith Bittner, State Historic Preservation Officer, Alaska State Historic Preservation Office)

DATE: April 23, 2020

PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA

SIGNATORY

ADVISORY COUNCIL ON HISTORIC PRESERVATION

By:____

(John M. Fowler, Executive Director, Advisory Council on Historic Preservation)

DATE: _____April 27, 2020_________________

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

INVITED SIGNATORY

ALASKA INDUSTRIAL DEVELOPMENT AND EXPORT AUTHORITY

By:__ ____
(Mark R. Davis, Chief Infrastructure Development Officer)

DATE:_______5/5/20_______________

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

INVITED SIGNATORY

ALASKA DEPARTMENT OF NATURAL RESOURCES

By:___ ____
(Corri A. Feige, Commissioner)

DATE: 4/27/2020_________________________

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

INVITED SIGNATORY

U.S. ARMY CORPS OF ENGINEERS

By:____
(Shannon Morgan, Chief North Branch)

DATE:____________________________

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

INVITED SIGNATORY

U.S. DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE

By: Greg Dudgeon
(Greg Dudgeon, Superintendent, Gates of the Arctic National Park and Preserve)

DATE: 04/23/2020

PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA

CONCURRING PARTY

ALATNA VILLAGE COUNCIL

By:____
(Harding Sam, First Chief)

DATE:____________________________

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

CONCURRING PARTY

ALLAKAKET VILLAGE COUNCIL

By:____
(Elsie Bergman, First Chief)

DATE:___________________________

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

CONCURRING PARTY

CITY OF ALLAKAKET

By:____
(Crystal Bergman, Mayor)

DATE:___________________________

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

CONCURRING PARTY

EVANSVILLE, INCORPORATED

By:____
(Frank Thompson, First Chief)

DATE:__________________________

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

CONCURRING PARTY

EVANSVILLE VILLAGE

By:____
(Dave Anderson, President)

DATE:__________________________

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

CONCURRING PARTY

NATIVE VILLAGE OF KOBUK

By: Henry Horner Sr
(Henry Horner, President)

DATE: 04/24/20

**PROGRAMMATIC AGREEMENT
BY AND AMONG THE
BUREAU OF LAND MANAGEMENT,
ALASKA STATE HISTORIC PRESERVATION OFFICER, AND
ADVISORY COUNCIL ON HISTORIC PRESERVATION
REGARDING THE
AMBLER MINING DISTRICT INDUSTRIAL ACCESS ROAD, ALASKA**

CONCURRING PARTY

NORTHWEST ARCTIC BOROUGH

By:______________________________
(Lucy Nelson, Mayor)

DATE: April 22, 2020

DEFINITIONS

ACHP (Advisory Council on Historic Preservation) – The ACHP is an independent federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources, and advises the President and Congress on national historic preservation policy. The National Historic Preservation Act (NHPA) gives the ACHP the legal responsibility to assist federal agencies in their efforts and to ensure they consider preservation during project planning.

Adverse Effect – An adverse effect is found when an Undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register of Historic Places (NRHP) in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the Undertaking that may occur later in time, be farther removed in distance, or be cumulative. The term is consistent with the definition found at 36 CFR 800.5(a)(1), and may include, but is not limited to, the effects described at 36 CFR 800.5(a)(2).

AIDEA (Alaska Industrial Development and Export Authority) – AIDEA is the Project proponent and Permittee. AIDEA is a public corporation of the State of Alaska, created in 1967 by the Alaska Legislature "in the interests of promoting the health, security, and general welfare of all the people of the state, and a public purpose, to increase job opportunities and otherwise to encourage the economic growth of the state…"

APE (Area of Potential Effects) – The APE geographic area or areas within which an Undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an Undertaking and may be different for different kinds of effects caused by the Undertaking.

Archaeological Sensitivity Model – This is a Geographical Information System model capable of identifying resource potential for prehistoric, protohistoric, and early historic archaeological resources left behind by Native Alaskans within the Direct and Indirect APE. The Model will be developed following selection of a preferred alternative. The Model does not predict site location but will identify areas that have high, medium, or low potential for these types of sites. The results of the Model will be integrated into the Survey Strategy.

Component/Project Component – The Project, as proposed, would include construction of bridges, material sites, maintenance stations, airstrips, and related ancillary features, which are referred to as Components.

Concurring Party – In accordance with 36 CFR 800.6(c)(3), a concurring party is a Consulting Party invited to sign the PA but who does not have the authority to amend or terminate the agreement. A concurring party signature is not required to execute the agreement.

Construction Phases – The Permittee has proposed building the Project in 3 Phases:

> <u>Phase I Construction of Seasonal Pioneer Road</u>: This Phase would overlap with the Pre-Construction Phase and will occur during years 2 to 4 of the Project. The Pioneer Road is proposed as a single-lane seasonal road with embankment width up to 28 feet and height 30 to 72 inches, 12-foot road lane, 2-foot shoulders, and 1-way operation for up to 7 months per year. This Phase would include clearing vegetation from the federal and state right of ways while other right-of-way negotiations are underway. Other activities associated with this Phase include construction of material sources, clearing and preparing construction camps, placement of radio towers, staging of equipment and labor in various areas, hauling materials and placing fill, excavating high areas, and

grading. It would also include installation of culverts and bridges (including driving piles for bridge supports) as well as airstrips, maintenance facilities, and access controls.

Phase II Construction of All Season Roadway: This Phase, occurring during years 3 to 4 of the Project (including overlap with Phase I) would involve the construction of a year-round useable road and would include additional material extraction, hauling and placing material to expand the Phase I embankment (width and depth), and grading to final slopes. Fiber optic facilities would be trenched into the road embankment during this Phase.

Phase II Operations and Maintenance of the Constructed Phase II Roadway: This Phase, occurring from years 4 to 50, includes continued development or expansion of material sites, air operations, maintenance station operations, hauling materials and placing fill for repairs/maintenance, grading, and removal and reclamation of temporary construction camps not turned into maintenance stations.

Phase III Construction of 2-Lane Road: Phase III, if needed, would include additional clearing, additional material extraction, additional excavation where widening road in cut sections or side hilling, additional hauling and placing materials to expand the Phase II embankment (width), and additional grading. Culverts would be extended by welding extensions onto existing culverts. The expansion would create a 2-lane all-season roadway. The road widening effort would take 2 to 3 years to complete.

Consultation – The process of seeking, discussing, and considering the views of other participants, and, where feasible, seeking agreement with them regarding matters arising in the Section 106 process.

Consulting Party – Any group, entity, or person that has a demonstrated interest in the Undertaking and has participated in the PA development or has indicated they wish to participate in the Section 106 process. This includes Tribes, agencies, local governments, nonprofit organizations, and the Permittee.

CRM (Cultural Resources Management) – CRM is the practice of cultural heritage management within a framework of federal, state, and local laws, regulations, and guidelines.

CRMP (Cultural Resources Management Plan) – A CRMP is a document drafted to guide compliance and consideration of cultural resources during implementation of a project or to assist a landowner or land manager.

Cultural Resource – Archaeological, historical or architectural resources, structures, or places that may exhibit human activity or occupation and/or may be places of religious, spiritual, or cultural significance to Tribes, or meet the criteria of a Traditional Cultural Property (TCP) (BLM Manual 8100).

Cumulative Effects – Cumulative effects result from incremental actions, that when added to other past, present, and reasonably foreseeable future actions, may adversely affect a historic property.

Curation – Refers to the process of selecting and caring for archaeological or cultural materials to be provided to a museum or landowner for future research, exhibit, or instruction. Curation procedures will follow University of Alaska Museum of the North's *Curation Guidelines* (UAM Curation Guidelines and 36 CFR 79).

Direct Effects – Direct effects include physical destruction or damage, alteration that is not consistent with 36 CFR 68, removal of a property from a historic location, change in the character of use or physical features that contribute to the historic significance, deterioration through neglect, or introduction of visual, atmospheric, or audible elements that diminish the integrity of a property's significant historic features. This includes, but is not limited to, the effects identified in 36 CFR 800.5(a)(2).

DOE (Determination of Eligibility) – A DOE is an evaluation of whether a property is eligible for listing in the NRHP, following guidance provided in the National Park Service Bulletin 15 *How to Apply the National Register Criteria for Evaluation*.

Effect – See Adverse Effect.

Execution – Refers to the date the PA goes into effect and is defined as the date that the last Signatory signs the document and it is filed with the ACHP. At that point, the PA is considered executed.

Field Crew Chief – Archaeologist who oversees and coordinates an archaeological field crew in locating, collecting, recording, and interpreting data during archaeological survey and excavation. The Field Crew Chief must have at least 2 years of supervisory experience conducting archaeological fieldwork in Alaska or have partaken in a cultural resource training/shadowing program prior to taking on the Field Crew Chief role.

GAAR (Gates of the Arctic National Park and Preserve) – The northernmost national park in the U.S., GAAR protects portions of the Brooks Range. It was initially designated a national monument in 1978. After passage of the Alaska National Interest Lands Conservation Act in 1980, it was re-designated as a national park and preserve.

Historic Property – Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious, spiritual, or cultural importance to a Tribe and that meet the NRHP criteria.

Indirect Effects – Indirect effects to historic properties are those caused by an Undertaking that are later in time or farther removed in distance but are still reasonably foreseeable.

Inventory – The term "inventory" is used throughout this document to refer to all efforts to compile information on historic properties, including consultation, archival research, and fieldwork. The term is similar to survey, but "survey" is used throughout this document to refer to inventory efforts that are field based only.

Invited Signatory – The State of Alaska, National Park Service, U.S. Army Corp of Engineers, and the Alaska Industrial Development and Export Authority are Invited Signatories to this PA. In accordance with 36 CFR 800.6(c)(2), Invited Signatories have the same rights with regard to seeking amendment or termination of the PA as the Signatories. The refusal of an Invited Signatory to sign the PA does not prevent the agreement from being executed.

Materials – The term "materials" refers to any objects, artifacts, specimens, records, or remains associated with historic properties, consistent with the definition found at 36 CFR 79.4(a)(1). This includes all documentation generated during the implementation of this PA, with the exception of information that is subject to confidentiality clauses of NHPA, Archaeological Resources Protection Act, and/or Alaska State law.

Monitor – Archaeologist who observes ground-disturbing/excavation activities in order to identify, recover, protect, and/or document archaeological information or materials that are unearthed during these activities. The Monitor has stop-work authority and must have a bachelor's degree in Archaeology or closely related field, plus at least 1 year of experience conducting archaeological fieldwork in Alaska.

NHPA (National Historic Preservation Act) – The NHPA, 54 USC 300101 to 307108, is the primary federal law governing the preservation of historic resources in the U.S. The law established a national preservation program and a system of procedural protections which encourage the identification and protection of historic resources of national, state, tribal and local significance.

NRHP (National Register of Historic Places) – The NRHP is the official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the NRHP is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.

PA (Programmatic Agreement) – A document that records the terms and conditions agreed upon to resolve the potential adverse effects of a Federal agency program, complex Undertaking or other situations in accordance with 36 CFR 800.14(b).

PA Signatories – This term is used in the PA to collectively mean the Signatories and Invited Signatories.

Permittee – The Permittee is AIDEA and any heirs, successors, assigns, join ventures, and any contractors acting on behalf of the Permittee; all of whom are bound by the terms of this PA.

Pre-Construction Phase – This Phase includes those activities required to complete permitting and design, such as: geotechnical investigations at bridge locations, along the corridor centerline to refine the embankment design, and at material sites along the east-end alignment; aerial imagery and LiDAR (and/or survey) for areas lacking coverage; wetland delineation on areas not field delineated; hydrology studies; and cultural resources surveys. No Components will be installed as part of this Phase. Years 1 and 2 may overlap with Phase I Construction timing.

Project – All aspects, including those not currently defined but may be defined in the future for the Ambler Mining District Industrial Access Road.

Project Field Plans – A planning tool for deployment of field crews during the entire field season, based on output for site potential value (high, medium, low) and the Survey Strategy.

Reclamation Phase – This Phase of the Project would occur at the end of the Project and would include removal of embankment, culverts, airstrips, and maintenance sites, as well as regrading and revegetation. All Components would be removed at end of reclamation.

ROD (Record of Decision) – The ROD is a statement issued by the Lead Federal Agency that informs the public of the agency's decision, the agency's rationale for it, and any mitigation measures the agency will carry out for significant impacts. The ROD will govern whether permits are issued for a project to move forward.

Section 106 – Section 106 of the NHPA of 1966 requires federal agencies to consider the effects of projects they carry out, assist, fund, permit, license, or approve throughout the country (known as "Undertakings") on historic properties. The Section 106 process requires federal agencies to identify historic properties, assess effects on those properties, and resolve adverse effects through avoidance, minimization, or mitigation. Section 106 gives the ACHP, interested parties, and the public the chance to weigh in on these matters before a final decision is made. The ACHP has issued regulations, 36 CFR 800, which guide how agencies should fulfill this responsibility.

Segments/Project Segments – Geographical sections of the Project (e.g., milepost 32 to 35).

Sensitive information – This is defined in the NHPA as including information about the location, character, or ownership of a historic property if disclosure to the public may cause a significant invasion of privacy, risk harm to the historic property, or impede the use of a traditional religious site by practitioners (54 USC 307103).

SHPO (State Historic Preservation Officer) – Every state and U.S. Territory has a SHPO who, with the support of qualified staff, is charged with: conducting a comprehensive survey of historic properties; maintaining an inventory of historic properties; identifying and nominating eligible properties for the NRHP; advising and assisting Federal, State and local governments in matters of historic preservation; preparing and implementing a statewide historic preservation plan; providing public information, education, training, and technical assistance; and providing consultation for Federal Undertakings under the Section 106 provision of the National Historic Preservation Act.

Signatory – The BLM, SHPO, and ACHP are Signatories to this PA. In accordance with 36 CFR 800.6(c)(1), the Signatories have sole authority to execute the PA. The Signatories, along with the Invited Signatories, can amend or terminate the PA.

Stages/Project Stages - Specific construction steps or activities that would occur within each Project Phase or Component (e.g., survey, geotechnical drilling, etc.).

Supervisory Monitor – Secretary of Interior-qualified archaeologist who is present at the job site for the duration of the monitoring program. Conducts monitoring and/or supervises historic properties monitors on-site. The Supervisory Monitory has stop-work and start-work authorities. Must have a master's degree in Archaeology or closely related field, plus at least 1 year of supervisory experience conducting archaeological fieldwork in Alaska.

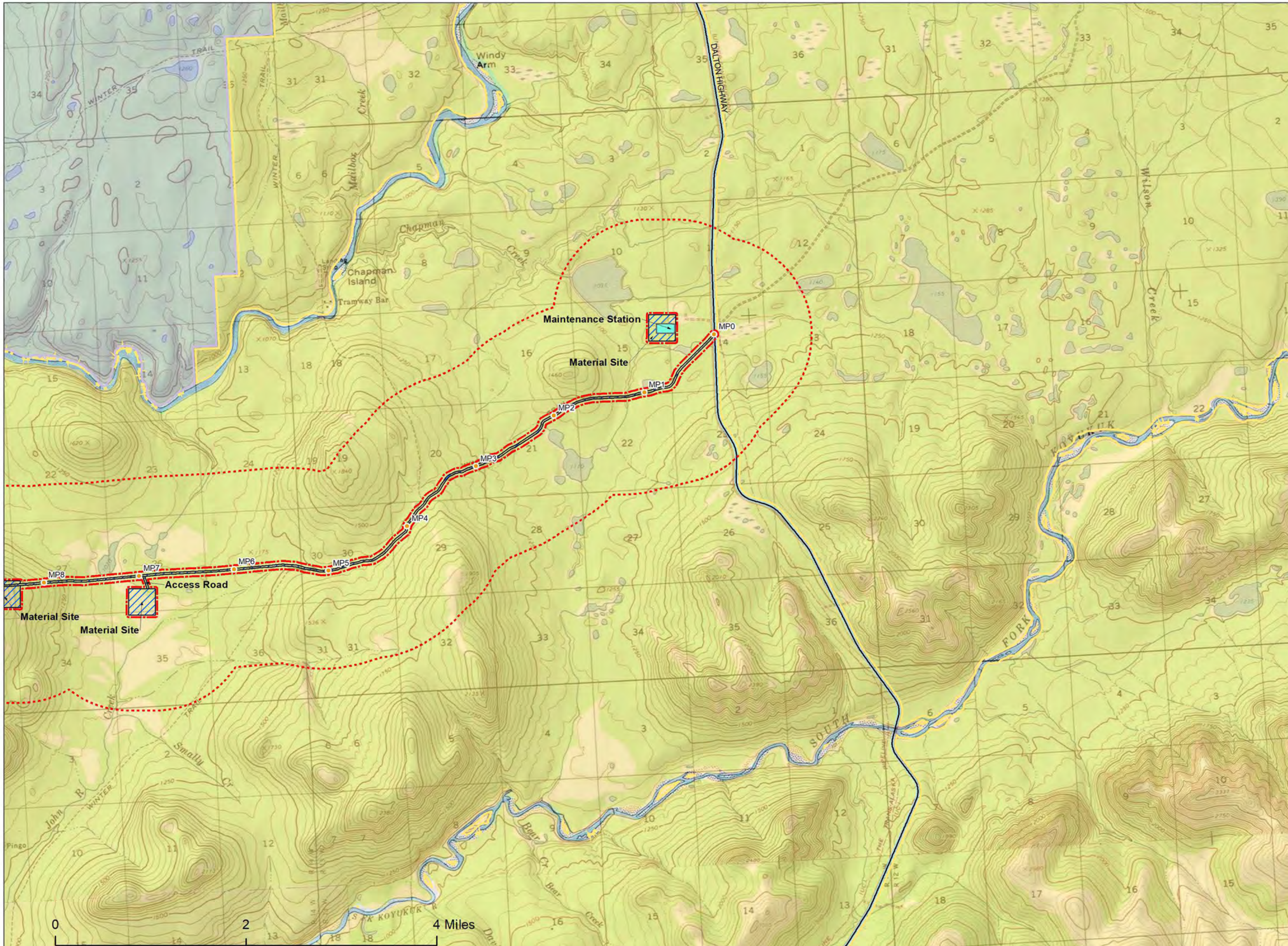
Survey – The term "survey" is used throughout this document to refer to inventory efforts that are field-based only. The term is similar to inventory, but "inventory" is used throughout this document to refer to all efforts to compile information on historic properties, including consultation, archival research, and fieldwork.

Survey Strategy – Required field inventory efforts based on a reasonable and good faith effort and incorporating specific field methods to document and record sites. The Survey Strategy will be developed by integrating multiple data sources for historic, ethnographic, and archaeological resources for the entire APE which will then be used to classify the APE into areas of high, medium, or low potential to contain archaeological and cultural material.

TCP (Traditional Cultural Property) – A place that is eligible for inclusion in the NRHP based on its associations with the cultural practices, traditions, beliefs, lifeways, arts, crafts, or social institutions of a living community. TCPs are rooted in a traditional community's history and are important in maintaining the continuing cultural identity of the community. More information on TCPs is found in the National Park Service Bulletin 38 *Guidelines for Evaluating and Documenting Traditional Cultural Properties*.

Undertaking – A project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency, including those carried out by or on behalf of a federal agency, those carried out with federal financial assistance, and those requiring a federal permit, license, or approval as defined at 36 CFR 800.16(y).

Attachment A – Maps



Alternative A Footprints
Direct APE
Indirect APE
Major Roadways

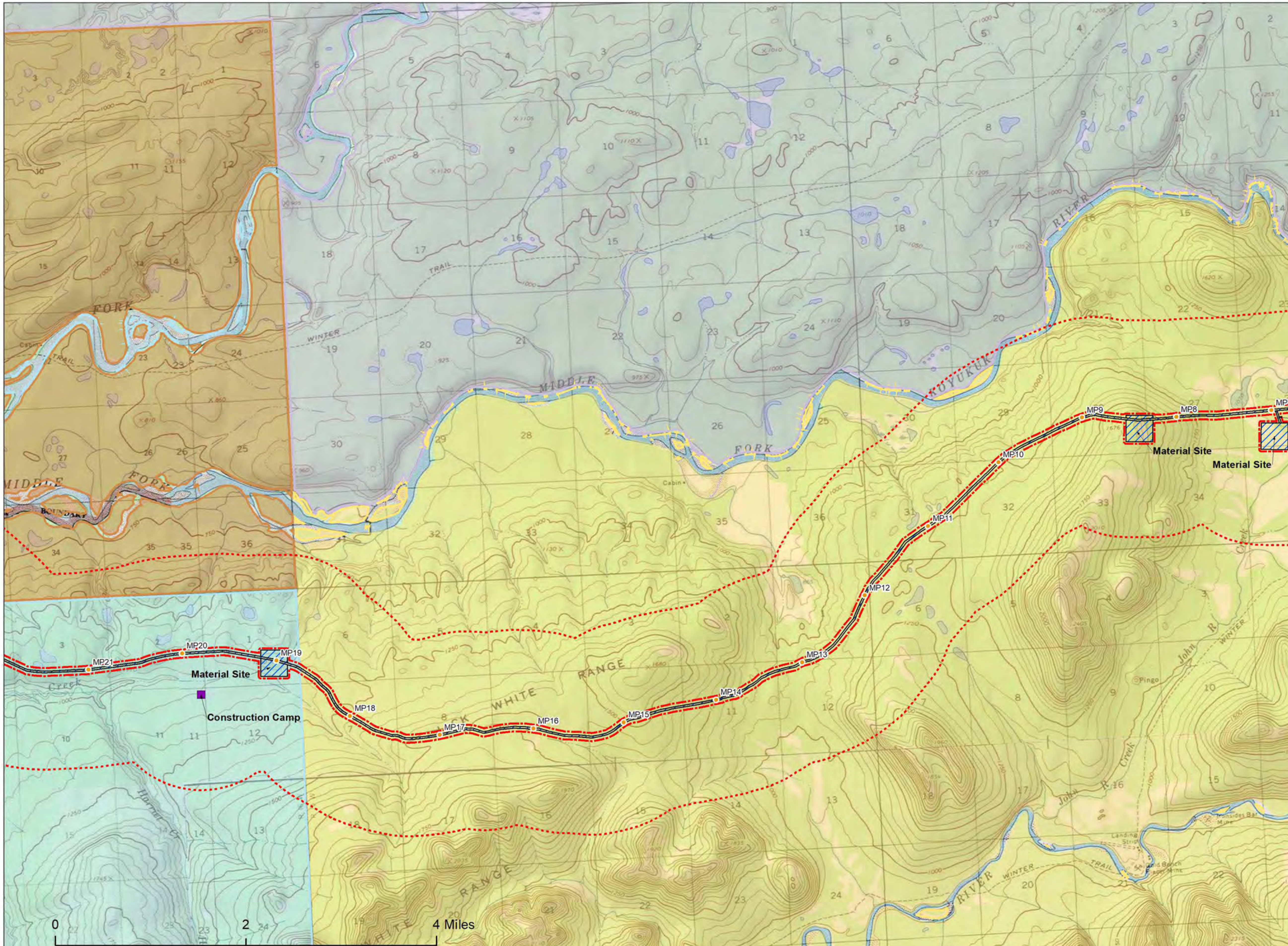
Administered Lands*

Bureau of Land Management
National Park Service
State

***Current as of April 11th, 2018**

Service Layer Credits: Copyright©: 2013 National Geographic Society, i-cubed

NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
For more information visit
www.blm.gov/AmblerRoadEIS
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

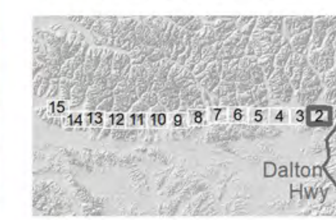


Alternative A Footprints
Direct APE
Indirect APE

Administered Lands*

Alaska Native Lands Patented or Interim Conveyed
Bureau of Land Management
National Park Service
State

***Current as of April 11th, 2018**



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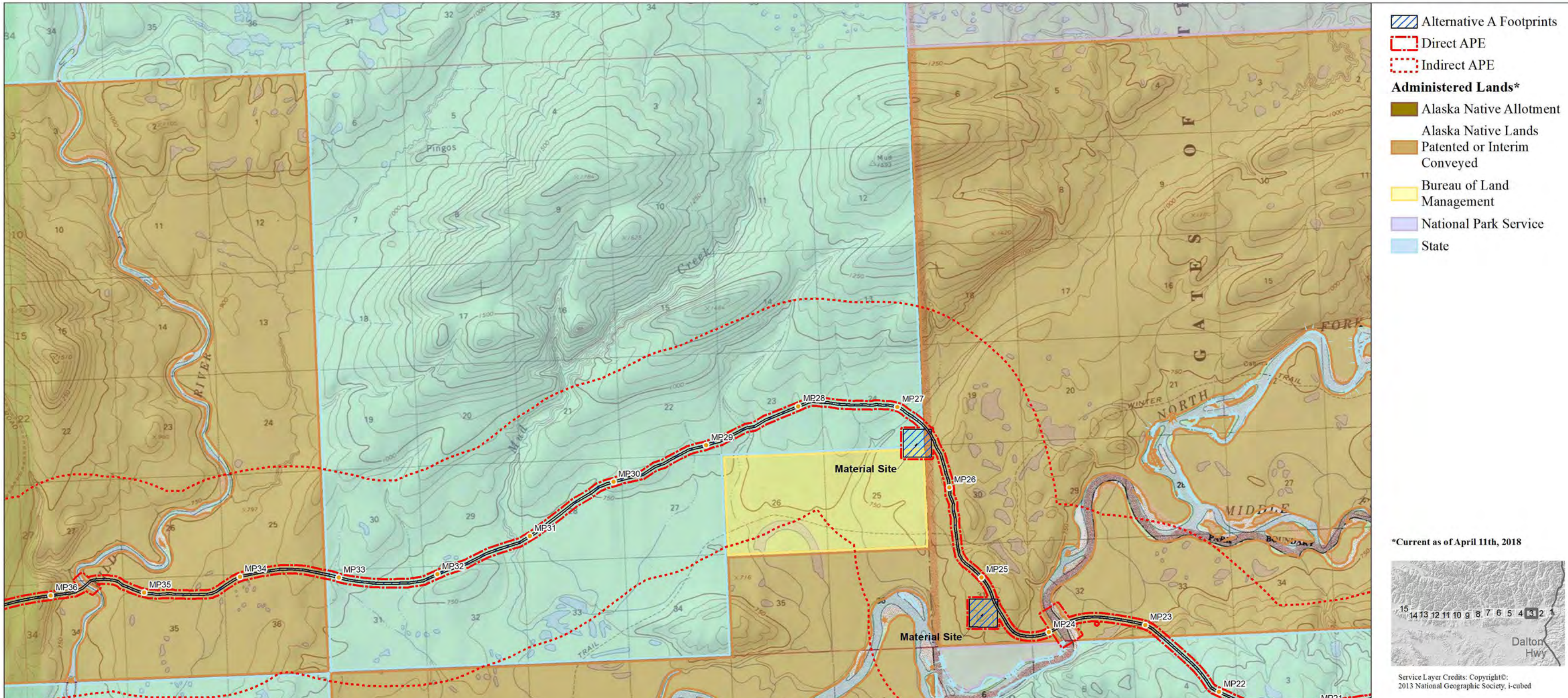

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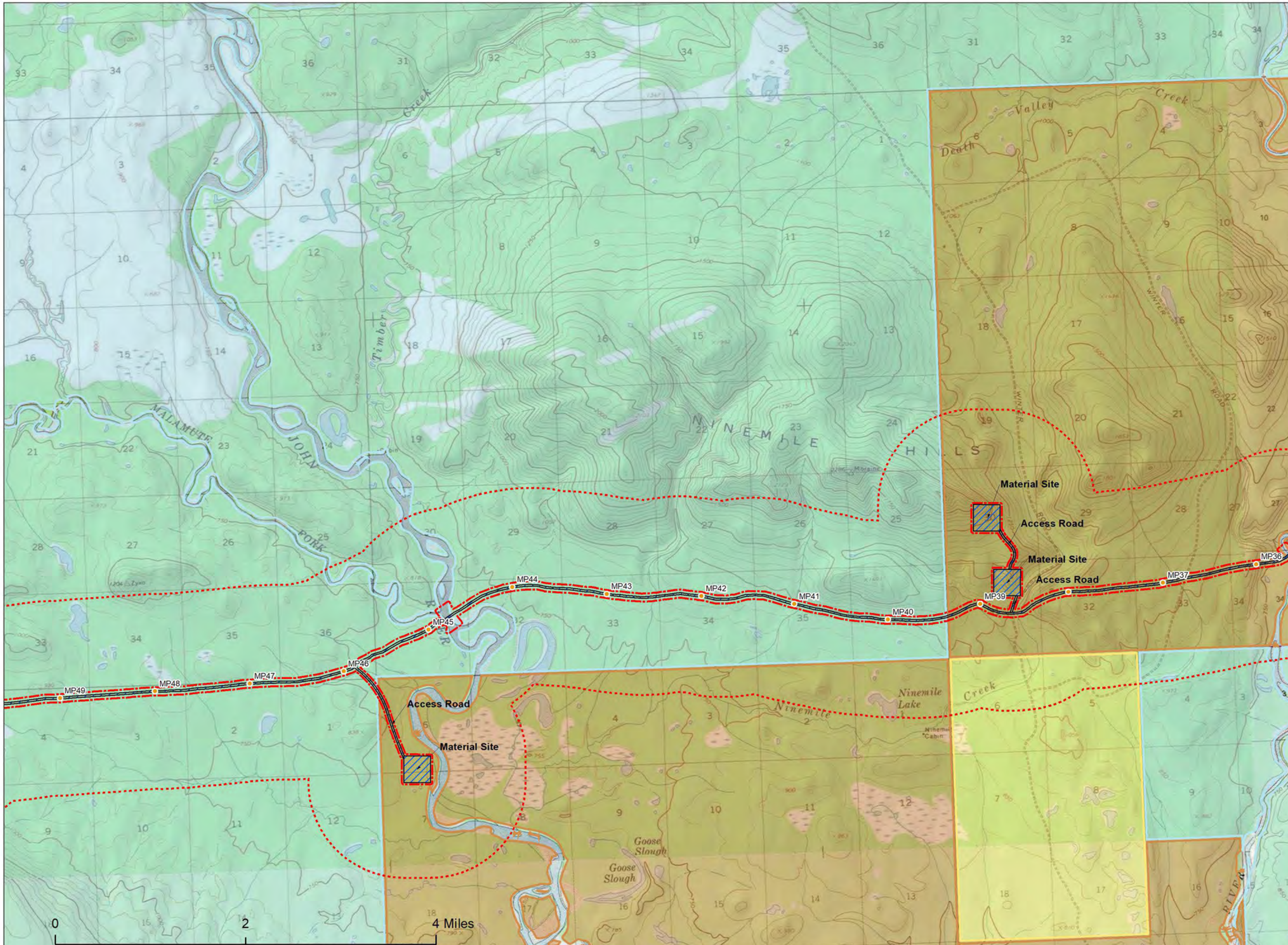

Alternative A Footprints
Direct APE
Indirect APE

Administered Lands*

Alaska Native Lands Patented or Interim Conveyed
Bureau of Land Management
State

***Current as of April 11th, 2018**

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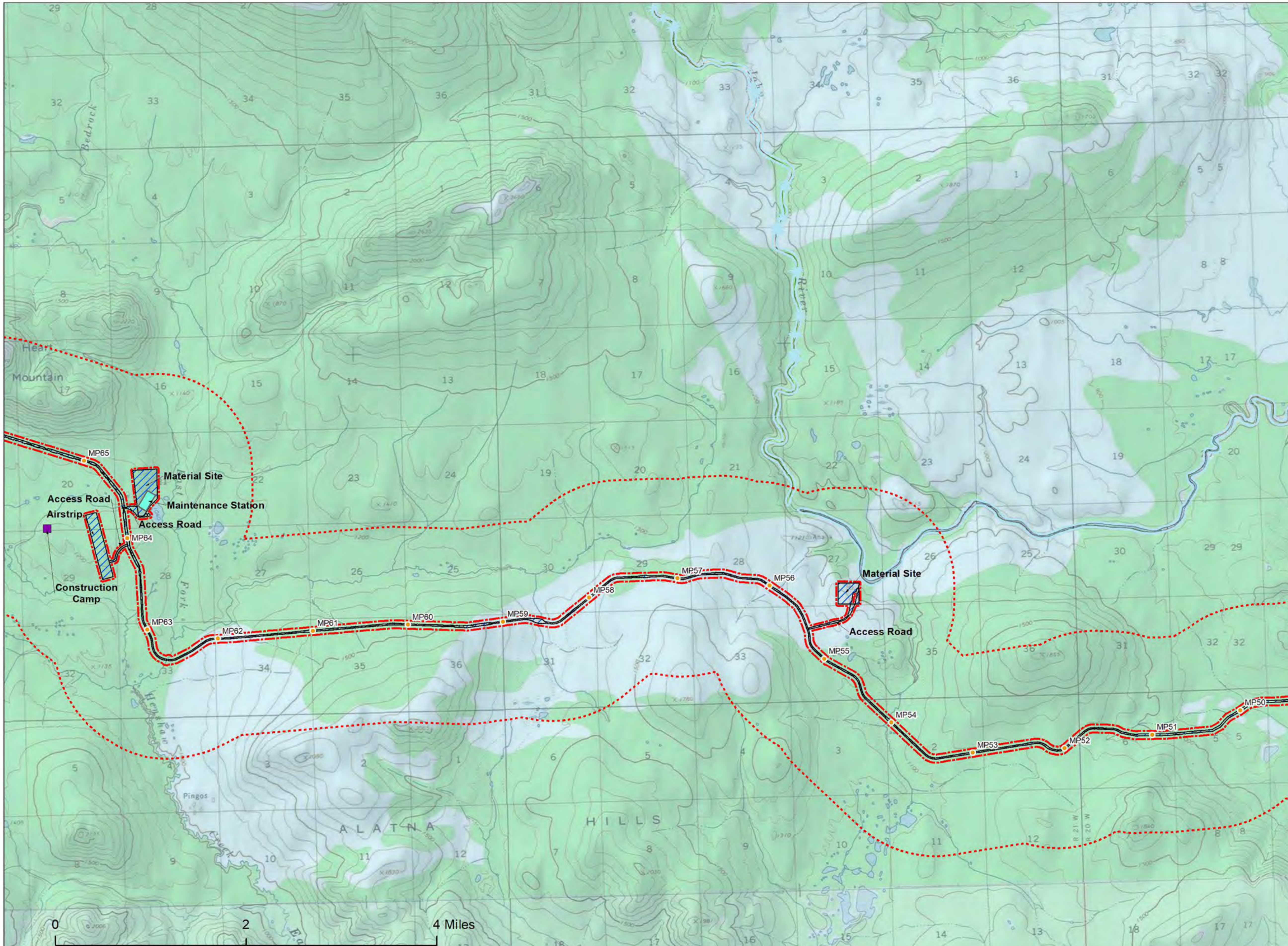

Alternative A Footprints
Direct APE
Indirect APE
Administered Lands*
State

***Current as of April 11th, 2018**

Dalton Hwy

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Basemap scale: 1:63,360
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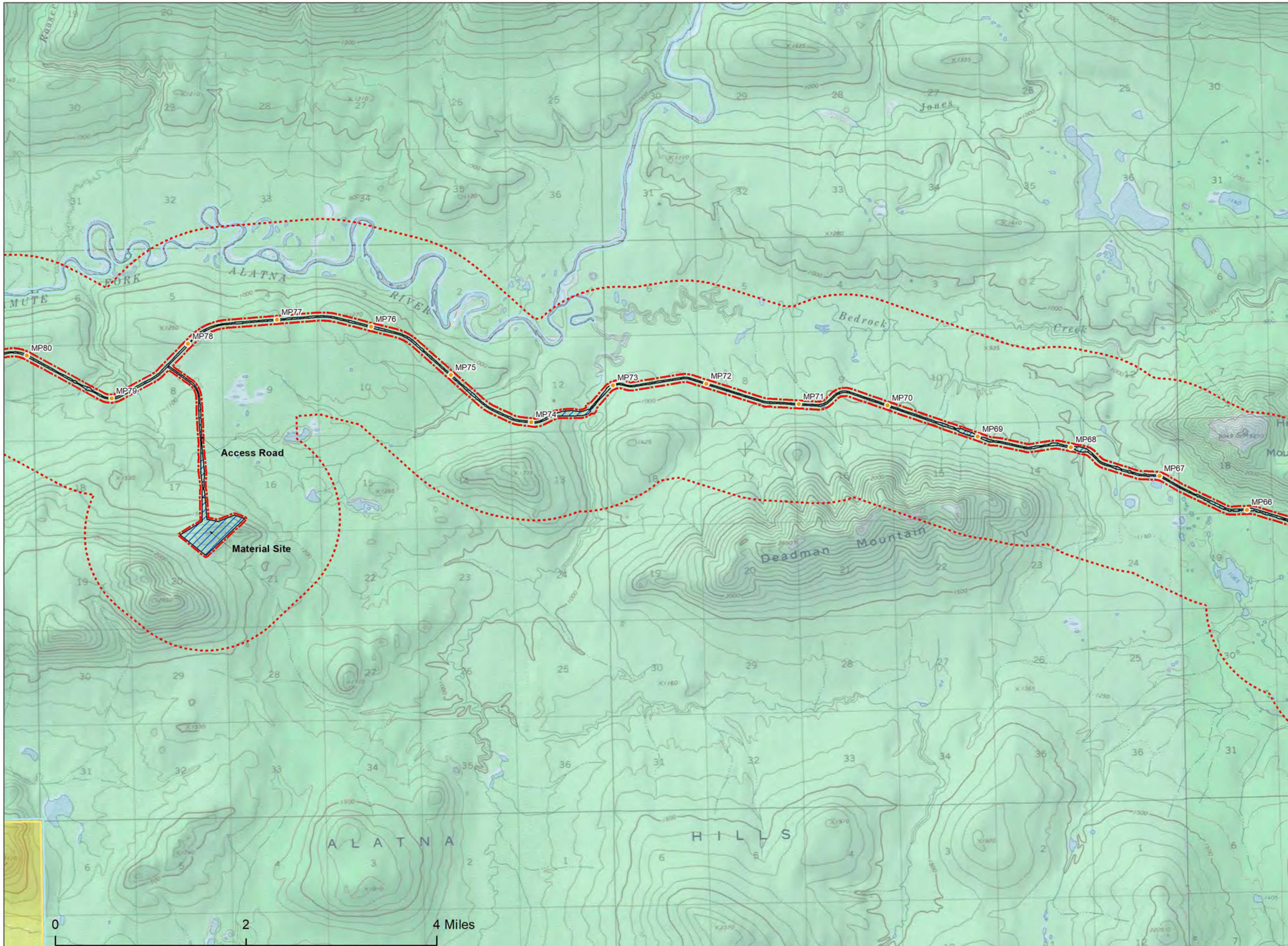
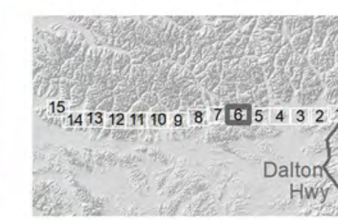


Alternative A Footprints
Direct APE
Indirect APE
Administered Lands*
Bureau of Land Management
State

***Current as of April 11th, 2018**



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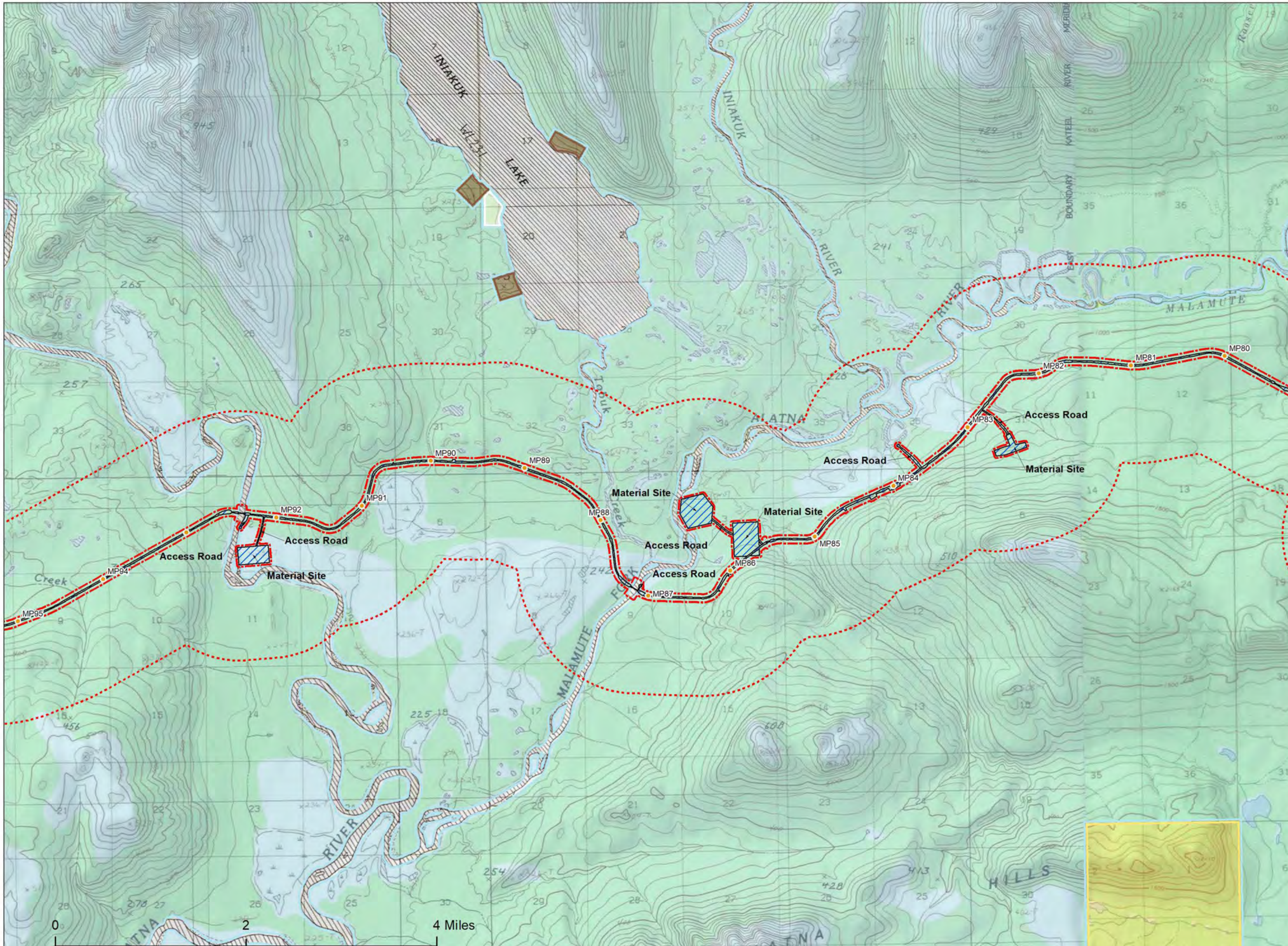

- Alternative A Footprints
- Direct APE
- Indirect APE

Administered Lands*

- Alaska Native Allotment
- Bureau of Land Management
- Private
- State

***Current as of April 11th, 2018**

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
Dalton Hwy

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NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
For more information visit
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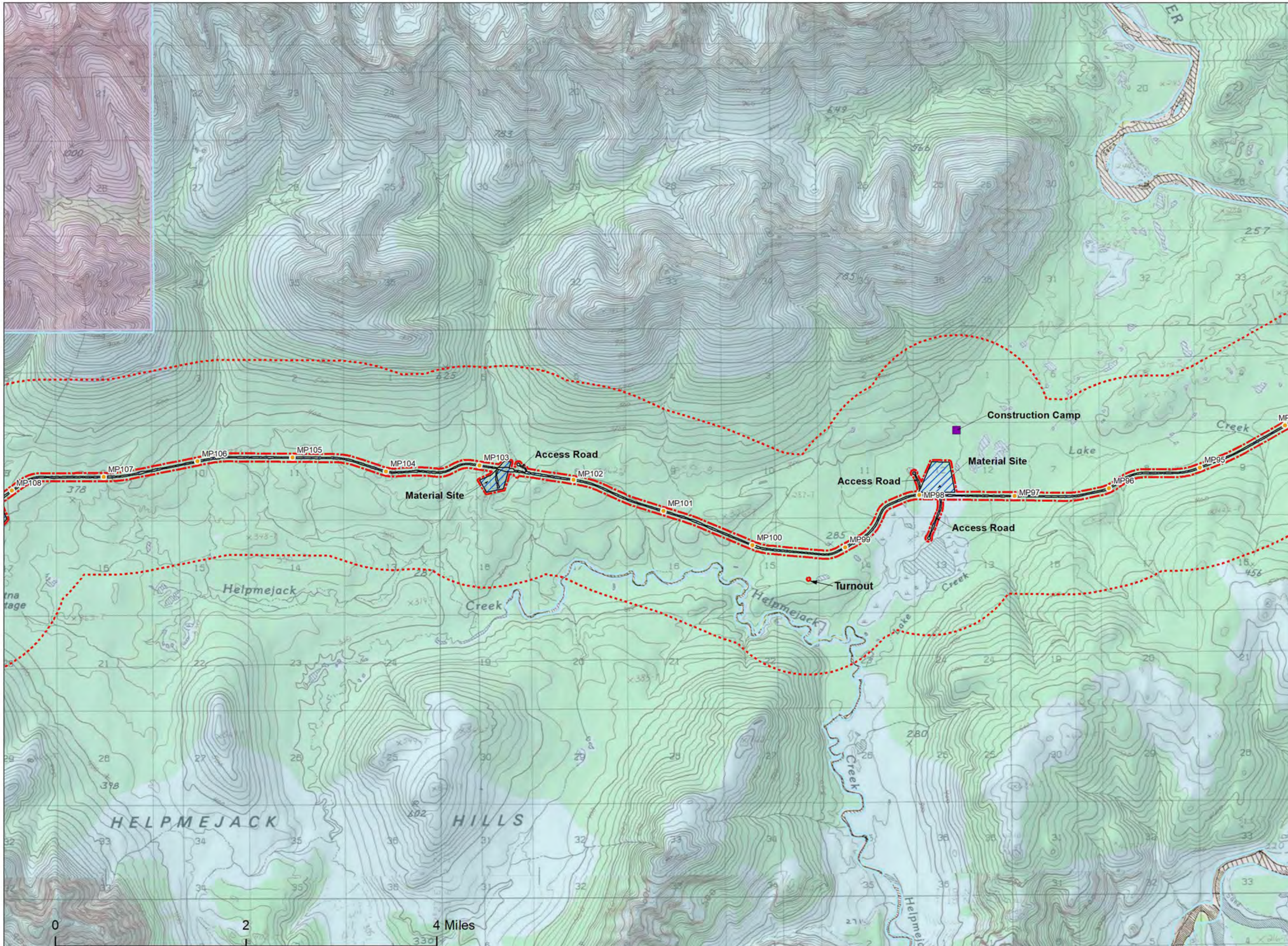

Alternative A Footprints
Direct APE
Indirect APE
Administered Lands*
National Park Service
State

***Current as of April 11th, 2018**

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NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
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Alaska Albers
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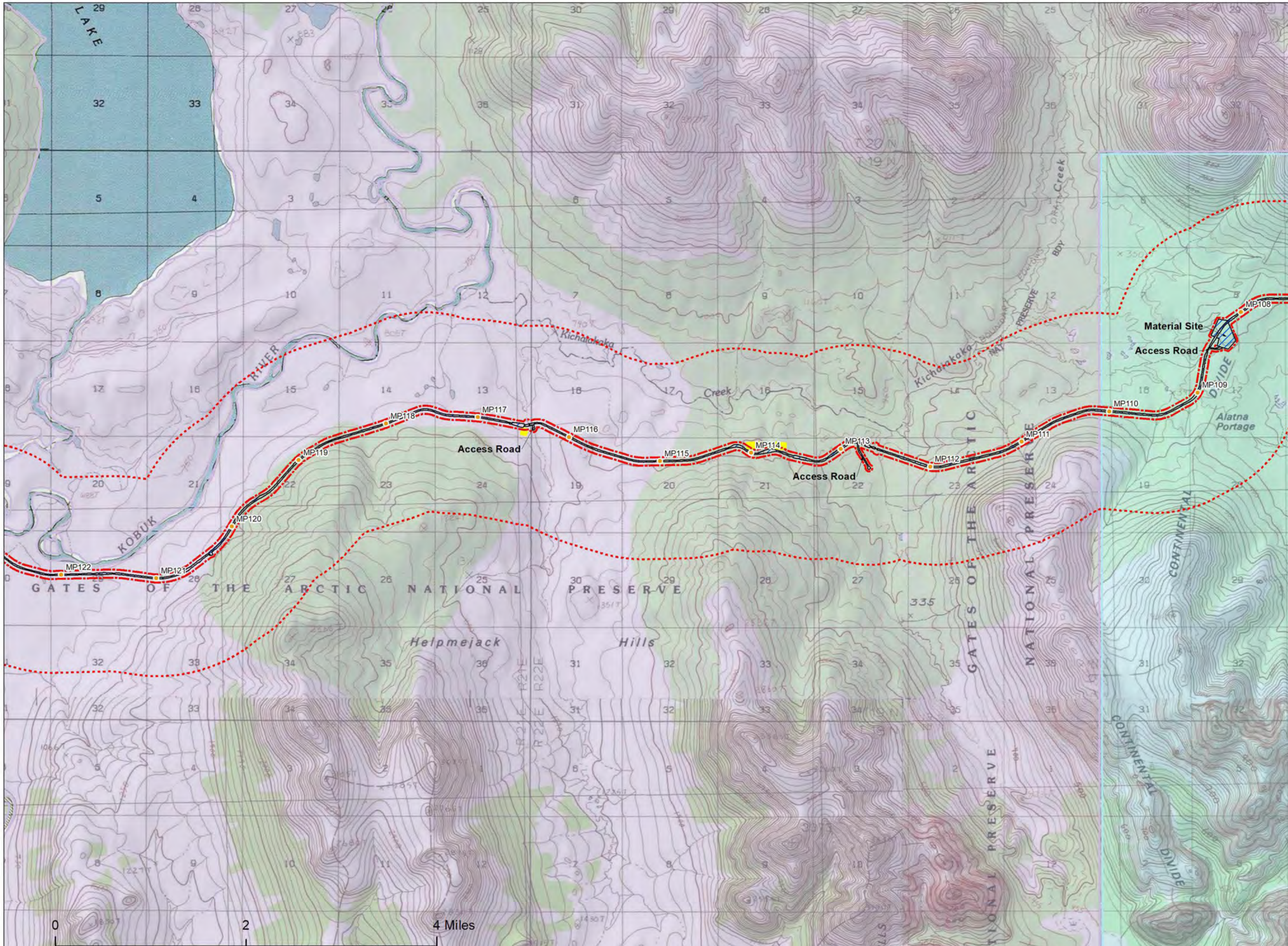
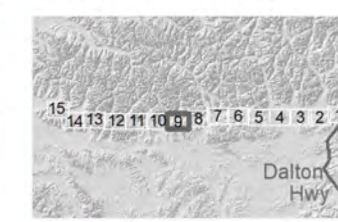


Alternative A Footprints
Direct APE
Indirect APE
2014 Ambler Pedestrian Survey

Administered Lands*

National Park Service
State

*Current as of April 11th, 2018



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NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
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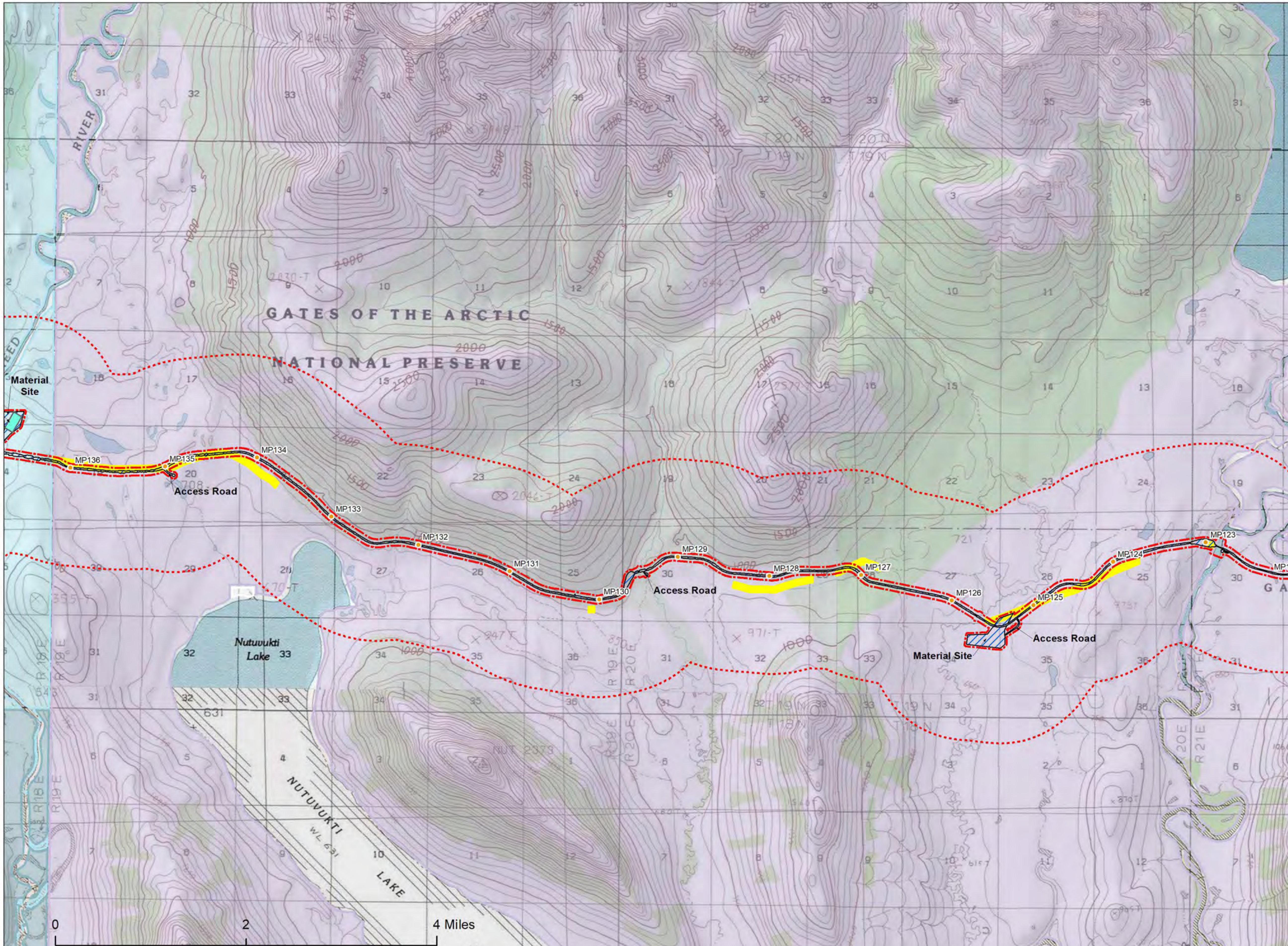

Alternative A Footprints
Direct APE
Indirect APE
2014 Ambler Pedestrian Survey

Administered Lands*

Local Government
National Park Service
Private
State

***Current as of April 11th, 2018**

Dalton Hwy

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NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
For more information visit
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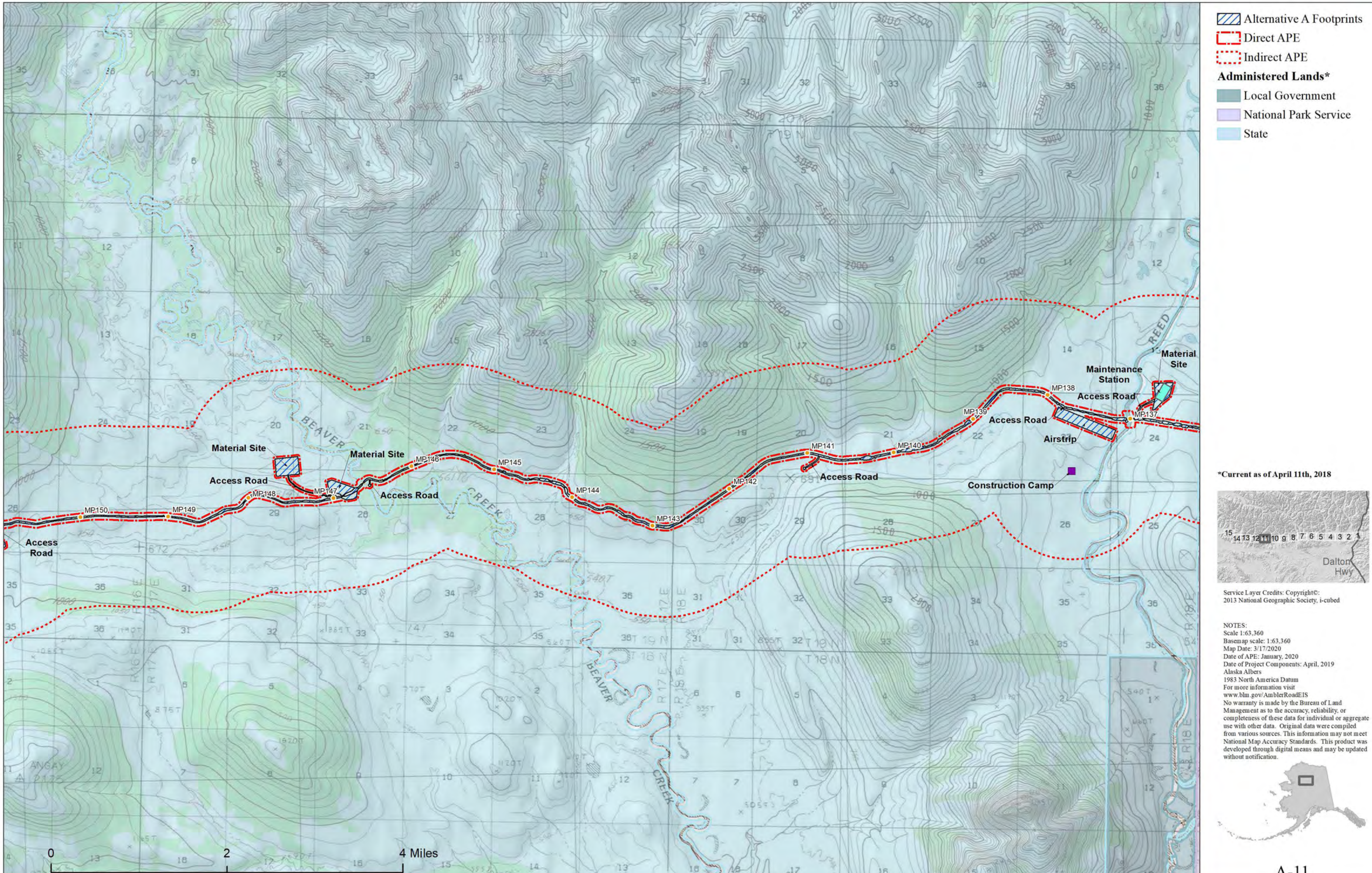
Alternative A Footprints
Direct APE
Indirect APE
Administered Lands*
Local Government
National Park Service
State
*Current as of April 11th, 2018
Material Site
Maintenance Station
Access Road
Airstrip
Construction Camp
MP137
MP138
MP139
MP140
MP141
MP142
MP143
MP144
MP145
MP146
MP147
MP148
MP149
MP150
Dalton Hwy
0
2
4 Miles
Service Layer Credits: Copyright©: 2013 National Geographic Society, i-cubed
NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
For more information visit
www.blm.gov/AmblerRoadEIS
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NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
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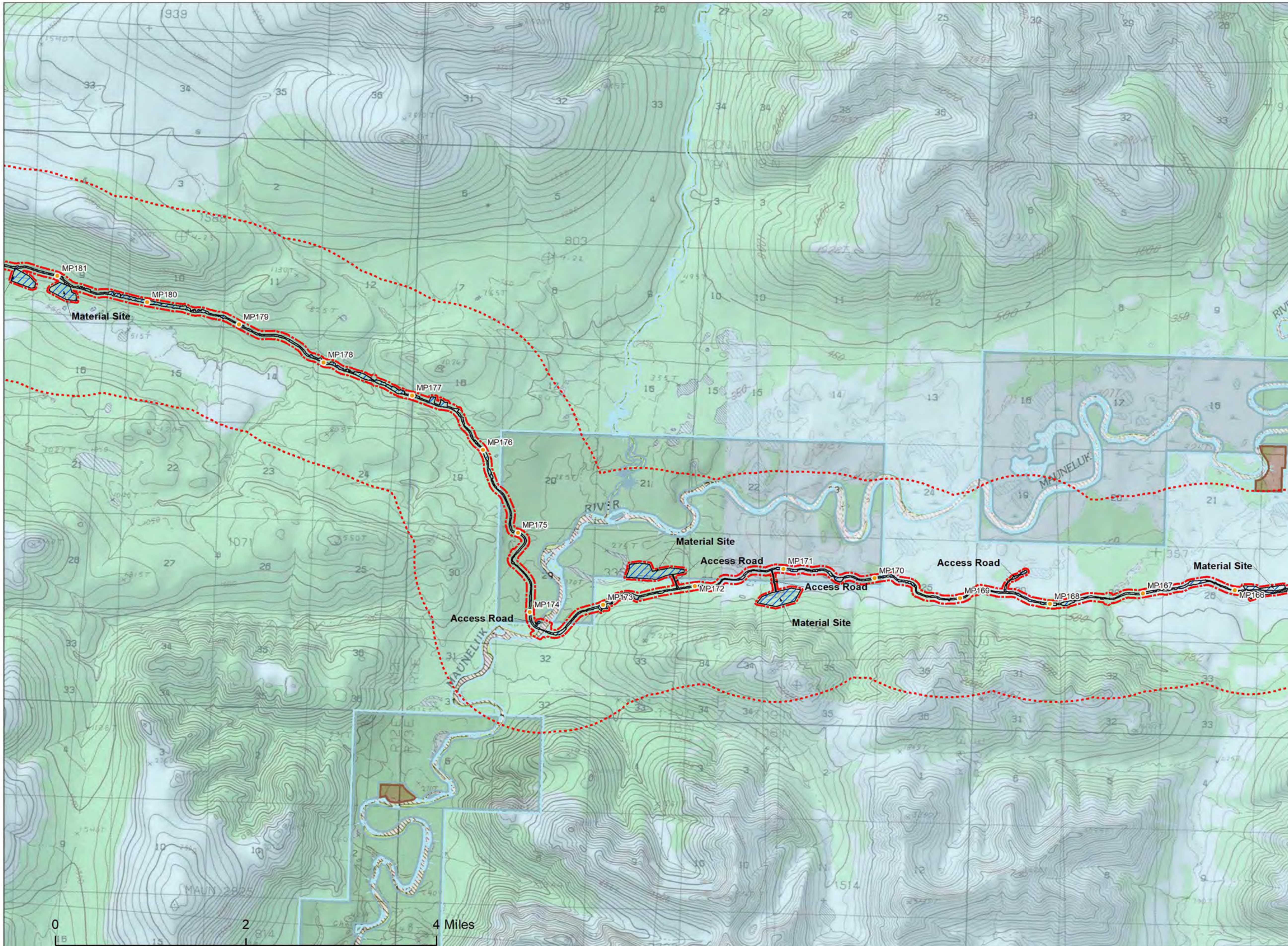

Alternative A Footprints
Direct APE
Indirect APE
Administered Lands*
Alaska Native Allotment
Local Government
State

*Current as of April 11th, 2018

Service Layer Credits: Copyright©: 2013 National Geographic Society, i-cubed

NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
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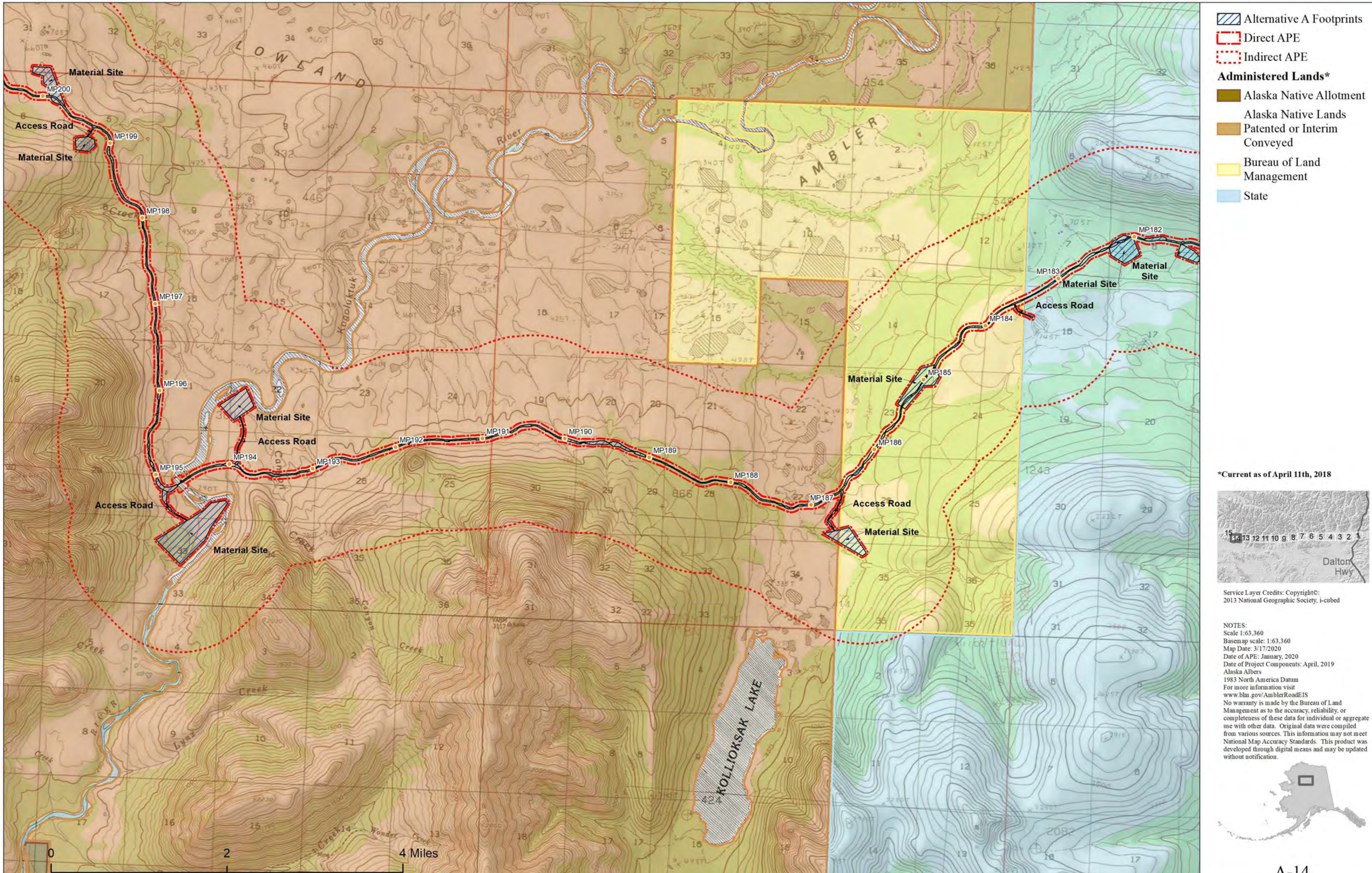
Material Site
MP200
Access Road
MP199
Material Site
MP198
MP197
MP196
Material Site
Access Road
MP194
MP195
Access Road
Material Site
MP193
MP192
MP191
MP190
MP189
MP188
MP187
Access Road
Material Site
MP186
MP185
Material Site
MP184
Access Road
MP183
Material Site
MP182
Material Site
LOWLAND
AMBLER
River
Kogoluktuk
KOLLIOKSAK LAKE
0
2
4 Miles
Alternative A Footprints
Direct APE
Indirect APE
Administered Lands*
Alaska Native Allotment
Alaska Native Lands Patented or Interim Conveyed
Bureau of Land Management
State
*Current as of April 11th, 2018
Dalton Hwy
Service Layer Credits: Copyright©: 2013 National Geographic Society, i-cubed
NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
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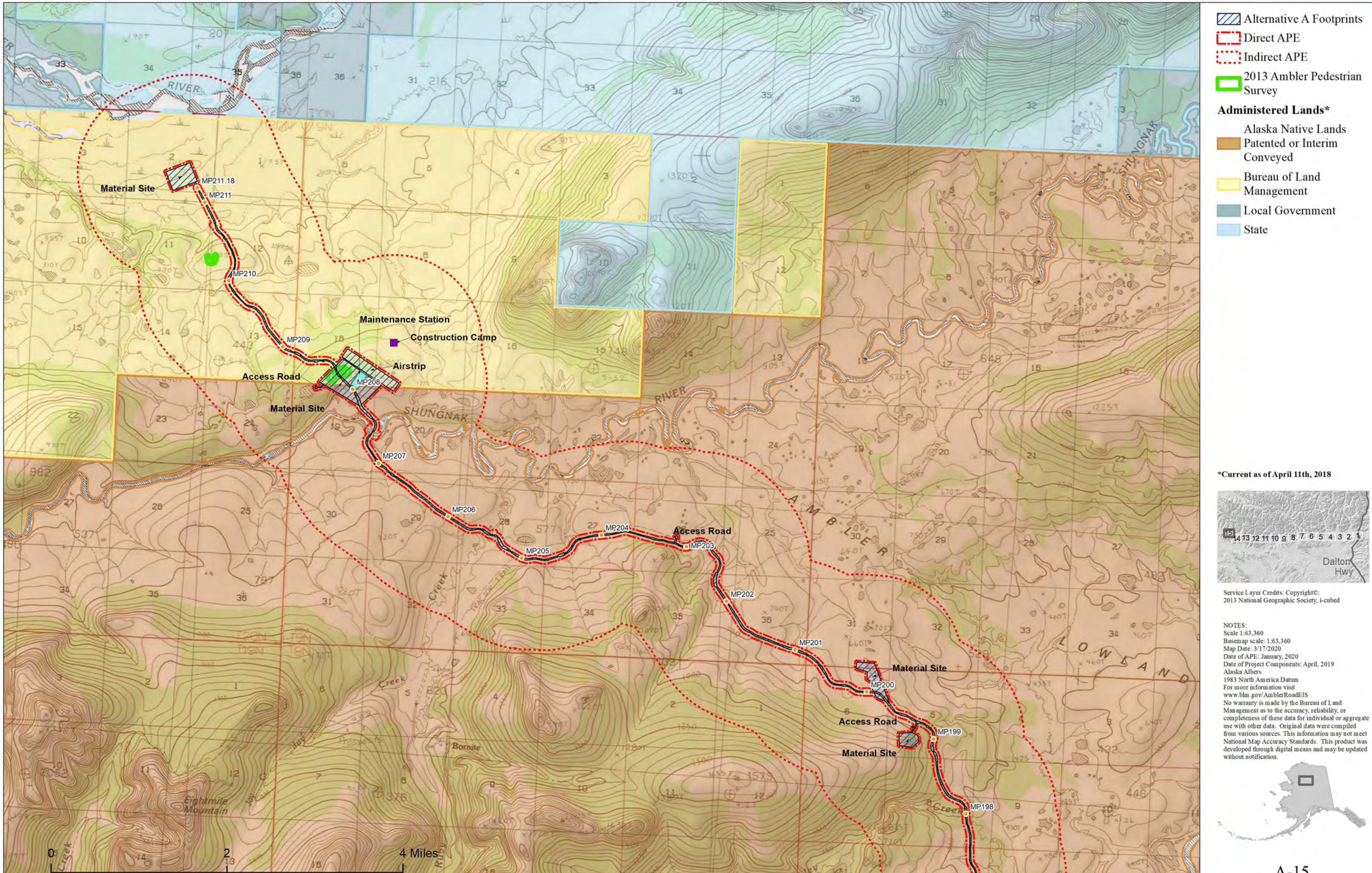

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NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
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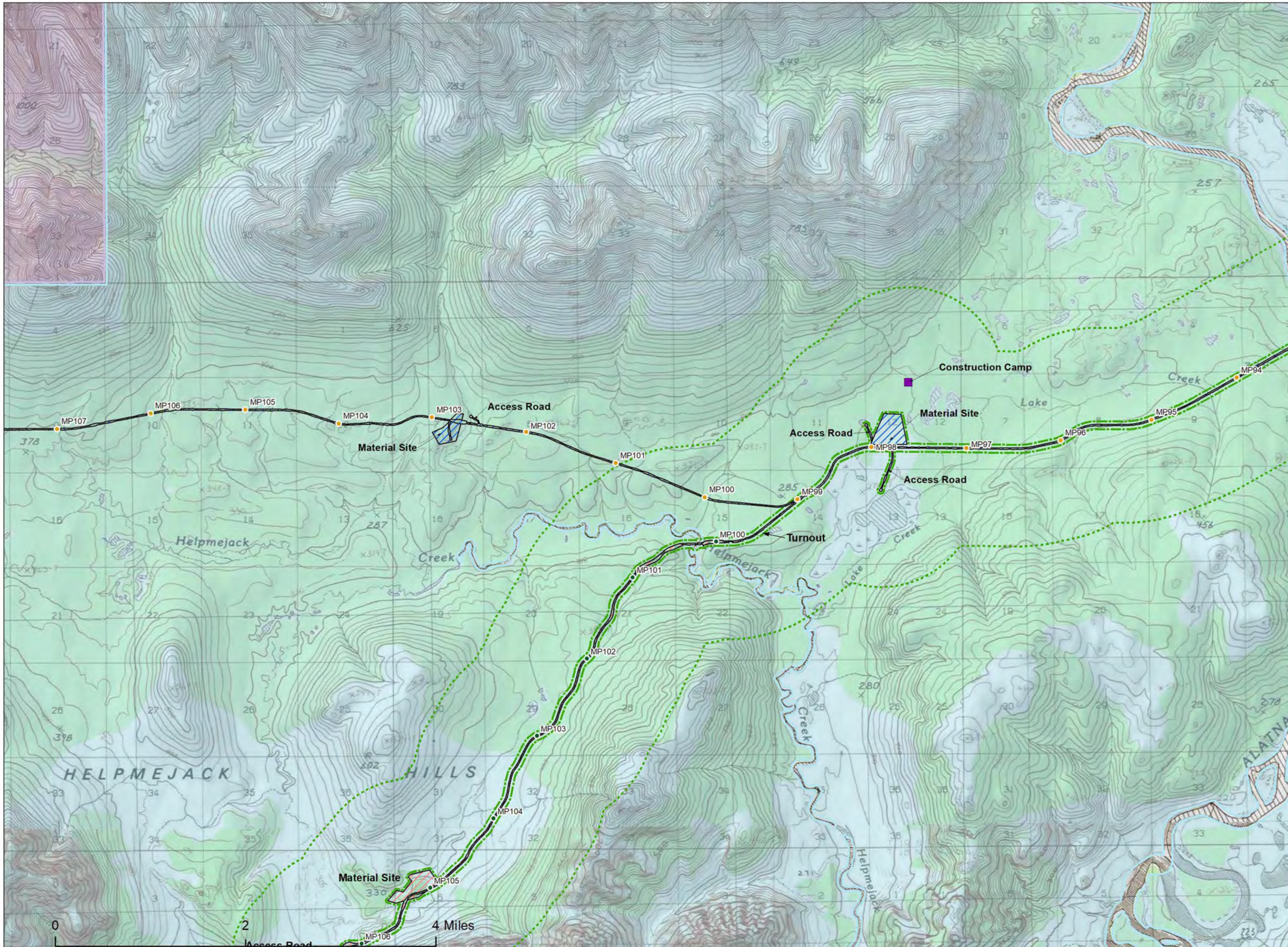
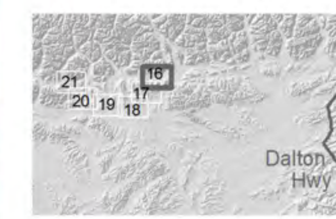


Alternative A Footprints
Alternative B Footprints
Direct APE
Indirect APE

Administered Lands*

National Park Service
State

*Current as of April 11th, 2018



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NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
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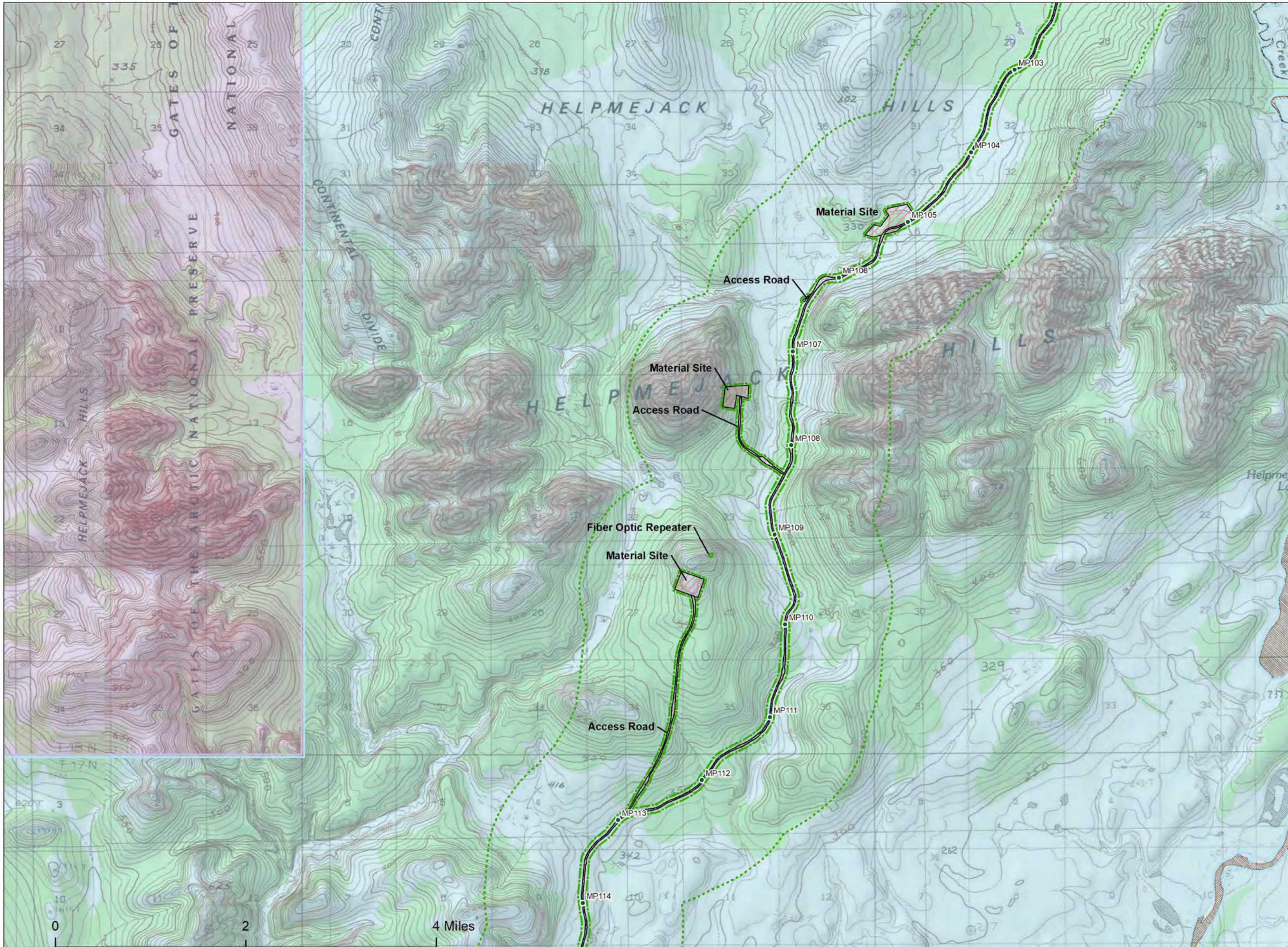
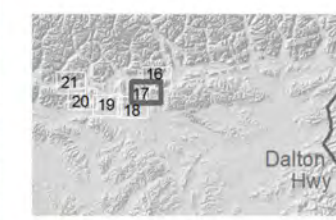


Alternative B Footprints
Direct APE
Indirect APE
Administered Lands*
National Park Service
State

***Current as of April 11th, 2018**



NOTES:
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Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
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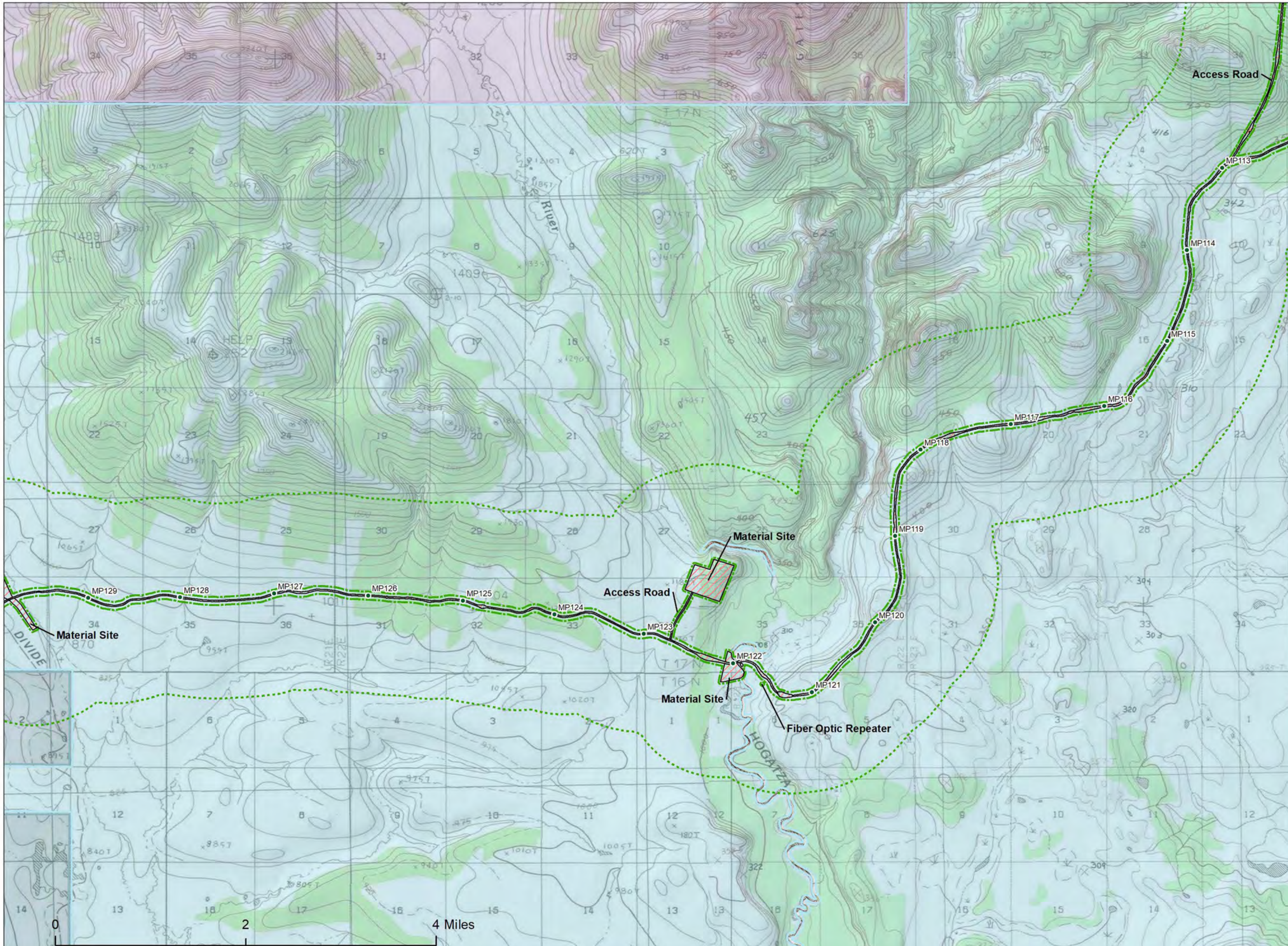
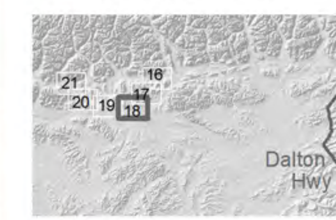


Alternative B Footprints
Direct APE
Indirect APE
Administered Lands*
Local Government
National Park Service
State

*Current as of April 11th, 2018



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NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
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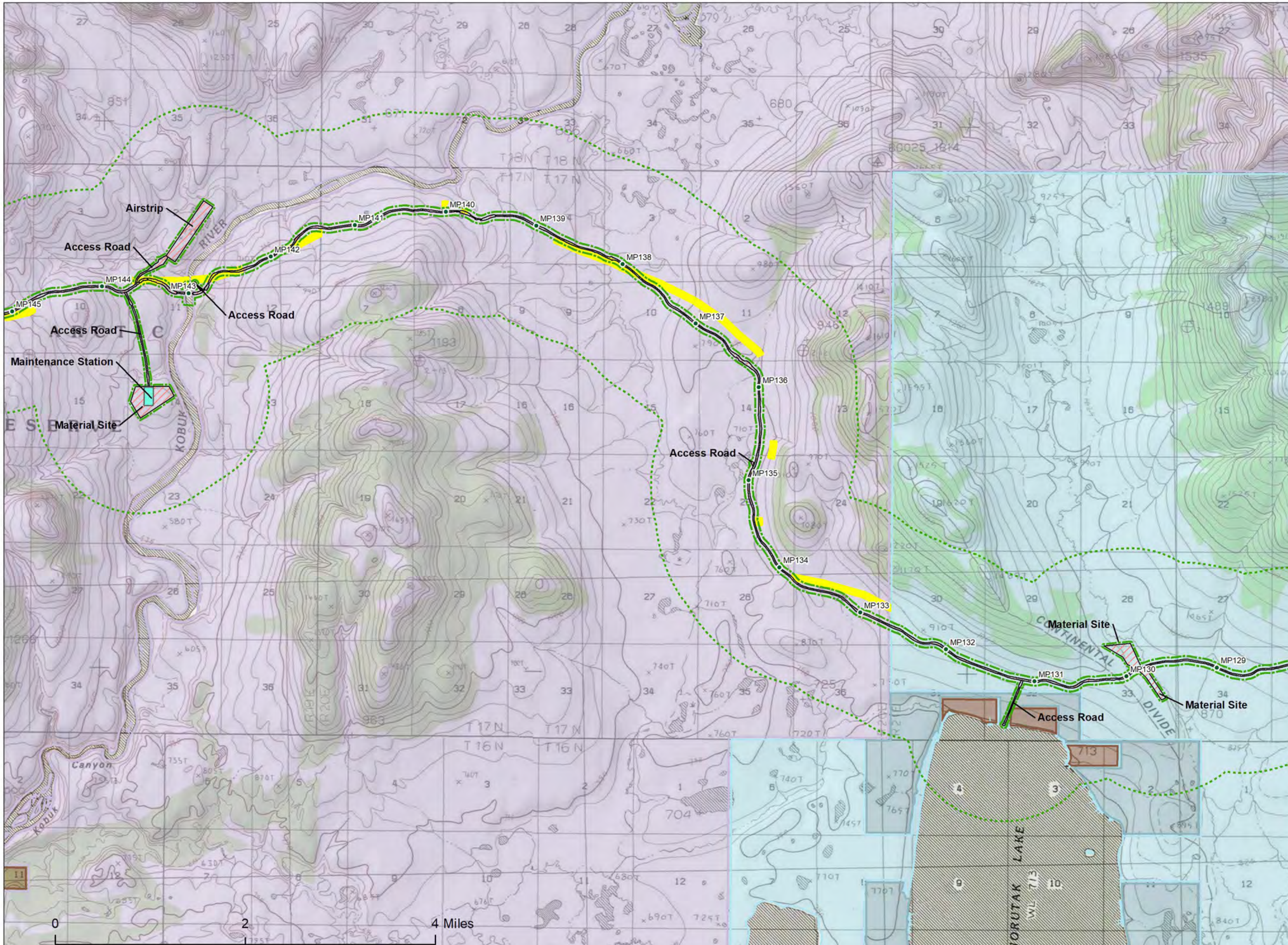
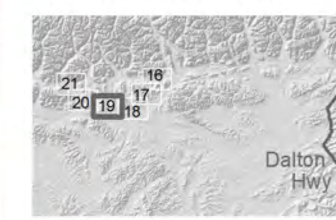


Alternative B Footprints
Direct APE
Indirect APE
2014 Ambler Pedestrian Survey

Administered Lands*

Alaska Native Allotment
Local Government
National Park Service
State

*Current as of April 11th, 2018



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NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
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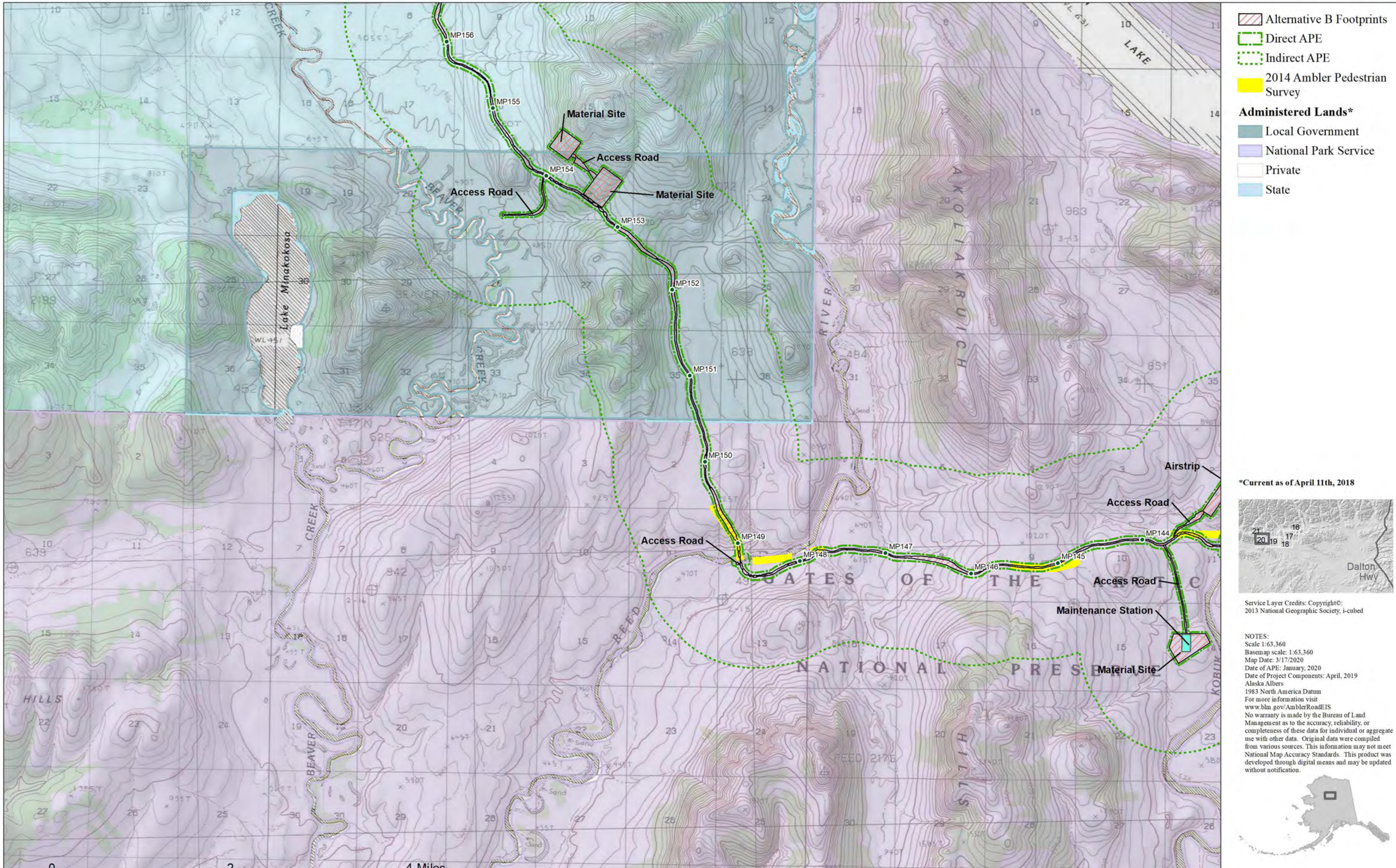
Alternative B Footprints
Direct APE
Indirect APE
2014 Ambler Pedestrian Survey
Administered Lands*
Local Government
National Park Service
Private
State
*Current as of April 11th, 2018
Dalton Hwy
Service Layer Credits: Copyright©:
2013 National Geographic Society, i-cubed
NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
Date of APE: January, 2020
Date of Project Components: April, 2019
Alaska Albers
1983 North America Datum
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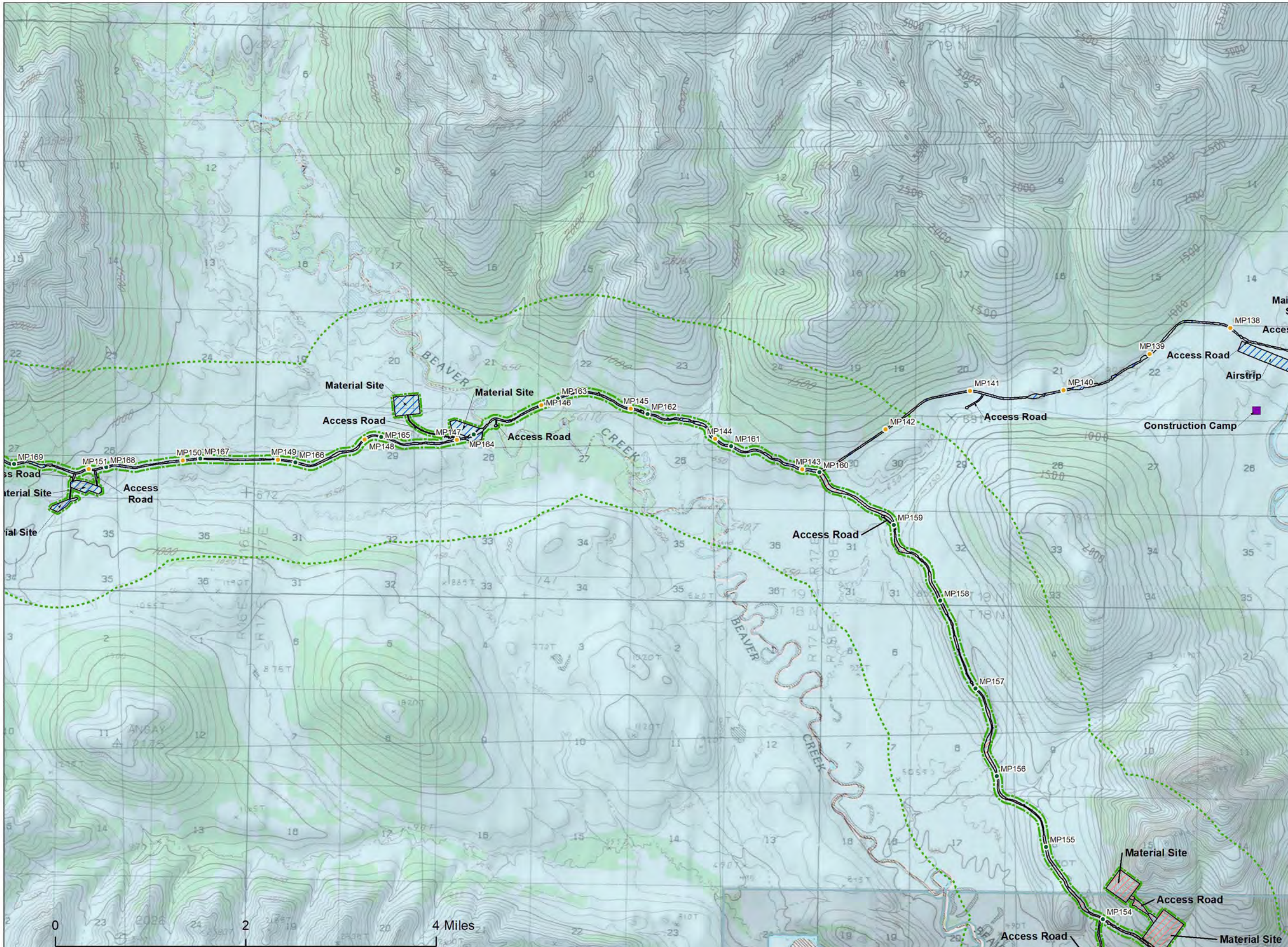
MP156
MP155
Material Site
Access Road
MP154
Access Road
Material Site
MP153
MP152
MP151
MP150
Access Road
MP149
MP148
MP147
MP146
MP145
MP144
Airstrip
Access Road
Access Road
Maintenance Station
Material Site
Lake Minakokosa
GATES OF THE ARCTIC
NATIONAL PRESERVE
AKOLIAKRUICH
HILLS
0
2
4 Miles



Alternative A Footprints
Alternative B Footprints
Direct APE
Indirect APE
Administered Lands*
Local Government
State

*Current as of April 11th, 2018

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NOTES:
Scale 1:63,360
Basemap scale: 1:63,360
Map Date: 3/17/2020
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Attachment B – Area of Potential Effects

Project APE (December 2019)

The Area of Potential Effects (APE)[13] consists of a 1-mile buffer on each side of the proposed corridor and around all Project Components; see Attachment A, Maps. The corridor consists of a 250-foot wide, and, in some cases (such as water crossings or steep terrain), 400-foot wide footprint. Components include vehicle turnouts, work camps, storage and staging areas, material sources, airstrips, access roads, maintenance stations, and/or any other Project features. The Bureau of Land Management (BLM), in consultation with the Consulting Parties, determined the 1-mile APE will encompass reasonably foreseeable direct, indirect, or cumulative adverse effects[14] from the Project. While some effects may be present beyond the APE in certain areas (e.g., the road may be visible for more than 1 mile away when viewed from higher ground), it is unlikely that the eligibility or significance of any historic properties would be changed, and therefore the effect would not be considered adverse. Inventory methods within the APE will vary based on the following:

> *Inventory for Direct Effects[15] (Direct APE):*
> Inventory for direct effects will include the 250-foot wide, and, in some cases (such as water crossings or steep terrain), 400-foot wide corridor, plus a 100-foot buffer on each side of the corridor. Inventory for direct effects will also encompass the footprint of all Project Components (e.g., vehicle turnouts, work camps, storage and staging areas, material sources, airstrips, access roads, and maintenance stations or any other features), plus a 100-foot buffer around the footprint.
>
> *Inventory for Indirect and Cumulative Effects[16] (Indirect APE):*
> Inventory for indirect and cumulative effects will be considered for the portion of the APE that falls outside of the Direct APE.

The BLM, in consultation with the Consulting Parties, will consider whether any changes to the APE is needed during the Annual Meeting (XV.A). Revisions to the APE could be necessary based on updated project plans; additional information about construction, maintenance, or reclamation procedures; newly identified resources or new information about historic or traditional uses of an area; new survey methods or technology; environmental factors; information from monitoring; or other factors.

---

[13] Per 36 CFR 800.16(d), an APE is "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historical properties, if any such properties exist."

[14] Per 36 CFR 800.5(a)(1), an adverse effect is found when an Undertaking may alter, directly or indirectly, the characteristics of a historic property that qualify it for inclusion in the NRHP. Adverse effects may include reasonably foreseeable effects caused by the Undertaking that may occur later in time, be farther removed in distance, or be cumulative.

[15] Per 36 CFR 800.5(a)(2), direct effects include physical destruction/damage, alteration not consisted with 36 CFR 68, removal of a property from a historic location, change in the character of use or physical features, deterioration through neglect, or introduction of visual, atmospheric, or audible elements that diminish the integrity. This includes effects that come from an Undertaking at the same time and place with no intervening cause, regardless of the specific type (i.e., visual, physical, auditory).

[16] Indirect effects are those caused by the Undertaking that are later in time or farther removed in distance but are still reasonably foreseeable. Cumulative effects result from incremental actions that, when added to other past, present, and reasonably foreseeable future actions, may adversely affect a historic property.

Attachment C – Previously Recorded AHRS Resources[17]

AHRS Number	Name	Period	Description	APE	Direct APE	NRHP Status	Landowner(s)
AMR-00227	Ticket Ridge Site	Prehistoric	Lithic and milled wood scatter	A/B	Yes	Unevaluated	BLM
AMR-00228	-	Unknown	Cairn	A/B	No	Unevaluated	NANA
HUG-00005	Norutak 1	Prehistoric	Ceramic and lithic scatter	B	No	Unevaluated	Allotment
HUG-00006	Norutak 7	Prehistoric	Lithic scatter	B	No	Unevaluated	Allotment
HUG-00007	Norutak 4	Prehistoric, Modern	Lithic and modern artifact scatter	B	No	Unevaluated	Allotment
HUG-00016	-	Prehistoric	Isolated lithic	B	No	Unevaluated	NPS
HUG-00024	-	Prehistoric	Lithic scatter	B	Yes	Unevaluated	NPS
HUG-00025	-	Prehistoric	Lithic scatter	B	No	Unevaluated	NPS
HUG-00028[a]	-	Prehistoric	Lithic scatter	B	Yes	Unevaluated	NPS
HUG-00029	-	Prehistoric	Lithic scatter	B	No	Unevaluated	NPS
HUG-00030	-	Prehistoric	Lithic scatter	B	No	Unevaluated	NPS
HUG-00032[b]	-	Prehistoric	Lithic scatter	B	No	Unevaluated	NPS
HUG-00033	-	Prehistoric	Lithic scatter	B	No	Unevaluated	NPS
HUG-00034	-	Prehistoric	Isolated lithic	B	No	Unevaluated	NPS
HUG-00035	-	Prehistoric	Lithic scatter	B	No	Unevaluated	NPS
HUG-00036	-	Prehistoric	Isolated lithic	B	No	Unevaluated	NPS
HUG-00037	-	Prehistoric	Lithic scatter	B	No	Unevaluated	NPS
HUG-00041	-	Prehistoric	Lithic scatter	B	No	Unevaluated	NPS
HUG-00103	-	Prehistoric	Lithic scatter	B	No	Unevaluated	NPS
HUG-00104	-	Prehistoric	Lithic scatter	B	Yes	Unevaluated	NPS
HUG-00132	Norutak 2	Prehistoric	Ceramic and lithic scatter	B	No	Unevaluated	Allotment
HUG-00133	Norutak 3	Prehistoric	Lithic scatter	B	No	Unevaluated	State
HUG-00134	Norutak 5	Prehistoric	Depression features and lithics	B	No	Unevaluated	State
HUG-00136	Norutak 8	Prehistoric	Depressions features and lithics	B	No	Unevaluated	State
HUG-00192[b]	-	Prehistoric	Subsurface lithic scatter	B	No	Unevaluated	NPS
HUG-00193	-	Prehistoric	Isolated lithic, projectile point	B	No	Unevaluated	NPS

[17] Data from the AHRS database as of December 2019; APE based on Project alignments as of April 2019.

AHRS Number	Name	Period	Description	APE	Direct APE	NRHP Status	Landowner(s)
HUG-00195	-	Prehistoric	Isolated lithic	B	No	Unevaluated	NPS
WIS-00001	-	Prehistoric	Hearth and lithic scatter	A/B	No	Unevaluated	BLM
WIS-00002	-	Prehistoric	Lithic scatter	A/B	No	Unevaluated	BLM
WIS-00003	-	Prehistoric	Hearth and lithic scatter	A/B	No	Unevaluated	BLM
WIS-00004	-	Prehistoric	Lithic scatter	A/B	No	Unevaluated	BLM
WIS-00005	-	Prehistoric	Surface and subsurface lithic scatter	A/B	No	Unevaluated	BLM
WIS-00019	-	Prehistoric	Surface and subsurface lithic scatter	A/B	No	Unevaluated	BLM
WIS-00021	-	Prehistoric	Lithic scatter	A/B	Yes	Unevaluated	BLM
WIS-00029	-	Prehistoric	Lithic scatter	A/B	No	Unevaluated	BLM
WIS-00030	-	Prehistoric	Lithic scatter	A/B	No	Unevaluated	BLM
WIS-00043	-	Prehistoric	Isolated lithic	A/B	No	Unevaluated	BLM
WIS-00231	Chapman Lake 1	Prehistoric	Cache Pit	A/B	No	Unevaluated	BLM
WIS-00232	Chapman Lake 2	Prehistoric	Subsurface Lithic Scatter	A/B	No	Unevaluated	BLM
WIS-00345	Chapman Lake Can and Flake Site	Prehistoric and Historic	Historic and Prehistoric Artifact Scatter	A/B	No	Unevaluated	BLM
WIS-00252	Chapman #1	Prehistoric	Activity area, lithic scatter	A/B	No	Unevaluated	BLM
WIS-00408	Dalton Highway	Historic	Highway	A/B	Yes	Eligible	State
WIS-00409	Hickel Highway	Historic	Transportation, winter road	A/B	Yes	Unevaluated	Doyon, Ltd.
WIS-00414[a]	-	Prehistoric	Lithic scatter	A/B	Yes	Unevaluated	BLM
XSP-00056	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00057	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00058	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00059	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00060	-	Prehistoric	Isolated lithic	A	No	Unevaluated	NPS
XSP-00061	-	Prehistoric	Surface and subsurface lithic scatter	A	No	Unevaluated	NPS
XSP-00062	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00065	-	Prehistoric	Isolated lithic	A	No	Unevaluated	NPS
XSP-00067	-	Prehistoric	Surface and subsurface lithic scatter	A	No	Unevaluated	State
XSP-00068	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS

AHRS Number	Name	Period	Description	APE	Direct APE	NRHP Status	Landowner(s)
XSP-00069	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00070	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00071	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00072[a]	-	Prehistoric	Isolated lithic	A	Yes	Unevaluated	NPS
XSP-00073	-	Prehistoric	Isolated lithic	A	No	Unevaluated	State
XSP-00074	-	Prehistoric	Surface and subsurface lithic scatter	A	No	Unevaluated	State
XSP-00075	-	Prehistoric	Isolated lithic	A	No	Unevaluated	State
XSP-00076	-	Prehistoric	Isolated lithic	A	No	Unevaluated	NPS
XSP-00079	-	Prehistoric	Surface and subsurface lithic scatter	A	No	Unevaluated	NPS
XSP-00080	-	Prehistoric	Surface and subsurface lithic scatter	A	No	Unevaluated	NPS
XSP-00096	-	Prehistoric	Isolated lithic	A	No	Unevaluated	NPS
XSP-00097[b]	-	Prehistoric	Isolated lithic	A	No	Unevaluated	NPS
XSP-00099[a]	-	Prehistoric	Lithic scatter	A/B	Yes	Unevaluated	State
XSP-00111	-	Prehistoric	Lithic scatter	B	No	Unevaluated	State
XSP-00112[a]	-	Prehistoric	Lithic scatter	A	Yes	Unevaluated	State
XSP-00113	-	Prehistoric	Surface and subsurface lithic scatter	A	No	Unevaluated	State
XSP-00114	-	Prehistoric	Lithic scatter	A	No	Unevaluated	State
XSP-00115	-	Prehistoric	Lithic scatter	A	No	Unevaluated	State
XSP-00117[b]	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00118	-	Prehistoric	Lithic scatter	A	No	Unevaluated	State
XSP-00119	-	Prehistoric	Lithic scatter	A	No	Unevaluated	State
XSP-00126	-	Prehistoric	Surface and subsurface lithic scatter	A	No	Unevaluated	State
XSP-00127	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00128	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00129	-	Prehistoric	Lithic scatter	A	No	Unevaluated	State
XSP-00131	-	Prehistoric	Surface and subsurface lithic scatter	A	No	Unevaluated	NPS
XSP-00135	-	Prehistoric	Surface and subsurface lithic scatter	A	No	Unevaluated	NPS
XSP-00136	-	Prehistoric	Surface and subsurface lithic scatter	A	No	Unevaluated	State
XSP-00137[a]	-	Prehistoric	Lithic scatter	A	Yes	Unevaluated	State

AHRS Number	Name	Period	Description	APE	Direct APE	NRHP Status	Landowner(s)
XSP-00138	-	Prehistoric	Lithic scatter	A	No	Unevaluated	State
XSP-00139[a]	-	Prehistoric	Isolated lithic	A	Yes	Unevaluated	NPS
XSP-00140	-	Prehistoric	Lithic scatter	A	Yes	Unevaluated	NPS
XSP-00141[a]	-	Prehistoric	Lithic scatter	A	Yes	Unevaluated	State
XSP-00142[a]	-	Prehistoric	Lithic scatter	A	Yes	Unevaluated	NPS
XSP-00143	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00144	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00145	-	Prehistoric	Isolated lithic	A/B	Yes	Unevaluated	State
XSP-00147	-	Prehistoric	Lithic scatter	A/B	No	Unevaluated	State
XSP-00148	-	Prehistoric	Lithic Scatter	A/B	No	Unevaluated	State
XSP-00149	-	Prehistoric	Lithic Scatter	A/B	No	Unevaluated	State
XSP-00150	-	Prehistoric	Lithic scatter	A/B	No	Unevaluated	State
XSP-00151	-	Prehistoric	Lithic scatter	A/B	No	Unevaluated	State
XSP-00152	-	Prehistoric	Lithic scatter	A/B	No	Unevaluated	State
XSP-00153	-	Prehistoric	Isolated lithic	A/B	No	Unevaluated	State
XSP-00154	-	Prehistoric	Isolated lithic	A	No	Unevaluated	State
XSP-00407	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00436	-	Prehistoric	Lithic scatter	A	No	Unevaluated	NPS
XSP-00449[b]	-	Historic	Trap	A	No	Unevaluated	NPS
XSP-00450	-	Historic	Can, cut wood	A	No	Unevaluated	NPS
XSP-00495	-	Prehistoric	Subsurface lithic scatter	A	No	Unevaluated	NPS
XSP-00496[a]	-	Prehistoric	Isolated lithic	A	Yes	Unevaluated	NPS

[a] Site geometry falls outside of the Direct APE but was buffered 500 feet to account for unknown data accuracy and lack of defined site boundaries. Buffered site geometry falls within the **Direct APE.**

[b] Site geometry falls outside of the APE but was buffered 500 feet to account for unknown data accuracy and lack of defined site boundaries. Buffered site geometry falls within the **Indirect APE.**

Attachment D – List of Parties Invited to Consult on the Section 106 Process

Federally Recognized Tribes (52)

Alatna Village Council [a]
Allakaket Village Council [a]
Arctic Village Traditional Council
Beaver Traditional Council
Birch Creek Tribal Council
Brevig Mission Traditional Council
Buckland IRA Council
Chalkyitsik Traditional Council
Circle Traditional Council
Deering IRA Council
Denduu Gwich'in Tribal Council
Elim IRA Council
Evansville Village [a]
Fort Yukon IRA Council
Golovin-Chinik Eskimo Community
Hughes Village Council [a]
Huslia Village Council [a]
Inupiat Community of the Arctic Slope
Kaltag Traditional Council
Kiana Traditional Council
Kivalina Traditional Council
Koyukuk Traditional Council
Louden Tribal Council
Manley Traditional Council
Minto Traditional Council
Native Village of Ambler [a]
Native Village of Atqasuk
Native Village of Barrow
Native Village of Kotzebue
Native Village of Kobuk [a]
Native Village of Koyuk
Native Village of Mary's Igloo
Native Village of Noatak [a]
Native Village of Nuiqsut
Native Village of Point Hope
Native Village of Point Lay
Native Village of Selawik [a]
Native Village of Shaktoolik
Native Village of Shishmaref
Native Village of Shungnak [a]
Native Village of Stevens [a]
Native Village of Tanana [a]
Native Village of Venetie
Native Village of Wales
Native Village of White Mountain
Nenana Traditional Council
Nome Eskimo Community

Noorvik Native Community [a]
Nulato Tribal Council
Rampart Tribal Council
Ruby Traditional Council
Village of Anaktuvuk Pass [a]

ANSCA Corporations and Non-Profits (26)

Arctic Slope Regional Corporation
Baan O Yeel Kon Corporation
Bean Ridge Corporation
Beaver Kwit'Chin Corporation
Bering Straits Native Corporation
Chalkyitsik Native Corporation
Danzhit Hanlaii Corporation
Dineega Corporation
Dinyea Corporation [a]
Doyon, Limited [a]
Evansville, Incorporated [a]
Gana-A'Yoo, Limited [a]
Gwitchyaa Zhee Corporation
Kawerak, Incorporated
Kikiktagruk Inupiat Corp
K'oyitl'ots'ina Limited [a]
Koyuk Native Corp
Maniilaq Association
NANA Regional Corporation [a]
Nunamiut Corporation
Seth-De-Ya-Ah Corporation
Tanana Chiefs Conference [a]
T'ee teraan'in - Council of Athabascan Tribal Governments
Tihteet'aii, Incorporated
Toghotthele Corporation
Tozitna, Limited

State and Federal Agencies (9)

Advisory Council on Historic Preservation (ACHP) [a]
Alaska Department of Natural Resources (DNR) [a]
Alaska Department of Transportation & Public Facilities (DOT&PF) [a]
Alaska State Historic Preservation Officer (SHPO) [a]
Bureau of Indian Affairs (BIA) [a]
Environmental Protection Agency (EPA)
Federal Highway Administration (FHWA)
National Park Service (NPS) [a]
U.S. Army Corps of Engineers (USACE) [a]
U.S. Coast Guard (USCG)

City & Borough Governments (15)

City of Allakaket [a]
City of Ambler [a]
City of Anaktuvuk Pass [a]
City of Bettles

City of Buckland
City of Deering
City of Kiana
City of Kobuk
City of Kotzebue [a]
City of Noorvik
City of Selawik
City of Shungnak [a]
Northwest Arctic Borough [a]
North Slope Borough
Wiseman Community Association

Other Entities (6)

Alaska Federation of Natives
Alaska Historical Society
Alaska Industrial Development and Export Authority (AIDEA) [a]
Brooks Range Council
First Alaskans Institute
Northern Alaska Environmental Center
Simon Paneak Museum

Note: [a] = Entities that have participated in or consulted with the BLM during the Section 106 Process.

Attachment E – Cultural Resource Management Plan

Abbreviated Table of Contents – see CRMP for full Table of Contents and text:

Table of Contents

Exhibits

Attachment F – Reporting Table

The Reporting Table represents the standard due dates and content for all required report, plan, and deliverables associated with implementation of the Programmatic Agreement (PA). In certain cases, the Submittal Due Date may vary for the first year of the Pre-Construction Phase.

Report Title	Submittal Due (XIV.B.i)	Content	Review Period (XIV.B.ii)	Review Focus	Required Report Approvals (XIV.B.iv)
Phase Plan (IV.E)	Prior to initiation of each Project Phase	Detailed descriptions of the locations of all Segments and Components, descriptions of the planned work Stages, and anticipated work schedules for all activities that will occur during that Phase.	N/A	Informational Only	None
Historic Themes(s) (VII.C.ii.a)	60 days prior to fieldwork initiation	Comprehensive summary of available data sources relating to traditional fishing economy; traditional hunting, trapping, and guiding economies; traditional trade networks; historic exploration and travel corridors; and prospecting and mining.	30 days	Review of themes to ensure they are adequate to reasonably identify high potential areas for survey within the APE.	BLM SHPO (15-day approval review period)
Annual Work Plan (VII.B.i)	No later than March 1 (annually)	Detailed information about the anticipated work for the upcoming year; where it will occur; how it will be phased within Project Segments, Stages, and/or Components; and how the Permittee will meet the PA requirements. Other submissions may include updates to the Phase Plan (IV.E), Historic Themes (VII.C.ii.a), Survey Strategy (VII.D), Monitoring Plan (X.D), and Contractor Training curriculum (XI.B).	30 days	Review of all content to ensure the work will meet the PA stipulations and reasonable and good faith intent for Section 106 compliance.	BLM SHPO NPS[a] (15-day approval review period)
Contractor Training Curriculum (XI)	With the Annual Work Plan (no later than March 1 annually)	Curriculum for training Project personnel on cultural resource information and procedures.	30 days	Review of curriculum – does it adequately capture necessary information.	BLM SHPO (15-day approval review period)
Annual PA Report (XV.B)	No later than March 1 (annually)	Summary of all activities resulting from PA implementation over the past year; content should be generalized to share with the public, with confidential information redacted as necessary.	30 days	Ensure all activities are documented and adequately described to share with the public.	BLM SHPO (15-day approval review period)

Report Title	Submittal Due (XIV.B.i)	Content	Review Period (XIV.B.ii)	Review Focus	Required Report Approvals (XIV.B.iv)
Interim Report for Indirect APE (VII.B.ii)	30 days following completion of fieldwork (annually)	Summary of inventory efforts and resources within the Indirect APE.	15 days	Identify resources within the Indirect APE that require NRHP evaluation.	No approval required, but BLM, SHPO, and NPS[a] will consult during a 7-day period.
Annual Fieldwork Report (VII.B.iii)	90 days following completion of fieldwork (annually)	1) Comprehensive summary of inventory efforts completed since the last report, including Monitoring results; 2) recommendations of NRHP eligibility for all cultural resources located within the Direct APE and those identified during review of the Interim Report for Indirect APE; 3) finding of effect recommendations for resources that may be eligible; and 4) recommended resolution measures for resources that may be adversely affected.	45 days	Review of all content to ensure the work will meet the PA stipulations and reasonable and good faith intent for Section 106 compliance.	BLM SHPO NPS[a] (15-day approval review period)
Treatment Plans (VII.B.iv)	120 days following approval of mitigation measures	Detailed property-specific description of the treatment measures to be implemented and schedule for the activities and deliverables.	30 days	Review to ensure treatment will be commensurate with the eligibility and significance of the historic property.	BLM SHPO NPS[a] (15-day approval review period)
Final Implementation Reports (VII.B.v)	180 days following implementation of Treatment Plan (or as determined necessary)	Summary of all activities that occurred at each historic property, from inventory through implementation of mitigation treatment measures, and description of all completed steps, analyses, methods, and results, including collections and datasets generated.	30 days	Review to ensure treatment is completed for the historic property.	BLM SHPO NPS[a] (15-day approval review period)
Technical Reports (VII.B.vi)	Variable	Results of background research, fieldwork activities, lab analyses, or other information as determined by the PA Signatories.	30 days	Review of methods, results, and/or other technical aspects or consider if mitigation for broad-scale effects may be necessary.	BLM SHPO (15-day approval review period)
Construction and Operations	Within 2 years following completion	Summary of PA implementation, including all work that occurred during that Phase or period,	30 days	Review to ensure compliance with the PA	BLM SHPO

Report Title	Submittal Due (XIV.B.i)	Content	Review Period (XIV.B.ii)	Review Focus	Required Report Approvals (XIV.B.iv)
Summary Report(s) (XV.C)	of Construction for Phase I, II, and III and/or every 10 years	resources found, measures implemented, changes and updates in project designs/plans, changes in management or roles, and/or other information as determined by the PA Signatories.		and that indirect and cumulative effects are accounted for.	(15-day approval review period)
Reclamation and Closure Report (XV.D)	TBD	TBD	TBD	TBD	TBD

[a] Requires approval by the NPS for lands and/or historic properties under NPS jurisdiction.

Attachment G – Project Plans

DESCRIPTION OF PROPOSED PROJECT PHASES (December 2019)

Pre-Construction Phase

The first step is to complete design and permitting and acquire right of way (ROW) from non-federal sources. Activities required to complete permitting and design include geotechnical investigations at bridge locations, along the corridor centerline to refine the embankment design, and at material sites along the east-end realignment; aerial imagery and Light Detection and Ranging (LiDAR) (and/or survey) for areas lacking coverage; wetland delineation on areas not field delineated; hydrology studies; and cultural resource surveys.

At this stage, permits to be acquired would include final U.S. Army Corps of Engineers wetland permit and mitigation, U.S. Coast Guard bridge permits, Alaska Department of Natural Resources material site permits, Alaska Department of Fish and Game fish stream crossing permits, state and federal ROWs, etc. The timeframe for this Phase depends on project delivery method used, whether Design-Bid-Build[18], Design-Build[19], Construction Manager at Risk[20], Construction Manager/General Contractor[21] and phasing.

If the project is broken up into "segments" (within each Phase), there could be design and permitting done on 1 segment and construction could start on that segment while design and permitting is done on other segments. Contractor input would be needed to identify appropriate segments and the sequencing of segments for permitting and construction.

Summary:

- Years: 1 to 2 – May overlap with Phase I Construction timing.
- Components: No installed Components associated with this Phase.
- Activities: May include aerial mapping/photography/LiDAR; survey (including some brush clearing); water monitoring; wetland delineation; cultural resource modeling and surveys; drilling in material sites, along alignment, and bridge locations.

Phase I Construction (Seasonal Pioneer Road)

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[18] **Design-Bid-Build** – This is the traditional delivery method for construction projects where the Owner contracts with a designer to design the project. Once design is complete, the project is put out to bid to Contractors to build as designed. Owner then enters into a construction contract with Contractor.

[19] **Design-Build** – This is an alternative delivery method for construction projects where the Owner hires a designer-contractor team to design and build the project. The Owner enters into one contract with the team to do both design and construction.

[20] **Construction Manager at Risk** – This is an alternative delivery method for construction projects where the Owner contracts separately with the designer and construction manager (CM). The CM acts as a consultant during design and as a general contractor during construction. The CM's responsibilities include procuring equipment and subcontracts and delivering the project within a fixed, negotiated price. In most states, the CM must be a licensed general contractor.

[21] **Construction Manager/General Contractor** - This is an alternative delivery method for construction projects and is very similar to the Construction Manager at Risk method. During the design phase, the construction manager provides input to the Owner and Designer regarding scheduling, pricing, phasing and other input to design a more constructible project. At approximately an average of 60% to 90% design completion, the owner and the construction manager negotiate a 'guaranteed maximum price' for the construction of the project based on the defined scope and schedule. If this price is acceptable to both parties, they execute a contract for construction services, and the construction manager becomes the general contractor.

This Phase will overlap with the Pre-Construction Phase. This Phase would include clearing vegetation from the federal and state ROWs while other ROW negotiations are underway. Activities would also include construction of material sources, clearing and preparing construction camps, placement of radio towers, staging of equipment and labor in various areas, hauling materials and placing fill, excavating high areas, and grading. It would also include installation of culverts and bridges (including driving piles for bridge supports) as well as airstrips, maintenance facilities, and access controls.

Since Phase I construction will most likely start in some portions of the Project area while pre-construction activities are still on-going in other areas, there could be some pre-construction activities (e.g., geotechnical borings, hydrology studies, cultural resource surveys) underway during this Phase.

Summary:

- Years: 2 to 4 – overlaps with Pre-Construction Phase and beginning of Phase II Construction.
- Operations: 1-lane seasonal road, embankment width up to 28 feet and height 30 to 72 inches, 12-foot road lane, 2-foot shoulders, 1-way operation for up to 7 months per year.
- Components: Construction camps, material sites, airstrips, radio towers, maintenance sites and communications equipment, access control (gates), construction equipment, and bridges, culverts, and road embankment.
- Activities: Clearing vegetation from the ROWs, construction of material sources, clearing and preparing construction camps, placement of radio towers, staging of equipment and labor in various areas, hauling materials and placing fill, excavating high areas, and grading. It would also include installation of culverts and bridges (including driving piles for bridge supports) as well as airstrips, maintenance facilities, and access controls. (Potential concurrent Pre-Construction Phase activities may include aerial mapping/photography/LiDAR, survey, water monitoring, wetland delineation, cultural resource modeling and surveys, and drilling in material sites, along alignment, and bridge locations).

<u>Phase II Construction (All-season Roadway)</u>

This Phase would involve the construction of a year-round useable road. This effort would entail additional material extraction, hauling and placing material to expand the Phase I embankment (width and depth), and grading to final slopes. Fiber optic facilities would be trenched into the road embankment during this Phase of construction.

Summary:

- Years: 3 to 4 – including overlap with Phase I.
- Operations: 1-lane year-round road, embankment width up to 44 feet and height 36 to 96 inches, 12-foot road lane, 4-foot shoulders, 1-way road operation.
- Components: Most already put in place during Phase I construction activities, with the addition of fiber optic line in roadway embankment and additional communication equipment at some Maintenance Stations.
- Activities: Continued development or expansion of material sources, construction camp operations, maintenance station operations, some aircraft operations, hauling materials and placing fill, excavating high areas, and grading.

<u>Phase II Operations and Maintenance</u>

Summary:

- Years: 4 to 50

- Operations: 1-lane year-round road, embankment width up to 44 feet and height 36 to 96 inches, 2 12-foot road lanes, 4-foot shoulders, 2-way road operations.
- Components: Use of previously constructed Components.
- Activities: Continued development or expansion of Material Sites, air operations, Maintenance Station operations, hauling materials and placing fill for repairs/maintenance, grading, and removal and reclamation of temporary construction camps not turned into Maintenance Stations.

Phase III Construction (2-Lane Road)

This Phase, if needed, would include additional clearing, additional material extraction, additional excavation where widening road in cut sections or side hilling, additional hauling and placing material to expand the Phase II embankment (width), and additional grading. Culverts would be extended by welding extensions onto the existing culverts. This expansion would create a 2-lane all-season roadway.

Summary:

- Years: 2 to 3 years for the road widening effort – could overlap with the Phase II Operations and Maintenance.
- Operations: 2-lane year-round road, embankment width up to 56 feet and height 36 to 96 inches, 2-way road operations.
- Components: Use of previously constructed Components; expansion of Material Sites; extension of fish passage culverts.
- Activities would include continued development or expansion of material sources, maintenance station operations, air operations, hauling materials and placing fill for expanded roadway, and grading.

Reclamation Phase

Reclamation at the end of the Project would include removal of embankment, culverts, Airstrips, and Maintenance Sites, as well as regrading and revegetation.

Summary:

- Years: 50 to 55
- Operations: Removal of road, no road operations.
- Components: Use of maintenance sites as construction camps, use of communications equipment during reclamation activities, restoration, regrading, and revegetation. Removal of all Components at end of reclamation.
- Activities: Equipment operations to remove fill, regrade, revegetate, restore areas affected by road embankments and associated facilities (airstrips, maintenance stations, material sites).

Attachment H – Amendment and Addendum Log

Change #	Date Revised	Stipulation or Attachment	Line or Paragraph	Revision
Example	*Dec 21, 2019*	*Attachment H*	*1*	*Original language which stated "Amendment Log" was changed to "Amendment and Addendum Log".*
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Appendix K. Ambler Road SEIS Scoping Summary Report

Note: This entire Appendix has been revised from the previous version and replaced with new content that is specific to the Supplemental EIS process only. Therefore, none of the text has been highlighted to indicate new or substantially revised text.

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Ambler Road Supplemental Environmental Impact Statement

Final Scoping Summary Report

May 2023

CONTENTS

Tables

ABBREVIATIONS

AAP	Ambler Access Project
ANILCA	Alaska National Interest Lands Conservation Act
AIDEA	Alaska Industrial Development and Export Authority
ANCSA	Alaska Native Claims Settlement Act
BLM	Bureau of Land Management
EIS	environmental impact statement
EJ	environmental justice
EPA	U.S. Environmental Protection Agency
GHG	greenhouse gas
NEPA	National Environmental Policy Act
NPS	National Park Service

1 PUBLIC ENGAGEMENT AND SCOPING PROCESS

Public involvement is an integral part of the National Environmental Policy Act (NEPA) process and is required in the preparation and implementation of agencies' NEPA procedures. The Bureau of Land Management (BLM) published a notice of intent to prepare a supplemental environmental impact statement (EIS) on September 9, 2022. The Proposed Ambler Mining District Industrial Access Road (Amber Road) was originally analyzed in the March 2020 final EIS and authorized in a record of decision issued in July 2020. Litigation commenced with suits from multiple parties in August and October 2020. In February 2022, the U.S. Department of the Interior requested the U.S. District Court for Alaska grant voluntary remand, stating that additional legal analysis had revealed deficiencies in the BLM's analysis of subsistence impacts under Alaska National Interest Lands Conservation Act (ANILCA) Section 810 and consultation with Tribes pursuant to Section 106 of the National Historic Preservation Act. The Court granted that request in May 2022, returning the matter to the BLM to correct the identified deficiencies. The supplemental analysis will address deficiencies identified during the litigation process.
The scoping period for this supplemental EIS was 45 days and ran from September 9, 2022, to November 4, 2022. The scoping period was announced in the *Federal Register*, local newspaper advertisements, radio announcements, postcard mailers to the mailing list, a BLM news release, and the Ambler Road ePlanning website.

2 COMMENT SUMMARY

In total, 18,977 respondents submitted comments during the scoping period. These comments were submitted via the ePlanning website, email, or mailed-in letters. Of the comment letters, the majority (88 percent) were submitted as form letters (i.e., letters containing identical content), whereas the remainder were either form letters with slight modifications (8 percent) (e.g., one or two unique sentences added, but otherwise identical to a form letter) or unique comment letters (4 percent) (i.e., original letters that did not have identical or almost identical wording as another letter). The 17,427 form letter submissions all originated from seven unique form master letters.

Nearly all respondents were individuals (99 percent), with the exception of those listed in Table 2.1. Individuals who provided their business title or employer information in their letter but did not state that they were an official representative were counted as individuals as opposed to businesses or organizations.

Table 2.1. Respondent Group Types

Respondent Group Type	Respondent Title
Tribes/Alaska Native Claims Settlement Act Corporations and non-profit organizations	Doyon, Limited NANA Native Village of Kotzebue Tanana Chiefs Conference
Businesses and organizations	Alaska Community on Toxics Alaska Premier Consulting Alaska Soles Broadband chapter of the Great Old Broads for Wilderness Alaska Wilderness League Alaska Wildlife Alliance Associated General Contractors of Alaska Audubon Alaska Brooks Range Council Center for Biological Diversity Earthworks Fairbanks Climate Action Coalition Iniakuk Lake Wilderness Lodge, LLC Kuna Engineering Michael Baker International National Mining Association National Parks Conservation Association Native Movement Northern Alaska Environmental Center Resource Development Council for Alaska Sea Lion Corporation Sierra Club The Alaska Support Industry Alliance The Wilderness Society Theodore Roosevelt Conservation Partnership Trustees for Alaska Western Arctic Caribou Herd Working Group Western Interior Regional Alaska Subsistence Regional Advisory Council Wilderness Watch Winter Wildlands Alliance
Government agencies	Alaska Department of Natural Resources City of Kiana U.S. Environmental Protection Agency State of Alaska Historic Preservation Office U.S. Fish and Wildlife Service

Within each comment letter, individual comments (i.e., stand-alone comments that relate to a single issue, idea, or conclusion) were identified and grouped into one or more of the following categories in Table 2.2. Comment categories are either defined by individual resources that may be affected by the project, individual elements of the project, or specific phases and aspects of the EIS or NEPA process (see Table 2.2). Categories are intended to describe the main topic or resource that is discussed in the comment, regardless of whether the comment is expressing opposition or support for the project as it relates to that topic. Any comments identified within form letters were categorized only once and counted as a single comment no matter how many form letters with that same comment were submitted.

Table 2.2. Comment Categories

Resource Topics	Project Element Topics	EIS/NEPA Process Topics
Air quality and climate	Funding and bonding	Alternatives
Cultural resources	Remand of final EIS	Analysis methods and data: Connected actions
Environmental justice		Analysis methods and data: Cumulative effects analysis
Fish and amphibians: General		Analysis methods and data: General
Fish and amphibians: Salmon		Analysis methods and data: Inadequate methodologies
Geology and minerals		Analysis methods and data: Suggest additional data source
Hazardous waste		Attention/action needed: Request for cooperating agency status
Land use/land management		Attention/action needed: Request for documents or information
Noise		Attention/action needed: Request to be added to mailing list
Petroleum resources		Attention/action needed: Request to confirm receipt of letter
Recreation and tourism		Decision process: Alaska Native Claims Settlement Act
Public health and safety		Decision process: ANILCA 810 analysis
Sand and gravel resources		Decision process: Compliance with other laws
Socioeconomics and Communities		Decision process: Cooperating agency relationships
Soil resources: General		Decision process: Essential fish habitat assessment
Soil resources: Permafrost		Decision process: General
Special designations		Decision process: Government-to-government consultation
Subsistence		Decision process: Mitigation and monitoring
Transportation and access		Decision process: Section 106 consultation
Vegetation		Public and stakeholder involvement: General
Visual resources		Public and stakeholder involvement: Tribal coordination Purpose and need
Water resources Wetlands		
Wildlife: Birds		
Wildlife: Caribou		
Wildlife: General		
Wildlife: Marine mammals		

The BLM considered each comment and determined if they were substantive or non-substantive. In performing this analysis, the BLM relied on Section 6.9.2 (Comments) in the BLM NEPA Handbook H-1790-1 (BLM 2008) to determine what constituted a substantive comment. Comments that are not considered substantive include the following:

- Comments in favor of or against the proposed action or alternatives without reasoning that meet the criteria listed above (such as "we disagree with Alternative Two and believe the BLM should select Alternative Three.")
- Comments that only agree or disagree with BLM policy or resource decisions without justification or supporting data that meet the criteria listed above (such as "a new road should be permitted.")
- Comments that do not pertain to the project area or the project (such as "the government should eliminate all dams," when the project is about a right-of-way permit)
- Comments that take the form of vague, open-ended questions

In total, 4,331 individual substantive comments were identified and categorized, as shown in Table 2.3. The five categories that received the most comments were as follows:

1. Subsistence - 9.4 percent
2. Wildlife: Caribou - 7.6 percent
3. Socioeconomic and communities - 6.6 percent
4. Water resources - 6.0 percent
5. Analysis methods and data: Inadequate methodologies - 5.2 percent

Additional details concerning the content of comments and their key points are summarized in Table 2.4.

Table 2.3. Comments Received

Comment Category	No. Comments Received	% Total Comments
Subsistence	408	9.4%
Wildlife: Caribou	333	7.6%
Socioeconomics and communities	287	6.6%
Water resources	261	6.0%
Analysis methods and data: Inadequate methodologies	228	5.2%
Wildlife: General	201	4.6%
Air quality and climate	199	4.6%
Transportation and access	176	4.0%
Fish and amphibians: General	174	4.0%
Remand of final EIS	154	3.0%
Geology and minerals	133	3.0%
Analysis methods and data: Cumulative effects analysis	131	2.9%
Cultural resources	125	2.8%
Analysis methods and data: General	115	2.6%
Decision process: General	104	2.4%

Comment Category	No. Comments Received	% Total Comments
Public and stakeholder involvement: Tribal coordination	101	2.3%
Alternatives	98	3.4%
Hazardous waste	92	2.1%
Public health and safety	90	2.1%
Public and stakeholder involvement: General	89	2.0%
Special designations	81	1.8%
Decision process: Mitigation and monitoring	75	1.6%
Environmental justice	56	1.3%
Vegetation	55	1.3%
Soil resources: Permafrost	54	1.2%
Decision process: ANILCA 810 analysis	52	1.2%
Fish and amphibians: Salmon	51	1.2%
Decision process: Compliance with other laws	48	1.1%
Analysis methods and data: Suggest additional data source	40	< 1%
Decision process: Section 106 consultation	39	< 1%
Recreation and tourism	38	< 1%
Land use/land management	36	< 1%
Wetlands	32	< 1%
Funding and bonding	29	< 1%
Noise	23	< 1%
Sand and gravel resources	16	< 1%
Analysis methods and data: Connected actions	15	< 1%
Decision process: Government-to-government consultation	14	< 1%
Purpose and need	11	< 1%
Attention/action needed: Request to confirm receipt of letter	10	< 1%
Visual resources	10	< 1%
Wildlife: birds	10	< 1%
Decision process: Cooperating agency relationships	7	< 1%
Attention/action needed: Request for cooperating agency status	5	< 1%
Decision process: Essential fish habitat assessment	5	< 1%
Decision process: Alaska Native Claims Settlement Act	4	< 1%
Soil resources: General	4	< 1%
Attention/action needed: Request to be added to mailing list	3	< 1%
Attention/action needed: Request for documents or information	2	< 1%
Wildlife: Marine mammals	1	< 1%
Total	**4,331**	**100%**

Table 2.4. Comment Summary

Comment Category	Summary of Key Points
Process Comments	
Alternatives	Commenters suggested that the BLM expand their list of alternatives to include a transport corridor that travels west to the Bering Sea, not east to the Dalton Highway; a railroad corridor that may or may not be spurred from the existing Red Dog Mine; aircraft access to mine sites; a no road alternative; and an alternative that includes increased environmental mitigation measures. Most comments sought to offer alternatives that would mitigate the footprint of the project. Some commenters criticized the lack of distinction between the alternatives in the 2020 EIS and stated that the BLM should provide a varied range to meet NEPA requirements of a "reasonable range of alternatives." Many commenters believed the phased approach to construction was not appropriate. Some commenters expressed concern that the EIS did not attempt to minimize impacts or reduce the size of the right-of-way. Two commenters questioned the necessity of the entire concept of soliciting new alternatives, because alternatives were not identified as an issue during the remand process.
Analysis methods and data: General	Many commenters listed resources that should be included in the analysis, as well as completing direct, indirect, and cumulative impacts analysis of those resources. Several commenters stated that without knowing how many or the maximum number of mines that could be built in the future, it is impossible to analyze impacts on resources. One commenter requested incorporating impacts from other resources into the subsistence analysis. One commenter requested that an independent multi-agency team be assembled to analyze the impacts. One commenter requested information about how the BLM is complying with their programmatic agreement obligations.
Analysis methods and data: Inadequate methodologies	Several commenters listed environmental, economic, and cultural resources that were not sufficiently analyzed due to a lack of baseline data, rushed analyses, and lack of any impact analyses from potential mines. Analyzing the road without analyzing the mines at the same time underestimates the impacts and goes against NEPA requirements. Several commenters noted that the mitigation plan did not have detailed goals and objectives to ensure implementation of mitigation was sufficient. Some commenters expressed concern that the scope of analysis was too narrow, and the analysis area of impacts was too small. Some commenters also claimed the information pertaining to the design for the road, bridges, and culverts was inadequate. One commenter stated that by leaving off Indigenous names for places, their cultural significance was not captured. Some commenters stated that doing a supplemental EIS was inappropriate.
Analysis methods and data: Suggest additional data source	Commenters suggested that additional data sources for the supplemental EIS be used for various resources, including published journal articles, information from State and Federal agencies, and publicly available reports. Some commenters requested that more information be obtained from Tribes with local knowledge of the areas, including updated Tribal names for places. Commenters requested that ethnographic work be conducted to capture all of the relevant Tribal name information.
Analysis methods and data: Cumulative effects analysis	Commenters requested a thorough evaluation of cumulative effects for all resources. Several commenters expressed concern about cumulative impacts on subsistence harvest. Many commenters stated that mining impacts need to be clearly defined so that proper cumulative effects can be evaluated. Commenters stated that evaluating the mines separate from the road is not appropriate when considering cumulative effects. Several commenters noted that the road could be open to the public via a lawsuit for public land access, and that these impacts should be included in the cumulative effects analysis. Some commenters pointed to potential projects that have been proposed since the EIS that should be added to the cumulative effects analysis. One commenter suggested that cumulative effects should not be analyzed because this was already completed in the previous EIS.
Analysis methods and data: Connected actions	Commenters requested a thorough evaluation of connected actions for all resources. Many commenters felt that the BLM failed to include mining impacts as a reasonably foreseeable and connected action. Commenters stated that by not including the effects from mining, the BLM did not properly evaluate impacts. One commenter stated that the BLM underestimated the infrastructure necessary for this road, saying there would also need to be 41 gravel mines for road construction, processing facilities, tailings disposal areas, ore/export terminals, gas stations, and ports.

Comment Category	Summary of Key Points
Attention/action needed: Request for cooperating agency status	The State of Alaska requested cooperating agency status.
Attention/action needed: Request to be added to mailing list	Two commenters requested to be included on the mailing list to remain updated on the proposal and to receive announcement of the availability of the draft supplemental EIS and all other documents, reviews, and comments.
Attention/action needed: Request to confirm receipt of letter	Commenters requested confirmation of receipt of their comments and attachments. One commenter requested a letter describing the alternatives the BLM proposes to address, eliminate, minimize, and mitigate their particular concerns.
Attention/action needed: Request for documents or information	One commenter requested dates for completion of the supplemental EIS.
Decision process: ANILCA Section 810 analysis	Several commenters requested a thorough evaluation of impacts to subsistence under Section 810 of ANILCA. They felt that the previous analysis was insufficient. Several commenters emphasized that the scope should be limited to Section 810 of ANILCA and be completed in an efficient and timely manner. Some commenters suggested that the Section 810 analysis should be completed independent of the NEPA analysis.
Decision process: Alaska Native Claims Settlement Act (ANCSA)	Commenters requested a more detailed evaluation of protective measures, and an investigation into whether the project would coincide with existing 17(d)(1) lands of ANCSA. One commenter suggested that the project would create economic opportunity for all Alaskans through exploratory mining on ANCSA lands, and proper interagency collaboration would ensure the protection of waterways and natural resources.
Decision process: Compliance with other laws	Commenters stated the project needed to be consistent with the following: Tribal treaty rights, the BLM's congressional mandate to sustain the health of the land, Clean Water Act, Compensatory Mitigation for Losses of Aquatic Resources: Final Rule, court rulings, Defense Production Act, Section 810 of ANILCA, Clean Water Act Section 404 Permit, Section 106 of the National Historic Preservation Act, constitutional mandates from the State of Alaska to provide for the maximum benefit of the people of the State of Alaska, Section 201(4)(b) of ANILCA, Thirty by Thirty Executive Order, the BLM Manual Section 1794 and Handbook 1794-1, Alaska Department of Natural Resources, Bald and Golden Eagle Protection Act, Federal Land Policy and Management Act's substantive requirements, National Ambient Air Quality Standards, Rivers and Harbors Act, ANILCA Title XI's Substantive and Procedural Requirements, Endangered Species Act, Materials Act, Migratory Bird Treaty Act, Customary and Traditional Use Determination for sheefish and chum salmon, Wilderness Act, Noise Control Act, Quiet Communities Act, Consultation and Coordination with Indian Tribal Governments, Article 32.2 of the United Nations Declaration on the Rights of the Indigenous Peoples. One commenter was concerned about the legality of any projects approved during the tenure of BLM Director William Pendley. They requested that proof be provided that the project is not subject to a court order requiring reversal of any decisions William Pendley made while acting as BLM director.

Comment Category	Summary of Key Points
Decision process: Cooperating agency relationships	Commenters were split on if cooperating agency relationships have or have not been sufficient. Some comments argued that sufficient cooperation has occurred through NEPA and ANILCA 810 analysis. Other comments have stressed the need for a multi-agency organization to ensure consistent policies across various jurisdictions during project construction. Commenters noted that this would resemble the Joint Fish and Wildlife Advisory Team for the Trans-Alaska Oil Pipelines System. One commenter stated that the BLM, National Park Service (NPS), and the U.S. Army Corps of Engineers evaluated different proposals. Another commenter stated that other government agencies should not be consulted because the BLM has no jurisdiction over them. One commenter stated that the NPS should actively participate in and sign onto the revised subsistence evaluation because it would impact NPS lands.
Decision process: Essential fish habitat assessment	Commenters emphasized the need for a fish habitat assessment due to the connection between fish and subsistence in the region. Several comments urged the BLM to analyze how project related activities (trails, mining, etc.) would affect essential fish habitat in streams, wetlands, and Kobuk Lake. One commenter urged the BLM to not rely on the State of Alaska's Anadromous Waters Catalog due to inaccurate data.
Decision process: General	Several commenters requested a more complete evaluation of all issues, including foreseeable mines and the possibility of Ambler Road opening to the public before a new decision is made. Many commenters expressed the desire for the process to focus only on those issues specifically listed in the court order to ensure an efficient and timely process. Some commenters stated that a supplemental EIS is not the correct course of action given that there are no new circumstances or information since the previous decision.
Decision process: Government-to-government consultation	Many commenters stated that government-to-government consultation has not occurred, because Tribal councils were not properly consulted. One commenter stated that government-to-government consultation should not be analyzed because it was not part of the court order.
Decision process: Mitigation and monitoring	Commenters requested clear mitigation and reclamation plans that include compensatory and other mitigation measures to address environmental effects. They requested that the mitigation measures are clear about non-BLM-managed lands and monitoring responsibilities. Commenters stated that the monitoring plan should include clear goals and objectives to determine the effectiveness of the mitigation measures. One commenter noted that closing the road after 30 to 50 years would not allow monitoring to take place. Some commenters noted that restoration mitigation is difficult in this area. The U.S. Fish and Wildlife Service laid out several mitigation measures addressing the court order to reevaluate subsistence impacts. These mitigation measures included the following resources: eagles, migratory birds, floodplain connectivity, sheet flow connectivity, water quality, wetlands and riparian buffers, revegetation and restoration, nonnative species, subsistence, sheefish, caribou, road design and construction practices, erosion control, hazardous material, air quality, and fish passage.
Decision process: Section 106 consultation	Several commenters requested a full and complete Section 106 consultation, which includes meaningful consultation with Tribal councils and villages. Given limited internet availability throughout Alaska, this includes meeting with Tribal councils in person outside of hunting and harvesting seasons. One commenter requested ethnographic studies and updates to place names.
Funding and bonding	Many commenters are opposed to the State of Alaska providing funding for Ambler Road. They stated that this would cost Alaskans in the long run through construction and maintenance costs. They were also against the State subsidizing companies that would make profit, especially a foreign company. Several commenters noted that the State of Alaska has not put forth a plan for how to pay for the road or its maintenance needs over the next several years. One commenter requested that the supplemental EIS evaluate the financial viability of the project. Other commenters expressed concern that the project has no Federal financial backing, and should it fail, there is no backup plan in place. One commenter noted that past Alaska Industrial Development and Export Authority (AIDEA)–funded projects are neither sustainable nor affordable.

Comment Category	Summary of Key Points
Public and stakeholder involvement: General	Commenters requested a comment period extension and stated that the BLM failed to hold public meetings during the comment period despite indicating in the scoping notice that there would be public meetings. Commenters suggested that the BLM should provide AIDEA and the public with a complete, detailed schedule, scope of work, and public outreach plan for the supplemental EIS and decision document. Commenters suggested that prior to the public comment period on the draft supplemental EIS, the BLM should compile all the concerns and issues identified through scoping and share them with all stakeholders to inform comments on the draft supplemental EIS. Commenters suggested that the BLM should include sending copies to each community within the caribou herd range, supplement data from local knowledge, and host workshops with the public in rural communities with translators to identify key issues and potential resolutions in a collaborative environment. Commenters suggested that the supplemental EIS should discuss public participation and how the public can get information on mitigation effectiveness and monitoring results. Several commenters expressed concern that the comment period was too short, occurred during hunting and harvesting seasons, and the BLM did not attend enough in-person meetings to capture local concerns. Some commenters suggested that critical metrics (the number, types, and sizes of individual mines; the number of on-site mining and support personnel; the mining footprint including the aggregate area of connecting roads between the individual mines, communities and the Ambler Access Project (AAP); numbers of airplane and helicopter overflights; daily traffic levels on the AAP and connected roads by vehicle type; primary sources and levels of noise; and other relevant potential sources of disturbance to caribou and other wildlife) must be made available to the public. Other commenters believed scoping was not required by the supplemental EIS because there were no changes in the proposed project nor new information that triggered scoping.
Public and stakeholder involvement: Tribal coordination	Several commenters expressed concern about the scoping period and process for Tribal communities. Scoping overlapped with critical subsistence hunting and harvesting seasons, so many members could not participate. Furthermore, several commenters requested in-person meetings and public postings in town to communicate with Tribal members because many do not have access to the internet. One commenter suggested a liaison to update the contact information for Tribes that want to receive updates on the project. Several commenters requested meaningful consultation with Tribes, which includes clear communication and in-person meetings that Tribal members can attend. One commenter specifically requested plain-language communication so that Tribal members with varied reading proficiencies can understand the project better.
Purpose and need	Many commenters objected to the purpose and need of the project, with several stating it was too narrow in scope (i.e., by specifying that access should be technically and economically practical), which restricted the agencies consideration of a reasonable range of alternatives. Several commenters stated that the purpose and need statement in the supplemental EIS should be broad enough to encompass meaningfully different alternatives to the proposed road for the purposes of accessing and developing the Ambler Mining District.
Remand of final EIS	Commenters believed that the previous analysis was rushed, insufficient, and downplayed threats to natural resources and cultural resources. They agreed with the remand process. Some commenters believed that analyzing impacts already fully addressed in the final EIS and joint record of decision is a waste of resources and will further delay development of the project. They want the supplemental EIS to be expedited and only address what was discussed in court. Many commenters expressed concern that the scope of the analysis exceeded the deficiencies identified in the court ruling. They requested that the scope of the analysis be limited to what is required, reducing the time and expenses needed to analyze resources that were already approved by the court. Several commenters believed the scope of the supplemental EIS should be limited to the portion of the project that crosses BLM-managed land within the far eastern portion of the project route.

Comment Category	Summary of Key Points
Natural Resource Comments	
Air quality and climate	Commenters expressed concern regarding the impacts to air quality arising from dust and debris that would be created during construction and operation of the road. Commenters requested that the supplemental EIS take particular care to analyze the cumulative effects of disturbed asbestos on air quality regarding wildlife, plants, and local people. Most commenters stated that the project would significantly increase greenhouse gas (GHG) emissions. When discussing climate, some commenters discussed how higher GHG emissions may affect other resources as well, particularly increased wildfire frequency and decreased water quality from higher temperatures. Some commenters suggested that the effects of the project would not allow the United States to meet their emissions goals set out by Executive Order 13990 and the Paris Agreement. Other commenters expressed concern that the project would exacerbate melting permafrost, along with its potential for methane contributions. Commenters urge the supplemental EIS to analyze any impacts to permafrost. Many commenters suggested the need for a cumulative analysis on the impact for GHG emissions from the proposed road and any mining activities that would follow. One commenter stated that the potential to mine resources would benefit the development of renewable energy systems, which would offset adverse effects to climate change and would align with national interests.
Fish: General	Many commenters stated that the project would have substantial impacts on fish and fish habitat Commenters expressed concern about road-specific factors harming fish resources. The multitude of stream crossings and culverts, sedimentation during construction and maintenance, and water withdrawals associated with the road were the main points of concern for many commenters. Several respondents requested more information regarding the engineering and design parameters of the project culverts. Other commenters voiced concern about how mining operation could impact fish through mining pollution from potential tailing spills and acid-rock drainage. Some commenters expressed concern about the degradation of Kobuk River fisheries and how that would affect the subsistence and socioeconomic needs of Indigenous people and commercial fishers. Specifically, some commenters requested additional analysis on how the project would affect Kotzebue Sound's fishery. Commenters expressed concern about contaminated water resources' impact on the ecology of the area. They state that changes to natural water chemistry parameters and water temperature may reduce egg survival and affect fish populations. Commenters suggest the steady flow and settlement of dust and contaminated particulates into waterways would render them murky and silt ladened. Commenters stated that gravel-covered channel bottoms would become clogged or covered to the detriment of fish and bottom dwelling organisms, the underpinnings of aquatic ecology. Other commenters mentioned the need for updated fish habitat assessments, stream flow patterns, and analyses of sulfide mineral deposits in project vicinity waterways. Commenters believed that bridging these data gaps will provide a fuller picture of the project's potential effects on fish. One commenter discouraged acquiring new fish data, concluding that the supplemental EIS would be treading on material already covered in the original EIS.
Fish: Salmon	Commenters requested that the supplemental EIS contain additional baseline information about anadromous fish habitat and salmon populations. Commenters stated that the project would have negative implications for chum salmon spawning in the Kobuk River due to fish passage barriers and road/mining pollution. More specifically, commenters suggest the impacts would hurt the Kotzebue Sound commercial fishery and hinder subsistence practices that rely on salmon. Commenters suggested that the supplemental EIS should consider the cultural, subsistence, and economical costs if salmon runs were to be depleted by the project road and mines.
Geology and minerals	Some commenters stated that the proposed action would allow for the acquisition of metals that are key in making the transition to renewable energy. Other commenters expressed concern about the potential for mine waste, particularly copper mine waste and asbestos dust, to adversely affect the environment. Many commenters identified gaps in the final EIS that they requested be analyzed in the supplemental EIS. The respondents requested that the supplemental EIS consider the effects of future mine operations, and associated mine infrastructure (gravel pits, spur roads, processing facilities, tailings disposal areas, gas lines, etc.) that would be permitted by the project's construction. Respondents cited this as part of the NEPA process to analyze foreseeable actions. One comment requested that the supplemental EIS include a worst-case analysis approach to the impacts of the road and mining activity and an analysis on which minerals are truly considered "critical" and why.

Comment Category	Summary of Key Points
Sand and gravel resources	Commenters requested that the supplemental EIS consider the impacts of gravel mining for road construction and requested the quantity or quality of gravel available for the project. Some commenters asked for analysis on how gravel pits would impact water quality and caribou foraging.
Soil resources: General	Commenters expressed concern that the construction of roads and associated infrastructure would also compact and compress sensitive soils, thus changing hydrology, runoff characteristics, and ecological function of the area, affecting flows and delivery of pollutants to waterbodies directly influencing the quality and quantity of local subsistence resources. Many stated that the supplemental EIS should include information about the types of soil along the right-of-way.
Soil resources: Permafrost	Commenters stated that the construction, maintenance, and use of the road and its river crossings would negatively impact permafrost conditions, causing the release of GHGs into the atmosphere. Commenters requested the supplemental EIS provide baseline information on permafrost resources and create estimations about thawing and releasing of permafrost and its interaction with the carbon cycle. Commenters suggested evaluating how permafrost melting would impact the entire ecosystem, both living and non-living resources.
Vegetation	Commenters were concerned that the construction, maintenance, and use of the road and its river crossings would negatively impact vegetation. They stated that a decrease in quantity or quality of vegetation would negatively impact the entire ecosystem that relies on it. Many noted that activities of the road would introduce invasive species, asbestos, metals, and dust to native vegetation.
Water resources	Commenters expressed concern about the waterways the proposed road, bridges, and culverts would impact. They stated that the EIS lacked adequate baseline mapping of aquatic resources and expressed concern about the pollution of drinking water, streams, wild and scenic rivers, and other water resources from sediment, acid rock, dust, and metal-leaching waste materials. Commenters expressed concern about the wildlife and aquatic habitat that relies on contaminated water sources. Commenters stated that the BLM has acknowledged that even with expected mitigation actions, water quality could suffer from the construction of the road itself and the operations of the mines it would serve. They state that mitigation measures such as water and sanitation projects should be addressed. Commenters expressed concern about the impacts of hazardous waste storage methods and potential spills on the water quality in the watershed. They state that there should be information about how much water is necessary for the project, and a revised subsistence evaluation needs to include meaningful analysis of the water withdrawals from surface water. Commenters request that no EIS be approved nor permits issued until the locations and amounts of water withdrawals are specified. *Recommendations for the supplemental EIS* Commenters noted that the supplemental EIS should catalogue and map all aquatic resources; address potential changes in water flow, dewatering, and culvert and bridge design and costs; be compliant with the Clean Water Act, Rivers and Harbors Act, and stormwater permitting requirements; identify all drinking water sources and potential impacts and mitigation measures; detail how ongoing water restoration efforts would be impacted; and analyze impacts to outstandingly remarkable values and wild and scenic rivers.
Wetlands	Commenters expressed concern that the Ambler Road would destroy 1,400 acres of wetlands. They were worried that pollution would put wetlands at risk. Commenters stated that there is no plan for the compensatory mitigation for loss of wetland function, required by the Clean Water Act. Commenters noted that the mandate of “no net loss” of wetlands dictated by the Clean Water Act cannot be fulfilled without compensatory mitigation of lost wetlands. Commenters stated that no Section 404 permit should be issued without an appropriate compensatory mitigation plan. Commenters noted that negative impacts in wetlands can impact that entire ecosystem. Commenters stated that the Brooks Range wetlands are intact and working to maintain a stable climate system, but a full account of the disruption to these wetlands has not been included in the EIS.
Wildlife: Birds	Commenters stated that the supplemental EIS should consider the dust, noise, and light pollution impacts on birds. Commenters expressed concern that the proposed road would be an intrusion on the habitat that migratory and resident birds rely on. Some commenters expressed concern that the future of sensitive songbirds (e.g., blackpoll warbler) and sandhill cranes would be impacted. Commenters stated that the project could affect birds in numerous ways, including direct and indirect habitat loss, changes in predation and food availability, noise impacts to bird communication, and light pollution affecting navigation and habitat use. Several comments were made regarding eagle disturbance and take prohibition noting the existence of paired eagles and active nests in the project area and citing the Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act.

Comment Category	Summary of Key Points
Wildlife: Caribou	*Migration* Commenters expressed concern that Ambler Road would disrupt or deter the migration path of the Western Artic Caribou Herd. The proposed road would bisect the migration routes of two other caribou herds, and commenters were concerned that their movements could be impacted as well. Commenters stated that roads have been known to change migration patterns, often re-routing and slowing herds. Commenters suggested wildlife overpasses should be considered to enable caribou migration. Commenters believed the road would lead to an increase in roadkill incidents. Commenters expressed concern about behavioral changes such as foraging behavior and energy expenditure of caribou and were concerned that these changes could impact reproductive success. *Subsistence* Commenters expressed concern that Ambler Road and its associated construction and maintenance activities would negatively impact the communities who depend on caribou for subsistence, causing an issue of food security. Commenters stated that without caribou, subsistence hunters would have a hard time finding meat, and their culture and traditions would be negatively affected. Commenters noted that by limiting the caribou hunts, Tribal communities may have to rely on expensive imported food outside traditional diets. Commenters stated that Ambler Road may also increase hunting pressure from non-local hunters. Commenters stated that mosses, lichen, and vegetation can accumulate metals in their tissue. They are concerned that caribou may consume contaminated lichen harming subsistence users harvesting the caribou and the caribou themselves. *Habitat* Commenters believed building the road would result in habitat fragmentation, displacing caribou from portions of their historic range, thus reducing their options to selectively use the best habitat. Commenters stated that habitat fragmentation can eventually reach a point where caribou numbers decline. Commenters requested that the supplemental EIS examine the spatial needs of caribou, noting that caribou distribute themselves to use the changing combinations of food biomass, accessibility, low insect and predator abundance, and areas of low hunting pressure. *Ecosystem health* Commenters requested that the supplemental EIS address the significant negative impacts on caribou that would lead to a population decline that would disrupt the entire ecosystem. Commenters stated that caribou foraging prevents the growth of plants that will insulate the ground. Commenters noted that, because of this, caribou aid in cooling the soil temperature by a few degrees, thus keeping permafrost frozen. *Food* Commenters expressed concern about how dust, asbestos, copper, and toxic sludge from gravel projects would impact Western Artic Caribou Herd foraging. Commenters stated that any detrimental effects to lichen availability or quality would impact caribou, especially during winter months. Commenters expressed concern that the toxic chemicals, dust, and hazardous waste would get into the water and food sources of caribou, leading to a decrease in population.
Wildlife: General	Commenters expressed concern that the project would permanently fragment and degrade wildlife habitat and ecosystems. They expressed concern on how dust, asbestos, petroleum spills, vehicle traffic and noise, GHG emissions, and increased public access would affect wildlife and their habitat. Commenters expressed concern that toxins and metals would seep into vegetation, impacting wildlife food sources. Commenters noted additional concerns include negative effects on animal reproductive and denning behavior. Commenters requested that the supplemental EIS provide a reasonable assessment of direct, indirect, and cumulative impacts, both short term and long term, of this road to wildlife populations and habitat. Commenters stated that baseline information about project design, fish, caribou, wildlife, and wetland resources was missing from the previous EIS and needs to be included in the supplemental EIS. Commenters requested that the supplemental EIS include an analysis of impacts to the approximately 200 species of vertebrates and invertebrates thought to exist in the project area. Commenters stated that the supplemental EIS should have a section on threatened and endangered species. Commenters stated that the supplemental EIS must analyze the location and projected amount of aircraft traffic at the new airstrips being proposed. Commenters noted that aircraft may have negative impacts on wildlife and subsistence in a broad geographic area, depending on flight patterns. Commenters suggested that wildlife overpasses and underpasses be considered to enable migration. Commenters also expressed concern about public access increasing hunting pressure on animals.

Comment Category	Summary of Key Points
Wildlife: Marine mammals	One commenter expressed concern about the developments' contaminants negatively affecting marine life.
Resource Use and Social Systems Comments	
Cultural resources	Commenters expressed concern about the loss of traditional cultural resources, including historic areas, sacred sites, traditional hunting grounds, and archeological resources. Most comments aligned the potential loss of subsistence opportunities, particularly regarding caribou, as damaging to cultural practices and traditions of Indigenous communities. The U.S. Environmental Protection Agency (EPA) and others commented that Traditional Ecological Knowledge should be integrated into NEPA analysis, as well as adaptation and resilience planning.
Environmental justice	Commenters expressed concern about the tangible engagement of impacted communities, specifically regarding the ability for isolated, non-English speaking villages and individuals who are directly impacted by the project, to meaningfully participate. In general, commenters recommended the following NEPA approach for incorporating environmental justice (EJ) analysis: identification of communities with EJ concerns, any potential disproportionate impacts to communities with EJ concerns from the proposed project, the processes to meaningfully engage communities with EJ concerns throughout the NEPA analysis, and steps taken to address EJ concerns. Commenters suggested the following tools for use in evaluating the EJ project impacts – EJScreen and "Environmental Justice Interagency Working Group Promising Practices for EJ Methodologies in NEPA reviews" report. Commenters stated that the supplemental EIS should consider EJScreen information for the block groups that contain the proposed action and a one-mile radius around those block groups. Commenters recommended consulting with local and State agencies to supplement data in EJScreen because some data are not included for Alaska. Comments also provided specific steps to incorporate EJ into the NEPA feedback process itself, including the direct identification and engagement of impacted communities through best practices, interpretation services, text translation, reducing the burden of participation, alternatives to online information dissemination, and extended comment period timelines. One comment specifically recommended complying with the Justice 40 Initiative and advocates that 40 percent of Federal resources being spent on environmental review should be used to increase participation of the villages and EJ communities throughout the environmental review process. Comments of significant concerns were expressed by organizations and individuals over the harm to the local resident and community traditional cultural heritage, subsistence way-of-life practices, food equity, food sources, habitat degradation, ecological disruptions, health impacts, social disruption, water quality deterioration, social conflict, competition for resources, wilderness health, spawning habitat sedimentation, economic hardship, burden of participation during hunting and gathering seasons, and persistent long-term cumulative impacts to the healthy functioning of the existing communities. Comments stated that community feedback should be reflected in decision making and should make explicit suggestions to include a detailed write-up of input received and how input was incorporated should be included in the NEPA document.
Hazardous waste	Commenters asked that the supplemental EIS consider all potential impacts of the project that contribute hazardous materials. Commenters stated that these hazards are associated with construction and maintenance of the road, including runoff, exposing asbestos dust, and impacts associated with mining, including tailings and acid rock drainage.
Land use/land management	Several commenters stated that the land use around the proposed Ambler Road should remain open and roadless and be used as wilderness instead of for development. One commenter questioned how the rest of the road would be managed outside of BLM jurisdiction. One commenter did not want a bridge over waterways that are currently used for rafting.
Noise	Several commenters expressed concern about the impacts of noise on the surrounding wilderness areas, including the Gates of the Arctic Wilderness. Commenters stated that increases in noise would come from mining operations, traffic, trucks, and aircraft. Some commenters noted the impacts to subsistence through noise impacts to wildlife, particularly caribou. One commenter requested that sound barriers be considered to reduce these impacts.

Comment Category	Summary of Key Points
Public health and safety	Commenters expressed concern about the health impacts from project activities and waste that comes from it, such as asbestos, dust, runoff, and toxic spills that could impact air, water, subsistence resources, and land quality. Commenters expressed concern about "man camps" from outside construction workers that create risks regarding drugs, alcohol, noise, crime, and sexual violence. Commenters noted that Indigenous women are murdered or go missing at a rate 10 times higher than any other ethnicity, much of which is perpetrated by male workers and people from outside the community. Commenters think both mental and physical health should be analyzed for the supplemental EIS. Commenters noted that factors that contribute to local communities' health impacts are adoption of Western diets (which has been shown to diminish the health of Indigenous populations that rely on their traditional foods), carcinogens (asbestos) spread through fugitive dust (which can cause pulmonary disease, lung cancer, and mesothelioma), and spills that contaminate water sources (which impacts game and vegetation). Commenters noted the supplemental EIS should include a review of the health impact assessment and supplement information, as appropriate from local Tribes and EJ screening tools.
Recreation and tourism	Many commenters discussed the value of primitive/wilderness recreation experiences in the state, and most agreed that the road is a potential threat to recreationists, local recreation businesses, and recreational hunting. Commenters expressed concern that the previous EIS downplayed the potential threats from the road to recreation, especially concerning the potential influx of hunters and recreationists into the area. Commenters noted that although the road would be restricted when built, many believed that lawsuits would lead to the road becoming public, which then would lead to the influx of users. One commenter expressed support for the road to open the area for further recreation and tourism opportunities. One commenter discussed the conflict between local and non-local hunters and the potential impact that hunting aircraft has on caribou behavior and local hunter success.
Socioeconomic and communities	Commenters expressed concern that the road would facilitate resource development and economic opportunities for the State of Alaska and boost Alaska's economy and provide mineral resources. Commenters wanted the road to bring jobs and lower prices for goods to the community, allowing for self-sustainability for the Tribes. Many commenters wanted the project to start because they are relying on the jobs provided by the project. Commenters believed that the road would decrease transportation and cargo costs, lowering prices in that area. Commenters requested that the BLM be clearer about the types and numbers of jobs offered and the qualifications for these jobs. Commenters noted that historically, construction jobs are temporary and often given to non-local peoples, increasing the risk of drugs, alcohol, and violence. Commenters expressed concern that the development could lead to a loss of subsistence resources, making communities more reliant on cash economy and expensive and less nutritious foods. Commenters noted that many unique local cultures that "benefited" from industrial development rightfully leave locals wondering if they wish to be part of this process. Commenters stated that local cultures are diluted and invaded by outside influences. Commenters noted that resulting wealth often arises along with wealth disparity, changing community structure and leaving the most disadvantaged behind. Commenters expressed concern that the revenue from this development and future mine developments does not benefit the local community. Commenters are also concerned that small businesses such as guiding services, fisheries, and recreational lodges may see decreased economic growth due to construction and mining activities. Commenters think the supplemental EIS should provide an analysis of the socioeconomic impacts of the road. Commenters expressed concern about how the price of goods would be impacted. Commenters noted that the supplemental EIS should incorporate communities' socioeconomic concerns and engage the community for decision making about these issues.
Special designations	Commenters noted that NEPA confers an obligation to fully consider the direct, indirect, and cumulative impacts of a proposal on protected areas like wilderness and wild and scenic rivers. Commenters noted that the analyses to date have failed in this regard, and any upcoming supplemental process must correct the shortcoming. Commenters expressed concern that this area is one of the last roadless areas, and development is irreversible for these pristine, scenic designated areas, which have been given wilderness character. Commenters noted that the Brooks Range, Kobuk Wild and Scenic River, Arctic Preserve, and Gates of the Arctic National Park would be impacted. Commenters want permanent protection for this corridor. Commenters requested that the NPS reopen its environmental and economic analysis process to update that analysis to ensure the agency is acting on complete information about that project and that any NPS authorizations are consistent with other agency authorizations.

Comment Category	Summary of Key Points
Subsistence	Most commenters stated that the initial environmental review performed by the BLM did not adequately analyze project impacts (construction and use of the Ambler Road as well as mining activities) to subsistence way of life. Specifically of concern to many commenters is the migration route of the Western Arctic Caribou Herd, the population effects of the project on caribou, the health of subsistence communities, the disruption of subsistence activities, and the destruction of the way of life for Indigenous and Tribal peoples. Many commenters expressed concern that known causes of migration disturbance, like road construction and use, are not being adequately considered and additionally express that impacts to the caribou population and migration would burden Alaskan native villages/Indigenous cultures unfairly. They expressed concern that the project could destroy their culture and traditional way of life. Commenters noted that many residents of Interior and Western Alaska have a customary and traditional use determination for the Western Artic Caribou Herd. Many commenters stated that impacts to subsistence, sport, and commercial fisheries are not adequately considered and that the project would negatively impact important species and their habitats—causing cultural and economic harm to local communities and peoples who operate fisheries downstream of the project. One commenter wanted to understand the relationship between increased financial capabilities in the region and decreased subsistence opportunities. Many commenters expressed dissatisfaction with the consideration of aquatic species affected in the project area. Commenters stated that sheefish and salmon species and their habitats (Kobuk River and tributaries, among others) would be impacted by the project and mining activities. Specific comments discussed that sheefish is a critical species that upper Kobuk River residents rely on and harvest during migration seasons and that the Kobuk River is one of only two areas where sheefish spawn. Commenters noted that the Kobuk River supports the largest population of spawning sheefish in northwestern Alaska and is one of only two spawning areas for sheefish in the Northwest Arctic region. Commenters stated that sheefish is considered a key species of the Selawik National Wildlife Refuge. The EPA recommends supplementing agency analysis of sheefish, whitefish, and salmon throughout the supplemental EIS with Traditional Ecological Knowledge. Commenters noted that residents of Interior and Western Alaska have a customary and traditional use determination for sheefish and chum salmon. Comments expressed concern about the following impacting subsistence: salmon and spawning habitat destruction, water contamination and runoff, air pollution, permafrost impacts, wildlife behavior and population impacts of road construction and mining operation, climate change, food chain impacts, aquatic habitat deterioration, hunting resources and competition, public use of the road, effects of the project on sheefish population health, safe drinking water, wilderness destruction, landscape and scenery destruction, destruction of historic and sacred areas, adverse public health impacts to the local communities, increased crime, introduction and spread of invasive species, increased wildfire risks, more use of local infrastructure, mine dewatering impacts, acidic rock impacts on the ecosystem, asbestos spread impacts on fisheries, and hazardous material spills. The EPA expressed concern that Traditional Ecological Knowledge has not been included in the environmental review and recommends the supplemental EIS include the identification, inclusion, and integration of Traditional Ecological Knowledge into the NEPA analysis. The EPA also expressed concern about food equity and the impact of the project in a known "food desert." The EPA refers to EJScreen data and the high nutritional and cultural value of subsistence food within Alaska and recommends analyzing the potential impacts of the proposed project and its reasonably foreseeable actions to the regional subsistence practices and economies. The EPA makes several recommendations for analyzing project impacts, including an approach to determining subsistence impacts, the importance of cumulative impact analysis, consultation needs, toxic hazard evaluation, water pollution and air quality analysis, mitigation and protection measures, and monitoring. Several commenters estimated that a person could lose approximately $10,000 per year in subsistence food as a result of the project. One commenter stated that access for elderly and disabled subsistence hunters should be incorporated into the supplemental EIS.

Comment Category	Summary of Key Points
Transportation and access	Commenters expressed concern that the road would eventually allow public access, which would lead to permanent and widespread impacts from non-industrial traffic, tourism, all-terrain vehicles, motorboats, airstrips, and external hunting and fishing pressure to wildlands, wildlife, and local traditional subsistence uses. Commenters noted that increased access due to roads could compound user conflict and trespass issues. Commenters noted the supplemental EIS should acknowledge the likely impacts of increased access and future mine developments, and therefore provide a reasonable assessment of direct, indirect, and cumulative impacts, both short term and long term, of this road. Other commenters believed the road should be open to the public to be used for recreation, hunting, and fishing. Some commenters requested the road be open to elderly and disabled locals and their needs. One commenter wanted to see an analysis of hunting regulations in relation to road access restrictions. Commenters stated that the supplemental EIS should provide adequate design and cost information about the road in order to conduct a thorough analysis of the impacts. Commenters stated the supplemental EIS should also have clearer information on how many truck trips per day are anticipated for the road, whether there would be any limitations or changes over time to the number of truck trips per day, and whether trip estimates are one-way or round-trip. Commenters noted the supplemental EIS should address additional traffic burden from road use on existing roads and communities. Commenters noted the maintenance for the road should be addressed because roads in this region erode seasonally and have to be repaired, creating more activity in this wilderness area. There should be more clarification on the permit system and rules for road access. One commenter stated that the BLM underestimated the infrastructure necessary for this road, saying there would also need to be 41 gravel mines for road construction, processing facilities, tailings disposal areas, ore/export terminals, gas stations, and ports.
Visual resources	Commenters expressed concern that the road would impair the area's wild character and scenery due to visual impacts such as road dust, vehicle lights during darkness, and sights of the road from numerous points in the wilderness. Commenters expressed concern that the development would desecrate the landscape and change the face of the region.

3 LITERATURE CITED

Bureau of Land Management (BLM). 2008. *National Environmental Policy Act Handbook H-1790-1*. *Handbook*. Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management.

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Appendix L. Subsistence Technical Report

Note: This entire Appendix has been revised from the previous version and replaced with new content that is specific to the Supplemental EIS process only. Therefore, none of the text has been highlighted to indicate new or substantially revised text.

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List of Acronyms

AAC	Alaska Administrative Code
AAP	Ambler Access Project
ADF&G	Alaska Department of Fish and Game
AIDEA	Alaska Industrial Development and Export Authority
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
ATV	all-terrain vehicle
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
DMTS	Delong Mountain Transportation System
DOI	U.S. Department of the Interior
EIS	Environmental Impact Statement
GAAR	Gates of the Arctic National Park and Preserve
GMU	Game Management Unit
GPS	Global positioning system
HHH	Hodzana Hills Herd
NPS	National Park Service
ROW	Right-of-way
SLM	small land mammals
SRB&A	Stephen R. Braund & Associates
TH	Teshekpuk Herd
USFWS	U.S. Fish and Wildlife Service
WAH	Western Arctic Caribou Herd
WG	Working Group

1. Introduction

The Alaska Industrial Development and Export Authority (AIDEA) is proposing to construct an all-season industrial access transportation corridor extending from the Dalton Highway to the Ambler Mining District in Northwest Alaska. The road would provide access for exploration and development of the Ambler Mining District and is referred to as the Ambler Access Project (AAP). In 2020, the Bureau of Land Management (BLM) developed an Environmental Impact Statement (EIS) in response to a right-of-way (ROW) application from AIDEA. The final EIS analyzed the potential impacts of the road on physical characteristics, biological resources, and social systems, including subsistence uses and resources. In February 2022, after identifying deficiencies in the original EIS, the U.S. Department of the Interior (DOI) sought, and in May 2022 was granted by the U.S. District Court for Alaska, a voluntary remand and prepared a Supplemental EIS to address the identified deficiencies. This Subsistence Technical Report has been prepared to inform the affected environment and environmental consequences section of the Ambler Road Supplemental EIS. The report provides an overview of subsistence uses in potentially affected communities and regions, in addition to a discussion of the potential impacts of the AAP on subsistence resources and uses.

2. Study Area

The subsistence study area for the Ambler Road Supplemental EIS includes communities that harvest subsistence resources within or near the project area, use project area to access subsistence use areas, or harvest resources that migrate through the project area and are later harvested elsewhere. The Supplemental EIS addresses potential subsistence impacts to 66 communities under three categories: primary subsistence study communities, caribou subsistence study communities, and fish study communities. For the purposes of the subsistence analysis, the **primary subsistence study communities** include any community located within 50 miles of one or more of the project alternatives, and any community with documented subsistence use areas within 30 miles of one or more of the project alternatives. These criteria aim to capture communities that may experience direct or indirect impacts on their subsistence uses resulting from construction and operation of the AAP. Based on the criteria, there are 27 primary subsistence study communities (see Table 1 and Map 1). The subsistence study communities are grouped into five primary regions based on their location. These regions include Kobuk River region, Kotzebue Sound region, Koyukuk River region, Tanana River region, and Yukon River region. In addition, the project is within the range of the Western Arctic Caribou Herd (WAH), a highly migratory and important subsistence resource to communities in Western and Northwestern Alaska. This section includes a separate subset of the 42 members of the Western Arctic Caribou Herd Working Group (WAH WG) (Map 1); these caribou subsistence study communities are referred to as the **WAH study communities** and include 16 of the subsistence study communities listed in Table 1. Inclusion of the WAH study communities captures potential indirect or cumulative impacts to communities who use caribou that migrate through the project area and are later harvested elsewhere. Finally, the project crosses tributaries of several river basins, including the Kobuk-Selawik River, Koyukuk River, and Yukon River basins. Thirty-two communities are located downstream from these tributaries and harvest fish which could be affected by the project. These 32 **fish study communities** overlap with 15 of the primary subsistence study communities, and 15 of the caribou subsistence study communities (see Appendix F, Table 15). Data presented for the fish study communities are focused on the three key subsistence species (Chinook salmon, chum salmon, and sheefish/whitefish) with the greatest likelihood to experience downstream effects due to the presence of key spawning grounds for those species in the project area.

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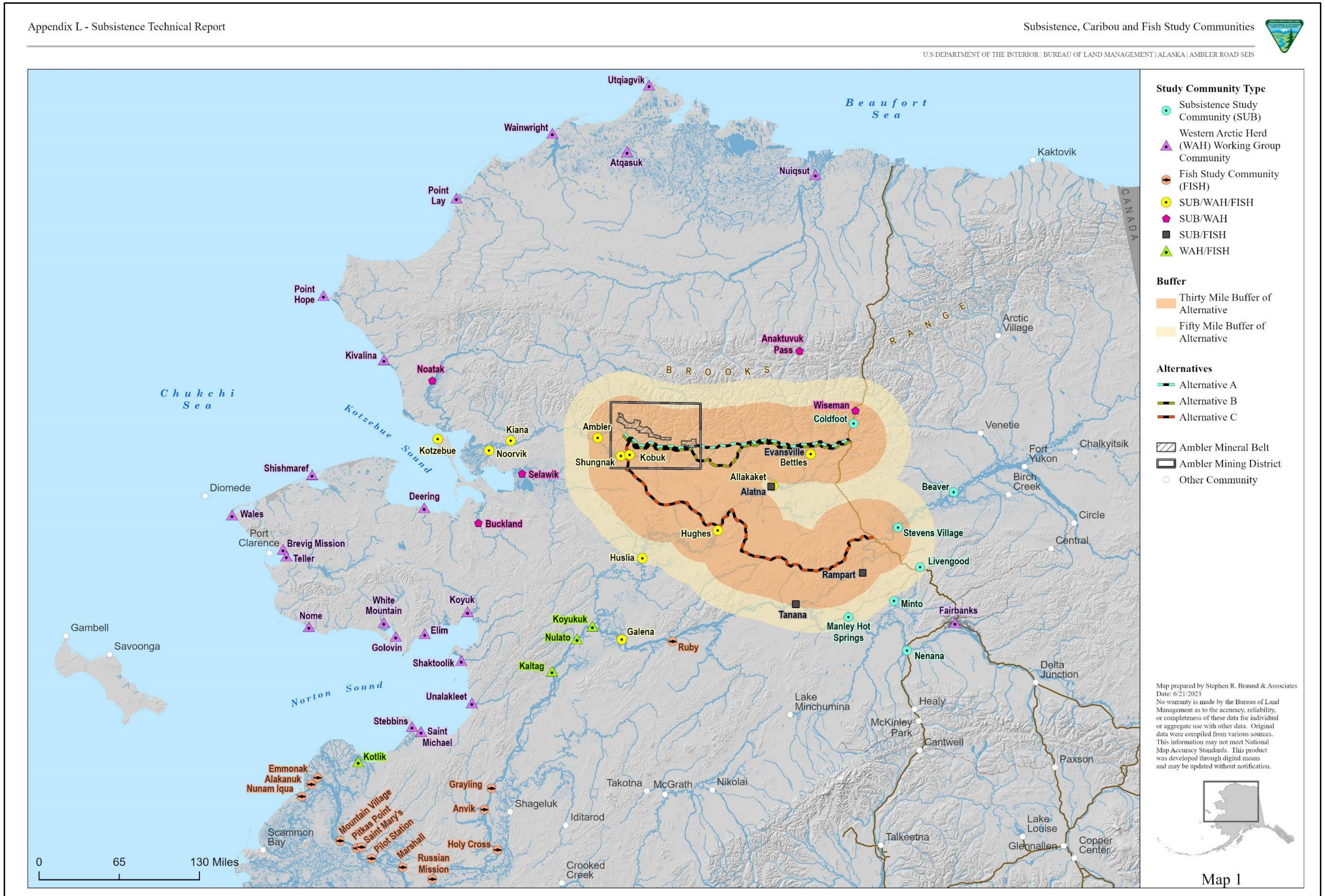

Map 1. Subsistence, Western Arctic Caribou Herd, and Fish study communities

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Table 1. Ambler Road EIS subsistence, WAH WG, and Fish study communities

Study community number	Study community	Study community type	Community within 50 miles	Community use areas overlap the project	Community use areas within 30 miles	Member of WAH WG
1	Beaver	SUB	No	No	Yes	No
2	Coldfoot	SUB	Yes	Yes	Yes	No
3	Livengood	SUB	Yes	No	No	No
4	Manley Hot Springs	SUB	Yes	No	Yes	No
5	Minto	SUB	Yes	No	Yes	No
6	Nenana	SUB	No	No	Yes	No
7	Stevens Village	SUB	Yes	Yes	Yes	No
8	Alatna	SUB/FISH	Yes	Yes	Yes	Yes
9	Evansville	SUB/FISH	Yes	Yes	Yes	No
10	Rampart	SUB/FISH	Yes	Yes	Yes	No
11	Tanana	SUB/FISH	Yes	Yes	Yes	No
12	Anaktuvuk Pass	SUB/WAH	No	Yes	Yes	Yes
13	Buckland	SUB/WAH	No	No	Yes	Yes
14	Noatak	SUB/WAH	No	No	Yes	Yes
15	Selawik	SUB/WAH	No	Yes	Yes	Yes
16	Wiseman	SUB/WAH	Yes	Yes	Yes	Yes
17	Allakaket	SUB/WAH/FISH	Yes	Yes	Yes	Yes
18	Ambler	SUB/WAH/FISH	Yes	Yes	Yes	Yes
19	Bettles	SUB/WAH/FISH	Yes	Yes	Yes	Yes
20	Galena	SUB/WAH/FISH	No	Yes	Yes	Yes
21	Hughes	SUB/WAH/FISH	Yes	Yes	Yes	Yes
22	Huslia	SUB/WAH/FISH	Yes	No	No	Yes
23	Kiana	SUB/WAH/FISH	No	Yes	Yes	Yes
24	Kobuk	SUB/WAH/FISH	Yes	Yes	Yes	Yes
25	Kotzebue	SUB/WAH/FISH	No	No	Yes	Yes
26	Noorvik	SUB/WAH/FISH	No	No	Yes	Yes
27	Shungnak	SUB/WAH/FISH	Yes	Yes	Yes	Yes
28	Alakanuk	FISH	No	No	No	No
29	Anvik	FISH	No	No	No	No
30	Emmonak	FISH	No	No	No	No
31	Grayling	FISH	No	No	No	No
32	Holy Cross	FISH	No	No	No	No
33	Marshall	FISH	No	No	No	No
34	Mountain Village	FISH	No	No	No	No
35	Nunam Iqua	FISH	No	No	No	No
36	Pilot Station	FISH	No	No	No	No

Study community number	Study community	Study community type	Community within 50 miles	Community use areas overlap the project	Community use areas within 30 miles	Member of WAH WG
37	Pitka's Point	FISH	No	No	No	No
38	Ruby	FISH	No	No	No	No
39	Russian Mission	FISH	No	No	No	No
40	St. Mary's	FISH	No	No	No	No
41	Atqasuk	WAH	No	No	No	Yes
42	Brevig Mission	WAH	No	No	No	Yes
43	Deering	WAH	Yes	No	No	Yes
44	Elim	WAH	Yes	No	No	Yes
45	Fairbanks	WAH	No	No	No	Yes
46	Golovin	WAH	Yes	No	No	Yes
47	Kivalina	WAH	Yes	No	No	Yes
48	Koyuk	WAH	Yes	No	No	Yes
49	Nome	WAH	No	No	No	Yes
50	Nuiqsut	WAH	No	No	No	Yes
51	Point Hope	WAH	No	No	No	Yes
52	Point Lay	WAH	No	No	No	Yes
53	Shaktoolik	WAH	No	No	No	Yes
54	Shishmaref	WAH	No	No	No	Yes
55	St. Michael	WAH	No	No	No	Yes
56	Stebbins	WAH	No	No	No	Yes
57	Teller	WAH	No	No	No	Yes
58	Unalakleet	WAH	No	No	No	Yes
59	Utqiagvik	WAH	No	No	No	Yes
60	Wainwright	WAH	No	No	No	Yes
61	Wales	WAH	No	No	No	Yes
62	White Mountain	WAH	Yes	No	No	Yes
63	Kaltag	WAH/FISH	No	No	No	Yes
64	Kotlik	WAH/FISH	No	No	No	Yes
65	Koyukuk	WAH/FISH	No	No	No	Yes
66	Nulato	WAH/FISH	No	No	No	Yes

Notes: SUB = Subsistence Study Community; WAH=Western Arctic Caribou Herd Working Group Study Community; FISH = Fish Study Community

3. Subsistence Definition and Regulatory Setting

Subsistence uses are central to the customs and traditions of many Alaskans, particularly rural and Indigenous peoples in Alaska. Subsistence customs and traditions encompass processing, sharing networks, cooperative and individual hunting, fishing, gathering, and ceremonial activities. These activities are guided by Indigenous Knowledge based on a long-standing relationship with the environment. Both federal and state regulations define subsistence uses to include the customary and traditional uses of wild renewable resources for food, shelter, fuel, clothing, and other uses (Alaska National Interest Lands Conservation Act [ANILCA], Title VIII, Section 803, and Alaska Statute 16.05.940[33]). The Alaska Federation of Natives views subsistence to not only encompass the practices of hunting, fishing, and gathering but as a way of life that has sustained Alaska Natives for thousands of years and a set of values associated with those practices (Alaska Federation of Natives 2012).

Subsistence fishing and hunting are traditional activities that include transmission of Indigenous Knowledge between generations, maintain the connection of people to their land and environment, and support healthy diet and nutrition in rural communities in Alaska. The Alaska Department of Fish and Game (ADF&G) estimates that the annual wild food harvest in rural areas Interior Alaska is approximately 6.4 million pounds or 613 pounds per person per year, and in the Arctic it is approximately 10.5 million pounds or 516 pounds per person per year (Wolfe 2000). Subsistence harvest levels vary widely among individuals in a community, from one community to the next, and from year to year. Sharing of subsistence foods is common in rural Alaska and can exceed 80 percent of households giving or receiving resources (ADF&G 2024). Sharing does not just occur between households within a community; sharing is based on social and kinship ties, which form complex social networks that connect communities and regions. Documentation of social networks for just three communities in the Upper Kobuk Region documented sharing ties that extended from Northwest Alaska to the major urban centers of Alaska, the North Slope, other Northwest communities, Southeast, Southwest, and Interior Alaska, during a single study year (Braem, Mikow, Wilson, and Kostick 2015). Sharing activities strengthen and affirm kinship and social ties, and are integral to maintaining the cultural identity of subsistence users. The term *harvest* and its variants – *harvesters* and *harvested* – are used as the inclusive term to characterize the broad spectrum of subsistence activities, including hunting, fishing, trapping, and gathering.

Subsistence is part of a rural economic system called a “mixed, subsistence-market” economy, wherein families invest money into small-scale, efficient technologies to harvest wild foods (Wolfe 2000). According to Wolfe and Walker (1987), fishing and hunting for subsistence resources provides a reliable economic base for rural regions; these important activities are conducted by domestic family groups who have invested in subsistence equipment such as fish wheels, gillnets, motorized skiffs, rifles, traps, all-terrain vehicles (ATVs), and snowmachines. Subsistence is not oriented toward sales, profits, or capital accumulation (commercial market production) but is focused toward meeting the self-limiting needs of families and their extended kin and communities. Participants in this mixed economy in rural Alaska augment their subsistence production by cash employment. Cash (from activities such as commercial fishing, trapping, and/or wages from public sector employment, construction, firefighting, oil and gas industry, or other services) provides the means to purchase the equipment, supplies, and gas used in subsistence activities. The combination of subsistence and commercial-wage activities provides the economic basis for the way of life so highly valued in rural communities (Wolfe and Walker 1987). Data show that subsistence in rural Alaska has remained stable over time, with the exception of some regional variation, regardless of income levels (BurnSilver et al. 2016). Thus, while the mixed cash economy is an important feature of subsistence in Alaska, economic growth or decline is not necessarily associated with corresponding increases or decreases in subsistence harvests.

Participation in subsistence activities promotes transmission of Indigenous Knowledge from generation to generation and serves to maintain peoples’ connection to the physical and biological environment. The subsistence way of life encompasses cultural values such as sharing, respect for elders, respect for the environment, hard work, and humility. In addition to being culturally important, subsistence is a critical source of nutrition for residents in areas of Alaska where food prices are high. While some people earn income from employment, these and other residents rely on subsistence to sustain them throughout the year and, as noted above, use money from the cash economy to support subsistence activities.

Furthermore, subsistence activities support a healthy diet and contribute to residents’ and communities’ social, spiritual, and physical well-being.

In the State of Alaska, subsistence is regulated in multiple ways including federal and state regulations and local traditions, norms, and values that guide subsistence hunting and fishing practices. The AAP is located on state, federal (BLM, National Park Service [NPS], and U.S. Fish and Wildlife Service [USFWS]), and private (including Native corporation) lands. The federal and state governments regulate subsistence hunting and fishing in the state under a dual-management system. The federal government implements a subsistence priority for rural residents on federal public lands. The priority is implemented, in accordance with Sections 802(2) and 804, whenever it is necessary to restrict the taking of populations of fish and wildlife on public lands for subsistence uses in order to protect the continued viability of such populations or to continue such uses. The priority is implemented through appropriate limitations based on the following criteria: 1) the customary and direct dependence upon the populations as the mainstay of livelihood; 2) local residency; and 3) the availability of alternative resources. The State of Alaska manages for sustainable fish and wildlife populations under the sustained yield principle mandated by the State Constitution. The intent is to provide all residents (both rural and nonrural) with the opportunity to utilize fish and wildlife populations for hunting and fishing among other uses.

The U.S. Congress adopted ANILCA recognizing that “the situation in Alaska is unique” regarding food supplies and subsistence practices. ANILCA specifies that any decision to withdraw, reserve, lease, or permit the use, occupancy, or disposition of public lands must evaluate the effects of such decisions on subsistence uses and needs (16 United States Code 3111–3126). In 1990, the U.S. Department of the Interior (DOI) and the U.S. Department of Agriculture established a Federal Subsistence Board to administer the Federal Subsistence Management Program (55 Federal Register 27114). The Federal Subsistence Board, under Title VIII of ANILCA and regulations at 36 Code of Federal Regulations (CFR) 242.1 and 50 CFR 100.1, implements the Federal Subsistence Management Program on public lands within the State of Alaska. Sections 36 CFR 242.3(a) and 50 CFR 100.3(a) state, The regulations in this part implement the provisions of Title VIII of ANILCA relevant to the taking of fish and wildlife on public lands in the State of Alaska. Federal regulations recognize subsistence activities based on a person’s residence in Alaska, defined as either rural or nonrural. Only individuals who permanently reside outside federally designated nonrural areas are considered rural residents and qualify for subsistence harvesting on federal lands under federal subsistence regulations. Nonrural residents may harvest fish and game on most federal lands (unless these are closed to non-federally qualified subsistence uses), but these harvests occur under state regulations. The Fairbanks nonrural area is the closest nonrural area to the project area. All of the 27 subsistence study communities are located outside federal nonrural areas and therefore are qualified as subsistence users on most federal lands.

The Alaska Board of Fisheries and the Alaska Board of Game have adopted regulations enforced by the state for subsistence fishing and hunting on all state lands (except nonsubsistence areas) and waters, and private lands, including those lands conveyed to Alaska Native Claims Settlement Act (ANCSA) groups. State law is based on Alaska Statute 16 and Title 5 of the Alaska Administrative Code (AAC) (05 AAC 01, 02, 85, 92, and 99) and regulates state subsistence uses. Under Alaska law, when there is sufficient harvestable surplus to provide for all subsistence and other uses, all Alaskan residents qualify as eligible subsistence users.

The state distinguishes subsistence harvests from personal use, general hunting, sport, or commercial harvests based on where the harvest occurs and the resource being harvested, not where the harvester resides (as is the case under federal law). More specifically, state law provides for subsistence hunting and fishing regulations in areas outside the boundaries of “nonsubsistence areas,” as defined in state regulations (5 AAC 99.015). According to these regulations, a nonsubsistence area is “an area or community where dependence upon subsistence is not a principal characteristic of the economy, culture, and way of life of the area or community" (5 AAC 99.016).

Activities permitted in these nonsubsistence areas include general hunting and personal use, sport, guided sport, and commercial fishing. There is no subsistence priority in these areas; therefore, no subsistence hunting or fishing regulations manage the harvest of resources. The closest state nonsubsistence area to the project is the Fairbanks Nonsubsistence Area. The entire project lies outside state nonsubsistence areas and therefore hunting and fishing on state lands in the project area may qualify as subsistence under state regulations.

4. Data Sources

Sources of subsistence data for the study communities are provided in Table 2, which shows data that can be incorporated into subsistence use area maps, tables, and figures discussed in Section 5, Overview of Subsistence Uses. Additional data on subsistence include ethnographic studies on harvest methods, Indigenous knowledge (IK) studies, or subsistence studies which are specific to a geographic area or season. These sources are not shown in Table 2 because they include data which are not comparable to other comprehensive data sources within the region or because they provide qualitative information that were not in a format to incorporate into study maps, tables, or figures.

This document incorporates IK throughout the document to provide context, additional information, or to fill in gaps in data. The review of IK was not exhaustive, instead relying on recent scoping testimony and meeting transcripts associated with the Project or regional wildlife and subsistence management. Sources of IK reviewed for this document include newsletters and meeting minutes for the Ambler Access Project Subsistence Advisory Committee (AIDEA 2022, 2023), government-to-government consultation for the project (Alatna Tribal Council 2022; Allakaket Tribal Council 2022; Evansville Village Council 2022); and meeting transcripts for Regional Subsistence Advisory Committees in the Northwest Arctic and Western Interior regions (Northwest Arctic Subsistence Regional Advisory Council 2022a, 2022b, 2023; Western Interior Federal Subsistence Regional Advisory Council 2022a, 2022b).

4.1. Harvest Data

Harvest data for the study communities are available primarily through the ADF&G, Division of Subsistence, although other agencies or entities have periodically conducted subsistence harvest studies in the region. Harvest data provide quantitative estimates of the amount of fish and game harvested by each study community, by subsistence species, in addition to household-level harvest and participation rates. They are useful for analyzing community harvests and uses (e.g., household participation and sharing) over time, for determining community harvest levels by species, and for comparing subsistence resources to one another in terms of household uses and harvests. Harvest data accuracy depends on various factors, including survey sample sizes and the accuracy of harvester recall. However, they are generally the only source of information for quantitative community-wide harvests for all resources and are collected throughout Alaska. Subsistence harvests and uses can vary widely from year to year based on a variety of factors, including resource availability, harvest regulations, and environmental conditions (e.g., high or low water levels, inadequate snow cover, which affect access to subsistence resources). Thus, estimated harvest data may under- or overestimate overall uses of subsistence resources by community households.

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Table 2. Subsistence data sources for Ambler Road EIS subsistence study communities

Community	Source	Harvest data - resources addressed	Harvest data - study period	Timing of subsistence – resources addressed	Timing of subsistence - study period	Use areas – resources addressed	Use area - study period
Alatna	(ADF&G 2024)	ALL	1983	N/D	N/D	N/D	N/D
Alatna	(ADF&G 2024)	ALL	1984	N/D	N/D	N/D	N/D
Alatna	(Andersen, Brown, Walker, and Elkin 2004a)	NSF	2002	NSF	2002	N/D	N/D
Alatna	(Andersen, Brown, Walker, and Jennings 2004b)	LLM	2001-02	LLM	2001-02	N/D	N/D
Alatna	(Andersen, Utermohle, and Brown 1998)	LLM	1997-98	LLM	1997-98	N/D	N/D
Alatna	(Andersen, Utermohle, and Brown 2000)	LLM	1998-99	LLM	1998-99	N/D	N/D
Alatna	(Andersen, Utermohle, and Jennings 2001)	LLM	1999-00	LLM	1999-00	N/D	N/D
Alatna	(Brown, Walker, and Vanek 2004)	LLM	2002-03	LLM	2002-03	N/D	N/D
Alatna	(Clark and Clark 1978)	N/D	N/D	ALL	1961-62, 1968	N/D	N/D
Alatna	(Holen, Hazell, and Koster 2012)	ALL	2011	LLM	2011	Bears, SLM, Migratory Birds, Berries	2011
Alatna	(Jones, Arundale, Moses, Nictune, Simon, Williams, William, Henzie, William, Ambrose, Williams, and Beetus 1997)	N/D	N/D	N/D	N/D	ALL	Traditional
Alatna	(Marcotte and Haynes 1985)	ALL	1982	ALL	1982	ALL	1981-1982 1981-83
Alatna	(Ristroph, Allakaket Tribal Council, and Alatna Tribal Council 2019)	N/D	N/D	N/D	N/D	ALL	Traditional
Alatna	(SRB&A 2016)	N/D	N/D	ALL	2006-2015	ALL	2006-2015
Alatna	(Watson 2018)	N/D	N/D	N/D	N/D	ALL	Lifetime to 2012
Alatna	(YRDFA 2008)	N/D	N/D	ALL	Historic	N/D	N/D
Allakaket	(ADF&G 2019)	ALL	1983	N/D	N/D	N/D	N/D
Allakaket	(ADF&G 2024)	ALL	1984	N/D	N/D	N/D	N/D
Allakaket	(Andersen et al. 2004a)	NSF	2002	NSF	2002	N/D	N/D
Allakaket	(Andersen et al. 2004b)	LLM	2001-02	LLM	2001-02	N/D	N/D

Community	Source	Harvest data - resources addressed	Harvest data - study period	Timing of subsistence – resources addressed	Timing of subsistence - study period	Use areas – resources addressed	Use area - study period
Allakaket	(Andersen et al. 1998)	LLM	1997-98	LLM	1997-98	N/D	N/D
Allakaket	(Andersen et al. 2000)	LLM	1998-99	LLM	1998-99	N/D	N/D
Allakaket	(Andersen et al. 2001)	LLM	1999-00	LLM	1999-00	N/D	N/D
Allakaket	(Brown et al. 2004)	LLM	2002-03	LLM	2002-03	N/D	N/D
Allakaket	(Holen et al. 2012)	ALL	2011	LLM	2011	ALL	2011
Allakaket	(Jones et al. 1997)	N/D	N/D	N/D	N/D	ALL	Traditional
Allakaket	(Marcotte and Haynes 1985)	ALL	1982	ALL	1982	ALL	1981-1982 1981-83
Allakaket	(Ristroph et al. 2019)	N/D	N/D	N/D	N/D	ALL	Traditional
Allakaket	(SRB&A 2016)	N/D	N/D	ALL	2006-2016	ALL	2006-2015
Allakaket	(Watson 2018)	N/D	N/D	N/D	N/D	ALL	Lifetime to 2012
Allakaket	(YRDFA 2008)	N/D	N/D	ALL	Historic	N/D	N/D
Ambler	(ADF&G 2024)	LLM, SLM	2003	N/D	N/D	N/D	N/D
Ambler	(Anderson, Anderson, Bane, Nelson, and Towarak 1998)	N/D	N/D	ALL	1974-1975	N/D	N/D
Ambler	(Braem 2012a)	LLM, SLM	2009-10	Moose, Caribou	2009-10	N/D	N/D
Ambler	(Braem et al. 2015)	ALL	2012	ALL	2012	ALL	2012
Ambler	(Braem, Godduhn, Mikow, Brenner, Trainor, Wilson, and Kostick 2018)	Salmon, NSF	2012-2014	N/D	N/D	N/D	N/D
Ambler	(Georgette 2000)	Birds	1997	N/D	N/D	N/D	N/D
Ambler	(Schroeder, Anderson, and Hildreth 1987)	N/D	N/D	N/D	N/D	ALL	Lifetime ca. 1925-1985
Ambler	(Watson 2018)	N/D	N/D	ALL	Post-1958	ALL	Lifetime to 2016
Anaktuvuk Pass	(Adams, Stephenson, Dale, Ahgook, and Demma 2008)	Wolves	1986-1991	N/D	N/D	N/D	N/D
Anaktuvuk Pass	(Bacon, Hepa, Brower, Pederson, Olemaun, George, and Corrigan 2009)	ALL	1996-97, 1998-99, 1999-00, 2000-01, 2001-02, 2002-03	ALL	1996-97, 1998-99, 1999-00, 2000-01, 2001-02, 2002-03	N/D	N/D

Community	Source	Harvest data - resources addressed	Harvest data - study period	Timing of subsistence – resources addressed	Timing of subsistence - study period	Use areas – resources addressed	Use area - study period
Anaktuvuk Pass	(Brower and Opie 1996)	ALL	1994-95	ALL	1994-95	N/D	N/D
Anaktuvuk Pass	(Brown, Braem, Mikow, Trainor, Slayton, Runfola, Ikuta, Kostick, McDevitt, Park, and Simon 2016)	ALL	2014	LLM, SLM, Birds	2014	ALL	2014
Anaktuvuk Pass	(Fuller and George 1999)	ALL	1992	ALL	1992	N/D	N/D
Anaktuvuk Pass	(Holen et al. 2012)	ALL	2011	LLM	2011	ALL	2011
Anaktuvuk Pass	(Pedersen 1979)	N/D	N/D	N/D	N/D	ALL	Lifetime Pre-1979
Anaktuvuk Pass	(Pedersen and Hugo 2005)	Fish	2001-02, 2002-03	Fish	2001-02, 2002-03	Fish	2001-02, 2002-03
Anaktuvuk Pass	(Pedersen and Nageak 2009)	Caribou	2006-07	Caribou	2006-07	Caribou	2006-07
Anaktuvuk Pass	(Pedersen and Opie 1991)	Caribou	1990-91	N/D	N/D	N/D	N/D
Anaktuvuk Pass	(Pedersen and Opie 1992)	Caribou	1991-92	N/D	N/D	N/D	N/D
Anaktuvuk Pass	(Pedersen and Opie 1994)	Caribou	1993-94	N/D	N/D	N/D	N/D
Anaktuvuk Pass	(Spearman, Pedersen, and Brown 1979)	N/D	N/D	ALL	General	N/D	N/D
Anaktuvuk Pass	(SRB&A 2013)	N/D	N/D	ALL	2001-2010	ALL	2001-2010
Beaver	(Andersen and Jennings 2001)	Birds	2000	Bird	2000	N/D	N/D
Beaver	(Brown and Godduhn 2015)	N/D	N/D	N/D	N/D	Salmon[a]	2010
Beaver	(Holen et al. 2012)	ALL	2011	LLM	2011	ALL	2011
Beaver	(Koskey and Mull 2011)	NSF	2005	NSF	2005	N/D	N/D
Beaver	(SRB&A 2007)	N/D	N/D	ALL	1997-2006	ALL	1997-2006
Beaver	(Stevens and Maracle n.d.)	LLM, SLM	2010-11	LLM, SLM	2010-11	N/D	N/D

Community	Source	Harvest data - resources addressed	Harvest data - study period	Timing of subsistence – resources addressed	Timing of subsistence - study period	Use areas – resources addressed	Use area - study period
Beaver	(Sumida 1989)	ALL	1984-85	ALL	1985	ALL	1930-86
Beaver	(Van Lanen, Stevens, Brown, Maracle, and Koster 2012)	LLM, SLM	2008-09, 2009-10	LLM, SLM	2008-09, 2009-10	N/D	N/D
Bettles	(ADF&G 2024)	ALL	1983	N/D	N/D	N/D	N/D
Bettles	(ADF&G 2024)	ALL	1984	N/D	N/D	N/D	N/D
Bettles	(Andersen et al. 2004a)	NSF	2002	NSF	2002	N/D	N/D
Bettles	(Andersen et al. 1998)	LLM	1997-98	LLM	1997-98	N/D	N/D
Bettles	(Andersen et al. 2000)	LLM	1998-99	LLM	1998-99	N/D	N/D
Bettles	(Andersen et al. 2001)	LLM	1999-00	LLM	1999-00	N/D	N/D
Bettles	(Brown et al. 2004)	LLM	2002-03	LLM	2002-03	N/D	N/D
Bettles	(Holen et al. 2012)	ALL	2011	LLM	2011	ALL	2011
Bettles	(Marcotte and Haynes 1985)	ALL	1982	ALL	1982	ALL	1981-82 1981-83
Bettles	(SRB&A 2016)	N/D	N/D	ALL	2006-2016	ALL	2006-2015
Bettles	(Watson 2018)	N/D	N/D	N/D	N/D	ALL	Lifetime to 2016
Buckland	(Braem 2012a)	LLM, SLM	2009-10	LLM, SLM	2009-10	N/D	N/D
Buckland	(Braem et al. 2018)	Salmon, NSF	2012-2014	N/D	N/D	N/D	N/D
Buckland	(Georgette 2000)	Birds	1996	N/D	N/D	N/D	N/D
Buckland	(Gonzalez, Mikow, and Kostick 2018)	LLM, SLM	2016-17	LLM, SLM	2016-17	N/D	N/D
Buckland	(Kevin Waring Associates 1992)	N/D	N/D	Beluga, Caribou, Fish	c. 1980	N/D	N/D
Buckland	(Magdanz, Smith, Braem, and Koster 2011a)	ALL	2003	N/D	N/D	N/D	N/D
Buckland	(Mikow and Cunningham 2020)	ALL	2018	LLM. SLM, MM, Birds	2018	ALL	2018
Buckland	(Satterthwaite-Phillips, Christopher Krenz, Glenn Gray, and Dodd 2016)	N/D	N/D	N/D	N/D	ALL[a]	Lifetime to 2014
Buckland	(Schroeder et al. 1987)	N/D	N/D	N/D	N/D	ALL	Lifetime ca. 1925-1985

Community	Source	Harvest data - resources addressed	Harvest data - study period	Timing of subsistence – resources addressed	Timing of subsistence - study period	Use areas – resources addressed	Use area - study period
Coldfoot	(Holen et al. 2012)	ALL	2011	N/D	N/D	ALL	2011
Coldfoot	(SRB&A 2016)	N/D	N/D	ALL	2005-2014	ALL	2005-2014
Evansville	(ADF&G 2024)	ALL	1983	N/D	N/D	N/D	N/D
Evansville	(ADF&G 2024)	ALL	1984	N/D	N/D	N/D	N/D
Evansville	(Andersen et al. 2004a)	NSF	2002	NSF	2002	N/D	N/D
Evansville	(Andersen et al. 1998)	LLM	1997-98	LLM	1997-98	N/D	N/D
Evansville	(Andersen et al. 2000)	LLM	1998-99	LLM	1998-99	N/D	N/D
Evansville	(Andersen et al. 2001)	LLM	1999-00	LLM	1999-00	N/D	N/D
Evansville	(Brown et al. 2004)	LLM	2002-03	LLM	2002-03	N/D	N/D
Evansville	(Holen et al. 2012)	ALL	2011	LLM	2011	ALL	2011
Evansville	(Marcotte and Haynes 1985)	ALL	1982	ALL	1982	ALL	1981-1982 1981-83
Evansville	(SRB&A 2016)	N/D	N/D	ALL	2006-2015	ALL	2006-2015
Evansville	(Watson 2018)	N/D	N/D	N/D	N/D	ALL	Lifetime to 2016
Galena	(ADF&G 2024)	LLM	1996 -97	N/D	N/D	N/D	N/D
Galena	(Andersen et al. 2004b)	LLM	2001-02	LLM	2001-02	N/D	N/D
Galena	(Andersen et al. 1998)	LLM	1997-98	LLM	1997-98	N/D	N/D
Galena	(Andersen et al. 2000)	LLM	1998-99	LLM	1998-99	N/D	N/D
Galena	(Andersen et al. 2001)	LLM	1999-00	LLM	1999-00	N/D	N/D
Galena	(Brown, Koester, and Koontz 2010)	NSF	2006	NSF	2006	NSF[a]	2006
Galena	(Brown, Brenner, Ikuta, Mikow, Retherford, Slayton, Trainor, Park, Koster, and Kostick 2015)	All	2010	LLM, SLM, Birds	2010	ALL	2010
Galena	(Brown et al. 2004)	LLM	2002-03	LLM	2002-03	N/D	N/D
Galena	(Marcotte 1988)	ALL	1985-1986	N/D	N/D	Fish	1986
Galena	(Robert and Andrews 1984)	N/D	N/D	Furbearers	1981-82	N/D	N/D
Hughes	(Andersen et al. 2004a)	NSF	2002	NSF	2002	N/D	N/D

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Hughes	(Marcotte and Haynes 1985)	ALL	1982	ALL	1982	ALL	1981-1982; 1981-83
Hughes	(Watson 2018)	N/D	N/D	N/D	N/D	ALL	Lifetime to 2016
Hughes	(Webb 1999)	Migratory Birds	1998	N/D	N/D	N/D	N/D
Hughes	(Webb and Koyukuk/Nowitna Refuge Complex (U.S.) 2000)	Migratory Birds	1998-99	N/D	N/D	N/D	N/D
Hughes	(Wilson and Kostick 2016)	ALL	2014	LLM, SLM, Birds	2014	ALL	2014
Hughes	(YRDFA 2008)	N/D	N/D	ALL	Historic	N/D	N/D
Huslia	(Andersen et al. 2004a)	NSF	2002	NSF	2002	N/D	N/D
Huslia	(Andersen et al. 2004b)	LLM	2001-02	LLM	2001-02	N/D	N/D
Huslia	(Andersen et al. 1998)	LLM	1997-98	LLM	1997-98	N/D	N/D
Huslia	(Andersen et al. 2000)	LLM	1998-99	LLM	1998-99	N/D	N/D
Huslia	(Andersen et al. 2001)	LLM	1999-00	LLM	1999-00	N/D	N/D
Huslia	(Brown et al. 2004)	LLM	2002-03	LLM	2002-03	N/D	N/D
Huslia	(Marcotte 1986)	ALL	1983	ALL	1983	ALL	1981-83
Huslia	(Watson 2018)	N/D	N/D	N/D	N/D	ALL	Lifetime to 2016
Kiana	(ADF&G 2024)	LLM, SLM	1999	N/D	N/D	N/D	N/D
Kiana	(Anderson et al. 1998)	N/D	N/D	ALL	1974-1975	N/D	N/D
Kiana	(Braem 2012a)	LLM, SLM	2009-10	Moose, Caribou	2009-10	N/D	N/D
Kiana	(Braem et al. 2018)	Salmon, NSF	2012-2014	N/D	N/D	N/D	N/D
Kiana	(Georgette 2000)	Birds	1996	N/D	N/D	N/D	N/D
Kiana	(Lamb et al. n.d. [2024])	ALL	2021	LLM, SLM, MM, Birds	2021	ALL	2021
Kiana	(Magdanz, Koster, Naves, and Fox 2011b)	ALL	2006	N/D	N/D	N/D	N/D
Kiana	(Magdanz et al. 2011a)	Fish	1994-2004	N/D	N/D	N/D	N/D
Kiana	(Schroeder et al. 1987)	N/D	N/D	N/D	N/D	ALL	Lifetime ca. 1925-1986
Kiana	(Wolfe and Paige 1995)	Birds	1993	N/D	N/D	N/D	N/D

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Kobuk	(ADF&G 2024)	LLM, SLM	2004	N/D	N/D	N/D	N/D
Kobuk	(Anderson et al. 1998)	N/D	N/D	ALL	1974-1975	N/D	N/D
Kobuk	(Braem 2012a)	LLM, SLM	2009-10	Moose, Caribou	2009-10	N/D	N/D
Kobuk	(Braem et al. 2015)	ALL	2012	ALL	ca. 2012	ALL	2012
Kobuk	(Braem et al. 2018)	Salmon, NSF	2012-2014	N/D	N/D	N/D	N/D
Kobuk	(Georgette 2000)	Birds	1996-1997	N/D	N/D	N/D	N/D
Kobuk	(Magdanz et al. 2011a)	Fish	1994-2004	N/D	N/D	N/D	N/D
Kobuk	(Schroeder et al. 1987)	N/D	N/D	N/D	N/D	ALL	Lifetime ca. 1925-1985
Kobuk	(Watson 2018)	N/D	N/D	N/D	N/D	ALL	Lifetime to 2016
Kotzebue	(Braem, Mikow, Brenner, Godduhn, Retherford, and Kostick 2017)	ALL	2014	LLM, SLM, Birds	2014	ALL	2014
Kotzebue	(Georgette and Loon 1993)	ALL	1986	ALL	1986	N/D	N/D
Kotzebue	(Georgette 2000)	Birds	1997	N/D	N/D	N/D	N/D
Kotzebue	(Godduhn, Braem, and Kostick 2014)	LLM, SLM	2012 - 2013	N/D	N/D	N/D	N/D
Kotzebue	(Magdanz, Georgette, and Evak 1995)	ALL	1991	N/D	N/D	N/D	N/D
Kotzebue	(Mikow and Kostick 2016)	LLM, SLM	2013 - 2014	N/D	N/D	N/D	N/D
Kotzebue	(Naves and Braem 2014)	Birds	2012	N/D	N/D	N/D	N/D
Kotzebue	(Satterthwaite-Phillips et al. 2016)	N/D	N/D	N/D	N/D	ALL[a]	Lifetime to 2014
Kotzebue	(Whiting 2006)	ALL	2002-2004	N/D	N/D	N/D	N/D
Manley Hot Springs	(ADF&G 2024)	LLM, Fish	2004	N/D	N/D	N/D	N/D
Manley Hot Springs	(Betts 1997)	N/D	N/D	ALL	General	ALL	1975-1995
Manley Hot Springs	(Brown, Slayton, Trainor, Koster, and Kostick 2014)	ALL	2012	N/D	N/D	ALL	2012
Minto	(ADF&G 2024)	LLM, SLM, NSF	2004	N/D	N/D	N/D	N/D
Minto	(Andrews 1988)	ALL	1983-84	ALL	1960-84	ALL	1960-84

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Minto	(Andrews and Napoleon 1985)	N/D	N/D	N/D	N/D	Moose	1960-85
Minto	(Brown et al. 2014)	ALL	2012	N/D	N/D	ALL	2012
Minto	(Marcotte and Haynes 1985)	NSF	1994	N/D	N/D	N/D	N/D
Minto	(SRB&A 2016)	N/D	N/D	ALL	2006-2015	ALL	2006-2015
Nenana	(ADF&G 2024)	NSF, LLM, SLM	2004	N/D	N/D	N/D	N/D
Nenana	(Brown and Kostick 2017)	ALL	2015	N/D	N/D	ALL	2015
Nenana	(Shinkwin and Case 1984)	N/D	N/D	N/D	N/D	ALL	1981-1982
Nenana	(SRB&A 2016)	N/D	N/D	ALL	2006-2015	ALL	2006-2015
Noatak	(ADF&G 2024)	ALL	1994	N/D	N/D	N/D	N/D
Noatak	(ADF&G 2024)	LLM, SLM	1999	N/D	N/D	N/D	N/D
Noatak	(ADF&G 2024)	LLM, SLM	2002	N/D	N/D	N/D	N/D
Noatak	(Braem and Kostick 2014)	LLM, SLM	2010-11	Caribou	2010-11	N/D	N/D
Noatak	(Braem et al. 2018)	Salmon, NSF	2012-2014	N/D	N/D	N/D	N/D
Noatak	(Georgette 2000)	Birds	1997	N/D	N/D	N/D	N/D
Noatak	(Magdanz, Braem, Robbins, and Koster 2010)	ALL	2007	N/D	N/D	ALL	2007
Noatak	(Mikow, Braem, and Kostick 2014)	LLM, SLM	2011-12	Caribou	2011-12	N/D	N/D
Noatak	(Satterthwaite-Phillips et al. 2016)	N/D	N/D	N/D	N/D	ALL[a]	Lifetime to 2014
Noatak	(SRB&A 2009)	N/D	N/D	ALL	1998-2007	ALL	1998-2007
Noatak	(Schroeder et al. 1987)	N/D	N/D	N/D	N/D	ALL	Lifetime ca. 1925-1985
Noorvik	(ADF&G 2024)	LLM, SLM	2002	N/D	N/D	N/D	N/D
Noorvik	(Anderson et al. 1998)			ALL	1974-1975	N/D	N/D
Noorvik	(Braem 2012b)	LLM, SLM	2008-09	LLM, SLM	2008-09	N/D	N/D
Noorvik	(Braem et al. 2017)	ALL	2012	LLM, SLM, Birds	2012	ALL	2012
Noorvik	(Braem et al. 2018)	Salmon, NSF	2012-2014	N/D	N/D	N/D	N/D
Noorvik	(Georgette 2000)	Birds	1996	N/D	N/D	N/D	N/D

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Noorvik	(Satterthwaite-Phillips et al. 2016)	N/D	N/D	N/D	N/D	ALL[a]	Lifetime to 2014
Noorvik	(Schroeder et al. 1987)	N/D	N/D	N/D	N/D	ALL	Lifetime ca. 1925-1985
Rampart	(ADF&G 2023)	LLM, SLM, NSF	1999	N/D	N/D	N/D	N/D
Rampart	(Andersen and Jennings 2001)	Birds	2000	Birds	N/D	N/D	N/D
Rampart	(Betts 1997)	N/D	N/D	ALL	General	ALL	1975-1995
Rampart	(Brown et al. 2016)	ALL	2014	LLM, SLM, Birds	2014	ALL	2014
Selawik	(ADF&G 2023)	LLM, SLM, NSF	2006	N/D	N/D	N/D	N/D
Selawik	(ADF&G 2023)	LLM, SLM	1998	N/D	N/D	N/D	N/D
Selawik	(Braem, Fox, Magdanz, and Koster 2013)	ALL	2010-11	LLM, SLM, Birds	2010-11	ALL	2010-11
Selawik	(Braem et al. 2018)	Salmon, NSF	2013-2014	N/D	N/D	N/D	N/D
Selawik	(Georgette 2000)	Birds	1997-1998	N/D	N/D	N/D	N/D
Selawik	(Satterthwaite-Phillips et al. 2016)	N/D	N/D	N/D	N/D	ALL[a]	Lifetime to 2014
Selawik	(Schroeder et al. 1987)	N/D	N/D	N/D	N/D	ALL	Lifetime (ca. 1925-1985)
Selawik	(Wolfe and Paige 2002)	Birds	1993	N/D	N/D	N/D	N/D
Shungnak	(Andersen and Jennings 2001)	Birds	2000	Birds	2000	N/D	N/D
Shungnak	(Braem 2012b)	LLM, SLM	2008-09	Caribou	2008-09	N/D	N/D
Shungnak	(Braem et al. 2015)	ALL	2012	ALL	ca. 2012	ALL	2012
Shungnak	(Braem et al. 2018)	Salmon, NSF	2012-2014	N/D	N/D	N/D	N/D
Shungnak	(Magdanz, Walker, and Paciorek 2004)	ALL	2002	N/D	N/D	N/D	N/D
Shungnak	(Schroeder et al. 1987)	N/D	N/D	N/D	N/D	ALL	Lifetime ca. 1925-1985
Shungnak	(Watson 2018)	N/D	N/D	ALL	pre-1958	ALL	Lifetime to 2016
Shungnak	(Wolfe and Paige 1995)	Birds	1993	N/D	N/D	N/D	N/D
Stevens Village	(ADF&G 2024)	LLM	1996	N/D	N/D	N/D	N/D

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Stevens Village	(Brown et al. 2016)	ALL	2014	SLM, Birds	2014	N/D	N/D
Stevens Village	(SRB&A 2016)	N/D	N/D	ALL	2006-2015	ALL	2006-2015
Stevens Village	(Stevens and Maracle n.d.)	LLM, SLM	2010-11	LLM, SLM	2010-11	N/D	N/D
Stevens Village	(Sumida 1988)	ALL	1983-84	ALL	N/D	ALL	1974-1984
Stevens Village	(Sumida and Alexander 1985)	N/D	N/D	Selected	1984	Moose, Furbearers	1974-1984
Stevens Village	(Van Lanen et al. 2012)	LLM, SLM	2008-09, 2009-10	LLM, SLM	2008-09, 2009-10	N/D	N/D
Stevens Village	(Wolfe and Scott 2010)	LLM, Fish	2008	N/D	N/D	N/D	N/D
Tanana	(Andersen et al. 1998)	LLM	1997-98	LLM	1997-98	N/D	N/D
Tanana	(Andersen et al. 2000)	LLM	1998-99	LLM	1998-99	N/D	N/D
Tanana	(Andersen et al. 2001)	LLM	1999-00	LLM	1999-00	N/D	N/D
Tanana	(Brown et al. 2010)	NSF	2006	NSF	2006	NSF	2006
Tanana	(Brown et al. 2016)	ALL	2014	LLM, SLM, Birds	2014	ALL	2014
Tanana	(Brown et al. 2004)	LLM	2002-03	LLM	2002-03	N/D	N/D
Tanana	(Case and Halpin 1990)	ALL	1987	ALL	1987	ALL	1968-1988
Tanana	(Wolfe and Scott 2010)	ALL	2008	N/D	N/D	N/D	N/D
Wiseman	(Holen et al. 2012)	ALL	2011	LLM	2011	ALL	2011
Wiseman	(Scott 1998)	ALL	1991	ALL		ALL	1992
Wiseman	(SRB&A 2016)	N/D	N/D	ALL	2006-2015	ALL	2006-2015

Notes: ca = circa; LLM = Large land mammals; N/D = No data; ALL = All resources/comprehensive; NSF = Non-salmon fish; SLM = Small land mammals

This table lists the primary publications associated with the harvest data for each time period; however, where available, the data are downloaded from the Alaska Department of Fish and Game's Community Subsistence Information System (CSIS), which is available at: www.adfg.alaska.gov/sb/CSIS/. The CSIS often includes more updated harvest estimates than those provided in the original publications reporting the data.

[a] Stephen R. Braund & Associates (SRB&A) requested this use area data for use in the Ambler Road Environmental Impact Statement (EIS), but the data were either unavailable or not provided to SRB&A.

4.1.1 Subsistence Use Area and Travel Method Data

Subsistence use area data primarily measure the geographic extent of residents' use of their environment to harvest subsistence resources. There are various methods of representing subsistence use area data. The most common method is to show the outline of the extent of a community's use area during a certain time period. This method does not differentiate between areas used periodically or by one harvester and areas used by multiple harvesters on a regular basis. Another method is to track harvesters' activities using global positioning system (GPS) units and are the most accurate method for documenting residents' travel during a specific time period; however, such studies are not available for the study region and may underrepresent a community's traditional use areas due to the narrow temporal and spatial focus. A third method maps subsistence use areas on separate overlays during individual interviews with active harvesters and creates subsistence use area maps differentiating between areas where a small number of individuals reported using the area and areas where a higher number of individuals reported using the area. Alternatively, the maps may differentiate between areas where a high number of subsistence use areas or target resources were reported, versus areas where a low number of subsistence use areas or target resources were reported. This method provides a measure of harvest effort in terms of the number of respondents reporting subsistence activities within geographic areas and, in the case of multiple resource maps, includes the number of species targeted. The overlapping use area method does not represent harvest success or intensity of use in terms of frequency or duration of trips. Subsistence mapping studies are also the most common source of information for characterizing travel methods used to access subsistence use areas; however, this type of information not always documented for all studies.

In general, subsistence use areas are documented for a subset of harvesters within a community, as it is usually not possible to interview every single hunter or harvester of a given resource. Even household harvest surveys do not necessarily document the use areas of every harvester in a community, as interviews are generally conducted with household heads, and these individuals are not necessarily the only or primary harvesters in a household. Thus, the subsistence use areas shown on the maps in this report likely do not represent the extent of all subsistence uses for a community, and other areas may be used.

In addition, subsistence use areas are documented for varying time periods, including lifetime, 10-year, or 1-year time periods. Lifetime use areas are useful for capturing long-term trends in subsistence use patterns and the extent of traditional land use areas. Shorter time periods are useful for capturing "current" subsistence use patterns and revealing recent trends in subsistence use. It is important to include all time periods when establishing a baseline of subsistence uses, as residents may return to previously used traditional areas in the event of environmental or regulatory changes, or changes in resource distribution or migration. Even if a community shows a change in traditional uses over time (e.g., constricted use areas), traditional land use areas are still important to the cultural identity, and protection of traditional land use areas ensures the ability of communities to adapt to future changes.

4.2. Timing of Subsistence Activities Data

Data on the timing of subsistence activities are available through various types of research including harvest studies (i.e., number harvested by month), subsistence mapping studies (i.e., months by use area, number of trips by month), and ethnographic studies (e.g., generalized depictions or narrative descriptions of subsistence activities by month or season). Data on the timing of subsistence activities are useful for characterizing a community's seasonal round, their use of the land, and for analyzing potential impacts based on the timing of subsistence activities in the context of the timing of development activities.

4.3. Resource Importance Data

Subsistence has both material/economic significance as well as cultural importance. This technical report chose several key subsistence indicators as measures of "Resource Importance" including harvest amount, sharing, and participation. These indicators are available in a majority of subsistence harvest studies to allow for the measuring of change over time and/or they encompass a broad range of subsistence characteristics including material harvest, effort, and sharing. Measures of material and cultural importance are established through the use of available quantitative measures. While all subsistence activities and resources are of high importance to a community, the importance of individual resources relative to one another varies according to material and cultural measures. The ADF&G Division of Subsistence and Stephen R. Braund & Associates (SRB&A) subsistence studies have systematically collected community harvest and use data in Alaska since the 1980s. These data allow for the quantitative measurement of certain aspects of cultural and material importance of subsistence resources used in this analysis.

In most cases, Resource Importance, as discussed in this report, is organized around 14 resource categories rather than at a species level, which number in the hundreds. Resource categories are based on species groupings such as salmon, non-salmon fish, berries, and small land mammals/furbearers; in some cases, single species represent their own resource category (e.g., caribou). The list of 14 resource categories is provided in Table 3. For the caribou and fish study communities, resource importance was calculated for selected species (caribou, Chinook salmon, chum salmon, and sheefish).

Table 3. Resource categories for subsistence impact analysis

Resource category number	Resource	Example species
1	Moose	N/A
2	Caribou	N/A
3	Dall sheep	N/A
4	Bear	Black and brown bear
5	Other large land mammals	Goat, elk, bison, deer
6	Small land mammals furbearers	Hare, fox, porcupine, wolf
7	Marine mammals	Bowhead, bearded seal, walrus
8	Migratory birds	Ducks, geese, crane
9	Upland birds	Grouse, ptarmigan
10	Bird eggs	Gull eggs, duck eggs
11	Salmon	Chinook, sockeye, coho
12	Non-salmon fish	Arctic grayling, trout, sheefish, whitefish
13	Marine invertebrates	Clams, cockles, shrimp
14	Vegetation	Blueberries, cranberries, tundra tea, firewood

Note: N/A = not applicable

In this analysis, material importance is quantitatively measured in terms of a resource's contribution toward each community's total subsistence harvest (i.e., edible pounds for each resource divided by the total edible pounds for all resources [percentage of total harvest]). ADF&G data that can be used to quantitatively measure the cultural importance of subsistence resources include data related to participation (percentage of households attempting harvests of each resource) and sharing (percentage of households receiving each resource). These measures were chosen as informing the cultural importance of subsistence resources because participation in subsistence activities promotes the transmission of skills from generation to generation, and sharing of subsistence resources between households strengthens community cohesion in the region. Furthermore, both participation and sharing are key to the cultural identity of community members.

The ranges for material importance were developed based on the fact that all resource categories contribute to a cumulative 100 percent of harvest. Because many subsistence communities rely on a diverse resource base from which they harvest, it is not unusual for the top contributing resource categories to only contribute in the teens to lower 20 percent of harvest. Thus, the ranges for material importance below in Table 4 allow for all study communities to have a high, moderate, and low resources, and they reflect the nature of subsistence harvests across an often diverse resource base where few resource categories represent a high percentage of the total community harvest.

The ranges for cultural importance are specific to each community's unique behavior of attempting to harvest and receiving. This community-centric approach, where every community's ranges are defined based on that community's unique set of data, takes into account cultural variation between communities and between the ways certain resources are harvested. Whereas, a community's harvest (material importance) will always total 100 percent, the cultural measures of importance are unique to each community and may exhibit a wide range of variation depending on the community's cultural and environmental setting (e.g., proximity to urban areas, regulatory restrictions, proximity to resources). For each variable by community, a range is determined by subtracting the lowest percentage of households within each variable (e.g., attempting to harvest) from the highest percentage of the same variable (e.g., 100-40 = 60). That range (e.g., 60) is then divided into thirds in order to determine the high, moderate, and low ranges (e.g., Low = 40–60; Moderate = 60–80; High = 80–100). As an example, in one community, the range of households trying to harvest different resources may be 20–50 percent, whereas in a second community it may be as high as 40–100 percent. Reasons for these differences may include work commitments, geographic and climatic restraints, urban disruption, or regulatory environment which limit or facilitate the opportunities for attempting to harvest. A community-centric approach takes into account the unique community range in both examples above, standardizing the high range to 40–50 percent for the first community and 80-100 percent for the second community.

Table 4. List of quantitative measures for material importance

Importance category / Quantitative measure	High (H)	Moderate (M)	Low (L)
Material importance % of total harvest (in pounds)	H ≥20%	20%> M ≥2%	L <2%

For the final determination as a high, moderate, or low resource of importance the top value from the three variables of percentage of total harvest, percentage of households attempting to harvest, and percentage of households receiving is selected as the final classification of importance. For example, moose may represent 15 percent of total harvest (moderate), the top third of households attempting to harvest (high), and the bottom third in receiving (low). The final selection ranks moose overall as a resource of high importance in this example due to the cultural importance of participation and attempting to harvest. Lastly, if no harvest data exist for a particular resource, the final selection ranks that resource importance as "Indeterminate."

This analysis, while reflecting one method of quantitatively measuring the importance of subsistence resources, does not take into account a multitude of factors for which quantitative data do not exist (e.g., spirituality, ethics and values, ideologies, identities, celebration and ceremonies). Rankings of resources under high, moderate, and low importance should be viewed only in terms of the indicators presented here and not in terms of overall importance. Subsistence harvesters in the study communities routinely view all of the resources they harvest during their seasonal cycle of availability as important to their community and/or individual health and cultural identity. To take into account the aspects of subsistence such as spirituality, values, and identity that could be impacted and which are not easily characterized by quantitative data, the project relies on the Indigenous Knowledge and concerns identified in the scoping comments for this project in both assessing impacts and providing potential mitigation measures and other potential strategies to minimize construction and operational impacts on resources and subsistence harvesters.

5. Overview of Subsistence Uses

5.1. Kobuk River

The Kobuk River region includes the communities of Ambler, Kiana, Kobuk, Noorvik, and Shungnak. Of these communities, Kobuk and Shungnak are closest to the proposed road corridors, followed by Ambler, Kiana, and Noorvik, which are located on the Kobuk River at varying distances downstream from the project corridors.

5.1.1 Subsistence Use Areas

Subsistence use areas for the Kobuk River region study communities are focused around the Kobuk River, but extending both south toward the Koyukuk River drainage and north into the Brooks Range and as far as the North Slope of Alaska. Residents' subsistence uses also extend downriver and into the marine waters of Kotzebue Sound and the Chukchi Sea. More recently documented subsistence use areas (Watson 2018; Satterthwaite-Phillips et al. 2016) indicate a smaller extent of overland travel. In particular, recent studies show less extensive travel to the north of the study communities into the Brooks Range and onto the North Slope. Watson (2018) discusses that some of the shifts in use areas may reflect changes in migratory routes of the WAH; changes in traditional hunting methods to avoid diverting caribou during their fall migration (thereby hunting them farther south); decreased need for extensive overland travel (e.g., less reliance on furbearer trapping); and increased reliance on fish resources (thus greater focus on riverine use areas). Except for Noorvik, subsistence use areas for Kobuk River region study communities overlap with the western portion of the project alternatives.

As shown on Map 2, Ambler subsistence use areas for all available time periods (Lifetime ca. 1925–1985; 2012; and Lifetime to 2016) extend west to the Chukchi Sea and Kotzebue Sound; north through the Brooks Range onto the North Slope surrounding the headwaters of the Colville River; east to the headwaters of the Kobuk River; and south toward Buckland and Huslia. Recent subsistence use areas documented for Ambler (Watson 2018) indicate that the contemporary subsistence use area of Ambler is somewhat smaller in that use areas do not extend as far north into the Brooks Range. As noted above in Section 4.1.1, Subsistence Use Area and Travel Method Data, even if certain traditional land use areas are not depicted on contemporary subsistence use area maps, communities maintain cultural ties to traditional use areas, and the protection of these areas is key to maintaining cultural identity and the ability to adapt to future changes. Contemporary use areas are focused around the Kobuk and Ambler rivers, north into the southern foothills of the Brooks Range, and south toward the Selawik and Koyukuk rivers. Based on Watson (2018), contemporary caribou hunting generally occurs along the Kobuk and Ambler rivers and in a large overland area south of the community toward Selawik River and Huslia. Moose hunting occurs in a similar area but with less extensive overland use. Furbearer trapping occurs in an overland area focused along the mid- to upper-Kobuk River and south toward Huslia and the Selawik River. Contemporary fishing occurs in a more extensive area than historic fishing and indicates a shift away from lakes toward rivers. Salmon and non-salmon fishing areas extend from Kotzebue Sound to the headwaters of the Kobuk River, along the Selawik area, and in the Koyukuk River drainage. Waterfowl hunting occurs over a similar area as fishing, focused along the entirety of the Kobuk River and in some overland areas both north and south of the river. Marine mammal hunting occurs downriver from Ambler into Kotzebue Sound. Contemporary berry harvesting areas extend along the Kobuk River and in a large overland area to the east, northeast, and southeast of the community, although respondents indicated that their primary berry harvesting areas are located closer to the community of Ambler.

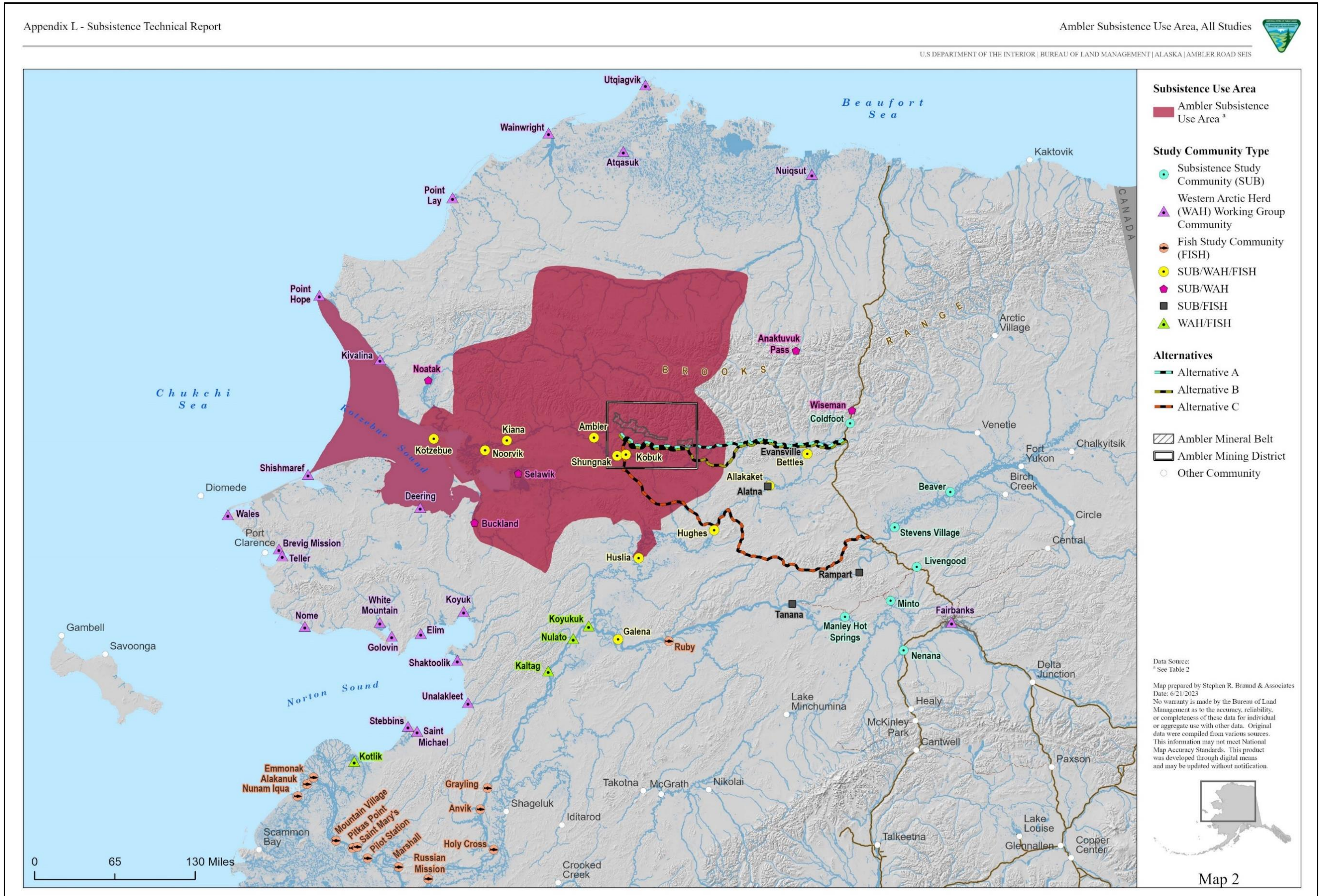
As shown on Map 3, Kiana use areas occur in a large area extending along the Kobuk River, north into the Brooks Range and the headwaters of the Colville River, south toward Buckland, and west into Kotzebue Sound and along the Chukchi Sea coast. Kiana use areas are only available from Schroeder et al. (1987), which depict lifetime use areas for the period circa 1925–1986. Most contemporary Kiana use areas (Lamb et al. n.d. [2024]) fall within the geographic boundaries described by Schroder et al., but also include an area along the Noatak River about 15 miles south of Noatak, as well as specific locations southwest of Hooper Bay on the Nuok Spit and in waterbodies near Anchorage and the Kenai River.

Kobuk subsistence use areas (Map 4) extend along the entire Kobuk River drainage to Norutak Lake, north into the Brooks Range, west into Kotzebue Sound, and south to an area surrounding Selawik Lake and River. Use areas have been documented for the Lifetime ca. 1925–1985; Lifetime to 2016; and 2012 time periods. Contemporary subsistence use areas as shown in Watson (2018) occur over a similar area but with lesser use to the north of the community into the Brooks Range and a greater focus along river drainages rather than large overland areas. Contemporary caribou hunting occurs in the upper Kobuk River, southern Brooks Range, and overland toward Buckland and the Dakli River. Moose hunting is focused solely long the Kobuk River upriver from Shungnak, in addition to a small overland area extending toward the Ambler River. Contemporary trapping is focused in a smaller area than historic trapping areas and occurs in an area near the Kobuk River and north toward the Ambler River. Fishing and waterfowl hunting both occur in a similar area which is focused along the Kobuk River upriver from Shungnak to Pah River. Contemporary marine mammal use areas occur within Kotzebue Sound, with the entire Kobuk River used for travel to those hunting areas. Finally, contemporary vegetation harvesting areas for Kobuk occur along the entire Kobuk River drainage downriver to the Kotzebue area.

Shungnak use areas (Map 6) for all available time periods (Lifetime ca. 1925–1985; Lifetime to 2016; and 2012) occur over a large area extending from the Colville River in the north to Buckland and Huslia in the south, west into Kotzebue Sound, and east to the headwaters of the Kobuk River. Contemporary use areas for Shungnak, as shown in Watson (2018), continue to occur in a large overland area which extends north into the Brooks Range although not as far as the North Slope. Contemporary use areas extend south to Buckland and Huslia but are primarily focused on the Kobuk River, Brooks Range to Noatak River, and south to Selawik River. Unlike other Kobuk River study communities, contemporary Shungnak use areas do not extend to marine areas in Kotzebue Sound. Caribou hunting generally occurs over a larger area than other resource pursuits, extending to the Noatak River in the north and the Buckland and Huslia areas in the south in addition to the mid- to upper-Kobuk River drainage. Moose hunting focuses along river drainages including the Ambler and Kobuk rivers. Sheep hunting extends north of the community of Shungnak into the Brooks Range as far as the Noatak River while trapping occurs in overland areas both north and south of the Kobuk River. Waterfowl hunting occurs along the Kobuk River and tributaries in addition to lakes and overland areas south of the community toward the Selawik and Dakli rivers. Similar to Ambler and Kobuk, Shungnak fishing areas have shifted from lake-focused fishing to fishing along the

Kobuk River. Vegetation harvesting occurs relatively close to the community of Shungnak along the Kobuk River between Shungnak and Kobuk.

Noorvik is the only study community in the Kobuk River region whose use areas do not overlap directly with the project area; however, use areas for this community occur directly downriver from the project area on the Kobuk River and near Shungnak. As shown on Map 5, Noorvik subsistence use areas for all available time periods (Lifetime ca. 1925–1985; Lifetime to 2014; and 2012) extend from the Chukchi Sea as far as Point Hope and throughout Kotzebue Sound; north into the Brooks Range and as far as the upper Colville River; south toward Buckland and surrounding Selawik River, and east to Shungnak. According to Satterthwaite-Phillips et al. (2016), more recently documented subsistence use areas for the community of Noorvik indicate a shift to the south, with use areas focused along the Kobuk River, Kotzebue Sound, and south in overland areas near Buckland and Deering. Noorvik use areas for small game and large game extend along the Kobuk River near Ambler but with more intensive focus around the mouth of the Kobuk River and to the southwest of the community toward Deering and Buckland. Other resource pursuits, including plant gathering, bird hunting, and fishing, also focus around the lower Kobuk River and to the southwest of the community near Buckland and Deering. Fishing also occurs with great intensity in Kotzebue Sound and near the mouth of Selawik Lake (Satterthwaite-Phillips et al. 2016).



Map 2. Ambler subsistence use areas, all studies

Note: where the use overlays water, the shade is darker.

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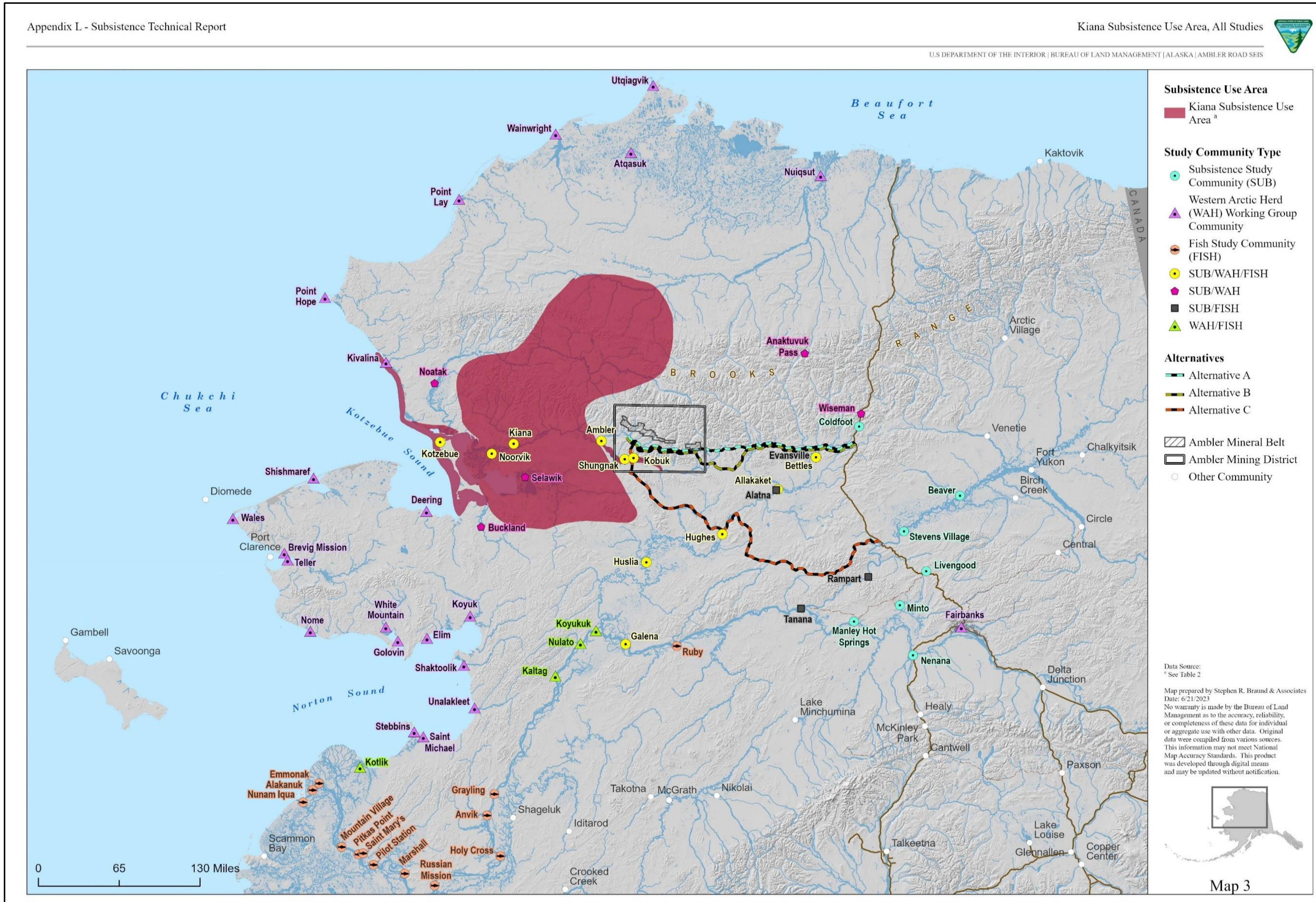

Map 3. Kiana subsistence use areas, all studies

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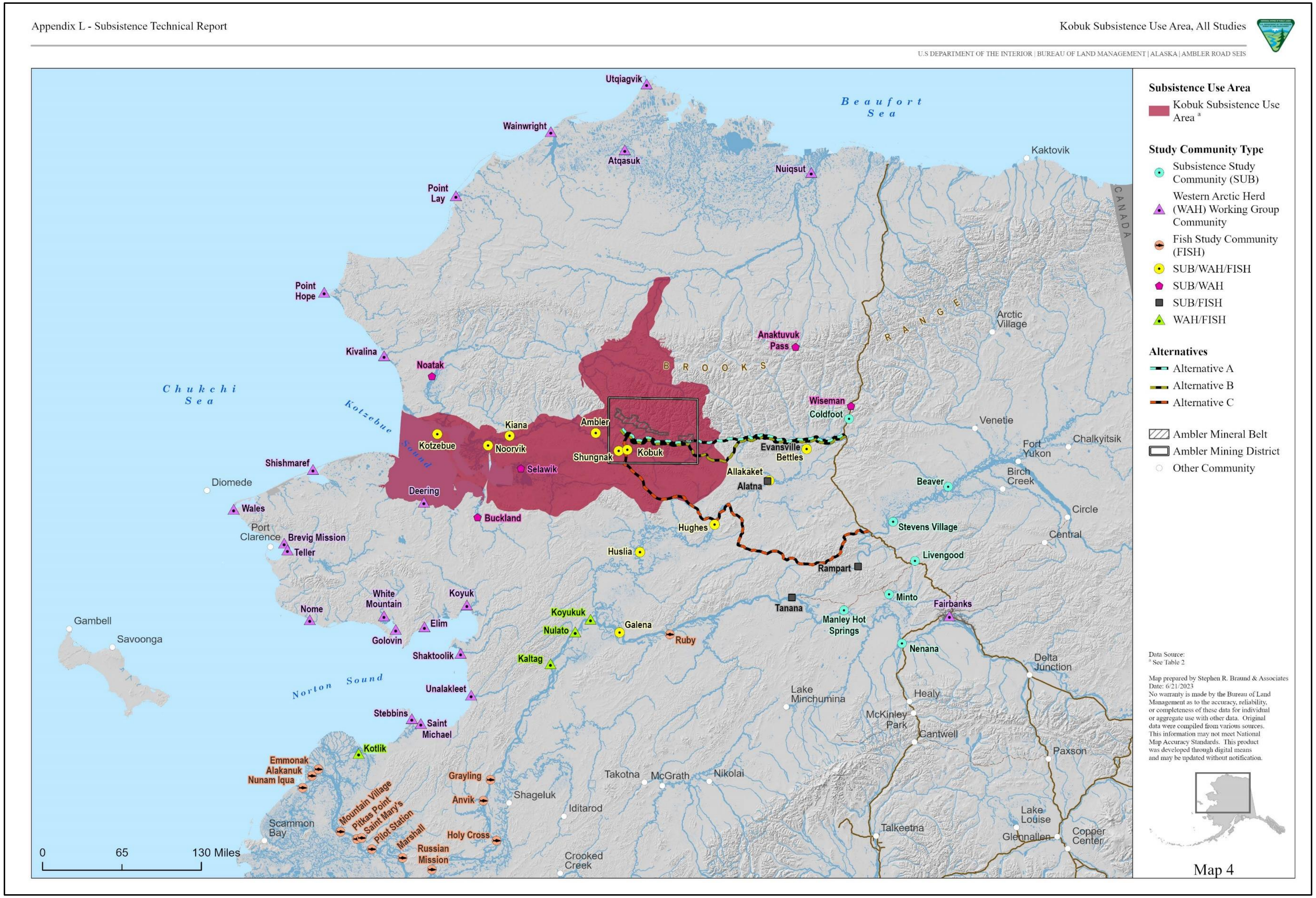

Map 4. Kobuk subsistence use areas, all studies

Note: where the use overlays water, the shade is darker.

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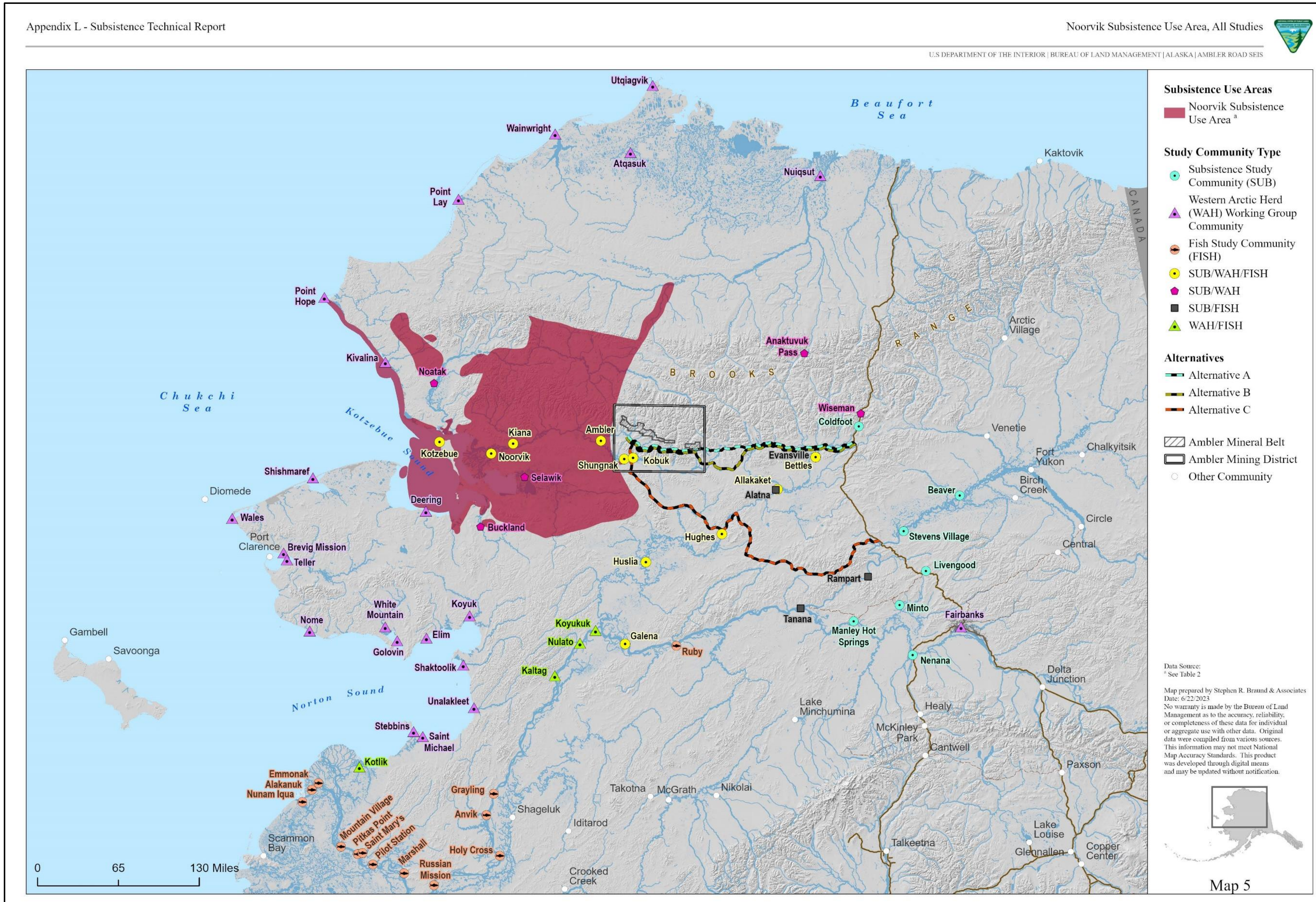

Map 5. Noorvik subsistence use areas, all studies

Note: where the use overlays water, the shade is darker.

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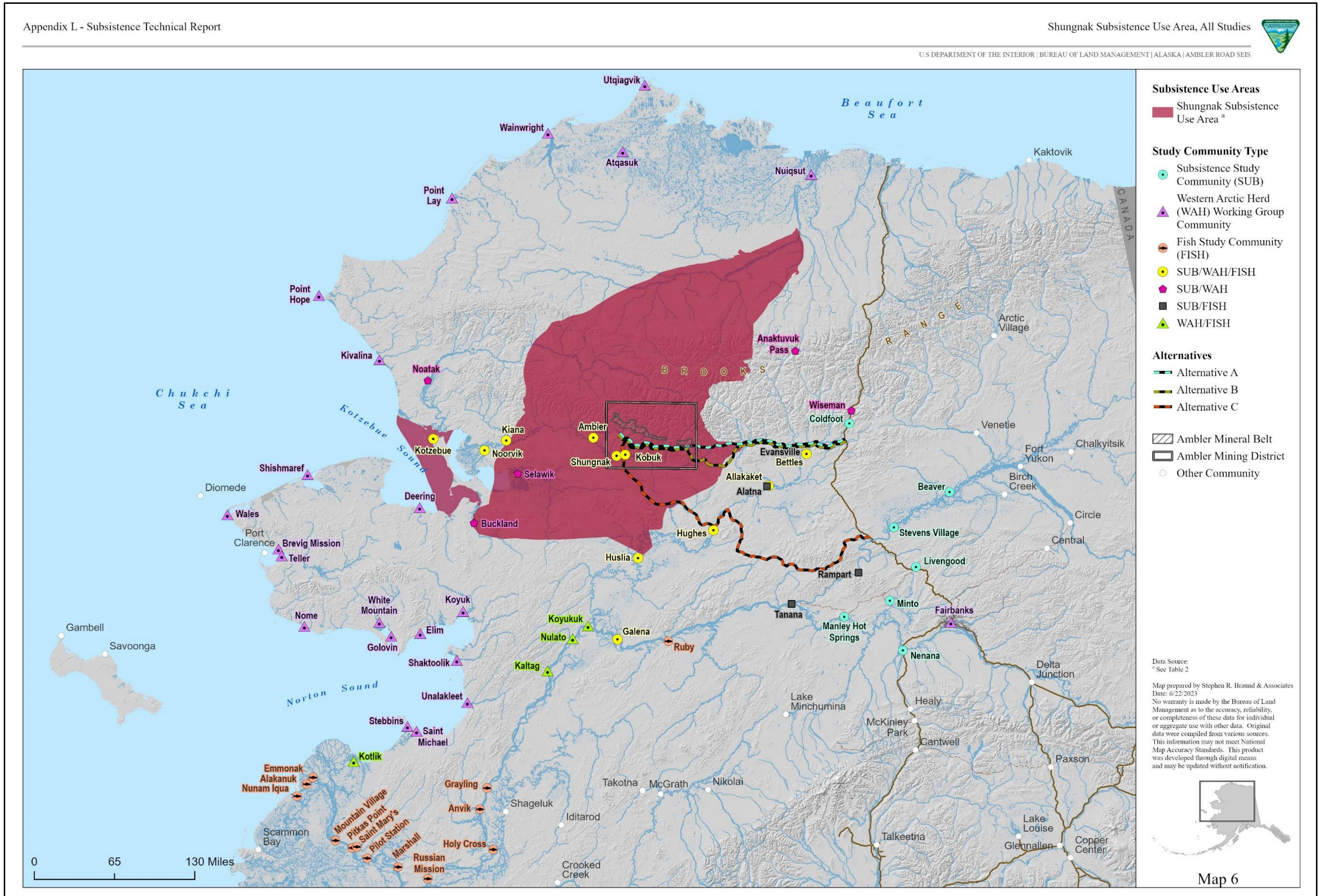

Map 6. Shungnak subsistence use areas, all studies

Note: where the use overlays water, the shade is darker.

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5.1.2 Harvest Data

Harvest data for the Kobuk River study communities are provided on Figure 1 through Figure 3 and in Table 5. The percentage of total harvest, shown on Figure 1, is calculated by dividing the total pounds of subsistence harvest for all resources by the pounds harvested for individual species or resource categories. Based on an average of available data, caribou is the primary resource harvested among the study communities in terms of percentage of usable pounds (39 percent), followed by non-salmon fish (31 percent), and salmon (18 percent). Other resources which contribute smaller amounts in terms of pounds include moose, vegetation, migratory birds, small land mammals/furbearers, and marine mammals. Resource contribution varies by study community. Communities located farther downriver (Kiana and Noorvik) and closer to Kotzebue Sound show a higher reliance on marine mammals. In addition, the community of Ambler shows a higher reliance on caribou than some other communities and a lower reliance on salmon. Recent fish-only studies show higher per capita harvests of salmon for Ambler, indicating a possible increase in the contribution of fish toward the total harvest.

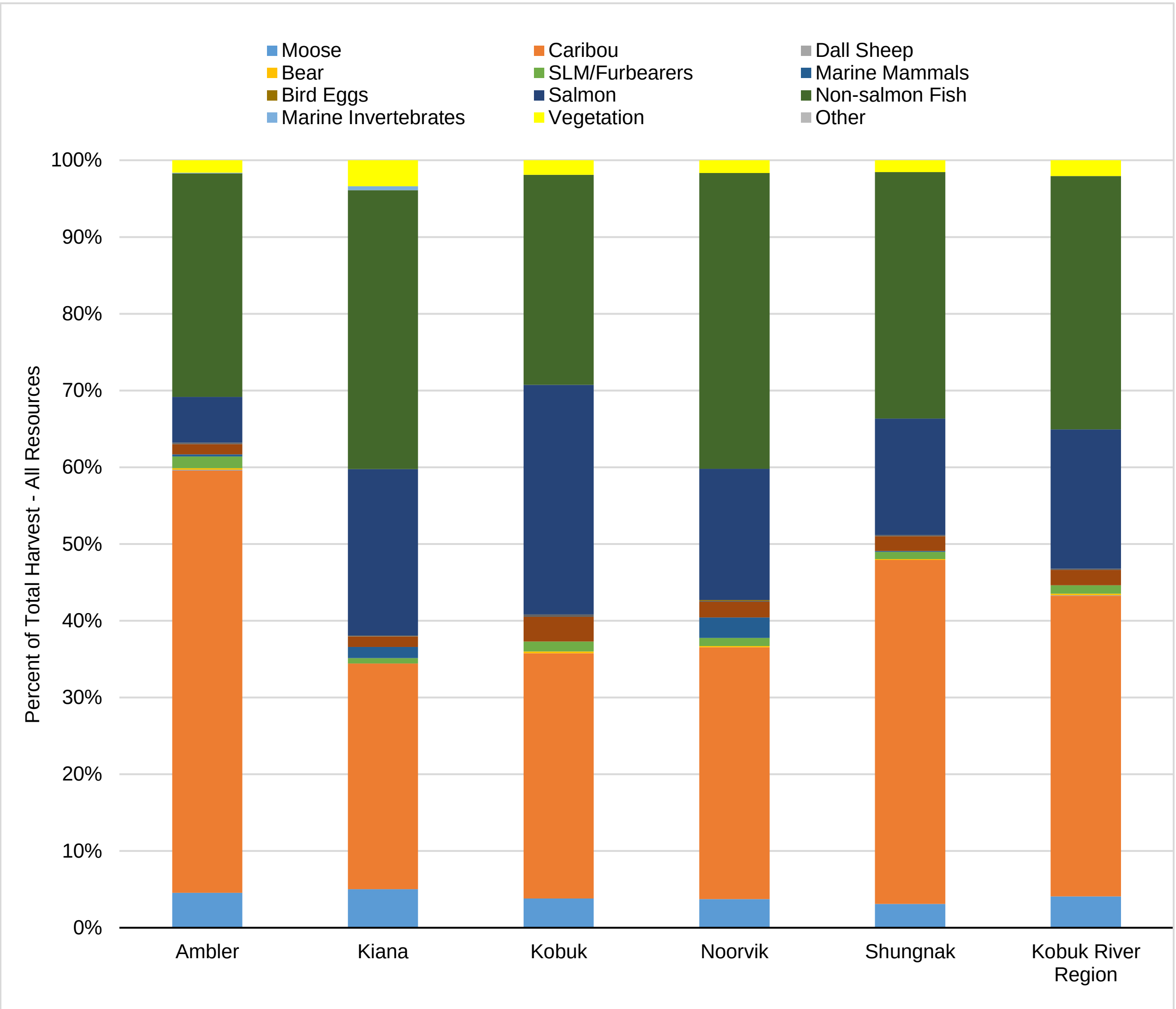

Figure 1. All resources percentage of total harvest by Kobuk River region communities
Source: See Table 2 for citations, time period, and resources addressed.
Notes: Data represent the average percentage of harvest across all available study years for comprehensive (i.e., all resources) household harvest surveys. In many cases, averages represent only a single study year. Available study years for each community are as follows: Ambler (2012); Kiana (2006); Kobuk (2012); Noorvik (2012); Shungnak (2002, 2012).

Average participation rates among Kobuk River communities, in terms of the average percentage of households attempting harvests by resource during individual study years, are shown on Figure 2. These data are based on averages across available study years; it is likely that in some years (or across all years) a higher percentage of households participates in each resource activity. Across all Kobuk River study communities, households most commonly participate in harvests of vegetation (86 percent of households), followed by non-salmon fish (74 percent), caribou (71 percent), and salmon (56 percent). Fewer households participate in harvests of Dall sheep, marine mammals, and small land mammals/furbearers. The average percentage of households receiving different resources is shown on Figure 3. This figure shows that while certain resources are not commonly harvested within a community, they may still be highly consumed through sharing. For example, while few Kobuk River region households participate in marine mammal hunting (less than 10 percent; Figure 2), an average of over 60 percent of households receive marine mammals. Other resources which are widely shared among Kobuk River region communities include non-salmon fish, salmon, caribou, vegetation, and migratory birds.

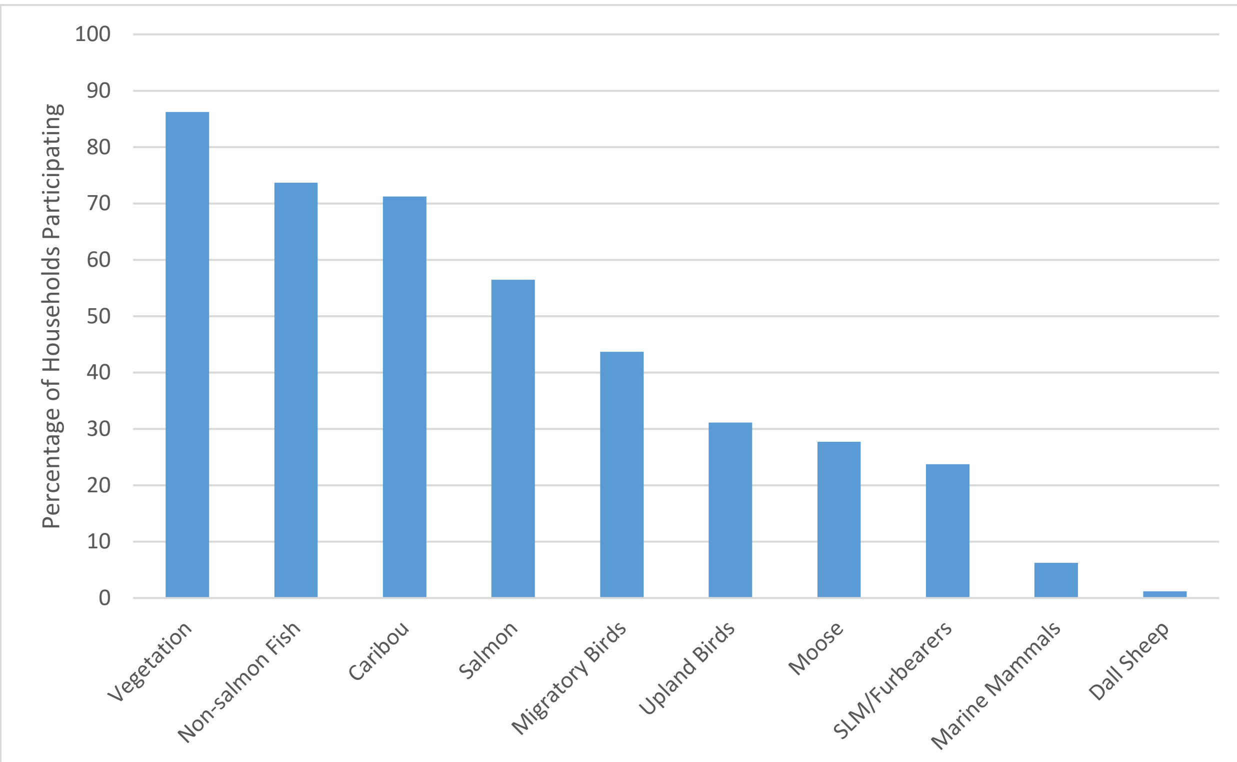

Figure 2. Percentage of households attempting harvests of resources, Kobuk River region communities

Source: See Table 2 for citations, time period, and resources addressed

Notes: Data represent the average percentage of households across all available study years Available study years for each community are as follows: Ambler (1997; 2003; 2009-10; 2012; 2012-2014); Kiana (1993; 1994-2004; 1996; 1999; 2009-10; 2012-2014); Kobuk (1994-2004; 1996-1997; 2004; 2009-10; 2012; 2012-2014); Noorvik (1996; 2002; 2008-09; 2012; 2012-2014); Shungnak (1996; 2000; 2002; 2008-09; 2012; 2012-2014).

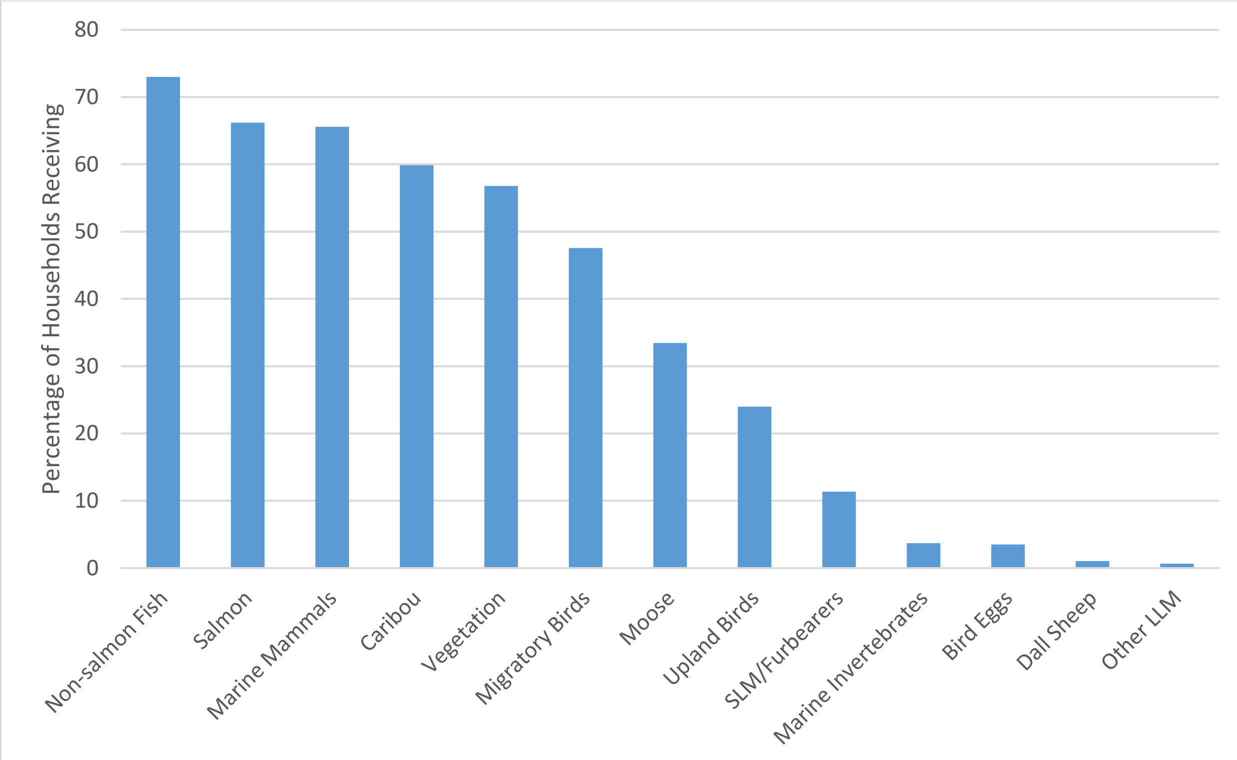

Figure 3. Percentage of households receiving resources, Kobuk River region communities
Source: See Table 2 for citations, time period, and resources addressed.
Notes: Data represent the average percentage of households across all available study years Available study years for each community are as follows: Ambler (1997; 2003; 2009-10; 2012; 2012-2014); Kiana (1993; 1994-2004; 1996; 1999; 2009-10; 2012-2014); Kobuk (1994-2004; 1996-1997; 2004; 2009-10; 2012; 2012-2014); Noorvik (1996; 2002; 2008-09; 2012; 2012-2014); Shungnak (1996; 2000; 2002; 2008-09; 2012; 2012-2014).

Table 5 shows average harvest and use data for the top five species harvested (in terms of average contribution toward the total subsistence harvest) by each of the Kobuk River Region study communities. Caribou is the top species in each of the study communities, contributing between 29.4 (Kiana) and 54.6 percent (Ambler) of the total subsistence harvest. Non-salmon fish species are also among the top five species for all study communities and include sheefish and whitefish (broad and humpback). Salmon – specifically chum salmon – are also among the top five species harvested in the study communities. Moose is among the top species harvested in Ambler, Kiana, and Kobuk. In addition, northern pike is a top species in the community of Noorvik. Data on the percentage of households using subsistence resources illustrates the heavy reliance of Kobuk River communities on resources such as caribou and fish, with between 88 percent and 95 percent of households in the individual communities using caribou; and between 76 and 94 percent of households using sheefish (Table 5). Across all study years, the percentages are likely higher.

Table 5. Average harvest and use data, top five species, Kobuk River region communities

Community	Species	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HHs receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% total harvest
Ambler	Caribou	88	74	69	56	51	489	66,473	937	255	54.6
Ambler	Broad whitefish	62	38	37	25	48	9,321	23,473	317	88	17.1
Ambler	Sheefish	87	72	69	47	56	1,481	20,966	291	84	7.5
Ambler	Chum salmon	76	53	52	34	57	2,902	20,262	281	80	5.4
Ambler	Moose	36	21	13	14	26	10	5,231	74	20	4.5
Kiana	Caribou	91	67	60	60	69	376	51,082	517	135	29.4
Kiana	Broad whitefish	53	32	29	21	36	4,926	15,762	158	40	20.2
Kiana	Chum salmon	86	61	57	41	73	3,661	20,270	207	51	18.8
Kiana	Moose	34	18	12	15	23	1,317	5,293	67	17	3.2
Kiana	Sheefish	80	60	58	40	61	1,428	14,688	149	36	7.3
Kobuk	Caribou	89	78	66	57	63	154	20,976	655	147	31.8
Kobuk	Chum salmon	83	63	60	38	54	2,174	12,841	384	84	29.5
Kobuk	Sheefish	94	81	79	42	43	903	10,199	306	67	23.3
Kobuk	Moose	48	45	16	16	43	6	2,958	95	21	3.8
Kobuk	Broad whitefish	27	19	19	9	14	543	1,738	55	12	1.8
Noorvik	Caribou	95	67	67	48	60	869	118,140	818	184	32.8
Noorvik	Sheefish	82	56	54	36	54	4,054	45,697	348	80	19.0
Noorvik	Chum salmon	89	47	45	42	66	15,408	93,115	719	165	16.3
Noorvik	Broad whitefish	78	45	42	33	53	12,063	38,603	297	68	9.1
Noorvik	Northern pike	59	43	41	25	27	6,347	20,945	161	37	4.8
Shungnak	Caribou	97	66	64	48	60	441	60,044	1,055	237	44.7
Shungnak	Chum salmon	78	52	50	30	58	4,691	28,070	452	105	14.8
Shungnak	Humpback whitefish	37	29	28	19	22	7,367	15,470	270	60	14.0

Community	Species	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HHs receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% total harvest
Shungnak	Sheefish	85	64	64	35	56	2,565	26,155	414	98	12.2
Shungnak	Broad whitefish	44	28	25	14	32	2,747	8,789	144	34	3.2

Source: See Table 2 for citations, time period, and resources addressed

Notes: HH = households

Data represent the average across all available study years. Available study years for each community are as follows: Ambler (1997; 2003; 2009-10; 2012; 2012-2014); Kiana (1993; 1994-2004; 1996; 1999; 2009-10; 2012-2014); Kobuk (1994-2004; 1996-1997; 2004; 2009-10; 2012; 2012-2014); Noorvik (1996; 2002; 2008-09; 2012; 2012-2014); Shungnak (1996; 2000; 2002; 2008-09; 2012; 2012-2014).

5.1.3 Timing of Subsistence Activities

Data on the timing of subsistence activities for Kobuk River study communities are provided in Table 6. This table shows the number of communities reporting subsistence activity or harvests within each month, based on the most recent data sources for each community. Overall, Kobuk River communities target the greatest number of resources during the month of October, with other periods of high activity also occurring in the earlier summer/fall months of August/September and in the spring months of April/May.

Early spring (March/April) is primarily spent on hunting and trapping of small land mammals, including hunting of upland birds. While residents no longer use spring muskrat camps regularly, some hunting of muskrats and beaver continues to occur. Geese and duck hunting peaks in April and May and remains an important spring activity with residents accessing harvest areas by boat and snowmachine depending on conditions (Braem et al. 2015). When available, residents may hunt WAH caribou during their spring migration north. Spring carnivals are important regional events, particularly for Kobuk and Koyukuk River communities, which center on the harvest and sharing of subsistence foods (Watson 2018).

Immediately after breakup, residents set nets for various non-salmon fish such as whitefish, graying, and northern pike (Braem et al. 2015). Harvesting of sheefish during their summer runs are a key summer activity for Kobuk River communities. Residents also harvest chum salmon and whitefish during the summer, sometimes staying at traditional fish camps, with harvesting of vegetation and hunting of large land mammals also occurring during this time.

While hunting of large land mammals (caribou, moose, and bear) may occur at lower levels during the summer, fall is the primary hunting season for these resources. Caribou hunting traditionally peaked in the fall months of September and October, although in recent years due to later WAH migrations, these activities peak in October and November. Residents also hunt other large land mammals such as moose and black bear during this time. Residents also resume hunting waterfowl in the fall as they migrate south. Residents continue to seine and set gillnets for fish into the fall, with whitefish replacing salmon and sheefish as the primary resource harvested during this time. Fall is also an important time for berry picking.

Hunting and fishing (through the ice) continues at somewhat lower levels into winter. Some individuals trap and hunt for beaver and other furbearers (e.g., wolf, wolverine, hare, and fox) in winter as well. When available during winter, hunters from the Kobuk River region may travel by snowmachine—sometimes great distances—to harvest caribou (Watson 2018). Residents also harvest ptarmigan during winter when they are available.

Table 6. Kobuk River region timing of subsistence activities, number of communities reporting subsistence activities

Resources	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Freshwater non-salmon	2	2	2	5	5	5	5	5	5	5	5	5
Marine non-salmon fish	N/A	N/A	N/A	N/A	3	3	5	2	2	2	N/A	N/A
Caribou	5	5	5	5	5	3	3	5	5	5	5	5
Moose	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	5	3	N/A	N/A
Bear	N/A	N/A	N/A	3	5	N/A	N/A	5	5	3	N/A	N/A
Furbearers	3	3	3	3	3	N/A	N/A	N/A	N/A	3	3	3
Small land mammals	5	5	5	5	5	N/A	N/A	N/A	N/A	2	5	5
Upland birds	5	5	5	5	N/A	N/A	N/A	N/A	N/A	2	5	5
Waterfowl	N/A	N/A	N/A	3	5	5	5	5	5	5	N/A	N/A
Plants and berries	N/A	N/A	N/A	N/A	N/A	5	5	5	5	5	2	N/A
Wood	5	5	5	5	5	3	N/A	2	2	2	5	5
Total number of resources per month	**6**	**6**	**6**	**8**	**8**	**6**	**5**	**8**	**8**	**11**	**7**	**6**

Source: Anderson et al. 1998; Braem 2012a; Braem et al. 2017

Notes: Apr = April; Aug = August; Dec = December; Feb = February; Mar = March; Jan = January; Jul = July; Jun = June; N/A = not applicable (no or limited subsistence activity); Nov = November; Oct = October; Sep = September

Kobuk River region communities = five (Ambler, Kiana, Kobuk, Noorvik, and Shungnak)

Each cell contains the number of communities reporting subsistence activity or harvests during each month, based on the most recent data source for each community. Months with only one community report harvests or activity are not included in the table. Resources with no subsistence activity data available are not included in the table.

5.1.4 Travel Method

While systematic, quantitative data on travel methods are not available for Kobuk River subsistence study communities, several studies provide qualitative information on travel methods and routes in the Kobuk River region. Braem et al. (2015) note that boat and snowmachine are the primary used by residents to travel to subsistence harvesting areas and to and from other communities within the region. To a lesser extent, residents use ATVs to access overland areas during the snow-free season. However, while still not a primary mode of transportation, use of ATVs has increased over time. As stated in Braem et al. (2015), residents of Ambler use ATVs to "reach country that may be inaccessible by boat" and to save on gas by opting for short ATV trips over longer boating trips. Snowmachine travel can extend into mid-May assuming snow conditions allow. In recent years, residents have noted changes in snow conditions which affect certain subsistence activities generally carried out by snowmachine (e.g., furbearer harvesting, wood-gathering, and inter-community travel). Breakup generally occurs in mid- to late May when residents switch from snowmachine travel to boat travel along local rivers. Erosion has also affected river channels, and subsequently boat travel, for Kobuk River communities. Freeze-up generally occurs in mid-October, and once the ice is thick enough, residents begin traveling by snowmachine which opens up larger overland areas for subsistence uses. In recent years, snowmachine travel along the river has not been safe until around December (personal communication, NPS, 2024). For the study communities, the Kobuk River is a major transportation corridor throughout the year.

5.1.5 Resource Importance

While all subsistence activities and resources are of high importance to a community, the importance of individual resources relative to one another varies according to various material and cultural measures used in this analysis. This section provides an analysis of the relative importance of resources to each Kobuk River Region study community, based on selected measures of harvest (percentage of total harvest), harvest effort (percentage of households attempting harvests) and sharing (percentage of households receiving). The relative importance of subsistence resources to the individual Kobuk River study communities, based on selected variables, is provided in Table 7 through Table 11.

Based on this analysis, caribou, non-salmon fish, salmon, marine mammals, and vegetation are resources of high importance in all five Kobuk River Region study communities. In addition, migratory birds are a resource of high importance in one study community (Shungnak). Resources of moderate importance in the study communities include moose (five study communities), small land mammals/furbearers (three study communities), migratory birds (four study communities), and upland birds (three study communities).

Table 7. Relative importance of subsistence resources based on selected variables, Ambler

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	21	26	5	M
2	Caribou	74	51	55	H
3	Dall sheep	2	2	0.1	L
4	Bear	NA	NA	0.2	L
5	Other large land mammals	NA	1	NA	L
6	Small land mammals/furbearers	19	9	2	M
7	Marine mammals	2	60	0.3	H

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
8	Migratory birds	40	30	1	M
9	Upland birds	40	26	0.2	M
10	Bird eggs	2	4	0	L
11	Salmon	55	62	6	H
12	Non-salmon fish	77	68	29	H
13	Marine invertebrates	2	2	0.1	L
14	Vegetation	85	51	2	H

Source: See Table 2
Notes: H = High; HH = Households; L = Low; M = Moderate; NA = Not Available

Table 8. Relative importance of subsistence resources based on selected variables, Kiana

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	18	23	5	M
2	Caribou	67	69	29	H
3	Dall sheep	1	2	0	L
4	Bear	NA	NA	NA	I
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/furbearers	18	7	1	L
7	Marine mammals	10	90	2	H
8	Migratory birds	38	NA	1	M
9	Upland birds	8	NA	0.03	L
10	Bird eggs	1	NA	0	L
11	Salmon	63	80	22	H
12	Non-salmon fish	68	72	36	H
13	Marine invertebrates	2	7	1	L
14	Vegetation	80	69	3	H

Source: See Table 2
Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 9. Relative importance of subsistence resources based on selected variables, Kobuk

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	45	43	4	M
2	Caribou	78	63	32	H
3	Dall sheep	NA	NA	NA	I
4	Bear	NA	NA	0.2	L

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/furbearers	26	14	1	L
7	Marine mammals	NA	63	NA	H
8	Migratory birds	40	57	3	M
9	Upland birds	50	33	0.3	M
10	Bird eggs	NA	NA	NA	I
11	Salmon	63	57	30	H
12	Non-salmon fish	85	71	27	H
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	87	80	2	H

Source: See Table 2

Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 10. Relative importance of subsistence resources based on selected variables, Noorvik

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	28	43	4	M
2	Caribou	67	60	33	H
3	Dall sheep	0.4	1	NA	L
4	Bear	NA	NA	0.2	L
5	Other large land mammals	NA	0.4	NA	L
6	Small land mammals/furbearers	20	10	1	L
7	Marine mammals	11	67	3	H
8	Migratory birds	54	53	2	M
9	Upland birds	29	12	0.1	M
10	Bird eggs	20	5	0.1	L
11	Salmon	47	69	17	H
12	Non-salmon fish	70	81	38	H
13	Marine invertebrates	1	7	0.003	L
14	Vegetation	86	54	2	H

Source: See Table 2

Notes: H = High; HH = Households; L = Low; M = Moderate; NA = Not Available

Table 11. Relative importance of subsistence resources based on selected variables, Shungnak

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	27	41	3	M

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
2	Caribou	66	60	45	H
3	Dall sheep	NA	1	NA	L
4	Bear	NA	NA	0.1	L
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/furbearers	35	22	1	M
7	Marine mammals	2	71	0.1	H
8	Migratory birds	47	51	2	H
9	Upland birds	29	24	0.1	L
10	Bird eggs	NA	2	NA	L
11	Salmon	54	62	15	H
12	Non-salmon fish	69	72	32	H
13	Marine invertebrates	1	2	NA	L
14	Vegetation	94	42	2	H

Source: See Table 2
Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

5.2. Kotzebue Sound

The Kotzebue Sound region includes the communities of Buckland, Kotzebue, Noatak, and Selawik. These communities are located to the west of the project corridors in Kotzebue Sound and along tributaries of Kotzebue Sound.

5.2.1 Subsistence Use Areas

Subsistence use areas for the Kotzebue Sound region study communities are focused around Kotzebue Sound, the Chukchi Sea coast, and lands and rivers surrounding Kotzebue Sound including the Brooks Range and the Noatak, Kobuk, Selawik, and Buckland rivers. More recently documented subsistence use areas for these study communities (Satterthwaite-Phillips et al. 2016) indicate a smaller extent of overland travel. Subsistence use areas for Kotzebue Sound region study communities do not overlap with the project alternatives but occur downriver from the alternatives or approach the project alternatives in overland areas from the west and north.

As shown on Map 7, Buckland subsistence use areas for all available time periods (Lifetime ca. 1925–1985; Lifetime to 2014) occur in a large overland area to the south and east of the community; along the Kobuk River to the community of Ambler; into Kotzebue Sound and along the coast near Kivalina; and north along the Noatak River. While recent subsistence use areas documented for Buckland (Satterthwaite-Phillips et al. 2016) indicate a shift in contemporary subsistence uses to the south, an even more recent 1-year harvest study conducted by ADF&G shows subsistence use continuing to occur along the Kobuk River nearly to the community of Ambler. In addition, a single non-salmon fish use area was reported on the Kobuk River upriver from the community of Kobuk (Mikow and Cunningham 2020). Marine mammal hunting by Buckland residents occurs in Kotzebue Sound primarily near the mouth of the Buckland River and near Deering. Bird hunting and egg harvesting is also focused around the Buckland River with coastal hunting in Kotzebue Sound as well. Fishing occurs along the Buckland River, in Kotzebue Sound, and in Selawik Lake, with the greatest amount of overlap occurring In Kotzebue Sound near the mouth of Selawik Lake, in the southern portion of Selawik Lake, and near the community of Buckland on the Buckland River. Large game hunting focuses to the south and east of the community, both along the Buckland River and in larger overland areas that extend south and east paralleling the Selawik River, with small game hunting and trapping occurring in similar overland areas. Finally, plant gathering in Buckland occurs most commonly along the Buckland River and in coastal areas near the mouth of the river (Satterthwaite-Phillips et al. 2016).

Map 8 shows Kotzebue subsistence use areas for all available time periods (Lifetime to 2014; 2014) occurring throughout Kotzebue Sound and along the Chukchi Sea coast, along the Kobuk and Noatak rivers, and in overland areas which extend to the southwest, north, east and southeast of the community. More recently documented subsistence use areas documented in Satterthwaite-Phillips et al. (2016) show Kotzebue residents using similar areas for subsistence throughout Kotzebue Sound and along the Noatak River and Kobuk River drainages. In addition, more recently documented use areas extend as far as Point Hope in the north and in areas surrounding the Kivalina and Wulik rivers. Based on the data in Satterthwaite-Phillips et al. (2016), contemporary marine mammal use areas occur throughout Kotzebue Sound and along the Chukchi Sea coast to Point Hope. Bird hunting focuses on the lands near Kotzebue, around the mouth of the Kobuk River, along the Noatak River, and along the coast extending from the Delong Mountain Transportation System (DMTS), Cape to Cape Krusenstern, Sheshalik, and the mouth of the Noatak River. Kotzebue use areas for fish are most concentrated around the mouth of the Kobuk River, in various areas of Kotzebue Sound and along the Noatak River. Large and small game hunting game hunting by Kotzebue residents focuses on coastal areas of Kotzebue Sound, along the Kobuk and Noatak rivers, and in overland areas to the northeast of the community in the Brooks Range. Plant gathering activities are focused on coastal areas in Kotzebue Sound and along the Noatak River, with some plant harvesting also occurring near the mouth of the Kobuk River (Satterthwaite-Phillips et al. 2016).

Noatak use areas for all available time periods (Lifetime ca. 1925–1985; Lifetime to 2014; 1998–2007; 2007) (Map 9) occur along the entire lower and upper Noatak River drainage, north onto the North slope, west to the Chukchi Sea coast and in marine waters of the Chukchi Sea, and south into Kotzebue Sound, along Kobuk river, and around the Selawik River drainage. More recently documented use areas occur in similar areas surrounding the Noatak River drainage but with less extensive use to the north of Brooks Range and south of the community along the Selawik River drainage. Marine mammal hunting by Noatak residents occurs throughout Kotzebue Sound and in marine waters off the Chukchi Sea coast as far as Point Hope. Bird hunting primarily occurs in overland areas surrounding the Noatak River, while fishing is focused along the Noatak River drainage with some fishing also occurring in coastal areas of Kotzebue Sound, particularly near Sheshalik. Contemporary large game and small game hunting in Noatak is focused heavily along the Noatak River drainage and in various overland areas surrounding the Noatak River. Plant gathering in Noatak is also focused around the Noatak River, with some coastal use areas identified as well (Satterthwaite-Phillips et al. 2016).

As shown on Map 10, Selawik subsistence use areas for all available time periods (Lifetime ca. 1925–1985; Lifetime to 2014; 2010-11) occur in an area surrounding the Selawik Lake and river, extending east toward the upper Kobuk and Koyukuk river drainages, north into the Brooks Range and as far as the upper Colville River, and west into Kotzebue Sound and along the Chukchi Sea coast to Kivalina. More recently documented subsistence use areas (Satterthwaite-Phillips et al. 2016) are focused primarily to the south of the Kobuk River drainage, with a majority of subsistence harvesting activities occurring around Selawik Lake, Selawik River, and in overland areas to the south of the community. Bird hunting is focused to the east of Selawik Lake along Inland Lake, Selawik River, and Tagagawik River. Fishing occurs with the greatest concentrations in Selawik Lake and along Selawik River, with lesser use of Kotzebue Sound and in several locations along the Kobuk River. Large game hunting focuses along local lakes and waterways in addition to extending across larger overland areas both north and south of the community of Selawik. Small game hunting and trapping occurs in similar overland areas but focused to the east of Selawik Lake. Residents also have reported a couple of isolated hunting areas for large and small game along the Kobuk River. Plant gathering by Selawik residents is more concentrated near the community and around river and lakesides.

5.2.2 Harvest Data

Harvest data for the Kotzebue Sound study communities are provided on Figure 4 through Figure 6 and in Table 12. The percentage of total harvest, shown on Figure 4, is calculated by dividing the total pounds of subsistence harvest for all resources by the pounds harvested for individual species or resource categories. Based on an average of available data, non-salmon fish is the primary resource harvested among the study communities in terms of percentage of usable pounds (32 percent), followed closely by caribou (31 percent). Marine mammals and salmon (both 14 percent) also contribute a substantial amount to Kotzebue Sound study communities. Other resources which contribute smaller amounts in terms of pounds include moose, vegetation, and migratory birds. Resource contribution varies by study community. Selawik shows a much higher reliance on non-salmon fish than other Kotzebue Sound study communities, at 68 percent of the total subsistence harvest. Noatak and Buckland show a higher reliance on caribou, while Kotzebue harvests are nearly evenly split between caribou, non-salmon fish, salmon, and marine mammals.

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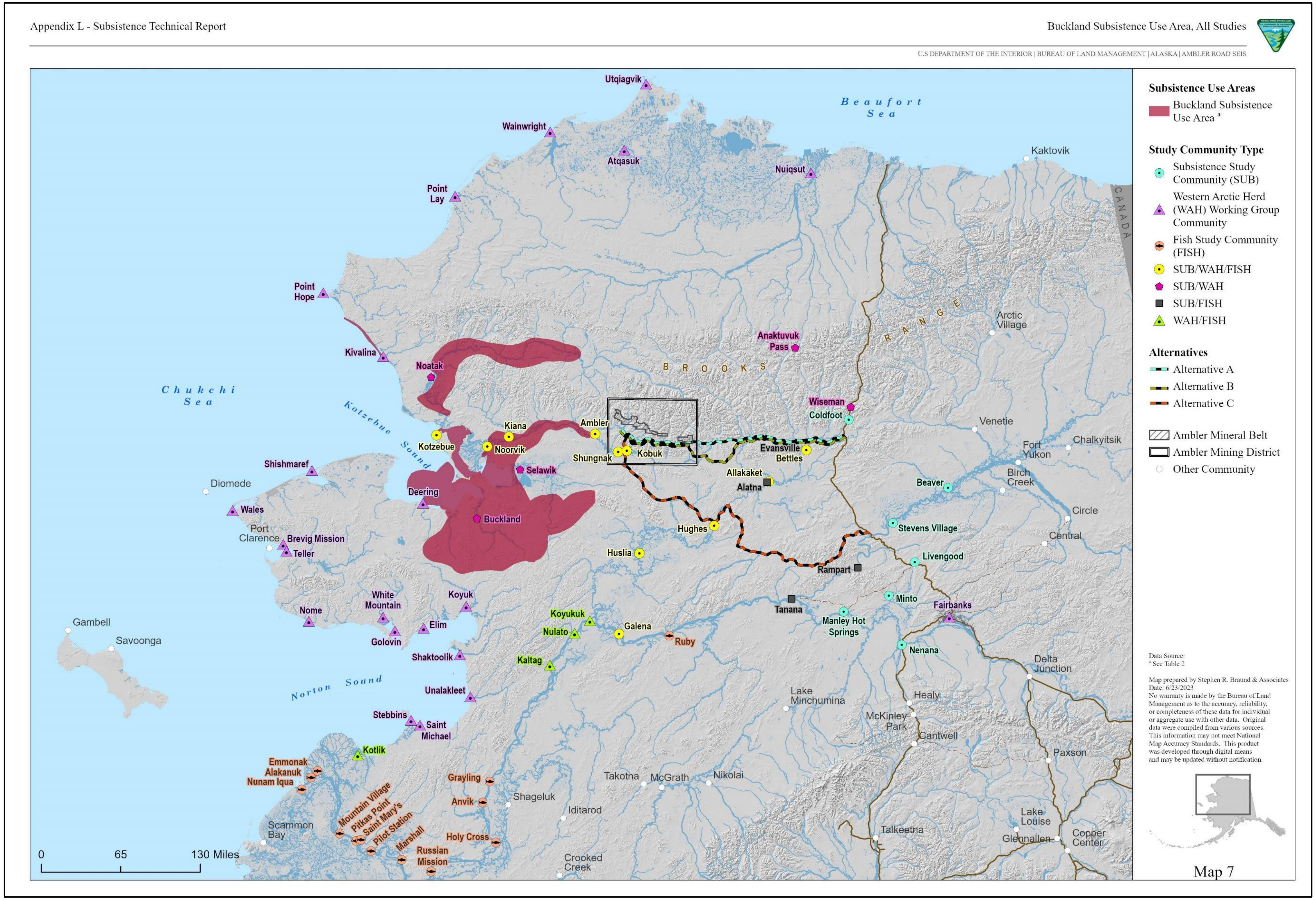

Map 7. Buckland subsistence use areas, all studies

Note: where the use overlays water, the shade is darker.

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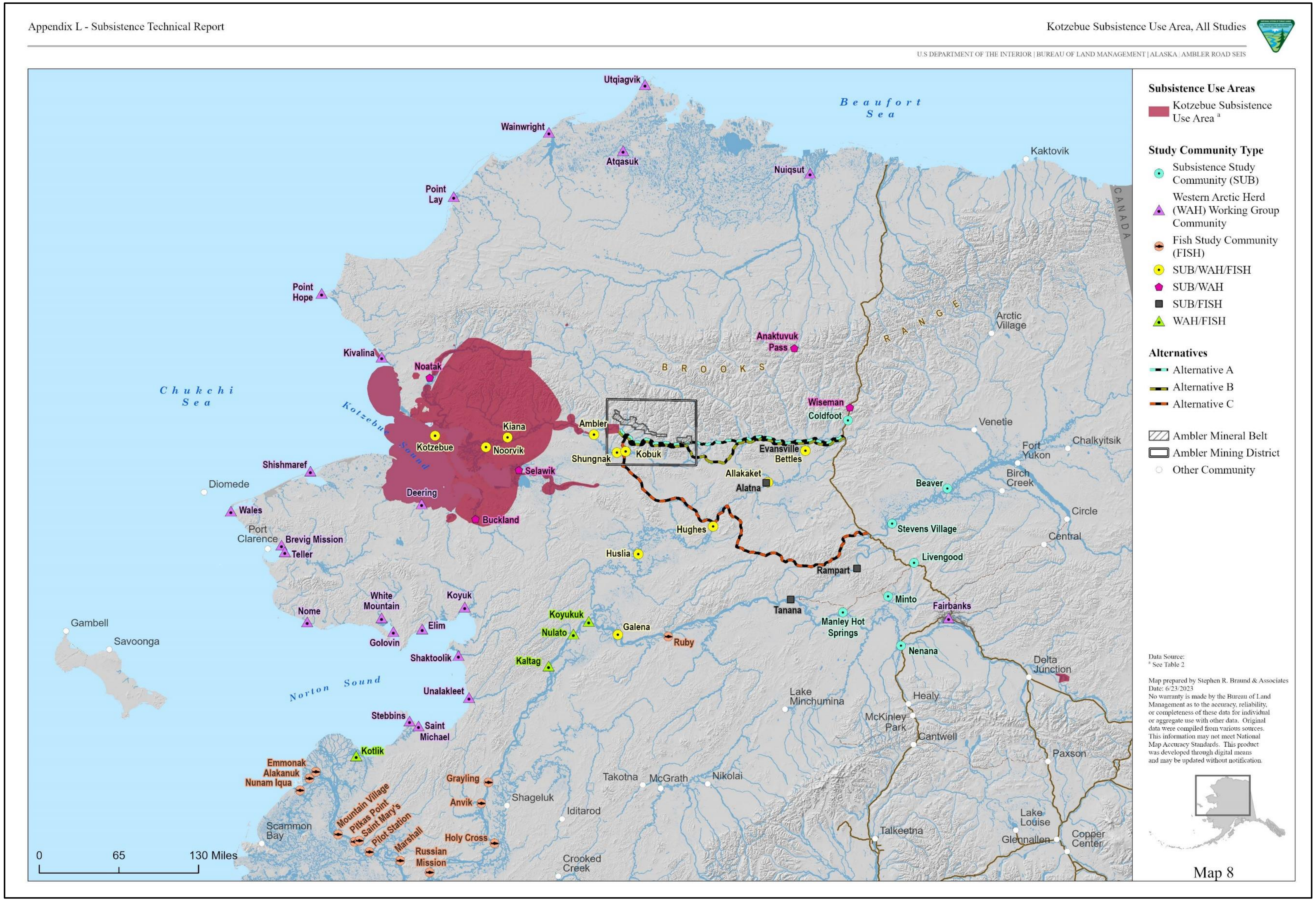

Map 8. Kotzebue subsistence use areas, all studies

Note: where the use overlays water, the shade is darker.

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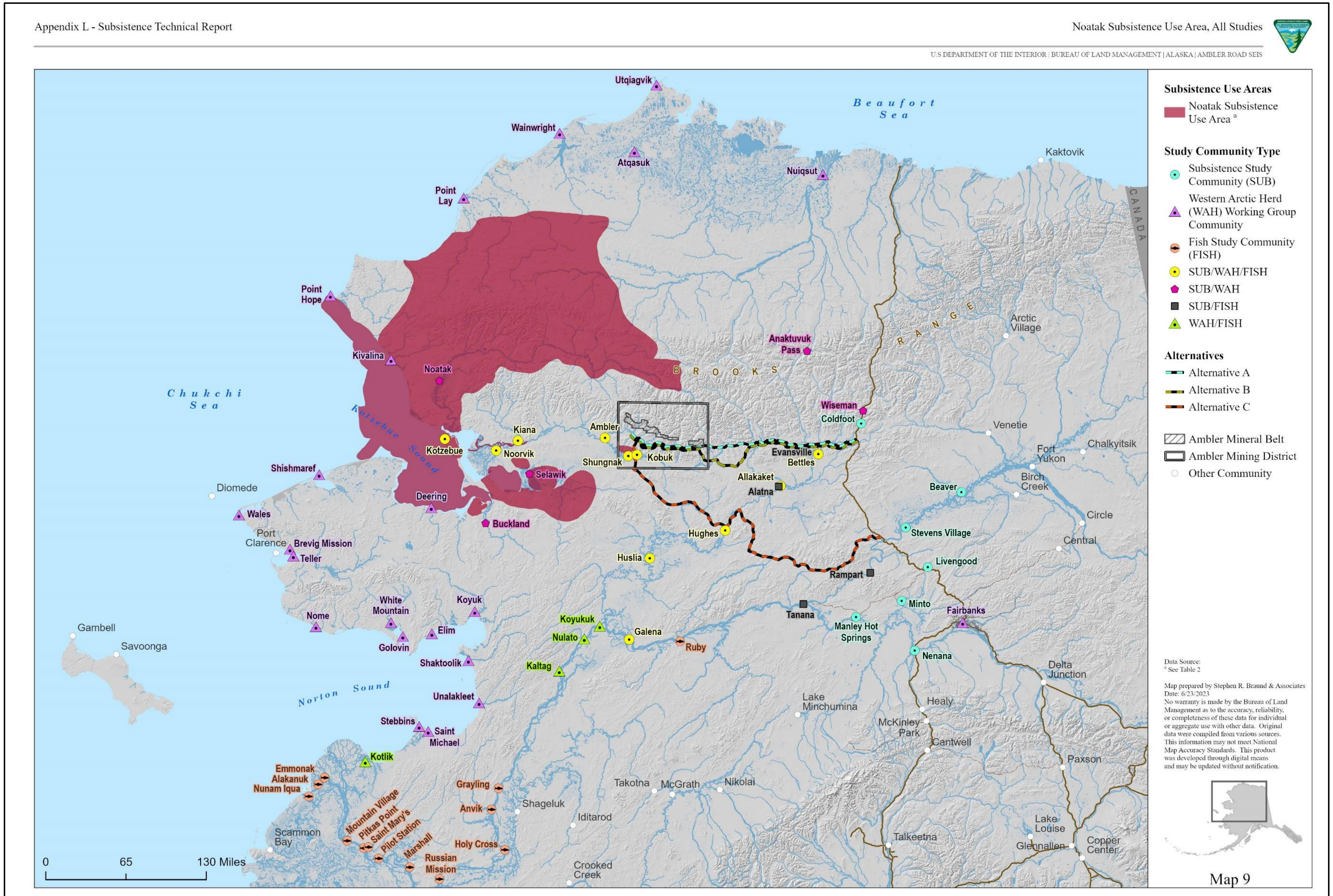

Map 9. Noatak subsistence use areas, all studies

Note: where the use overlays water, the shade is darker.

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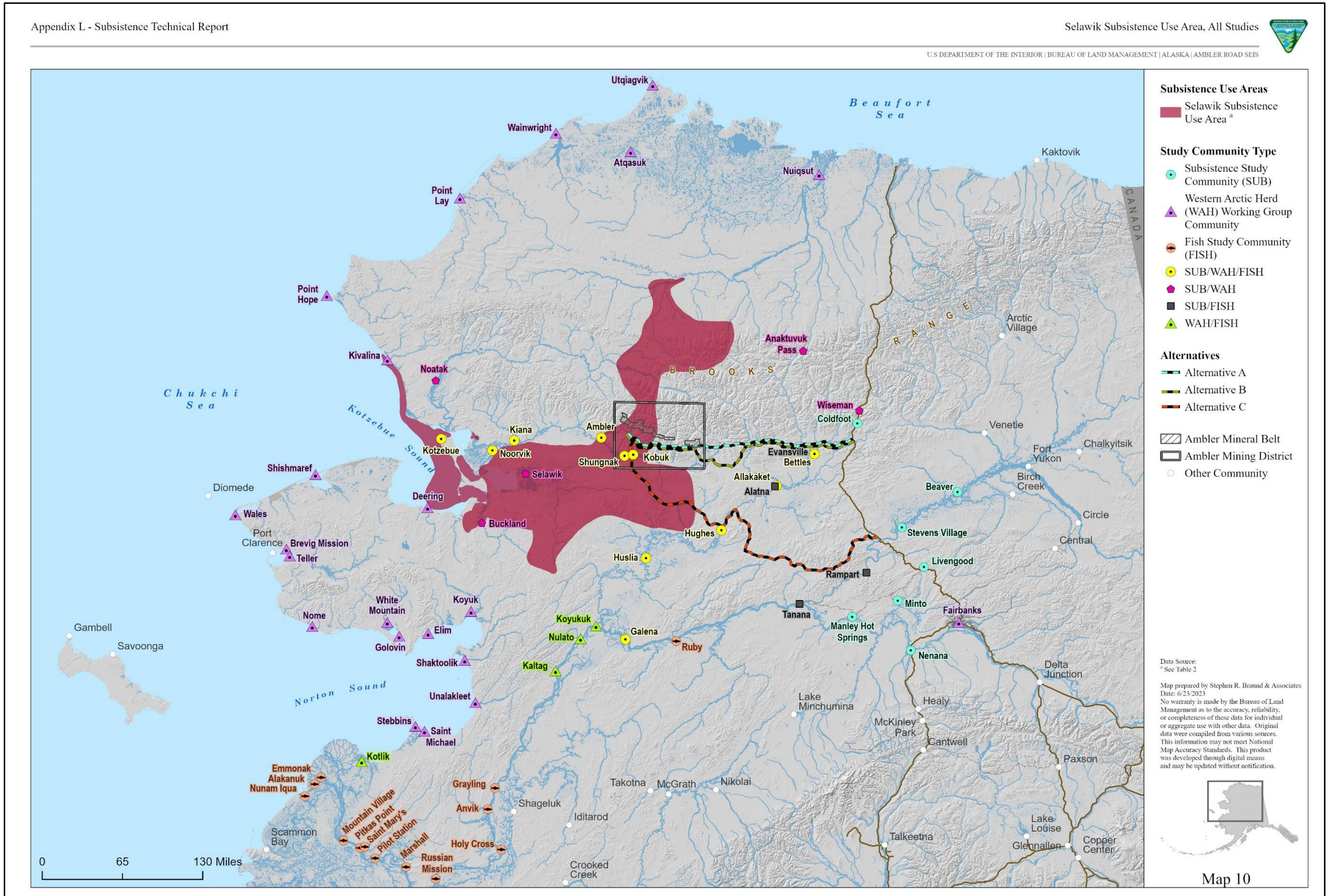

Map 10.Selawik subsistence use areas, all studies

Note: where the use overlays water, the shade is darker.

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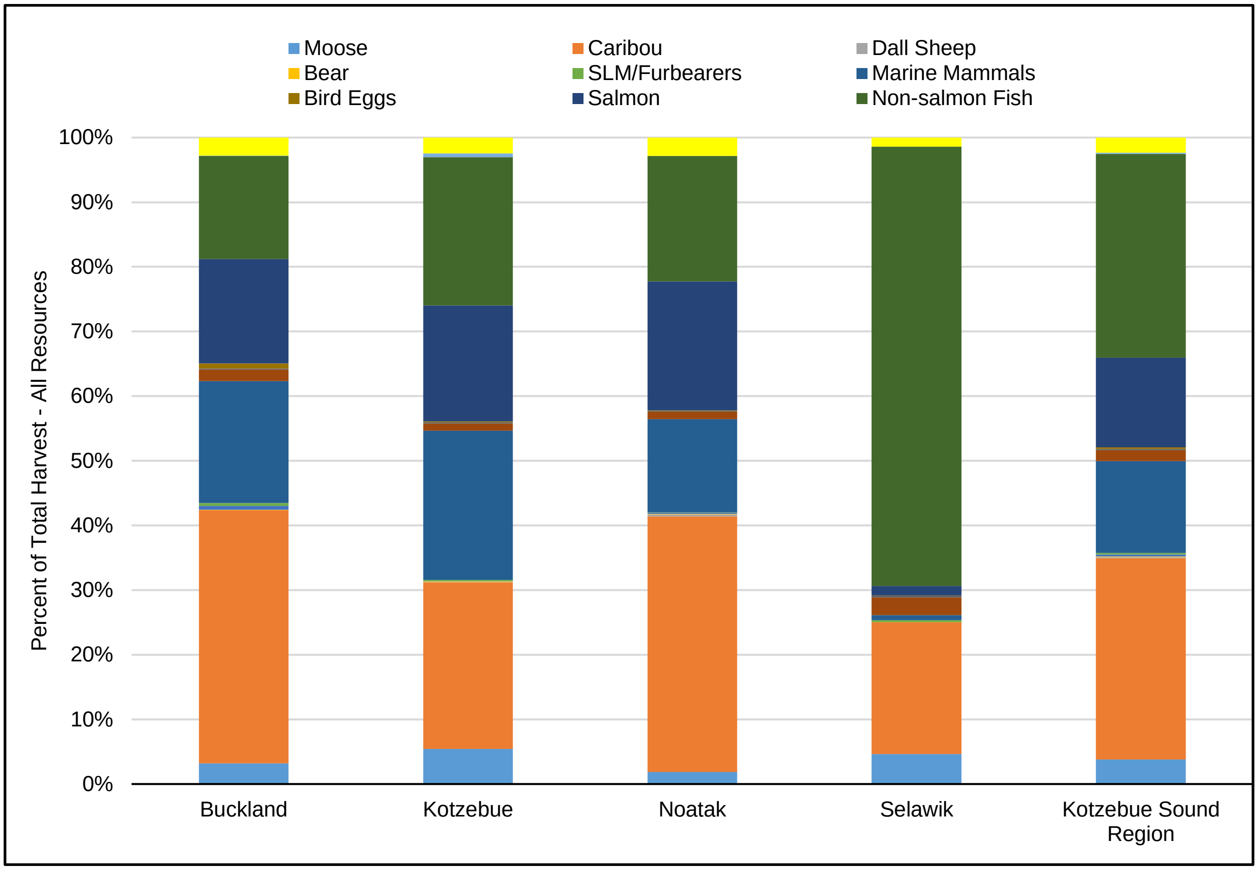

Figure 4. All resources percentage of total harvest by Kotzebue Sound region communities
Source: See Table 2 for citations, time period, and resources addressed
Notes: Data represent the average percentage of harvest across all available study years for comprehensive (i.e., all resources) household harvest surveys. In many cases, averages represent only a single study year. Available study years for each community are as follows: Buckland (2003); Kotzebue (1986, 1991, 2002-2004, 2014); Noatak (1994, 2007); Selawik (2010-11).

Average participation rates among Kotzebue Sound study communities, in terms of the average percentage of households attempting harvests by resource during individual study years, are shown on Figure 5. These data are based on averages across available study years; it is likely that in some years (or across all years) a higher percentage of households participates in each resource activity. Across all Kotzebue Sound study communities, households most commonly participate in harvests of vegetation (81 percent of households), followed by non-salmon fish (74 percent), caribou (62 percent), salmon (48 percent), and migratory birds (43 percent). Fewer households participate in harvests of marine invertebrates, Dall sheep, other large land mammals, and small land mammals/furbearers. While an important resource in terms of harvest amounts, participation in marine mammal harvesting occurs among a smaller subset of households (26 percent). The average percentage of households receiving different resources is shown on Figure 6. Similar to the Kobuk River region, this figure shows that while certain resources are not as commonly harvested within a community, they may still be highly consumed through sharing. For example, while only 26 percent of households hunt marine mammals nearly 50 percent of households receive this resource. The most commonly shared resources in Kotzebue Sound communities (more than half of households receiving) include caribou, non-salmon fish, and salmon.

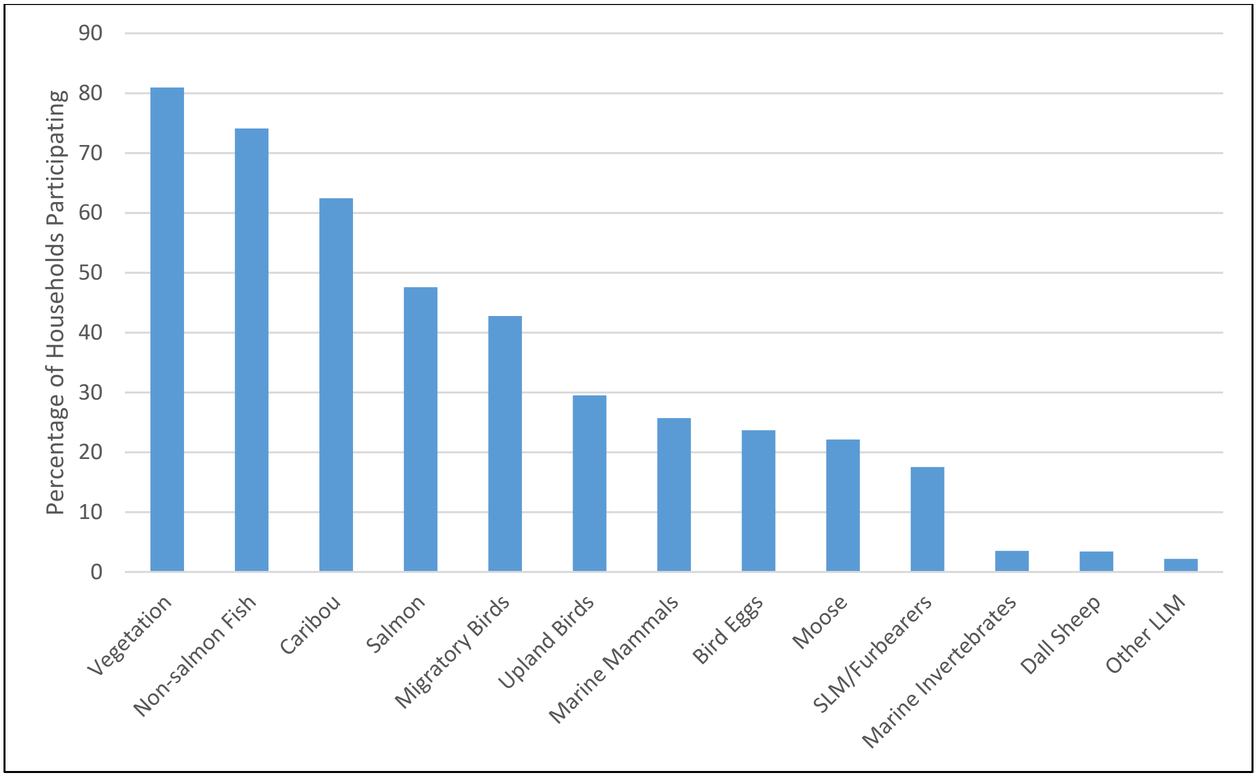

Figure 5. Percentage of households attempting harvests of resources, Kotzebue Sound region communities

Source: See Table 2 for citations, time period, and resources addressed.

Notes: Data represent the average percentage of households across all available study years. Available study years for each community are as follows (available study years vary by resource): Buckland (1996, 2003, 2009-10, 2012-2014, 2016-17); Kotzebue (1986, 1991,1997, 2002-2004, 2012, 2012-2013, 2013-2014, 2014); Noatak (1994, 1997, 1999, 2002, 2007, 2010-11, 2011-12, 2012-2014); Selawik (1993, 1997-1998, 1998, 2006, 2010-11, 2013-2014).

Table 12 shows average harvest and use data for the top five species harvested (in terms of average contribution toward the total subsistence harvest) by each of the Kotzebue Sound Region study communities. Caribou is the top species in three of the four study communities (Buckland, Kotzebue, and Noatak), contributing between 25.7 percent and 39.6 percent of the total subsistence harvest. Broad whitefish is the top harvested resource in Selawik, at 33.2 percent of the harvest. Other non-salmon fish species are among the top five species in Kotzebue Sound study communities and include sheefish (Kotzebue and Selawik), smelt (Buckland), and Dolly Varden (locally called trout; Noatak). Salmon—specifically chum salmon—are among the top five species harvested in two of the study communities. Other top species in the Kotzebue Sound Region include moose (Buckland, Kotzebue), seal (spotted and bearded; Buckland, Kotzebue, and Noatak), and northern pike (Selawik). Data on the percentage of households using subsistence resources illustrates the heavy reliance of Kotzebue Sound communities on resources such as caribou and fish, with between 86 percent and 97 percent of households in the individual communities using caribou; and between 81 and 97 percent of households using fish (Table 5). Across all study years, these percentages are likely higher.

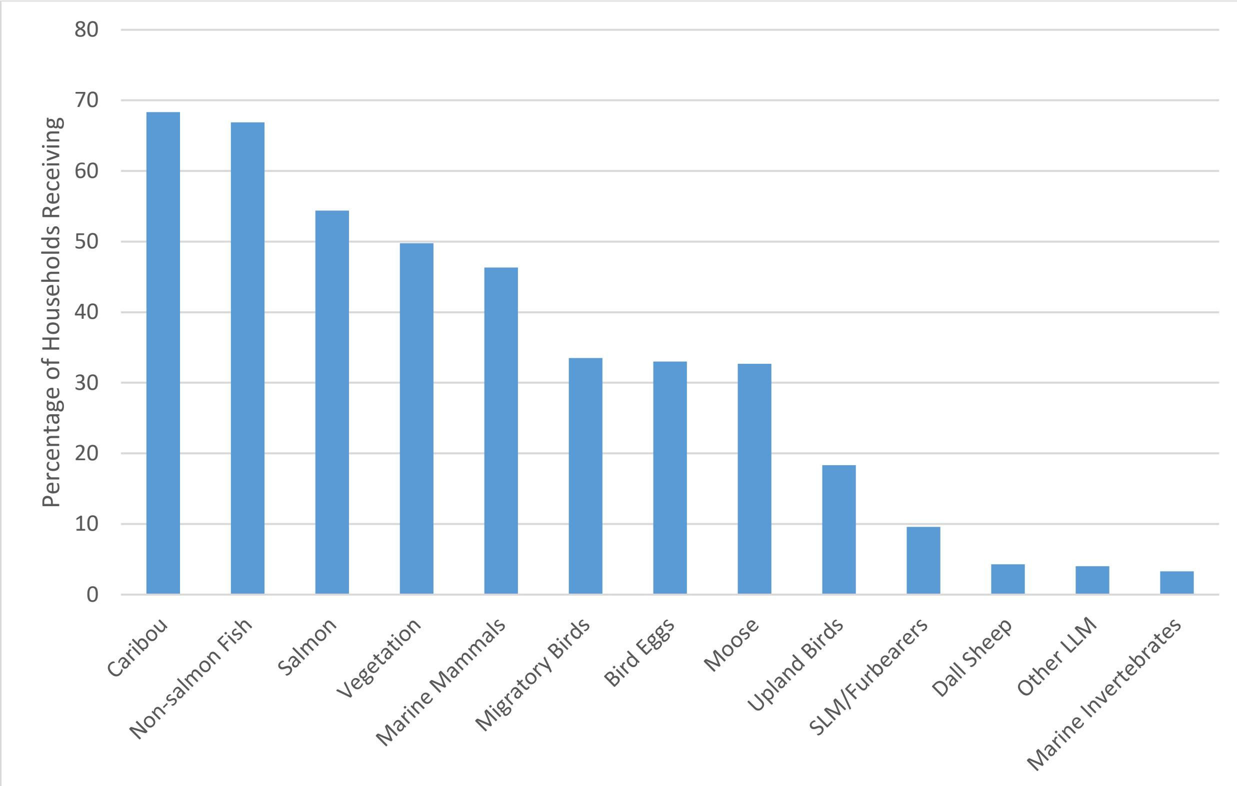

Figure 6. Percentage of households receiving resources, Kotzebue Sound region communities
Source: See Table 2 for citations, time period, and resources addressed.
Notes: Data represent the average percentage of households across all available study years. Available study years for each community are as follows (available study years vary by resource): Buckland (1996, 2003, 2009-10, 2012-2014, 2016-17); Kotzebue (1986, 1991,1997, 2002-2004, 2012, 2012-2013, 2013-2014, 2014); Noatak (1994, 1997, 1999, 2002, 2007, 2010-11, 2011-12, 2012-2014); Selawik (1993, 1997-1998, 1998, 2006, 2010-11, 2013-2014).

5.2.3 Timing of Subsistence Activities

Data on the timing of subsistence activities for Kotzebue Sound study communities are provided in Table 13. This table shows the number of communities reporting subsistence activity or harvests within each month, based on the most recent data sources for each community. Overall, Kotzebue Sound communities target the greatest number of resources during the spring month of April, followed by the fall month of September.

In early spring (March/April), residents continue to trap and hunt for furbearers and small land mammals. Sheefish are also commonly harvested in the spring through the ice, while residents may also set nets to harvest whitefish and Dolly Varden (locally referred to as “trout”) during their spring runs. Geese and duck hunting peaks in May (Braem et al. 2017). When available, residents may also hunt WAH caribou during their spring migration north. Marine mammal hunting also begins during the spring months, as bearded seals begin migrating on the ice past Kotzebue Sound.

Salmon harvesting is a key summer activity which peaks in July and August. Harvesting of sheefish continues through summer as well. Harvesting of berries and wild plants begins in summer, as does hunting of large land mammals. Harvesting of marine mammals throughout the summer.

Table 12. Average harvest and use data, top five species, Kotzebue Sound region communities

Community	Species	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HHs receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% total harvest
Buckland	Caribou	87	70	66	56	59	704	95,692	1,006	195	39.0
Buckland	Bearded seal	66	45	42	41	34	119	34,175	338	58	10.5
Buckland	Smelt	83	70	69	50	39	80,817	19,068	203	40	7.2
Buckland	Spotted seal	38	35	32	20	15	97	9,470	100	19	3.5
Buckland	Moose	27	18	9	13	17	13	7,003	74	15	3.2
Kotzebue	Caribou	86	49	42	47	64	2,094	284,711	353	90	25.7
Kotzebue	Chum salmon	84	47	45	41	60	32,714	199,009	244	59	17.0
Kotzebue	Sheefish	82	54	52	42	52	39,545	217,497	271	66	15.9
Kotzebue	Bearded seal	55	23	19	25	40	22,179	218,447	274	67	15.6
Kotzebue	Moose	47	23	12	16	38	105	56,591	70	18	5.4
Noatak	Caribou	88	66	60	54	67	416	44,761	12,355	124	39.6
Noatak	Chum salmon	85	75	74	57	58	6,282	28,800	8,869	74	18.8
Noatak	Dolly Varden	90	78	69	63	67	6,685	18,724	3,207	42	12.8
Noatak	Bearded seal	52	19	32	40	56	48	12,579	7,176	42	10.6
Noatak	Whitefish	61	39	38	37	54	6,778	14,234	120	27	7.4
Selawik	Broad whitefish	66	44	43	36	42	29,252	93,626	544	115	33.2
Selawik	Caribou	97	65	59	67	82	969	131,801	810	174	20.4
Selawik	Sheefish	72	56	53	39	42	6,011	43,712	256	55	15.1
Selawik	Northern pike	63	51	46	34	31	11,612	37,485	218	47	11.5
Selawik	Humpback whitefish	31	21	19	16	20	8,515	16,930	98	21	5.2

Source: See Table 2 for citations, time period, and resources addressed
Notes: HH = households

Table 13. Kotzebue Sound region timing of subsistence activities, number of communities reporting subsistence activity

Resources	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Freshwater non-salmon fish	2	2	2	2	2	2	2	2	2	2	2	2
Salmon	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	2	N/A	N/A	N/A
Caribou	4	4	4	4	3	2	2	4	4	4	4	3
Moose	N/A	N/A	N/A	N/A	N/A	N/A	N/A	4	4	2	N/A	N/A
Bear	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	N/A	N/A	N/A
Other large land mammals	N/A	N/A	N/A	2	N/A	N/A	N/A	N/A	2	N/A	N/A	N/A
Furbearers	3	3	2	2	N/A	N/A	N/A	N/A	N/A	N/A	2	3
Small land mammals	2	N/A	2	2	2	N/A	N/A	N/A	2	2	N/A	N/A
Marine mammals	N/A	N/A	N/A	5	4	6	4	3	4	3	2	N/A
Upland birds	2	2	2	2	N/A	N/A	N/A	N/A	N/A	N/A	2	2
Waterfowl	N/A	N/A	N/A	2	2	2	N/A	N/A	2	N/A	N/A	N/A
Plants and berries	N/A	N/A	N/A	N/A	N/A	2	2	2	2	N/A	N/A	N/A
Total number of resources per month	**5**	**4**	**5**	**8**	**5**	**5**	**4**	**6**	**10**	**5**	**5**	**4**

Source: Gonzalez et al. 2018; Georgette and Loon 1993; Braem et al. 2017; SRB&A 2009b; Mikow et al. 2014; Braem et al. 2013; Mikow and Cunningham 2020.

Notes: Apr = April; Aug = August; Dec = December; Feb = February; Mar = March; Jan = January; Jul = July; Jun = June; N/A = not applicable (no or limited subsistence activity); Nov = November; Oct = October; Sep = September

Kotzebue Sound Region Communities = four (Buckland, Kotzebue, Noatak, and Selawik).

Each cell contains the number of communities reporting subsistence activity or harvests during each month, based on the most recent data source for each community. Months with only one community report harvests or activity are not included in the table. Resources with no subsistence activity data available are not included in the table

As with the Kobuk River region, subsistence harvesting in the Kotzebue Sound region peaks in fall. Caribou and moose hunting is most intense during the fall months of August through October, and residents also resume hunting waterfowl as they migrate south. Seal hunting continues into the fall as well during the open water months. Residents set nets for whitefish and trout as well during this time.

Hunting and fishing (through the ice) continues at somewhat lower levels into winter. For some residents, sheefish harvesting continues into the winter. Residents hunt caribou throughout the winter as they are available. Hunting and trapping of furbearers and small land mammals is most active during the winter and into the early spring.

5.2.4 Travel Method

While systematic, quantitative data on travel methods are not available for most Kotzebue Sound subsistence study communities, several studies provide qualitative and quantitative information on travel methods and routes in the Kotzebue Sound region. Primary travel corridors within the Kotzebue Sound region include the Noatak River, Kobuk River, and Kotzebue Sound, in addition to the Selawik and Buckland rivers. Similar to the Kobuk River region, snowmachines and boats are the primary mode of travel to subsistence harvesting areas, although ATVs are also present in the study communities as well (Satterthwaite-Phillips et al. 2016). A subsistence mapping and Indigenous Knowledge study conducted in 2007 provides more quantitative data on travel methods for Noatak (SRB&A 2009). These data show Noatak residents traveling by boat primarily from May to September, with limited travel reported in April and October. Snowmachine travel generally occurs from November through April and dropping off in May. To a lesser extent, residents take four-wheelers during the summer months, primarily in July and August. Documented travel routes for the community of Noatak occur over a large area, with the Noatak River a primary travel corridor in addition to various overland snowmachine routes between Noatak and Kivalina, Kiana, Noorvik, Selawik, and Kotzebue.

5.2.5 Resource Importance

The relative importance of subsistence resources to the individual Kotzebue Sound study communities, based on selected variables, is provided in Table 14 through Table 17 (see Section 5.3.5, Resource Importance, for discussion of methods). Based on this analysis, caribou, non-salmon fish, and vegetation are resources of high importance in all four study Kotzebue Sound Region study communities. In addition, salmon are a resource of high importance in three of the four study communities (Buckland, Kotzebue, and Noatak). Resources of moderate importance in the study communities include moose (four study communities), other large land mammals (one study community), migratory birds (four study communities), upland birds (three study communities), and salmon (one study community).

5.3. Koyukuk River

The Koyukuk River region includes the communities of Alatna, Allakaket, Anaktuvuk Pass, Bettles, Coldfoot, Evansville, Hughes, Huslia, and Wiseman. These communities are located along the Koyukuk River drainage which is crossed in multiple locations by the AAP alternatives. Bettles and Evansville are located directly along the northern project corridor alternatives, while Hughes is located directly along the southern project corridor alternative. Alatna and Allakaket are located on the Koyukuk River between the northern and southern alternatives; Anaktuvuk Pass, Wiseman, and Coldfoot are located north of all project alternatives; and Huslia is located south of all project alternatives.

Table 14. Relative importance of subsistence resources based on selected variables, Buckland

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	18	17	3	M
2	Caribou	87	70	39	H
3	Dall sheep	NA	NA	NA	NA
4	Bear	2	1	0.09	L
5	Other large land mammals	9	7	0.88	L
6	Small land mammals/furbearers	22	7	0.3	L
7	Marine mammals	47	46	19	M
8	Migratory birds	49	33	2	M
9	Upland birds	38	18	0.14	M
10	Bird eggs	55	33	0.80	M
11	Salmon	51	54	16	H
12	Non-salmon fish	79	67	16	H
13	Marine invertebrates	5	3	0.04	L
14	Vegetation	87	50	3	H

Source: See Table 2
Notes: H = High; HH = Households; L = Low; M = Moderate; NA = Not Available

Table 15. Relative importance of subsistence resources based on selected variables, Kotzebue

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	23	38	5	M
2	Caribou	49	64	26	H
3	Dall sheep	3	4	0.1	L
4	Bear	NA	NA	0.1	L
5	Other large land mammals	1	6	0.05	L
6	Small land mammals/furbearers	11	11	0.2	L
7	Marine mammals	26	70	23	H
8	Migratory birds	31	23	1	M
9	Upland birds	31	13	0.2	M
10	Bird eggs	14	13	0.1	L
11	Salmon	50	60	18	H
12	Non-salmon fish	74	76	23	H
13	Marine invertebrates	5	24	1	L
14	Vegetation	72	50	2	H

Source: See Table 2
Notes: H = High; HH = Households; L = Low; M = Moderate; NA = Not Available

Table 16. Relative importance of subsistence resources based on selected variables, Noatak

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	12	23	2	M
2	Caribou	66	67	40	H
3	Dall sheep	4	5	0.3	L
4	Bear	NA	NA	0.1	L
5	Other large land mammals	1	3	0.2	L
6	Small land mammals/furbearers	11	4	0.1	L
7	Marine mammals	20	72	14	H
8	Migratory birds	46	29	1	M
9	Upland birds	20	17	0.1	L
10	Bird eggs	20	9	0.1	L
11	Salmon	77	62	20	H
12	Non-salmon fish	79	78	19	H
13	Marine invertebrates	1	3	0.02	L
14	Vegetation	85	64	3	H

Source: See Table 2
Notes: H = High; HH = Households; L = Low; M = Moderate; NA – Not Available

Table 17. Relative importance of subsistence resources based on selected variables, Selawik

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	36	53	5	M
2	Caribou	65	82	20	H
3	Dall sheep	NA	NA	NA	NA
4	Bear	NA	NA	0.04	L
5	Other large land mammal	NA	NA	NA	NA
6	Small land mammal/furbearers	19	9	0.3	L
7	Marine mammals	10	75	1	H
8	Migratory birds	44	41	3	M
9	Upland birds	30	17	0.3	M
10	Bird eggs	6	3	0.02	L
11	Salmon	12	45	1	M
12	Non-salmon fish	65	59	68	H
13	Marine invertebrates	2	7	0.001	L
14	Vegetation	80	53	1	H

Source: See Table 2
Notes: H = High; HH = Households; L = Low; M = Moderate; NA = Not Available

5.3.1 Subsistence Use Areas

Subsistence use areas for the Koyukuk River region study communities are focused around the upper and lower Koyukuk river drainages and various tributaries of the Koyukuk River, the upper Kobuk River, and overland areas surrounding the Koyukuk River and into the Brooks Range. Use areas for the northernmost Koyukuk River region study community of Anaktuvuk Pass extend onto the North Slope of Alaska and as far north as Nuiqsut, while use areas for the southernmost community of Huslia extend west to Kotzebue Sound and south to the Yukon River. More recently documented subsistence use areas for the study communities (Watson 2018; SRB&A 2016a) indicate various changes to contemporary subsistence use areas compared to historic use areas, including certain changes brought about by establishment of the Gates of the Arctic National Park and Preserve (Watson 2018).

As shown on Map 11 and Map 12, Alatna and Allakaket subsistence use areas for all available time periods ("Traditional"; Lifetime to 2012; 1981-1985; 1981-83; 2006-2015; 2011) occur along the Koyukuk River between Huslia and the Dalton Highway, along the Alatna, Kanuti, and Hogatza rivers and various smaller tributaries of the Koyukuk River; and in various overland areas surrounding the Koyukuk River. Recent subsistence use areas documented for Alatna and Allakaket (Watson 2018; SRB&A 2016a) indicate similar subsistence uses, with the greatest concentration of use occurring along the Koyukuk, Alatna, and Kanuti rivers. Ristroph et al. (2019) also recently documented traditional subsistence use areas in addition to place names that show similar areas of importance to Alatna and Allakaket; these use areas are displayed on Map 11 and Map 12 along with place name areas as documented by Jones et al. (1997). Areas of high overlapping use along the Alatna River are crossed by the northern project alternatives. Comparison of more recent use area data to historic use areas indicate a shift away from overland use and toward riverine use. According to Watson (2018) contemporary large land mammal hunting by Alatna and Allakaket hunters, including hunting of Dall sheep and moose, occurs along the Koyukuk and Alatna rivers. Hunting of Dall sheep is focused on drainages that extend into the Brooks Range (Alatna and John rivers), while moose hunting occurs along a more extensive riverine area including the Koyukuk River drainage both upriver and downriver from Alatna and Allakaket, Henshaw Creek, Kanuti River, and Hogatza River. Furbearer trapping occurs along the Kanuti River and along the Koyukuk as far as the Dalton Highway; recent furbearer trapping areas are more concentrated along river corridors than historic trapping areas which may be a result of changes in transportation method (e.g., less plane travel) or an overall decline in the number of furbearer trappers (Watson 2018). Non-salmon fish harvesting is also focused along the Koyukuk River, Henshaw Creek, Alatna River, and Kanuti River, while salmon harvesting is limited primarily to the Alatna River and Henshaw Creek areas. Harvest of vegetation is also focused on the Alatna River and Henshaw Creek. Hunting of black bear may occur during the fall months along the river system; however, traditionally, black bears were harvested in dens by Koyukuk Athabascans. The locations of bear dens, which are often used year after year, are known to residents, and these locations are passed down through Indigenous Knowledge (Attla 1995).

Map 13 shows use areas for Anaktuvuk Pass for all available time periods (Lifetime Pre-1979; 2001–2010; 2001–2002, 2002–2003, 2006–2007, 2011, 2014) occurring throughout the Brooks Range and into the foothills of the Brooks Range on the North Slope. Use areas for this community extend into the John River which is a tributary of the Koyukuk River. In addition, community residents travel to the west and southwest of the community and have reported caribou and furbearer hunting areas which overlap with the terminus of the project alternatives. According to Brown et al. (2016), during the 2014 study year hunting for caribou, moose, and Dall sheep occurred in various drainages of the Brooks Range, including the John River, a tributary of the Koyukuk River. Caribou hunting also extended into the foothills of the Brooks Range on the North Slope. Various other resource activities extended into the John River drainage, including small land mammal hunting/trapping, non-salmon fish harvesting, and vegetation harvesting.

Use areas for Bettles and Evansville for all available time periods (Lifetime to 2016; 1981–1982; 1981–1983; 2006–2015; 2011) are shown on Map 14 and Map 15 and indicate use areas that extend along the foothills of the Brooks Range; along various drainages of the southern Brooks Range, including the Kobuk River, upper Koyukuk River, Alatna River, and John River; in an area surrounding Iniakuk Lake; and along the Dalton Highway north of Coldfoot and Wiseman. Some isolated use areas occur on the North Slope. Previous studies indicate disjointed subsistence use areas due to the use of planes to access areas within the Gates of the Arctic National Park and Preserve. Airplane access for subsistence activities is not allowed in the Park. In terms of specific resources, contemporary Dall sheep use areas occur along the Koyukuk River, including the Middle Fork Koyukuk parallel to the Dalton Highway. Moose hunting occurs in a large area surrounding the upper Alatna River in the Brooks Range, and in an area surrounding the community along the John, Wild, and Koyukuk rivers. Trapping also occurs in an area surrounding the Alatna River and Iniakuk Lake, in addition to the John and Koyukuk rivers. Caribou hunting occurs near the communities of Bettles and Evansville, near Iniakuk Lake, and in the foothills of the Brooks Range on the North Slope. Residents access fish in various lakes and rivers of the Brooks Range in addition to the upper Kobuk River, Iniakuk Lake, John River, and North Fork Koyukuk River. Contemporary vegetation harvesting occurs in several areas of the Brooks Range surrounding Walker Lake, Iniakuk Lake, and Evansville and Bettles.

Coldfoot and Wiseman use areas for all time periods (2005-2014; 2011) are depicted on Map 16 and Map 17 and indicate subsistence harvesting activities surrounding the Dalton Highway in the Brooks Range and at various locations to the west and southwest of the communities including along the Koyukuk River, Alatna River, Iniakuk Lake area, John River, and upper Kobuk River. Recently documented resource-specific use areas (SRB&A 2016a) for the 2005–2014 time period show moose, caribou, bear and small land mammal hunting occurring primarily along the Dalton Highway in addition to various mountain passes extending off of the Dalton Highway. Dall sheep hunting occurs in larger areas off of the highway into the mountains. Hunting of large and small land mammals, in addition to bird hunting occurs primarily to the north of the communities although some activities occur farther south in or near the upper Koyukuk River drainages. Harvesting of non-salmon fish occurs primarily south of the communities along the Dalton Highway where it crosses the South Fork Koyukuk and Jim rivers, in addition to various small lakes in the Brooks Range.

Subsistence use areas for Hughes for all available time periods (Lifetime to 2016; 1981-1985; 1981-83; 2014) are shown on Map 18. Use areas for this community are primarily focused along the Koyukuk River between Huslia and Evansville/Bettles and along the Alatna River into the Brooks Range. In addition, Hughes subsistence harvesting areas extend overland from the community both south and north of the Koyukuk River. The southern project alternative crosses through the heart of Hughes subsistence harvesting areas near the community, while the northern alternatives cross through subsistence harvesting areas along the Alatna and John rivers. According to Watson (2018), contemporary subsistence use areas occur over a more extensive riverine area, although this may be attributed to the lack of documentation of Dall sheep use areas in earlier studies. Contemporary Dall sheep use areas occur along the Koyukuk River upriver from the community and substantial distances into the Alatna and John rivers. Contemporary and historic moose hunting occur in similar areas both upriver and downriver from the community of Hughes. Furbearer hunting and trapping occurs overland both north and south of the community and along the Koyukuk River between Huslia and Alatna/Allakaket. Salmon and non-salmon fish harvesting both occur in the Koyukuk River near Hughes, while vegetation harvesting occurs primarily downriver from the community.

Huslia use areas (Map 19) for all available time periods (Lifetime to 2016; 1981-83) occur along the mid- to lower-Koyukuk River, the Yukon River, and in large overland areas which extend to the north and west toward Buckland, Selawik, and along the Kobuk River from Shungnak to Kotzebue Sound. Huslia use areas, including overland hunting areas to the north of the community and use areas along the Koyukuk River, are overlapped with the southern project corridor. Watson (2018) indicates that the community's primary hunting areas occur along the Yukon River toward Ruby, along the Koyukuk River to Hughes, and in an overland areas between the Koyukuk River and the Kobuk River. Other overland areas, such as those toward Buckland, Selawik, and Kotzebue are less commonly used. More recent contemporary use areas compared to historic use areas indicate an expansion of harvest areas over time, although this may be partly attributed to underreporting of use areas during earlier studies (Watson 2018), as respondents characterized their contemporary areas as "traditional" areas that were used by their elders. Moose hunting by Huslia residents occurs along the Yukon and Koyukuk rivers in addition to some overland use areas directly around the community. Caribou hunting extends over a larger overland area, including hunting areas between the Koyukuk River toward Selawik and Buckland, which is reflective of recent reports of changes in caribou distribution toward the Buckland area. Non-salmon fish harvesting occurs in various lake systems and creeks surrounding the Koyukuk River, including Clear Creek, Caribou Creek, and the Huslia River. Residents fish for salmon in various river systems including the Yukon, Koyukuk, and Kobuk rivers (Watson 2018).

5.3.2 Harvest Data

Harvest data for the Koyukuk River study communities are provided on Figure 7 through Figure 9 and in Table 18. The percentage of total harvest, shown on Figure 7, is calculated by dividing the total pounds of subsistence harvest for all resources by the pounds harvested for individual species or resource categories. Based on an average of available data, salmon is the primary resource harvested among the study communities in terms of percentage of usable pounds (31 percent), followed closely by moose (28 percent) and caribou (26 percent). Non-salmon fish (12 percent) and vegetation (4 percent) also contribute a substantial amount to Koyukuk River Region study communities. Other resources which contribute smaller amounts in terms of pounds include Dall sheep, small land mammals, and migratory birds. Resource contribution varies widely among the Koyukuk River Region study communities, reflecting the large variation in geography and resource availability across the region. The communities of Anaktuvuk Pass and Coldfoot rely on caribou for a majority of their harvests, with caribou contributing over 80 percent of the harvest. Compared to the other subsistence study communities, these two communities have access to the Central Arctic Herd (CAH) on the North Slope. Bettles, Evansville, and Wiseman rely primarily on moose for their subsistence harvests, while Alatna, Allakaket, Hughes, and Huslia rely primarily on non-salmon fish harvests.

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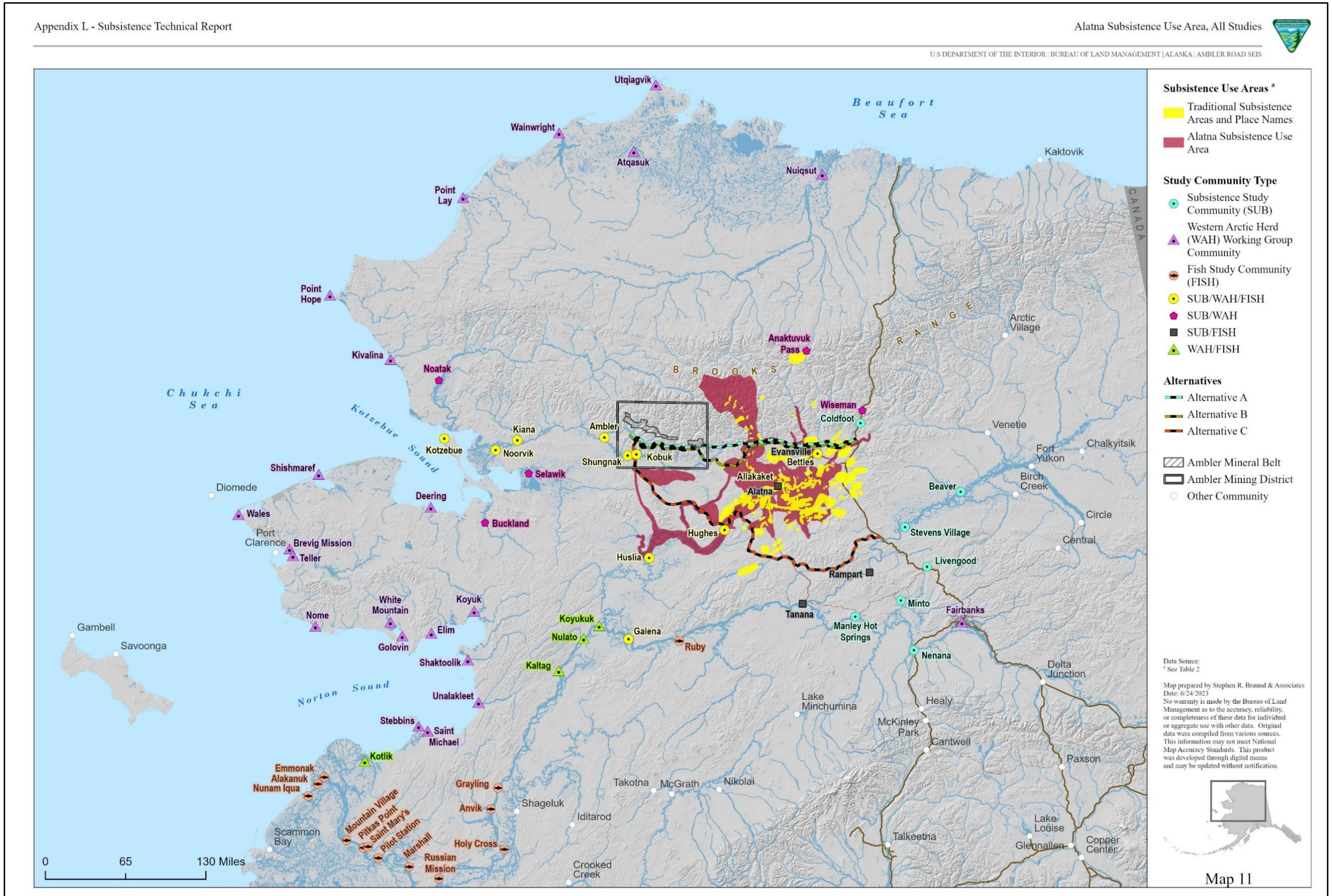

Map 11. Alatna subsistence use areas, all studies

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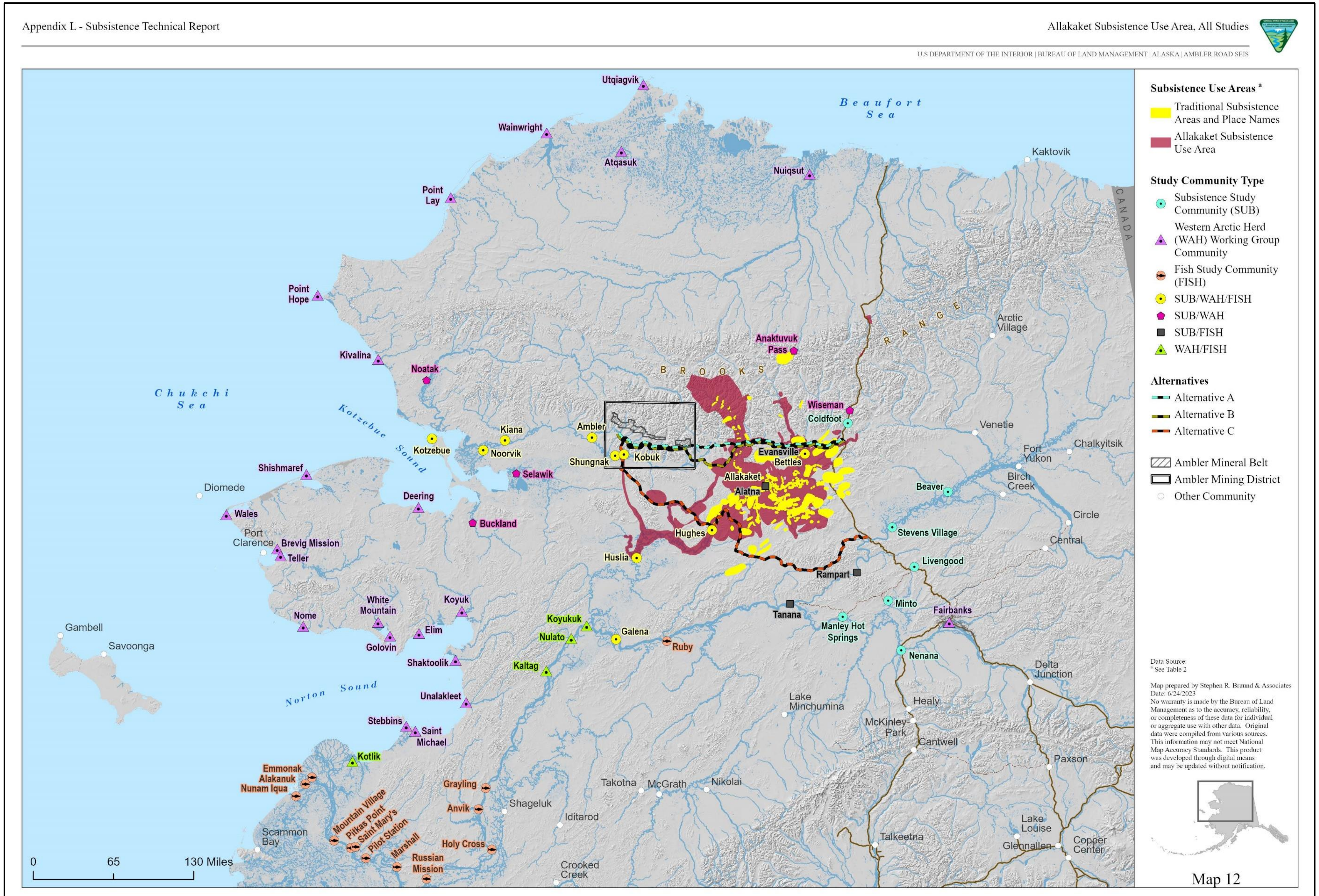

Map 12. Allakaket subsistence use areas, all studies

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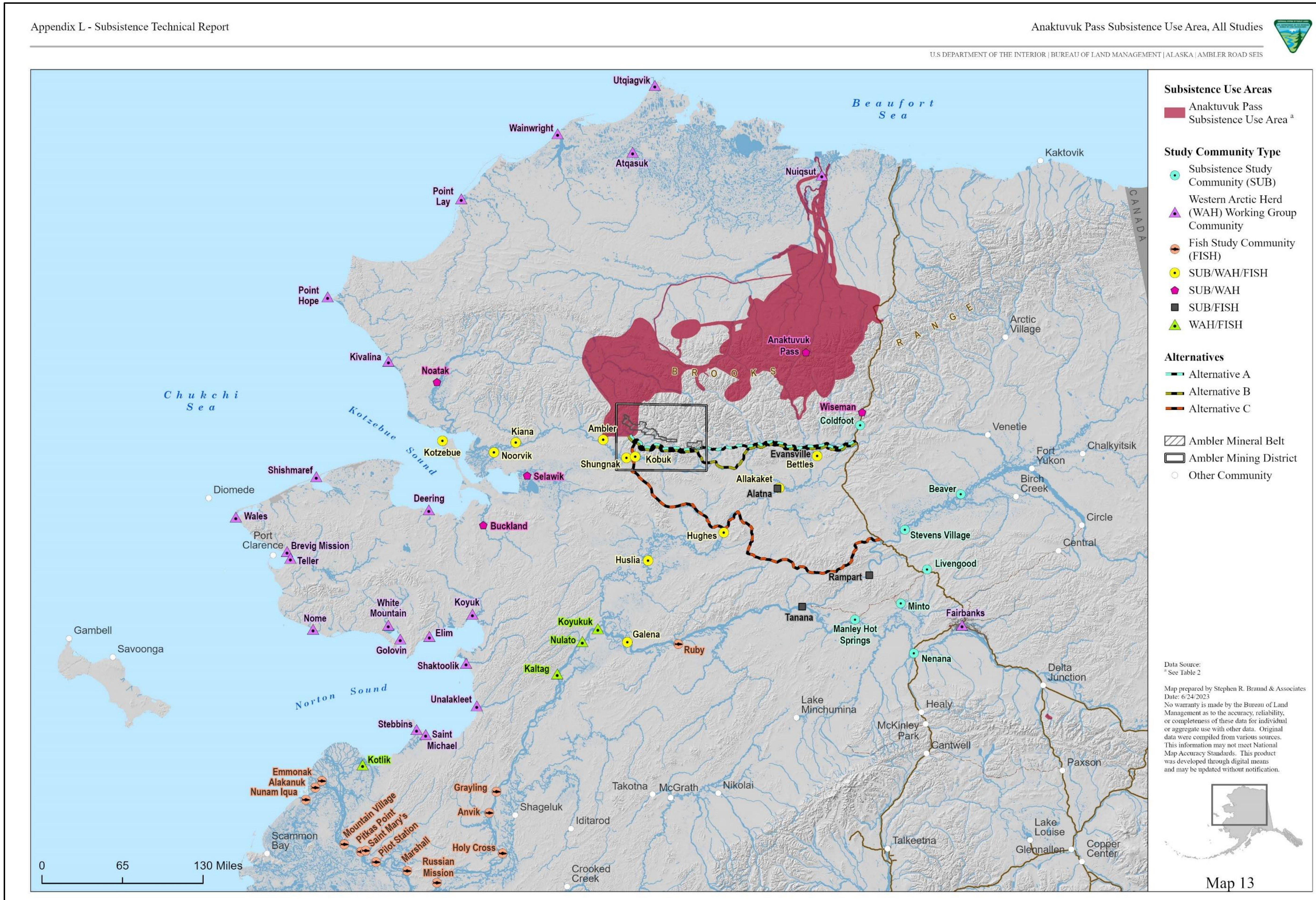

Map 13. Anaktuvuk Pass subsistence use areas, all studies

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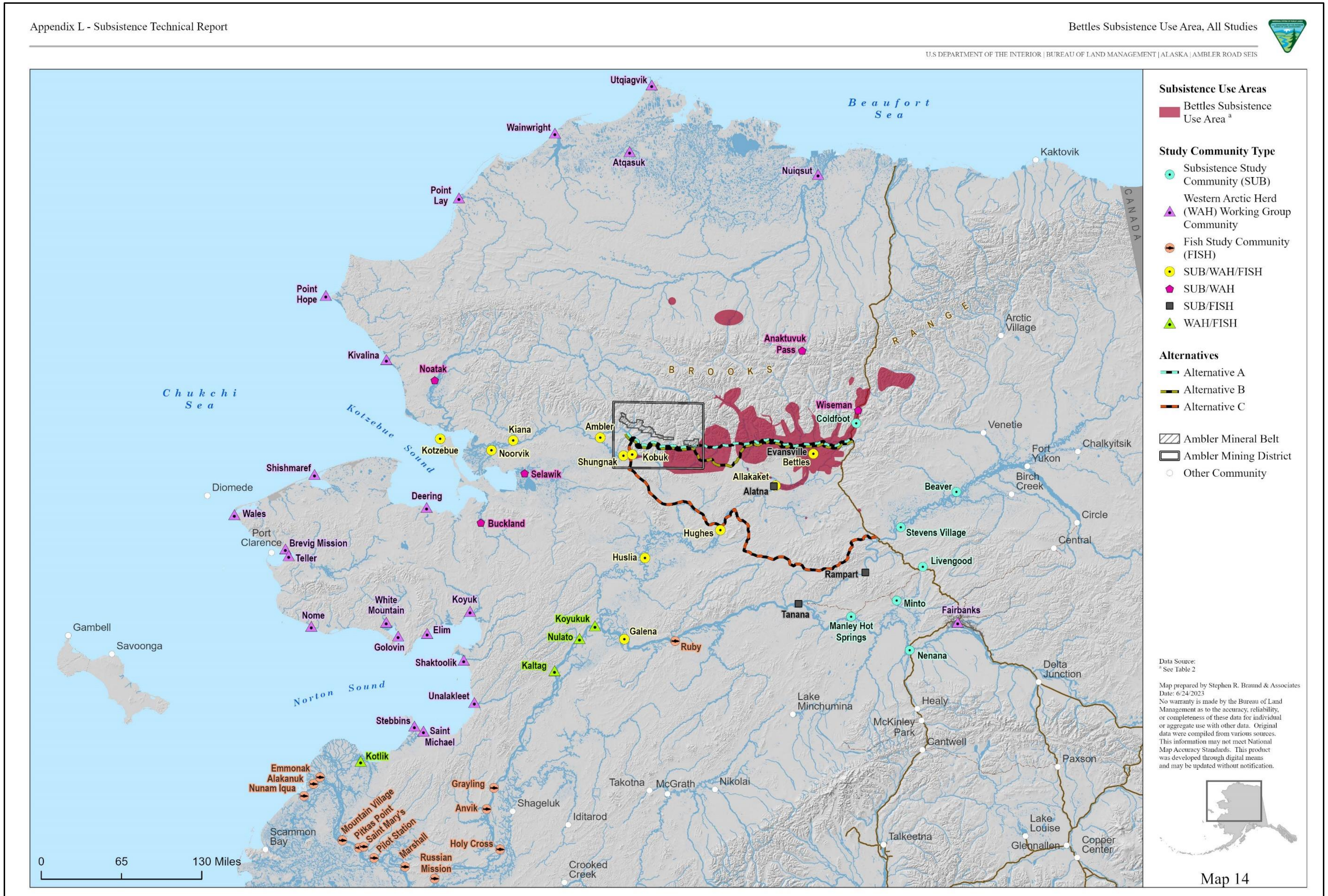

Map 14. Bettles subsistence use areas, all studies

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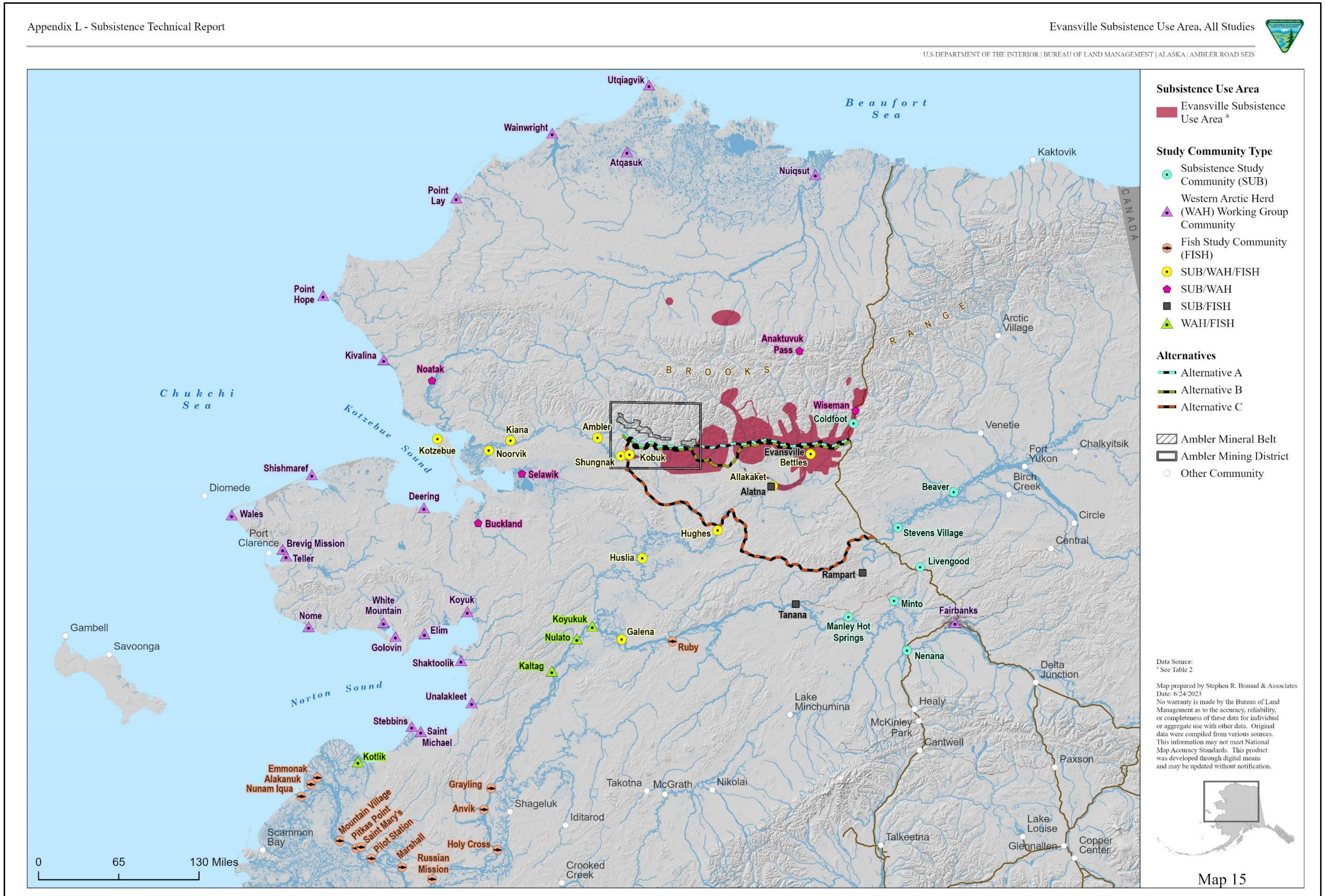

Map 15. Evansville subsistence use areas, all studies

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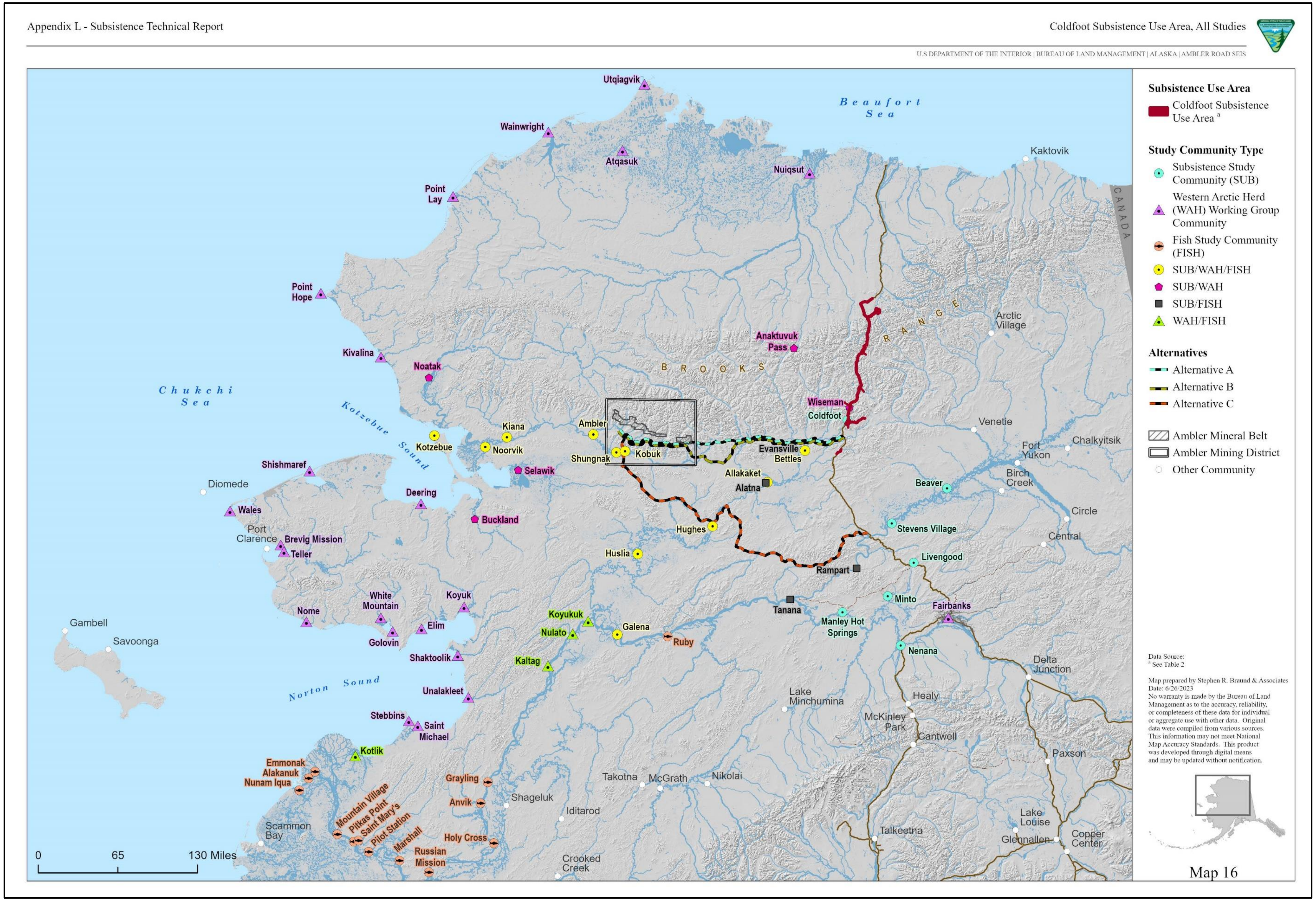

Map 16. Coldfoot subsistence use areas, all studies

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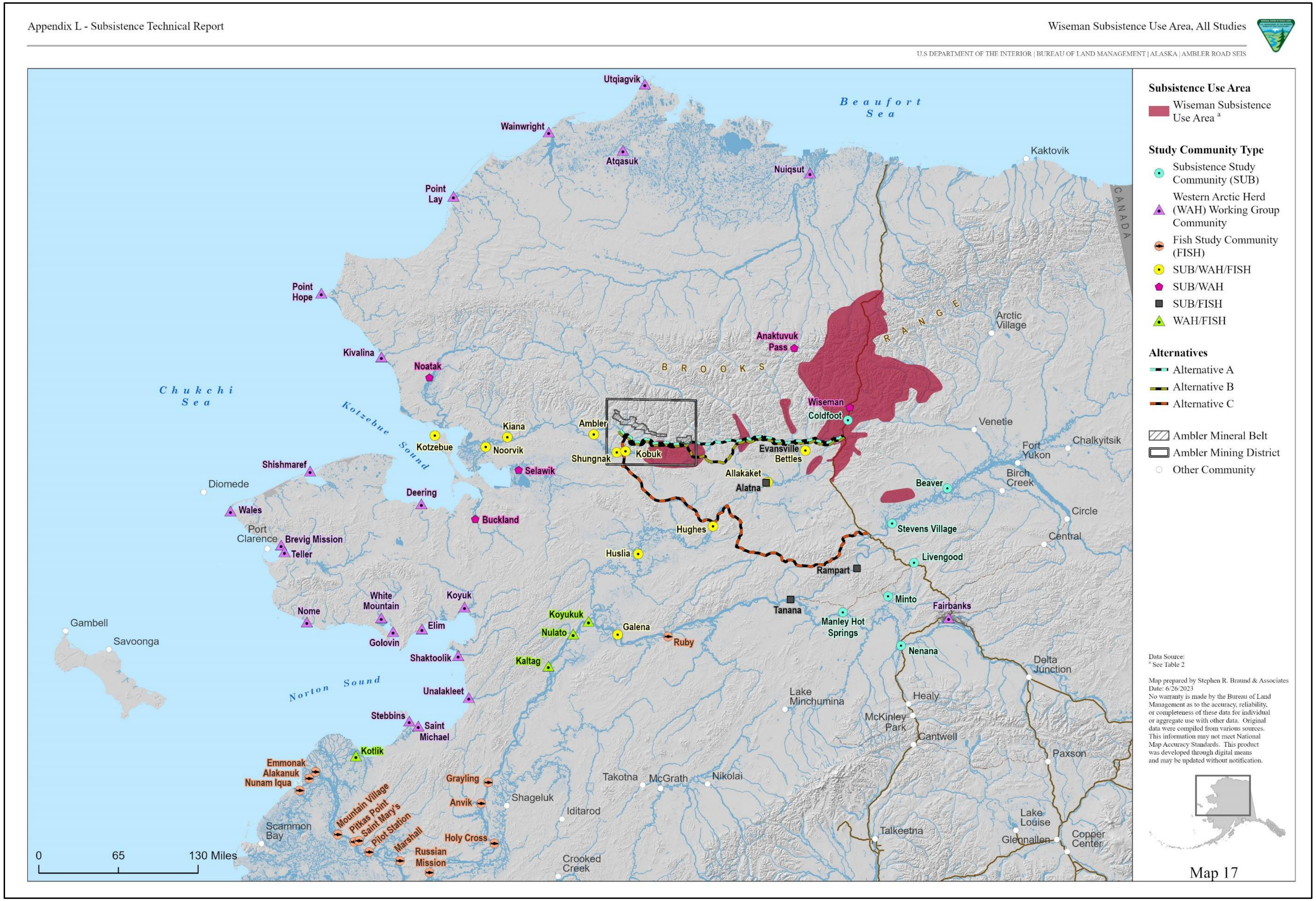

Map 17. Wiseman subsistence use areas, all studies

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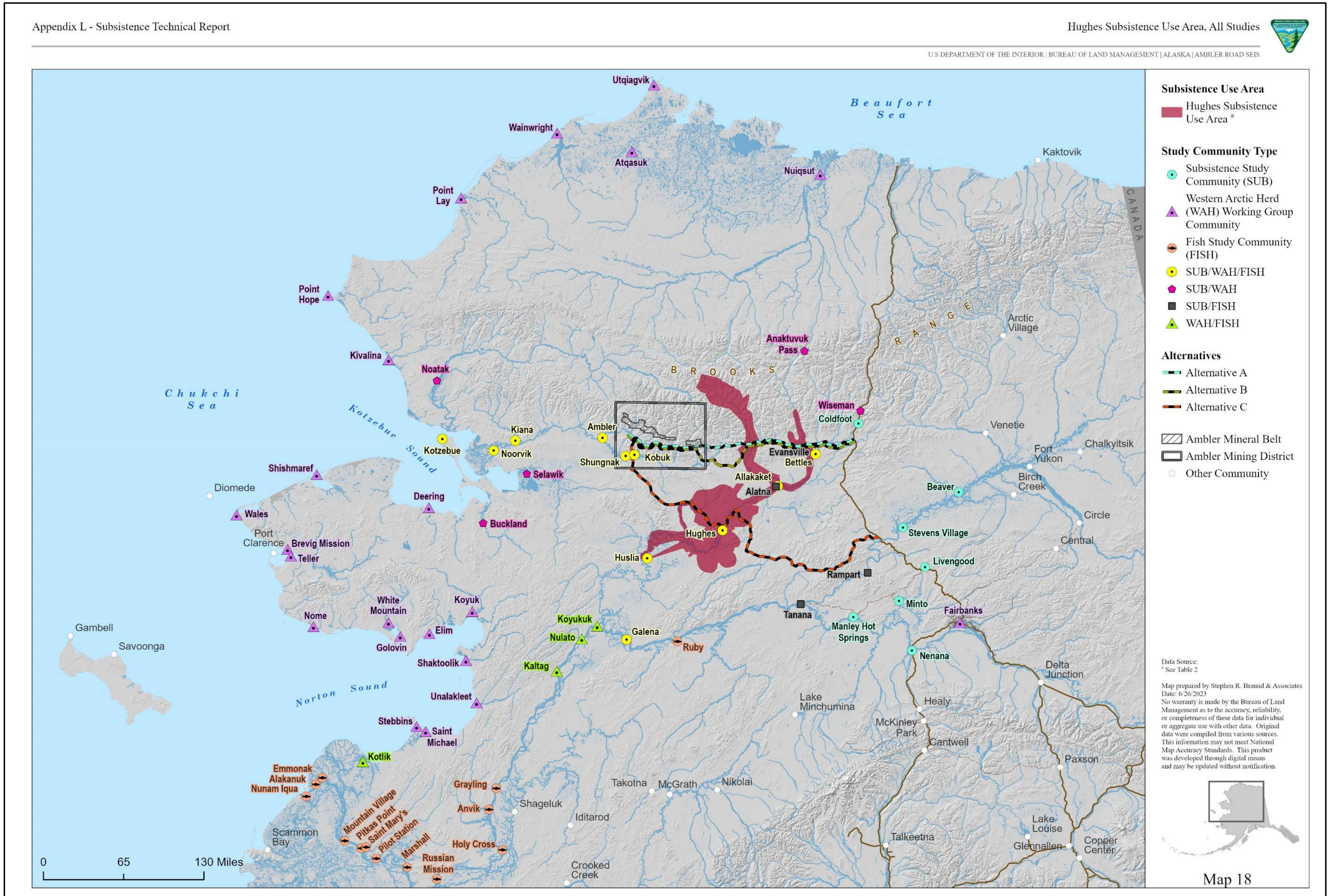

Map 18. Hughes subsistence use areas, all studies

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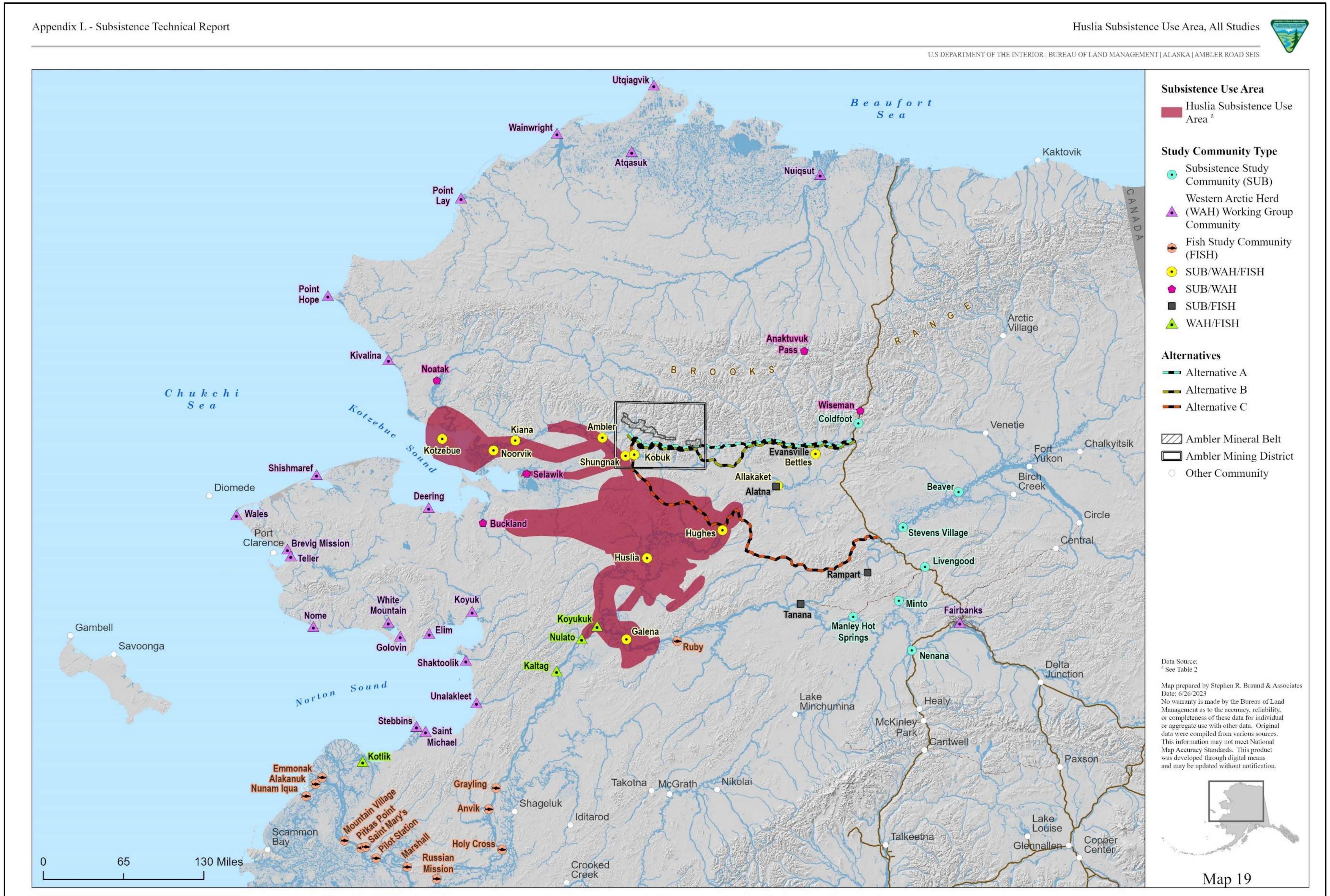

Map 19. Huslia subsistence use areas, all studies

Note: where the use overlays water, the shade is darker.

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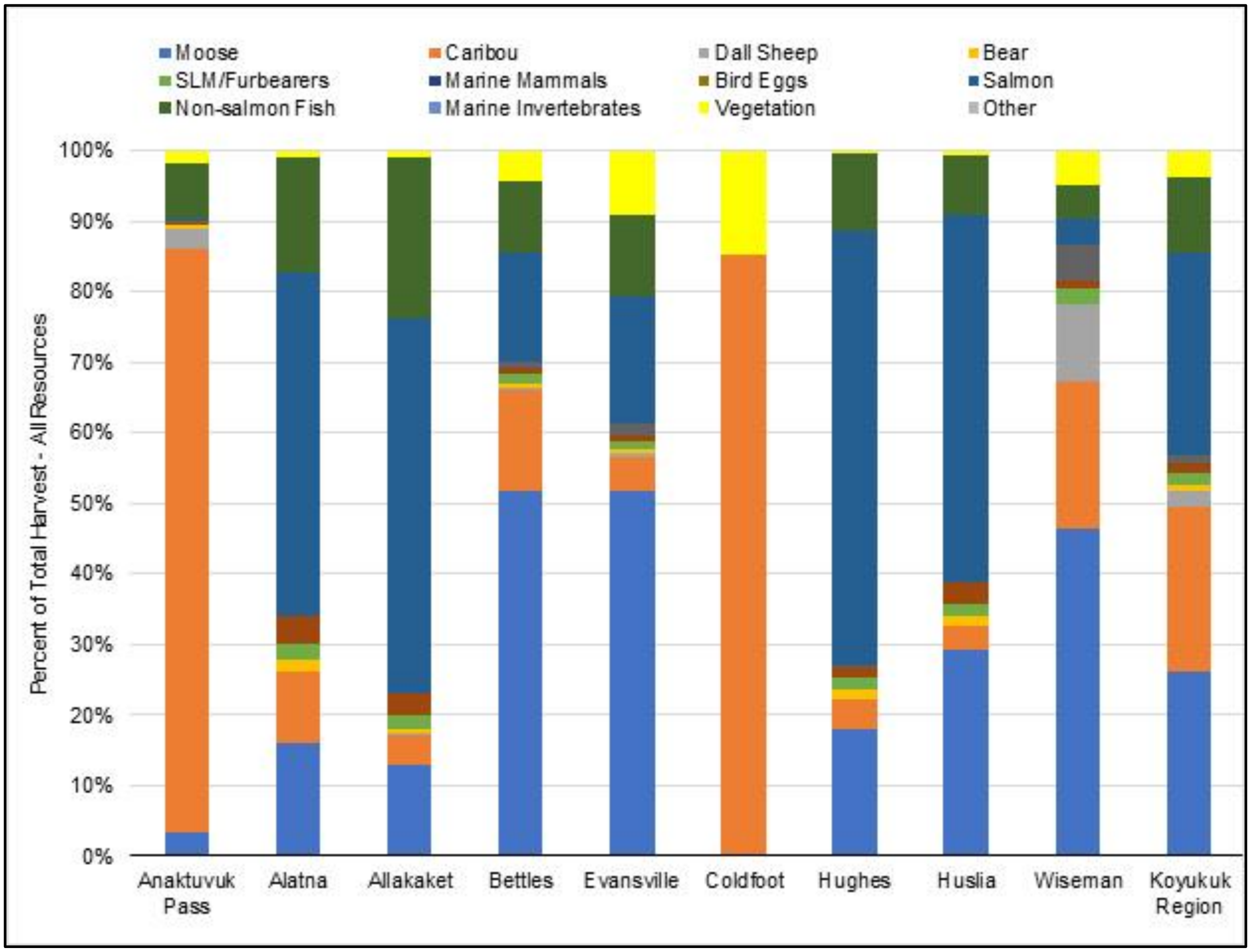


Figure 7. All resources percentage of total harvest by Koyukuk River region communities
Source: See Table 2 for citations, time period, and resources addressed
Notes: Data represent the average percentage of harvest across all available study years for comprehensive (i.e., all resources) household harvest surveys. In some cases, averages represent only a single study year. Available study years for each community are as follows: Anaktuvuk Pass (1992, 1994-95, 1996-97, 1998-99, 1999-00, 2000-01, 2001-02, 2002-03, 2011, 2014); Alatna (1982, 1983, 1984, 2011); Allakaket (1982, 1983, 1984, 2011); Bettles (1982, 1983, 1984, 2011); Evansville (1982, 1983, 1984, 2011); Coldfoot (2011); Hughes (1982, 2014); Huslia (1983); Wiseman (1991, 2011).

Average participation rates among Koyukuk River Region study communities, in terms of the average percentage of households attempting harvests by resource during individual study years, are shown on Figure 8. These data are based on averages across available study years; it is likely that in some years (or across all years) a higher percentage of households participates in each resource activity. Across all Koyukuk River Region study communities, households most commonly participate in harvests of vegetation (89 percent of households), followed by non-salmon fish (59 percent), moose (54 percent), upland birds (49 percent), migratory birds (43 percent), and caribou (45 percent). Fewer households participate in harvests of marine mammals, salmon, Dall sheep, and small land mammals. While all communities report high participation rates overall, participation in specific resource harvesting activities varies by community. For example, while Dall sheep hunting is not particularly common for the region as a whole, a substantial percentage of households in Wiseman (80 percent) and Anaktuvuk Pass (32 percent) engage in this activity. The average percentage of households receiving different resources is shown on Figure 9. Similar to the Kobuk River and Kotzebue Sound regions, some resources which are not regularly harvested by Koyukuk River Region study communities are still highly consumed through sharing with other regions. For example, while only 1 percent of households hunt marine mammals, nearly 50 percent of households receive this resource. In addition to marine mammals, the most commonly shared resources in Koyukuk River Region communities (more than half of households receiving) include non-salmon fish, moose, vegetation, and salmon.

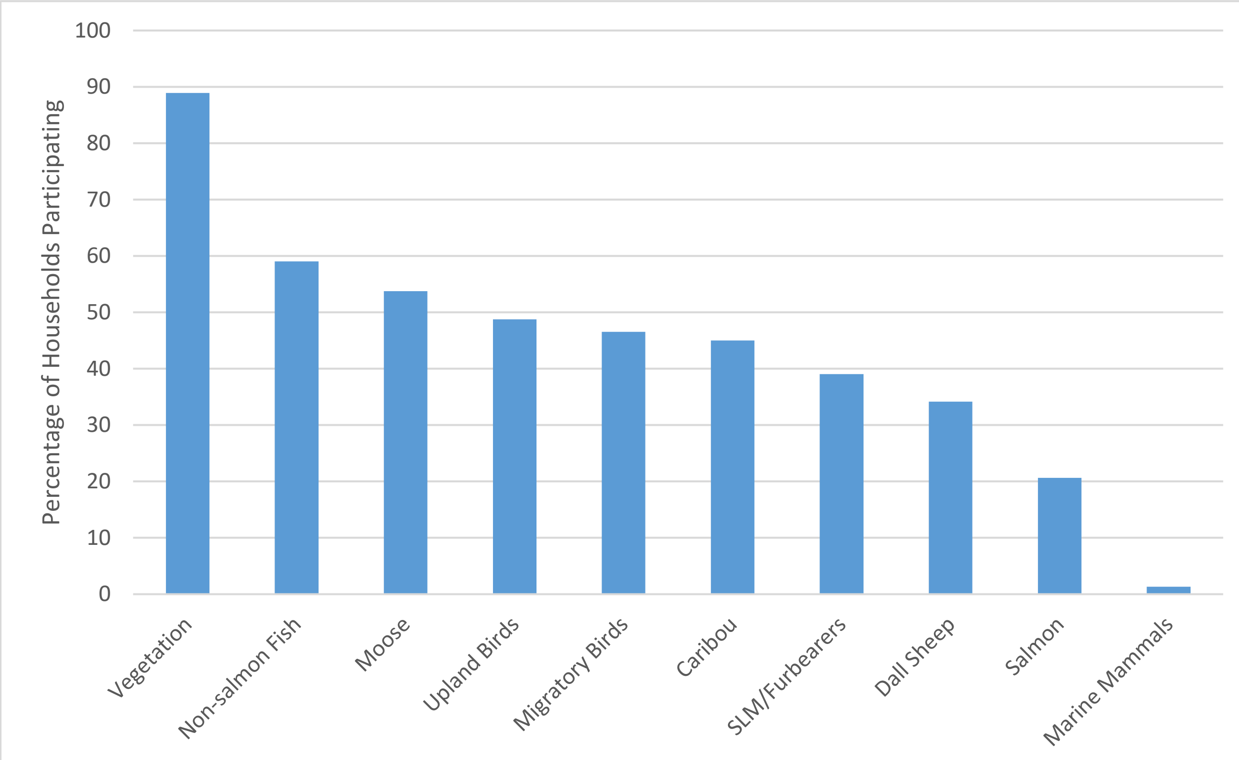


Figure 8. Percentage of households attempting harvests of resources, Koyukuk River region communities

Source: See Table 2 for citations, time period, and resources addressed

Notes: Data represent the average percentage of households across all available study years. Available study years for each community are as follows: Anaktuvuk Pass (1986-1991, 1990-91, 1991-92, 1992, 1993-94, 1994-95, 1996-97, 1998-99, 1999-00, 2000-01, 2001-02, 2002-03, 2006-07, 2011, 2014); Alatna (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2001-02, 2002, 2002-03, 2011); Allakaket (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2001-02, 2002, 2002-03, 2011); Bettles (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2002, 2002-03, 2011); Evansville (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2002, 2002-03, 2011); Coldfoot (2011); Hughes (1982, 1998, 1998-99, 2002, 2014); Huslia (1983, 1997-98, 1998-99, 1999-00, 2001-02, 2002, 2002-03); Wiseman (1991, 2011).

Table 18 shows average harvest and use data for the top five species harvested (in terms of average contribution toward the total subsistence harvest) by each of the Koyukuk River Region study communities. Chum salmon is the top species in four of the nine study communities (Alatna, Allakaket, Hughes, and Huslia), contributing between 44 percent and 57 percent of the total subsistence harvest. Based on the average of available harvest data for each community, some of which are more than 10 years old, Table 18 may not reflect current salmon harvest patterns. For example, based on 2020 subsistence harvest permit data for salmon for the Yukon area, 2020 showed a substantial decline in harvests of Chinook, summer chum, fall chum, and coho salmon (Brown et al. 2023). Moose is the top harvested resource in three of the nine study communities (Bettles, Evansville, and Wiseman; between 46 and 52 percent), and caribou is the top harvested in two of the nine study communities (Anaktuvuk Pass and Coldfoot; 86 and 85 percent, respectively). Other top species in the Koyukuk River Region include sheefish (Alatna, Allakaket, and Huslia), whitefish (Alatna, Allakaket, and Hughes), other salmon species (Chinook and sockeye; Allakaket and Evansville), Dall sheep (Anaktuvuk Pass, Wiseman), black bear (Huslia), and berries (Anaktuvuk Pass, Bettles, Coldfoot, Evansville, and Wiseman).

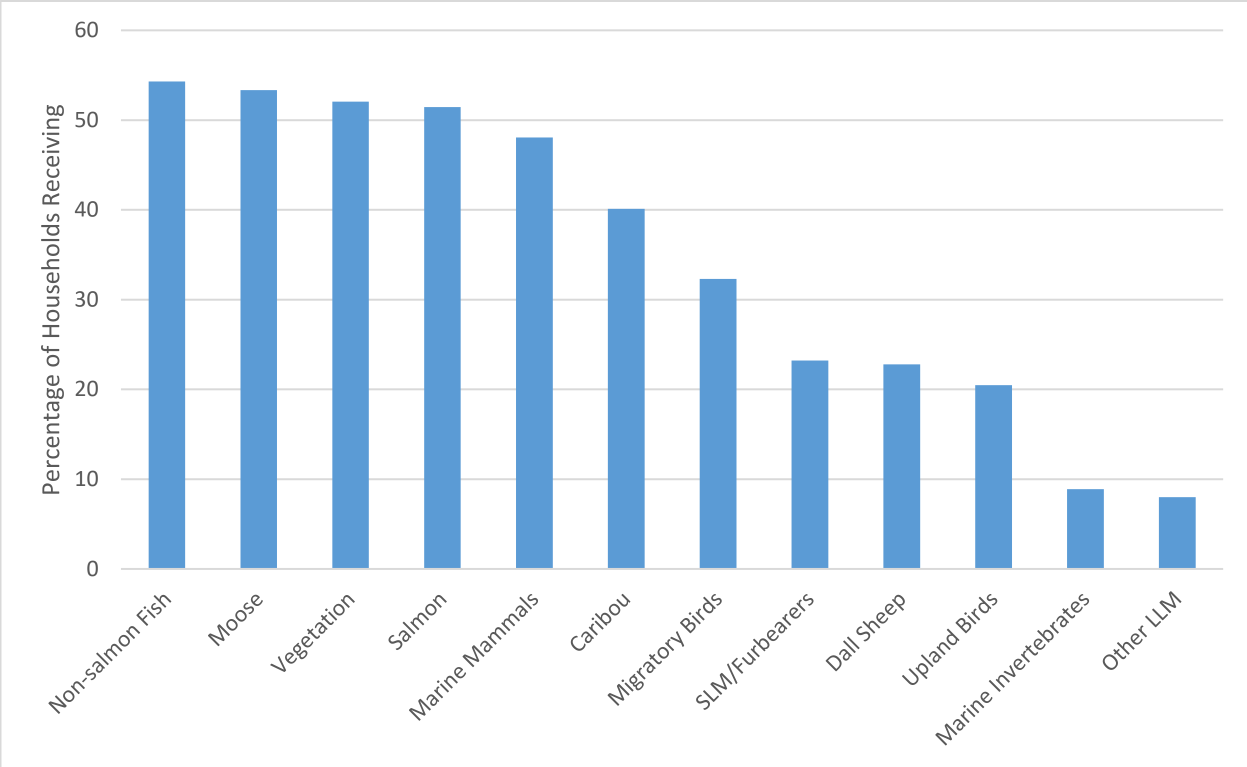


Figure 9. Percentage of households receiving resources, Koyukuk River region communities

Source: See Table 2 for citations, time period, and resources addressed

Notes: Data represent the average percentage of households across all available study years. Available study years for each community are as follows: Anaktuvuk Pass (1986-1991, 1990-91, 1991-92, 1992, 1993-94, 1994-95, 1996-97, 1998-99, 1999-00, 2000-01, 2001-02, 2002-03, 2006-07, 2011, 2014); Alatna (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2001-02, 2002, 2002-03, 2011); Allakaket (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2001-02, 2002, 2002-03, 2011); Bettles (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2002, 2002-03, 2011); Evansville (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2002, 2002-03, 2011); Coldfoot (2011); Hughes (1982, 1998, 1998-99, 2002, 2014); Huslia (1983, 1997-98, 1998-99, 1999-00, 2001-02, 2002, 2002-03); Wiseman (1991, 2011).

5.3.3 Timing of Subsistence Activities

Data on the timing of subsistence activities for Koyukuk River study communities are provided in Table 19. This table shows the number of communities reporting subsistence activity or harvests within each month, based on the most recent data sources for each community. Overall, Koyukuk River communities target the greatest number of resources during the spring months of April and the summer/fall months of August and September.

Spring (April-May) in the Koyukuk River Region is characterized by warming temperatures, breakup on the rivers, and lengthening days. Spring marks a decrease in seasonal harvests of furbearers, upland birds, and small land mammals; however, it also marks the beginning of the waterfowl hunting season, as ducks and geese arrive in the area. Koyukuk River Region residents occasionally harvest small land mammals, including marten, hare, and beaver, in the springtime, but harvest by month data show harvests more commonly occurring over the winter months (Van Lanen et al. 2012, Holen et al. 2012). Fishing for non-salmon fish occurs in the region during the springtime, either through the ice or after breakup in the open water. Harvests of caribou, bear, and sheep may also occur in the springtime in a number of communities.

Table 18. Average harvest and use data, top five species, Koyukuk River region communities

Community	Species	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HHs receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% total harvest
Alatna	Chum salmon	50	33	42	33	33	8,865	54,036	1,157	321	44
Alatna	Moose	98	75	50	41	74	15	7,905	355	117	16
Alatna	Caribou	83	57	27	34	60	12	1,498	133	46	10
Alatna	Sheefish	67	67	47	29	33	1,335	9,340	203	56	10
Alatna	Whitefish	NA	NA	56		14	7,512	6,761	140	38	5
Allakaket	Chum salmon	50	38	42	31	19	9,723	58,398	1,216	346	48
Allakaket	Moose	97	73	52	45	65	34	17,676	332	98	13
Allakaket	Sheefish	72	53	55	34	27	1,968	13,111	266	80	12
Allakaket	Humpback whitefish	44	30	27	17	25	1,611	4,817	86	31	7
Allakaket	Chinook salmon	48	29	39	24	33	317	5,374	111	32	4
Anaktuvuk Pass	Caribou	92	61	49	49	68	514	65,678	784	222	86.2
Anaktuvuk Pass	Moose	29	10	6	9	24	4	2,230	25	7	3.2
Anaktuvuk Pass	Dall sheep	48	24	16	19	36	22	2,249	26	8	2.9
Anaktuvuk Pass	Berries	84	76	76	42	44	728	1,978	22	6	2.0
Anaktuvuk Pass	Arctic grayling	70	68	50	43	29	1,715	1,471	17	5	2.0
Bettles	Moose	88	35	24	40	62	8	3,792	193	72	51.5
Bettles	Chum salmon	13	13	13		0	338	2,057	79	29	14.3
Bettles	Caribou	62	29	18	32	32	11	1,387	106	38	14.1
Bettles	Char	38	8	8	8	38	264	429	16	6	5.4
Bettles	Berries	NA	NA	43	NA	NA	160	638	23	8	4.7
Coldfoot	Caribou	75	50	25	50	50	2	325	65	33	85.3
Coldfoot	Blueberry	100	100	100	0	0	14	40	8	4	10.5

Community	Species	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HHs receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% total harvest
Coldfoot	Low bush cranberry	25	25	25	0	0	4	15	3	2	3.9
Evansville	Moose	78	33	20	39	68	7	3,201	133	55	51.4
Evansville	Chum salmon	NA	NA	21	NA	5	447	2,725	103	38	13.7
Evansville	Sockeye salmon	46	8	8	31	46	18	91	7	5	8.6
Evansville	Low bush cranberry	77	69	69	54	46	22	89	7	4	8.4
Evansville	Blueberry	85	85	85	46	46	21	84	6	4	8.0
Hughes	Chum salmon	46	19	19	15	39	15,195	56,895	2,474	603	56.8
Hughes	Moose	96	62	57	35	69	26	13,083	538	140	17.6
Hughes	Caribou	31	27	6	4	18	10	1,360	40	15	4.2
Hughes	Chinook salmon	NA	NA	68		16	586	10,603	482	112	7.5
Hughes	Humpback whitefish	51	29	29	14	27	1,959	5,877	219	86	5.0
Huslia	Chum salmon	NA	NA	43	14	41	22,583	102,603	1,800	533	49.3
Huslia	Moose	99	66	58	36	52	79	44,774	608	198	28.8
Huslia	Caribou	75	40	33	23	38	107	13,880	182	60	3.3
Huslia	Sheefish	60	31	34	20	37	896	5,815	85	27	3.0
Huslia	Black bear	60	34	23	18	37	29	3,240	47	15	2.9
Wiseman	Moose	100	80	60	60	40	4	1,890	432	166	46.4
Wiseman	Caribou	80	80	60	60	20	7	890	104	40	20.9
Wiseman	Dall sheep	75	80	40	25	25	5	468	42	16	10.8
Wiseman	Low bush cranberry	100	100	100	40	20	42	169	34	13	4.4
Wiseman	Ptarmigan	80	80	80	40	NA	229	151	46	18	3.8

Source: See Table 2 for citations, time period, and resources addressed

Notes: HH = Households; NA = Not Available

Data represent the average across all available study years. Available study years for each community are as follows: Anaktuvuk Pass (1986-1991, 1990-91, 1991-92, 1992, 1993-94, 1994-95, 1996-97, 1998-99, 1999-00, 2000-01, 2001-02, 2002-03, 2006-07, 2011, 2014); Alatna (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2001-02, 2002, 2002-03, 2011); Allakaket (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2001-02, 2002, 2002-03, 2011); Bettles (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2002, 2002-03, 2011); Evansville (1982, 1983, 1984, 1997-98, 1998-99, 1999-00, 2002, 2002-03, 2011); Coldfoot (2011); Hughes (1982, 1998, 1998-99, 2002, 2014); Huslia (1983, 1997-98, 1998-99, 1999-00, 2001-02, 2002, 2002-03); Wiseman (1991, 2011).

Table 19. Koyukuk River region timing of subsistence activities, number of communities reporting subsistence activity

Resources	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Freshwater non-salmon fish	5	7	6	4	7	8	8	8	8	5	4	6
Marine non-salmon fish	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Salmon	N/A	N/A	N/A	N/A	2	6	4	4	4	2	N/A	N/A
Caribou	8	9	8	9	5	N/A	3	6	6	6	8	8
Moose	5	4	5	3	N/A	N/A	N/A	6	9	7	4	4
Bear	3	4	5	6	9	4	8	9	6	6	5	2
Sheep	3	3	3	3	N/A	3	3	7	6	4	3	3
Furbearers	2	2	2	2	N/A	N/A	N/A	N/A	N/A	N/A	2	2
Small land mammals	9	9	9	8	7	3	4	6	6	6	9	9
Upland birds	9	9	9	7	6	4	4	8	9	9	9	9
Waterfowl	N/A	N/A	N/A	6	8	6	2	3	3	N/A	N/A	N/A
Eggs	N/A	N/A	N/A	N/A	3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Plants and berries	2	2	2	2	3	6	8	8	8	3	2	2
Wood	6	6	6	6	6	6	6	6	6	6	6	6
Total number of resources per month	10	10	10	11	10	9	10	11	11	10	10	10

Source: Holen et al. 2012; SRB&A 2016a; SRB&A 2013a; Brown et al. 2016; Marcotte and Haynes 1985; Wilson and Kostick 2016; Andersen et al. 2004b; Marcotte 1986

Notes: Apr = April; Aug = August; Dec = December; Feb = February; Mar = March; Jan = January; Jul = July; Jun = June; N/A = not applicable (no or limited subsistence activity); Nov = November; Oct = October; Sep = September

Koyukuk River Region Communities = nine (Alatna, Allakaket, Anaktuvuk Pass, Bettles, Coldfoot, Evansville, Hughes, Huslia, and Wiseman)

Each cell contains the number of communities reporting subsistence activity or harvests during each month, based on the most recent data source for each community. Months with only one community report harvests or activity are not included in the table. Resources with no subsistence activity data available are not included in the table.

While non-salmon fish and plants and berries are harvested year round in the Koyukuk River Region, during summer (June-August) residents begin to focus on fishing and collecting plants and berries. Salmon abundances vary throughout the region and therefore harvesting salmon is a strong focus of some communities, including Allakaket and Alatna, while other communities located further from the major salmon rivers (i.e., Bettles and Evansville) focus their fishing endeavors on non-salmon fish. Berries are a particularly important resource in the region; they are among the highest-used resources (in terms of the percentage of households using) in many of the communities (Holen et al. 2012). Most large land mammal subsistence activity, more commonly a fall activity, occurs at the end of the summer in August. However, communities hunt bear year round and may also take a caribou in July. Harvests of waterfowl occur during the summer months, although harvest activities decrease during the July nesting and rearing period

Many subsistence activities which occur over the summer, including fishing, waterfowl hunting, and large land mammal hunting, continue or amplify during the fall (September–October). Caribou and moose are particularly important resources for the northern communities in the Koyukuk River Region (i.e., Wiseman, Coldfoot, Evansville, and Bettles), and by weight make up the majority of the annual subsistence harvest in these communities. Moose harvests most commonly occur in the month of September and residents harvest caribou during the fall and into the winter months. Dall sheep hunting in the Koyukuk River Region usually occurs in the fall, when water levels are high enough to allow hunters to access mountainous areas by boat. Dall sheep and bear harvests continue in early fall and berry picking may also continue from the summer into fall. Fall in the Koyukuk River Region marks the end of waterfowl subsistence activity and an increase of harvests of upland birds, such as grouse and ptarmigan. Wood is collected year-round and in the fall is a particularly important resource to prepare for heating through the upcoming winter.

During the winter season (November-March), focus shifts to harvests of small land mammals and furbearers as watersheds freeze over creating conditions for travel to trapping grounds. Pelts of the small mammals and furbearers are prime over the winter season and residents of the region hunt or trap for the pelts and/or meat of small mammals for subsistence purposes. Large land mammal harvests, including caribou, moose, bears, and sheep, occur over the winter months although moose, bear, and sheep harvests occur with more frequency during other seasons. Ice fishing for non-salmon fish occurs over winter months. In Bettles and Evansville changing ice conditions have decreased winter non-salmon fishing subsistence activities in recent years (Holen et al. 2012). Residents of the Koyukuk River Region harvest upland birds throughout the winter and into the spring as the annual cycle of subsistence activities begins again.

5.3.4 Travel Method

A recent subsistence mapping study (SRB&A 2016a) collected data on travel methods for a majority of Koyukuk River study communities. The data show that a majority of use areas in the study communities are accessed by boat and, to a lesser extent, snowmachine. Other methods used to access subsistence use areas include truck/car, plane, ATV, and foot. Primary travel methods used to search for resources within use areas are boat, snowmachine, and foot (SRB&A 2016a). Access and search methods vary by community. For example, the communities of Bettles and Evansville rely more heavily on plane travel to access subsistence use areas, although Watson (2018) indicates that access to airplanes may decrease with the newer generations. In addition, Wiseman and Coldfoot report much heavier use of trucks/cars to access their harvesting areas, given their proximity to the Dalton Highway. The communities of Alatna and Allakaket are much more likely to use boats to access their harvesting areas than other Koyukuk River study communities. Data on travel methods for Anaktuvuk Pass (SRB&A 2013b) indicate a heavy reliance on ATVs and snowmachines rather than boats, which reflects the lack of access to navigable rivers near that community. Travel routes documented for Anaktuvuk Pass show various overland travel routes which follow mountain passes to the south toward Bettles and Evansville and to the southwest as far as Ambler. Finally, travel method data for the community of Hughes are available in Wilson and Kostick (2016) and indicate that boat is the primary method used by community households, followed closely by snowmachine and to a lesser extent, ATV. Watson (2018), who mapped contemporary subsistence use areas for a number of the Koyukuk River study communities (Allakaket, Alatna, Bettles, Evansville, Hughes, and Huslia) included access routes to subsistence use areas within the use areas mapped in that study; thus many of the use areas shown on Map 11 through Map 19 include travel routes as well.

5.3.5 Resource Importance

The relative importance of subsistence resources to the individual Koyukuk River Region study communities, based on selected variables, is provided in Table 20 through Table 28 (see Section 4.3, Resource Importance Data, for discussion of methods). Based on this analysis, vegetation is of high importance in the largest number of Koyukuk River study communities (eight communities), followed by moose and non-salmon fish (seven communities), salmon (six communities), and caribou (five communities). Other resources of high importance in the Koyukuk River Region study communities include marine mammals (three communities), upland birds (two communities), and migratory birds and Dall sheep (one community each).

Table 20. Relative importance of subsistence resources based on selected variables, Alatna

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	75	74	16	H
2	Caribou	57	34	10	M
3	Dall Sheep	NA	9	0.1	L
4	Bear	NA	NA	1	L
5	Other LLM	NA	NA	NA	I
6	SLM/Furbearers	67	67	2	M
7	Marine mammals	NA	100	NA	H
8	Migratory birds	83	83	4	H
9	Upland birds	83	50	0.2	H
10	Bird eggs	NA	NA	NA	I
11	Salmon	33	50	48	H
12	Non-salmon fish	71	58	16	M
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	100	100	1	H

Source: See Table 2

Notes: H = High; HH = Households; I = Indeterminate; L = Low; M - Moderate; NA = Not Available; LLM = Large land mammals; SLM = Small land mammals

Table 21. Relative importance of subsistence resources based on selected variables, Allakaket

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	73	65	13	H
2	Caribou	38	52	4	H
3	Dall sheep	12	9	0.2	L
4	Bear	NA	NA	1	L
5	Other large land mammals	NA	2	NA	L
6	Small land mammals/ furbearers	40	38	2	M
7	Marine mammals	NA	55	NA	H
8	Migratory birds	55	40	3	M
9	Upland birds	43	10	0.2	M
10	Bird eggs	NA	NA	NA	NA
11	Salmon	40	60	53	H
12	Non-salmon fish	64	55	23	H
13	Marine invertebrates		2	-	L
14	Vegetation	83	57	1	H

Source: See Table 2

Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 22. Relative importance of subsistence resources based on selected variables, Anaktuvuk Pass

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	6	26	3	M
2	Caribou	66	68	84	H
3	Dall sheep	32	42	3	M
4	Bear	NA	NA	0.4	L
5	Other large land mammals	NA	2	NA	L
6	Small land mammals/ furbearers	18	8	0.03	L
7	Marine mammals	1	60	NA	H
8	Migratory birds	23	21	0.3	L
9	Upland birds	18	18	0.2	L
10	Bird eggs	NA	NA	NA	I
11	Salmon	11	40	0.4	M
12	Non-salmon fish	74	61	8	H
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	79	47	2	H

Source: See Table 2

Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 23. Relative importance of subsistence resources based on selected variables, Bettles

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	35	62	51	H
2	Caribou	29	32	14	M
3	Dall sheep	13	19	0.4	L
4	Bear	NA	NA	1	L
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/ furbearers	50	13	1	M
7	Marine mammals	NA	NA	NA	I
8	Migratory birds	13	NA	1	L
9	Upland birds	25	13	1	L
10	Bird eggs	NA	NA	NA	I
11	Salmon	13	25	15	M
12	Non-salmon fish	38	46	10	H
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	88	63	4	H

Source: See Table 2
Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 24. Relative importance of subsistence resources based on selected variables, Evansville

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	33	68	51	H
2	Caribou	18	50	5	H
3	Dall sheep	NA	33	0.4	M
4	Bear	NA	NA	0.6	L
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/ furbearers	8	8	1.3	L
7	Marine mammals	NA	23	NA	L
8	Migratory birds	NA	15	1	L
9	Upland birds	46	38	1.5	M
10	Bird eggs	NA	NA	NA	I
11	Salmon	8	62	18	H
12	Non-salmon fish	38	60	12	H
13	Marine invertebrates	NA	15	NA	L
14	Vegetation	100	62	9	H

Source: See Table 2
Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 25. Relative importance of subsistence resources based on selected variables, Coldfoot

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	NA	25	NA	L
2	Caribou	50	50	85	H
3	Dall sheep	NA	NA	NA	I
4	Bear	NA	NA	NA	I
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/ furbearers	NA	NA	NA	I
7	Marine mammals	NA	NA	NA	I
8	Migratory birds	NA	NA	NA	I
9	Upland birds	NA	25	NA	L
10	Bird eggs	NA	NA	NA	I
11	Salmon	NA	25	NA	L
12	Non-salmon fish	NA	NA	NA	I
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	100	NA	15	H

Source: See Table 2

Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 26. Relative importance of subsistence resources based on selected variables, Hughes

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	62	69	18	H
2	Caribou	27	18	4	M
3	Dall sheep	NA	NA	NA	I
4	Bear	NA	NA	1	L
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/ furbearers	31	12	2	M
7	Marine mammals	NA	31	NA	M
8	Migratory birds	46	19	1	M
9	Upland birds	46	4	0.2	M
10	Bird eggs	NA	NA	NA	I
11	Salmon	19	50	61	H
12	Non-salmon fish	51	39	11	H
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	62	23	1	H

Source: See Table 2

Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 27. Relative importance of subsistence resources based on selected variables, Huslia

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	66	52	29	H
2	Caribou	40	38	3	M
3	Dall sheep	NA	NA	NA	I
4	Bear	NA	NA	1	L
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/ furbearers	NA	18	2	M
7	Marine mammals	NA	NA	NA	I
8	Migratory birds	NA	27	3	M
9	Upland birds	NA	7	0.1	L
10	Bird eggs	NA	NA	NA	I
11	Salmon	NA	52	51	H
12	Non-salmon fish	58	55	8	H
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	NA	5	1	L

Source: See Table 2
Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 28. Relative importance of subsistence resources based on selected variables, Wiseman

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	80	40	46	H
2	Caribou	80	20	21	H
3	Dall sheep	80	25	11	H
4	Bear	NA	NA	NA	I
5	Other large land mammals	NA	20	NA	L
6	Small land mammals/ furbearers	60	NA	2	M
7	Marine mammals	NA	20	NA	I
8	Migratory birds	60	20	1	M
9	Upland birds	80	20	5	H
10	Bird eggs	NA	NA	NA	I
11	Salmon	20	100	4	H
12	Non-salmon fish	80	60	5	H
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	100	60	5	H

Source: See Table 2
Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

5.4. Tanana River

The Tanana River region includes the communities of Manley Hot Springs, Minto, Nenana, and Tanana. Tanana use areas are overlapped with the southern corridor alternative, while the three other Tanana River region communities have uses which occur within 30 miles of (but do not overlap with) the southern corridor. Three of four of the Tanana River region communities (Manley Hot Springs, Minto, and Nenana) are road-connected.

5.4.1 Subsistence Use Areas

Subsistence use areas for the Tanana River region study communities are focused around the Tanana River, Yukon River, Nenana River, and Minto Flats. For road-connected communities (e.g., Manley Hot Springs, Minto, and Nenana) use areas also occur along the Parks, Elliot, Steese, and/or Dalton highways. In the case of Nenana, documented use areas occur as far west as the Koyukuk River.

Manley Hot Springs subsistence use areas for all available time periods (1975–1995; 2012) are shown on Map 20. The community's harvesting activities occur in an area surrounding the community, along the Tanana River to its mouth, and upriver into the Minto Flats. In addition, use areas occur at several locations along the Yukon River. Use areas recently documented by the ADF&G (Brown et al. 2014) show salmon and non-salmon fish harvesting areas for the community occurring along the Tanana River and on the Yukon River at a location referred to as The Rapids. Additional non-salmon fish harvesting areas occur at various lakes and sloughs near the community. Large land mammal hunting for bears and moose occur along the Tanana River in addition to areas accessed along the local road system and several overland areas south and north of the community. Small land mammal hunting and trapping areas in addition to bird hunting and vegetation harvesting also occur in various overland areas north and south of the community and along the nearby road system. Vegetation harvesting areas also occur to the north of the community along the Yukon River.

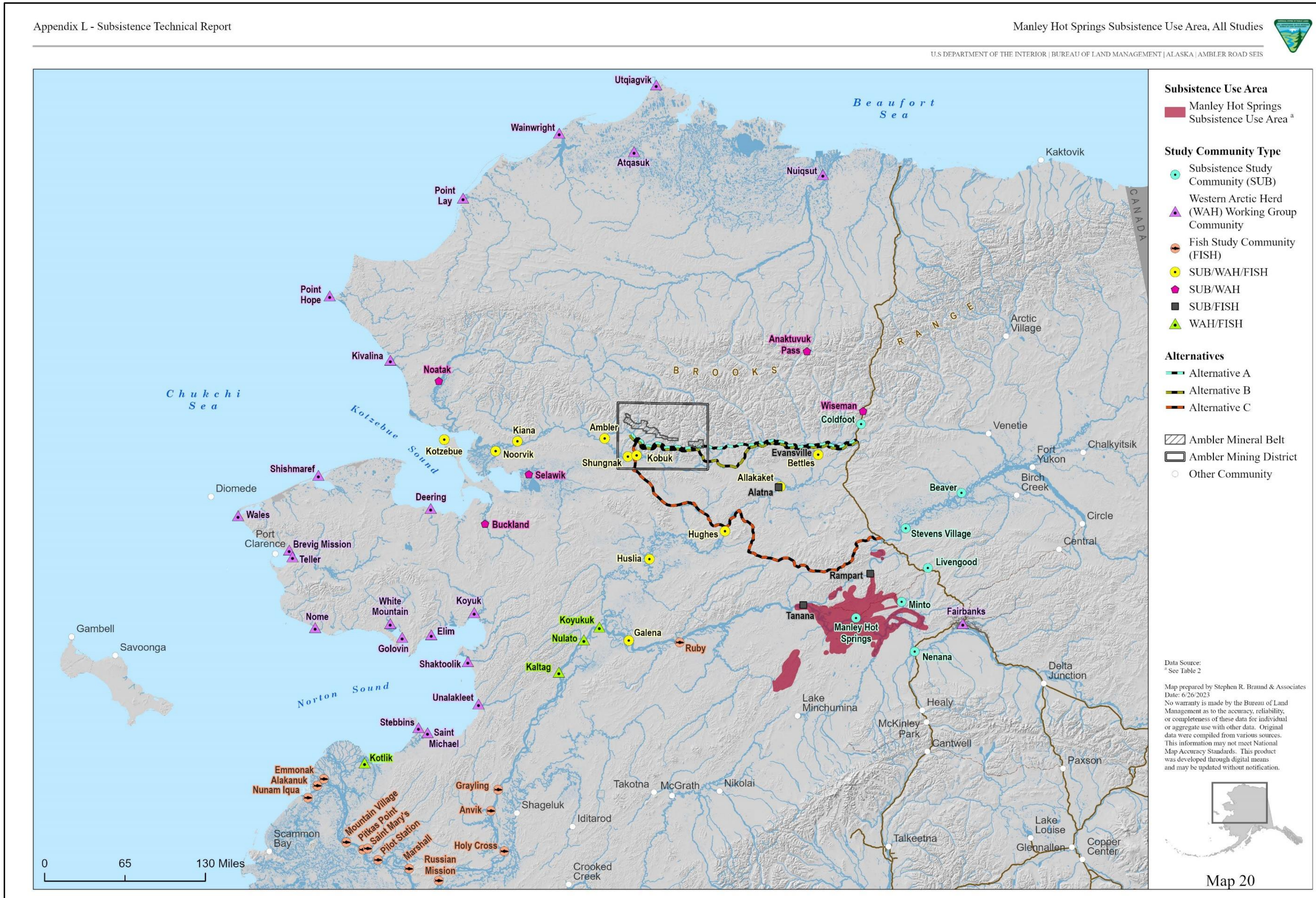
Minto subsistence use areas (Map 21) for all available time periods (1960–1984; 1960–1985; 2006–2015; 2012) occur throughout the Minto Flats, along the Elliot Highway, and along the Tanana, Kantishna, and Yukon rivers. Recent use areas documented for Minto (SRB&A 2016a) show large land mammal (moose and bear) hunting concentrated in the Minto Flats including the Tolovana and Chatanika Rivers and Sawmill Slough. Small land mammal hunting and trapping is focused on the Chatanika and Tanana Rivers in addition to various overland areas within the Minto Flats, to the north near the Elliot Highway, and at an isolated area long the Yukon River near Stevens Village. Waterfowl hunting is also concentrated within the Minto Flats close to the community and near Sawmill Slough, while upland bird hunting occurs most commonly along the road system out of Minto and along the Elliot Highway. Fishing for Minto residents occurs within the Minto Flats but with a majority of activity in the Tanana River and at various locations along the Yukon River. Non-salmon fish harvesting generally occurs closer to the community than salmon harvesting. Harvesting of berries and vegetation occur within the Minto Flats and to a lesser extent along the Elliot Highway.

As shown on Map 22, Nenana use areas for all available time periods (1981–1982; 2006–2015; 2015) occur primarily along the Tanana, Nenana, and Kantishna rivers, portions of the Minto Flats, and along the highway system north and south of the community. Recent use areas documented for Nenana (SRB&A 2016a) show large land mammal hunting for moose and bear occurring primarily along the Parks Highway south of the community and along the Tanana River and Minto Flats; waterfowl hunting occurs in a similar area. Caribou hunting by Nenana residents was reported primarily to the northeast of the community along the Steese Highway, while small land mammal and upland game hunting occur closer to the community and in overland areas extending north to the Elliot Highway. Salmon fishing by Nenana residents is focused along the Tanana River near the community, while non-salmon fish harvesting extends farther from the community into the Tanana River and Minto Flats. Vegetation harvesting occurs along the road system near to and south of the community of Nenana, in addition to various spots along the Tanana River and in the Minto Flats.

Of the four Tanana Region study communities, Tanana has uses closest to the AAP corridors, with subsistence use areas overlapping with the southern corridor alternative north of the Yukon River. Map 23 shows Tanana use areas for all available time periods (1968–1988; 2006; 2014) extending along the Tanana and Yukon rivers and in overland areas both north and south of the Yukon River. Recently documented use areas for the 2014 time period (Brown et al. 2016) show moose hunting occur along the Yukon River downriver from their community, along the Tanana-Allakaket Winter Trail extending north of their community toward Allakaket, and along the Koyukuk River to Huslia. Small land mammal hunting and trapping occurs north of the community along the Tanana-Allakaket Winter Trail to its crossing with the Tozlina River, in addition to locations along the Yukon River and overland to the south of the community. Several caribou hunting areas were documented to the east and north of their community, including in the Ray Mountains. Fishing for salmon and non-salmon fish occurs on the Yukon River primarily in front of or upriver from the community of Tanana. Waterfowl hunting took place along the Yukon and Tanana rivers including the lake system surrounding Fish Creek and Fish Lake to the southeast of the community, while upland bird hunting occurred primarily in overland areas to the north and west of the community. Vegetation harvesting by Tanana residents took place in overland areas to the north of the community in addition to the Fish Creek/Fish Lake area southeast from the community.

5.4.2 Harvest Data

Harvest data for the Tanana River study communities are provided on Figure 10 through Figure 12 and in Table 29. The percentage of total harvest, shown on Figure 10, is calculated by dividing the total pounds of subsistence harvest for all resources by the pounds harvested for individual species or resource categories. Based on an average of available data, salmon is the primary resource harvested among the study communities in terms of percentage of usable pounds (70 percent), followed by non-salmon fish (12 percent) and moose (11 percent). Other resources which contribute smaller amounts in terms of pounds include vegetation, small land mammals, migratory birds, and caribou. Resource contribution is relatively similar among the Tanana River Region study communities, although Nenana and Minto rely more heavily on moose harvests than the other study communities, at 32 and 22 percent of the total harvest, respectively.



Map 20. Manley Hot Springs subsistence use areas, all studies

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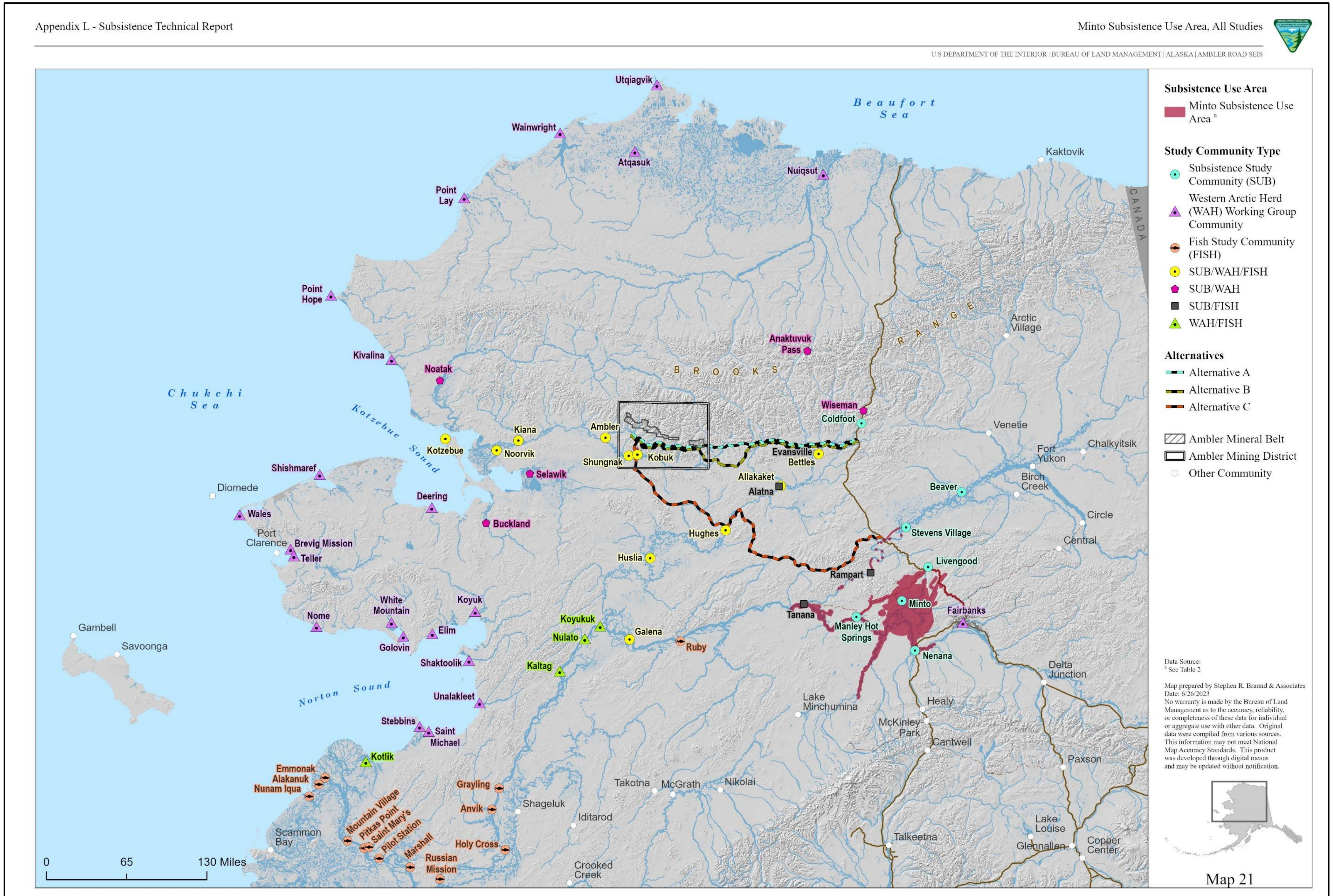

Map 21. Minto subsistence use areas, all studies

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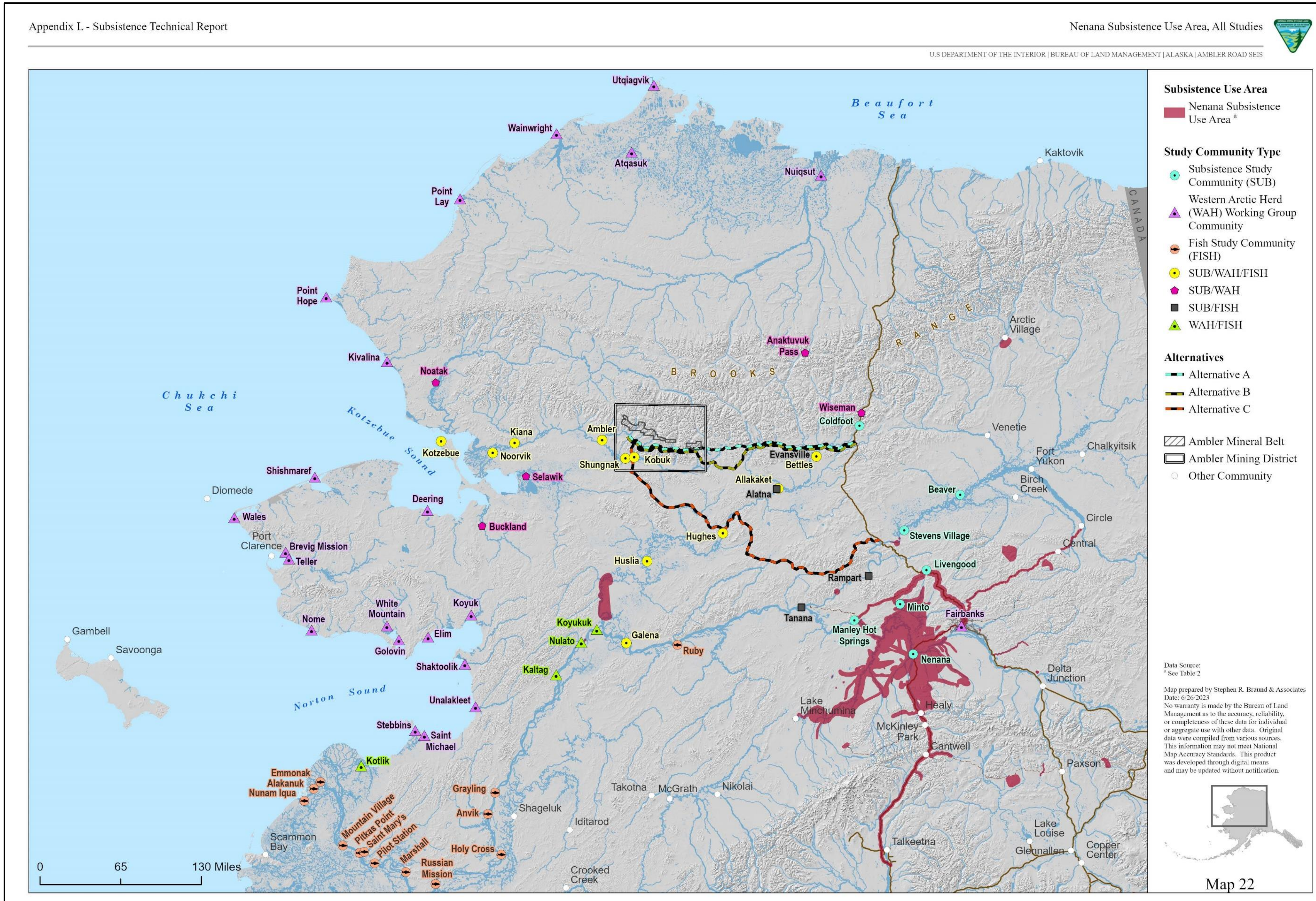

Map 22. Nenana subsistence use areas, all studies

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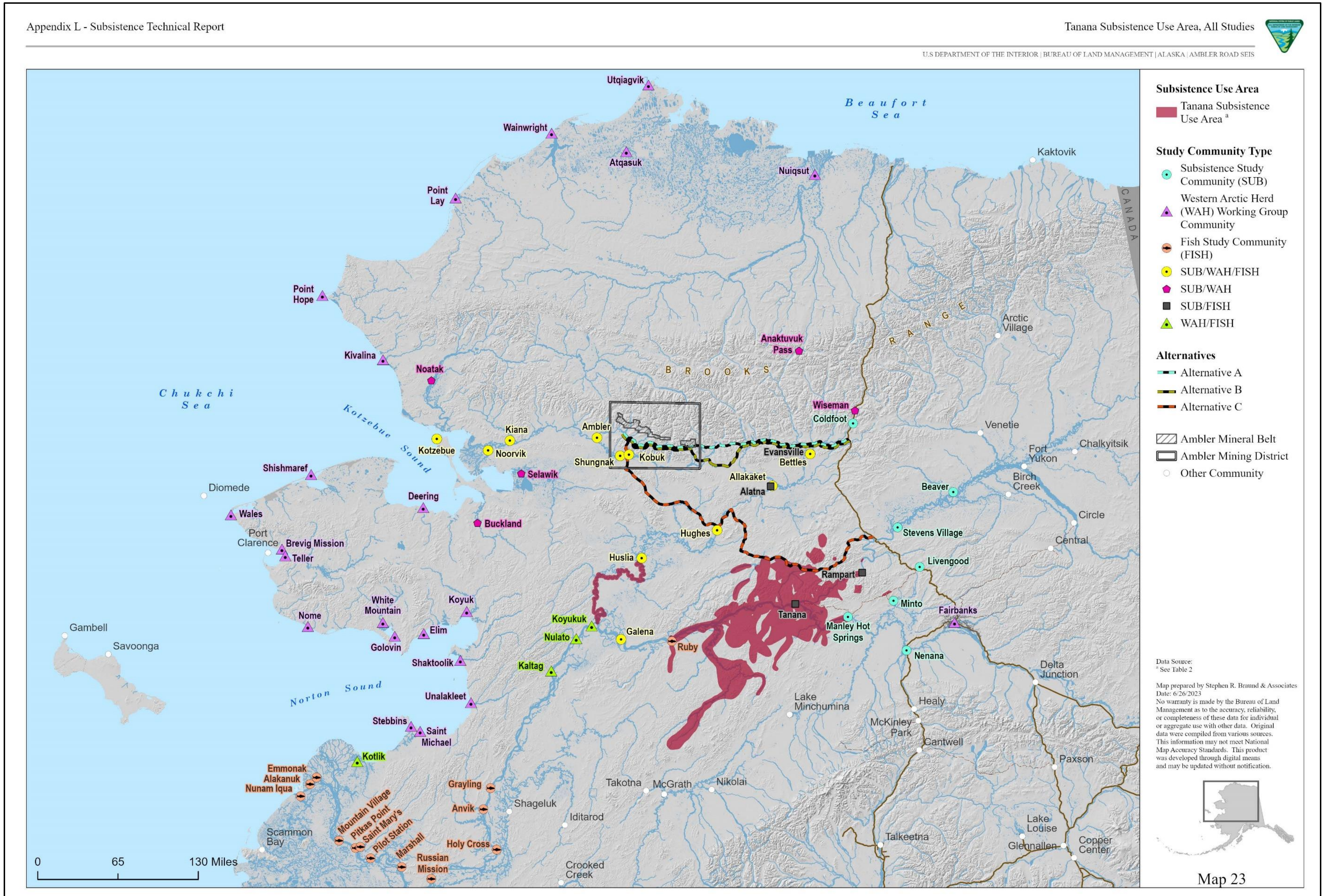

Map 23. Tanana subsistence use areas, all studies

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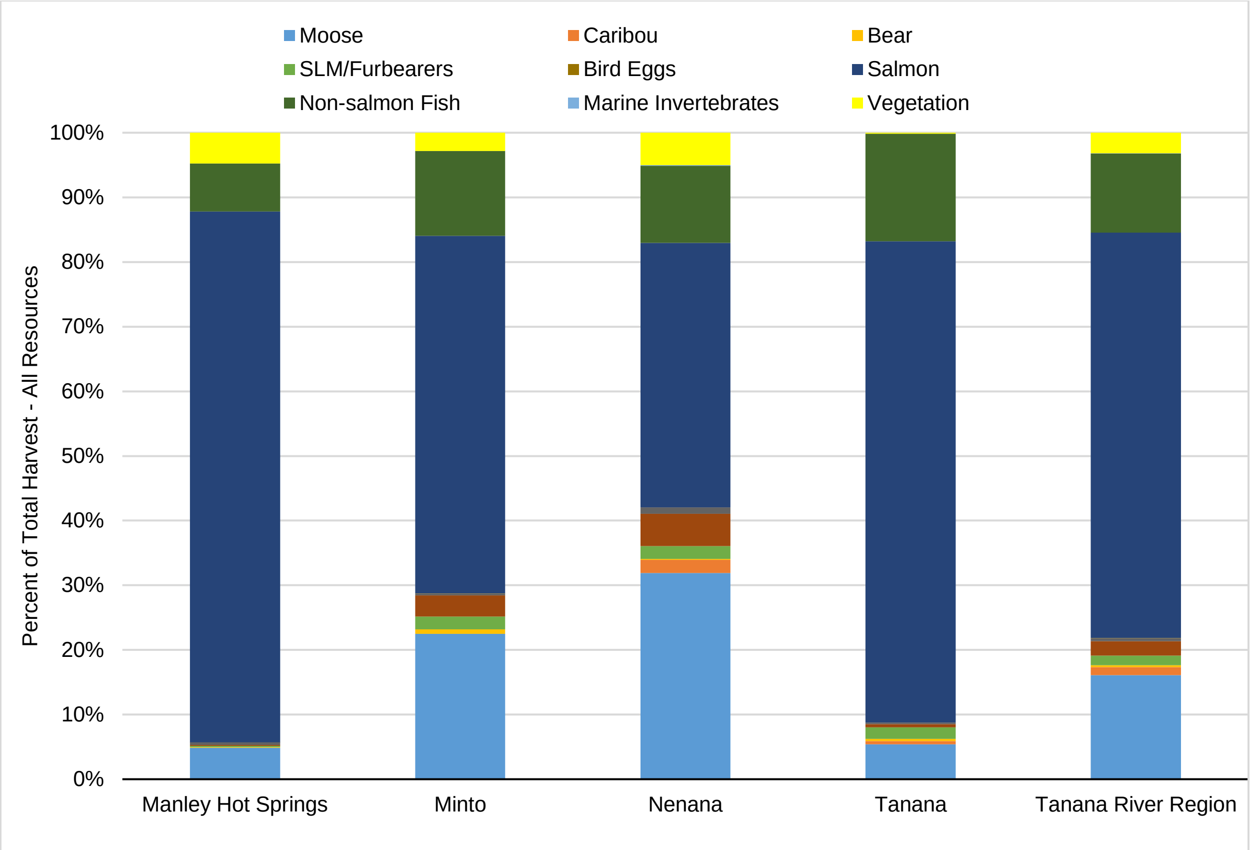


Figure 10. All resources percentage of total harvest by Tanana River region communities
Source: See Table 2 for citations, time period, and resources addressed
Notes: Data represent the average percentage of harvest across all available study years for comprehensive (i.e., all resources) household harvest surveys. In some cases, averages represent only a single study year. Available study years for each community are as follows: Manley Hot Springs (2012); Minto (1983-84, 2012); Nenana (2015); Tanana (1987, 2008, 2014).

Average participation rates among Tanana River Region study communities, in terms of the average percentage of households attempting harvests by resource during individual study years, are shown on Figure 11. These data are based on averages across available study years; it is likely that in some years (or across all years) a higher percentage of households participates in each resource activity. Across all Tanana River Region study communities, households most commonly participate in harvests of vegetation (84 percent of households), followed by moose (61 percent), non-salmon fish (51 percent), and salmon (50 percent). A smaller percentage of households participate in harvests of migratory birds and small land mammals, while participation in caribou hunting, bird egg harvesting, marine invertebrate harvesting, and Dall sheep hunting is minimal. The average percentage of households receiving different resources is shown on Figure 12. The most widely received resources in the region are also the most widely harvested. Salmon is the most commonly received resource among Tanana River Region study communities, followed by moose, vegetation, non-salmon fish, and migratory birds.

Table 29 shows average harvest and use data for the top five species harvested (in terms of average contribution toward the total subsistence harvest) by each of the Tanana River Region study communities. For three of the Tanana River communities (Manley Hot Springs, Minto, and Tanana), chum salmon is the top species harvested, contributing between 34 percent and 54 percent of the total subsistence harvest. Chinook and coho salmon are also among the top species harvested in these communities, as is moose. In Nenana, moose is the top species harvested (32 percent of the total subsistence harvest), followed by coho and chum salmon. Northern pike is among the top species harvested in Minto, whereas whitefish is a top species harvested in Tanana.

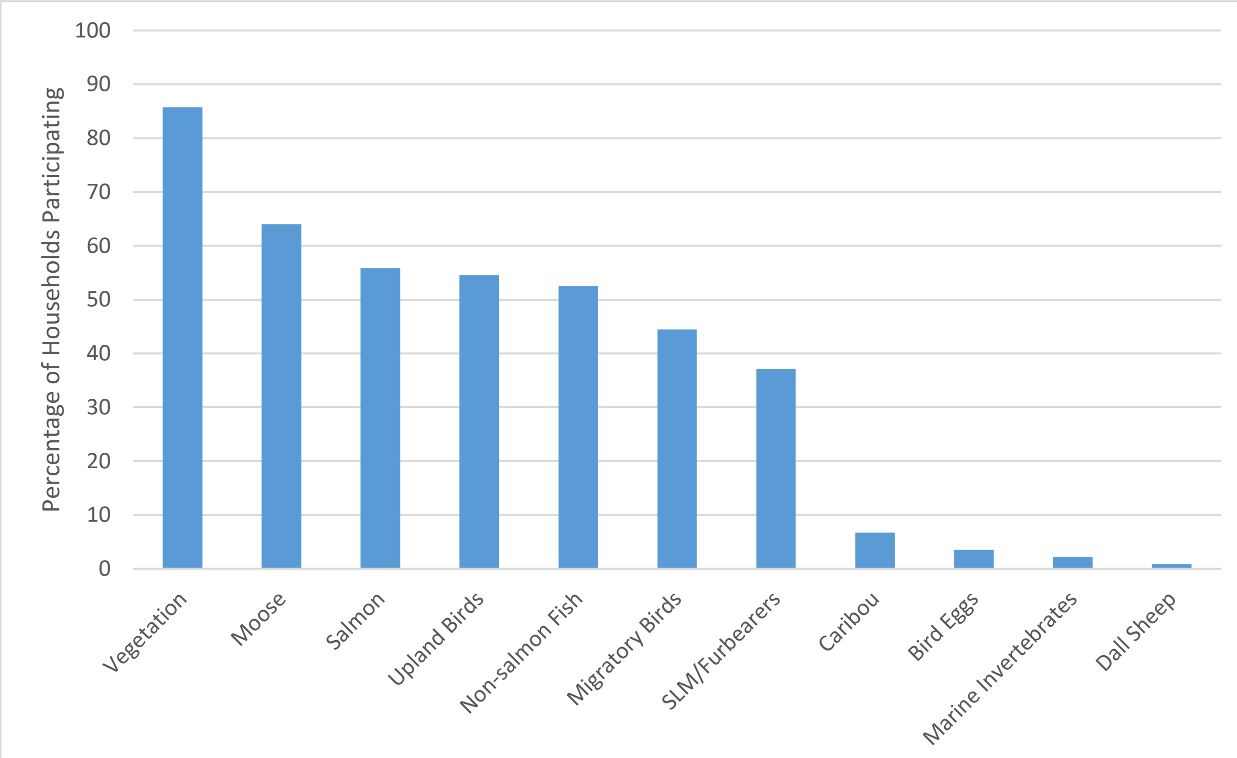


Figure 11. Percentage of households attempting harvests of resources, Tanana River region communities

Source: See Table 2 for citations, time period, and resources addressed

Notes: Data represent the average percentage of households across all available study years. Available study years for each community are as follows: Manley Hot Springs (2004, 2012); Minto (1983-84, 1994, 2004, 2012); Tanana (1987, 1997-98, 1998-99, 1999-00, 2002-03, 2006, 2008, 2014)

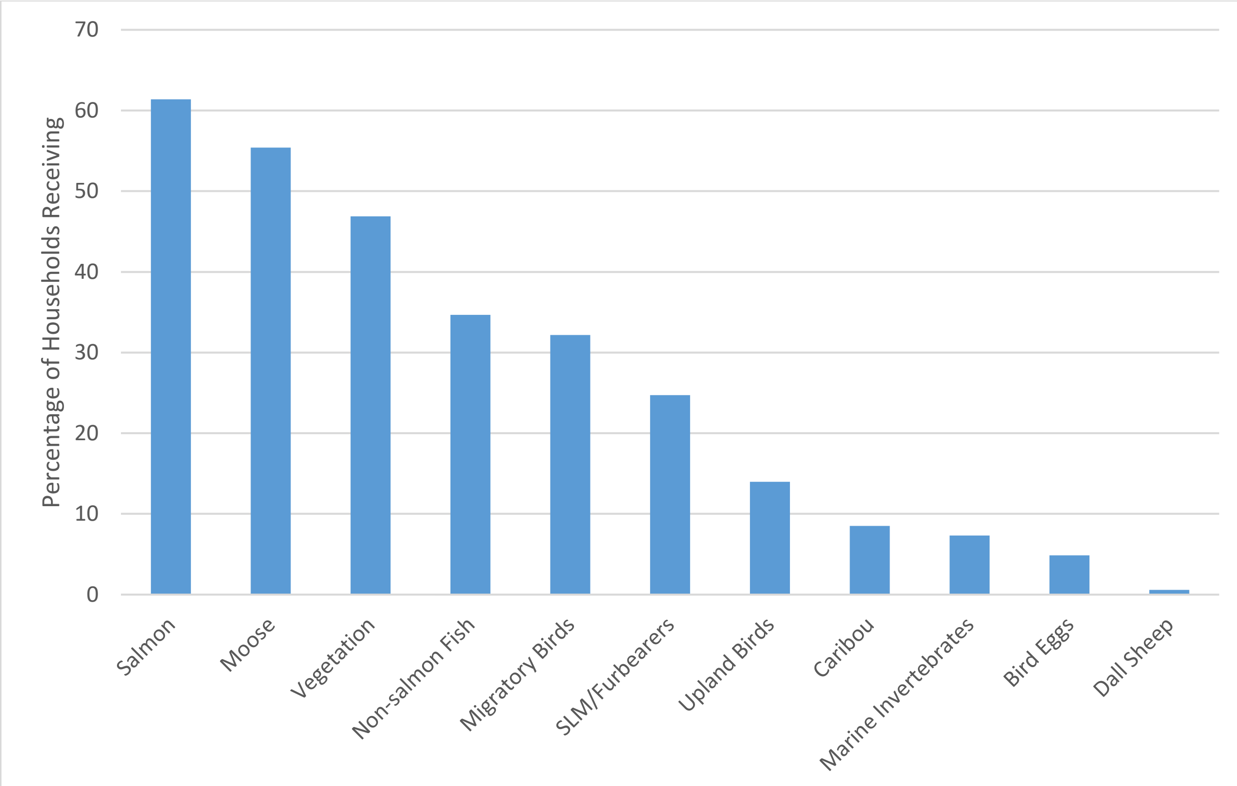


Figure 12. Percentage of households receiving resources, Tanana River region communities
Source: See Table 2 for citations, time period, and resources addressed.
Notes: Data represent the average percentage of households across all available study years. Available study years for each community are as follows: Manley Hot Springs (2004, 2012); Minto (1983-84, 1994, 2004, 2012); Tanana (1987, 1997-98, 1998-99, 1999-00, 2002-03, 2006, 2008, 2014)

Table 29. Average harvest and use data, top five species, Tanana River region communities

Community	Species	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HHs receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% total harvest
Manley Hot Springs	Chum salmon	32	15	12	15	20	3,586	17,992	310	146	34.3
Manley Hot Springs	Chinook salmon	80	29	20	29	68	979	12,958	223	105	24.7
Manley Hot Springs	Coho salmon	39	12	12	10	27	1,835	11,858	204	96	22.6
Manley Hot Springs	Moose	59	50	11	25	49	8	4,498	123	55	4.9
Manley Hot Springs	Northern pike	39	29	29	7	17	364	1,018	18	8	1.9
Minto	Chum salmon	41	44	44	11	24	12,578	62,903	1,294	336	40.4
Minto	Moose	90	70	39	34	74	32	18,732	309	96	22.5
Minto	Coho salmon	35	11	11	9	26	690	4,457	73	25	11.2
Minto	Chinook salmon	61	37	37	22	43	485	7,044	139	38	7.2
Minto	Northern pike	61	44	47	22	25	1,740	5,639	113	30	5.7
Nenana	Moose	65	58	16	15	39	50	30,351	154	59	31.5
Nenana	Coho salmon	28	12	10	9	20	1,788	9,629	40	16	14.8
Nenana	Chum salmon	33	10	8	12	28	8,039	8,039	33	14	12.4
Nenana	Sockeye salmon	30	10	10	10	25	954	4,588	19	8	7.1
Nenana	Chinook salmon	31	10	10	14	27	564	4,466	18	8	6.9
Tanana	Chum salmon	70	66	62	28	27	67,411	400,317	3,127	1,158	53.7
Tanana	Whitefish	49	33	33	23	18	16,598	54,489	435	136	11.7
Tanana	Chinook salmon	92	53	52	46	47	4,769	81,079	633	270	10.9
Tanana	Coho salmon	35	30	27	7	10	14,374	71,870	561	106	9.6
Tanana	Moose	94	67	38	42	70	48	27,253	258	105	5.4

Source: See Table 2 for citations, time period, and resources addressed

Notes: HH = households

Data represent the average across all available study years. Available study years for each community are as follows: Manley Hot Springs (2004, 2012); Minto (1983-84, 1994, 2004, 2012); Nenana (1981-82, 2004, 2015); Tanana (1987, 1997-98, 1998-99, 1999-00, 2002-03, 2006, 2008, 2014)

5.4.3 Timing of Subsistence Activities

Data on the timing of subsistence activities for Tanana River study communities are provided in Table 30. This table shows the number of communities reporting subsistence activity or harvests within each month, based on the most recent data sources for each community. Overall, Tanana River communities target the greatest number of resources during August and September. In general, subsistence activities are at their highest between the months of April through October, with less activity in winter.

Spring (April–May) in the Tanana River Region is a transitional time when winter subsistence activities wane and activities that will occur throughout the summer begin. Subsistence activity for upland birds and furbearers declines in early spring as residents of the region shift focus to non-salmon fish and waterfowl as they migrate through the area. However, communities continue to harvest upland birds throughout the year except in the month of June, during the nesting and rearing period. Spring is a primary harvest time for bear in the region, although bear can be taken year round. Spring marks a decline of small land mammal harvests in general, though beaver and porcupine subsistence activity continues.

Summer (June–August) in the Tanana River Region is characterized by intensified fishing activities. Salmon fishing begins in June and continues through the fall as different species navigate the watersheds of the region. Non-salmon fish harvests, including whitefish and sheefish harvests, occur along with the summer salmon fishing. Waterfowl subsistence activity continues through the summer as well as harvests of small land mammals, namely squirrel. Residents of the region may target moose in late summer; however, harvests at that time are only occasional. The emergence and ripening of vegetation in the region allows for increased harvests of plants and berries.

The focus on fishing continues into the fall (September–October) with harvests of coho salmon and non-salmon fish; moose harvests begin to intensify at this time. Moose subsistence activity occurs year round, but is primarily in September-March. Bear subsistence activity continues and is particularly common in the fall in Tanana and Minto. Moose and bear are the most common large land mammal resources harvested in the region. Waterfowl subsistence activity intensifies to peak activity with the fall migration, particularly in Manley Hot Springs and Tanana. Ripe berries are collected into early fall and wood collection begins at the end of fall.

The focus of subsistence activity shifts in the winter (November–March), with the end of salmon fishing and the slowing of non-salmon fishing. Residents primarily harvest small land mammals and upland birds for fresh meat over the winter season. Furbearer pelts are in prime condition over the winter and residents report peak activity during this time. Moose subsistence activity may occur during December and wood collection continues to maintain a fuel supply.

Table 30. Tanana River region timing of subsistence activities, number of communities reporting subsistence activity

Resources	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Freshwater non-salmon fish	3	3	4	4	4	4	4	4	4	4	4	4
Salmon	N/A	N/A	N/A	N/A	N/A	4	4	4	4	4	N/A	N/A
Caribou	N/A	2	2	2	N/A	N/A	N/A	2	2	N/A	2	N/A
Moose	4	4	4	2	2	3	3	2	4	4	3	4
Bear	2	2	4	3	4	4	4	4	4	3	2	2
Furbearers	2	2	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2	2
Small land mammals	4	4	4	4	3	3	2	3	4	4	4	4
Upland birds	4	4	4	4	3	N/A	2	4	4	4	4	4
Waterfowl	N/A	N/A	N/A	4	3	4	3	4	4	2	N/A	N/A
Eggs	N/A	N/A	N/A	N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Plants and berries	N/A	N/A	N/A	2	2	3	4	4	4	2	N/A	N/A
Wood	3	3	3	3	3	3	3	3	3	3	3	3
Total number of resources per month	**7**	**8**	**8**	**9**	**9**	**8**	**9**	**10**	**10**	**9**	**8**	**7**

Source: Case and Halpin 1990; Brown et al. 2010; Brown et al. 2016; Betts 1997; Brown et al. 2014; SRB&A 2016a

Notes: Apr = April; Aug = August; Dec = December; Feb = February; Mar = March; Jan = January; Jul = July; Jun = June; N/A = not applicable (no or limited subsistence activity); Nov = November; Oct = October; Sep = September

Tanana River Region Communities = four (Manley Hot Springs, Minto, Nenana, and Tanana)

Each cell contains the number of communities reporting subsistence activity or harvests during each month, based on the most recent data source for each community. Months with only one community report harvests or activity are not included in the table. Resources with no subsistence activity data available are not included in the table.

5.4.4 Travel Method

A recent subsistence mapping study (SRB&A 2016a) collected data on travel methods for two of the four Tanana River study communities (Minto and Nenana). The data show that a majority of use areas in the study communities are accessed by boat and, to a lesser extent, truck/car and snowmachine. Many use areas are accessible directly from the community. Other methods used to access subsistence use areas include truck/car and ATV. Both of these study communities have road access. Primary travel methods used to search for resources within use areas are boat, foot, and snowmachine (SRB&A 2016a). Access and search methods vary by community. Nenana residents are more likely to use road vehicles to access subsistence harvesting areas, while Minto residents are more likely to use boats to access and search within their harvesting areas. Unlike many other rural communities who have abandoned the use of dog teams in winter for snowmachines, some individuals in the community of Tanana continue to run dog teams and use their teams to access winter harvesting areas (Brown et al. 2016).

5.4.5 Resource Importance

The relative importance of subsistence resources to the individual Tanana River Region study communities, based on selected variables, is provided in Table 31 through Table 34 (see Section 4.3, Resource Importance Data, for discussion of methods). Based on this analysis, salmon and vegetation are of high importance in all communities, while moose is of high importance in three out of the four Tanana River Region study communities (Minto, Nenana, and Tanana). Other resources of high importance in the Tanana River Region study communities include upland birds (one community), migratory birds (one community), non-salmon fish (two communities), and small land mammals (one community).

5.5. Yukon River

The Yukon River region includes the communities of Beaver, Galena, Livengood, Rampart, and Stevens Village. Stevens Village use areas are overlapped with the eastern end of the southern corridor alternative, while the three Yukon River region communities of Beaver, Galena, and Rampart have uses which occur within 30 miles of (but do not overlap with) the southern corridor. Subsistence data are not available for Livengood.

5.5.1 Subsistence Use Areas

Subsistence use areas for the Yukon River region study communities (Map 24 through Map 27) are focused around the Yukon River system, extending from the Chalkyitsik area to the mouth of the Koyukuk River, in addition to along the Koyukuk River toward the southern corridor alternative near Hughes. A majority of use areas for the Yukon River region study communities are located to the east and south of the AAP alternatives.

Table 31. Relative importance of subsistence resources based on selected variables, Manley Hot Springs

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	58	39	32	H
2	Caribou	4	7	2	M
3	Dall sheep	0	2	0	L
4	Bear	3	1	0.15	L

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
5	Other large land mammals	NA	NA	NA	L
6	Small land mammals/ furbearers	17	7	2	M
7	Marine mammals	0	13	0	L
8	Migratory birds	47	14	5	M
9	Upland birds	32	5	1	L
10	Bird eggs	2	0	0	L
11	Salmon	51	47	41	H
12	Non-salmon fish	54	36	12	H
13	Marine invertebrates	2	6	0.1	L
14	Vegetation	77	43	5	H

Source: See Table 2

Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 32. Relative importance of subsistence resources based on selected variables, Minto

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	70	74	22	H
2	Caribou	NA	8	NA	L
3	Dall sheep	1	NA	NA	L
4	Bear	NA	NA	1	L
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/ furbearers	48	35	2	M
7	Marine mammals	NA	NA	NA	I
8	Migratory birds	69	46	3	H
9	Upland birds	48	7	0.3	M
10	Bird eggs	2	NA	0.01	L
11	Salmon	54	80	55	H
12	Non-salmon fish	54	40	13	M
13	Marine invertebrates	2	NA	0.001	L
14	Vegetation	87	35	3	H

Source: See Table 2

Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 33. Relative importance of subsistence resources based on selected variables, Nenana

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	58	39	32	H
2	Caribou	4	7	2	M
3	Dall sheep	0	2	0	L
4	Bear	3	1	0.2	L
5	Other large land mammals	NA	NA	NA	L
6	Small land mammals/ furbearers	17	7	2	M
7	Marine mammals	0	13	0	L
8	Migratory birds	47	14	5	M
9	Upland birds	32	5	1	L
10	Bird eggs	2	0	0	L
11	Salmon	51	47	41	H
12	Non-salmon fish	54	36	12	H
13	Marine invertebrates	2	6	0.1	L
14	Vegetation	77	43	5	H

Source: See Table 2

Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 34. Relative importance of subsistence resources based on selected variables, Tanana

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	67	70	5	H
2	Caribou	10	10	1	L
3	Dall sheep	NA	NA	NA	I
4	Bear	NA	NA	0.3	L
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/ furbearers	54	44	2	H
7	Marine mammals	NA	NA	NA	I
8	Migratory birds	49	34	0.5	M
9	Upland birds	55	21	0.3	H
10	Bird eggs	NA	NA	NA	I
11	Salmon	62	59	74	H
12	Non-salmon fish	50	26	17	M
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	73	45	0.1	H

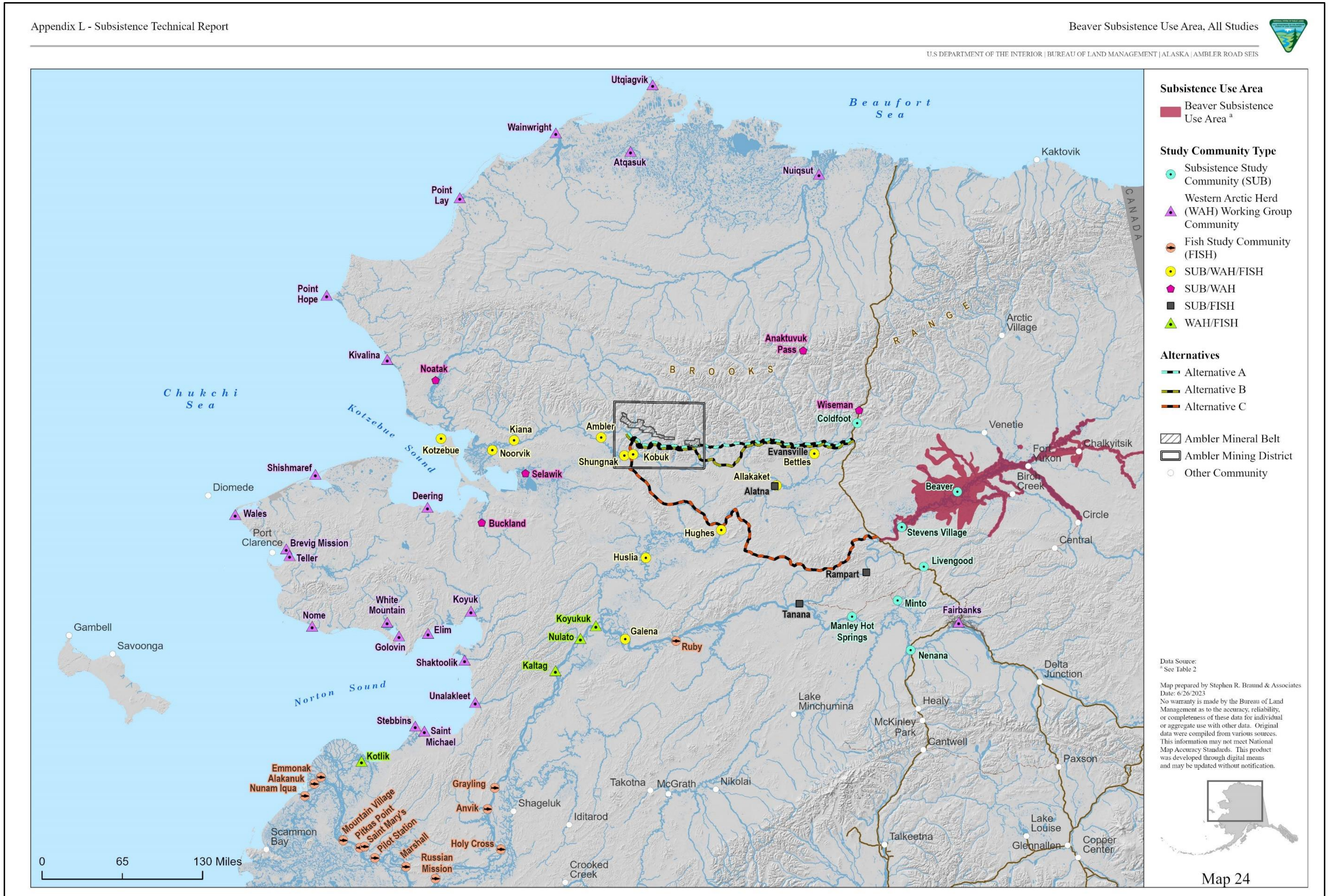
Source: See Table 2

Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Beaver subsistence use areas for all available time periods (1930–1986; 1997–2006; 2010; 2011) are shown on Map 24. The community's use areas cover an extensive river system with residents traveling along various drainages of the Yukon River between the Circle and the Dalton Highway; other primary river drainages used for subsistence harvesting activities include the Porcupine River, Black River, Beaver Creek, and Birch Creek. As shown in SRB&A (2007) Beaver use areas for moose and bear are most focused along the Yukon River between the mouths of Birch Creek and Stevens Village, while furbearer and small land mammal use areas extend farther from the community along the river system and include various traplines that extend both north and south of the community. Fishing areas are located in relatively close proximity to the community of Beaver on the Yukon River while waterfowl hunting and egg harvesting occur along the Yukon River to the Dalton Highway but with the greatest concentration in the sloughs and lakes surrounding the community.

Galena use areas (Map 25) for all available time periods (1986; 2006; 2010) occur farther downriver on the Yukon River and include large areas surrounding both the Yukon and Koyukuk rivers. Isolated harvesting areas occur even farther north toward Selawik, and Hughes, just south and west of the southern project corridor alternative. According to Brown et al. (2015), for the 2014 study year, salmon harvesting by Galena residents took place primarily along the Yukon River upriver from their community and downriver past the mouth of the Koyukuk River to Nulato. Non-salmon fish harvesting occurred on the Yukon River but also in various sloughs and lakes alongside the Yukon River and at a location on the Koyukuk River. Moose harvesting extended along the Yukon and Koyukuk rivers and in overland areas surrounding these drainages; small land mammal harvesting was focused primarily to the north of the community in overland areas between the Yukon River, Koyukuk River, and the community of Huslia. Waterfowl and bird harvesting generally occurred closer to the community of Galena with some isolated search areas reported farther to the north (along the Koyukuk River) and east of the community. Similarly, vegetation harvesting occurred close to the community with isolated harvesting areas reported along the Koyukuk River and near Huslia.

Rampart use areas for all available time periods (1975-1995; 2014) are shown on Map 25 and show subsistence use areas focused relatively close to the community along the Yukon River downriver from the Dalton Highway, in addition to overland harvesting areas to the north and south of the community. Documented use areas for the 2014 time period (Brown et al. 2016) indicate a much smaller extent of harvesting areas for Rampart community residents in that year compared to previously documented use areas, in addition to increased use of the Stevens Village area for subsistence (Betts 1997). Brown et al. (2016) indicate the changes could be a result of the declining population of Rampart in addition to strong social and familial ties with Stevens Village which may have altered harvesting patterns to focus in that area. Use areas in 2014 were concentrated along the Yukon River directly near the community in addition to near Stevens Village. In addition, a couple of isolated harvesting areas were reported at greater distances from the community. Fishing occurred directly in front of the community of Rampart in addition to several locations upriver toward Stevens Village. Moose harvesting occurred at several isolated locations along Hess Creek, Tolovana River, and in a small area north of the Yukon River, while small land mammal and bird harvesting occurred directly near Rampart as well as at Stevens Village. Vegetation harvesting by Rampart households in 2014 occurred directly around the community.



Map 24. Beaver subsistence use areas, all studies

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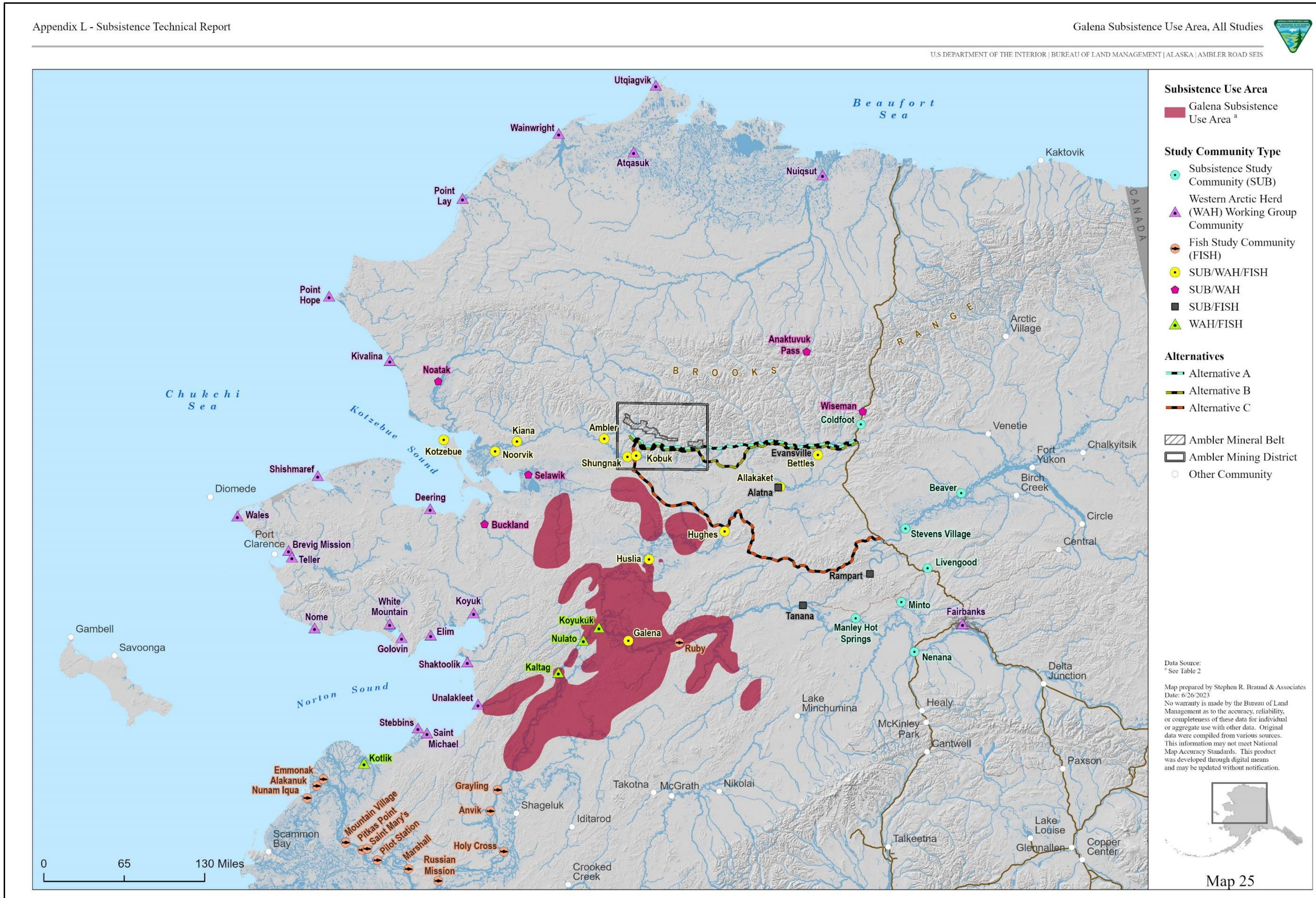

Map 25. Galena subsistence use areas, all studies

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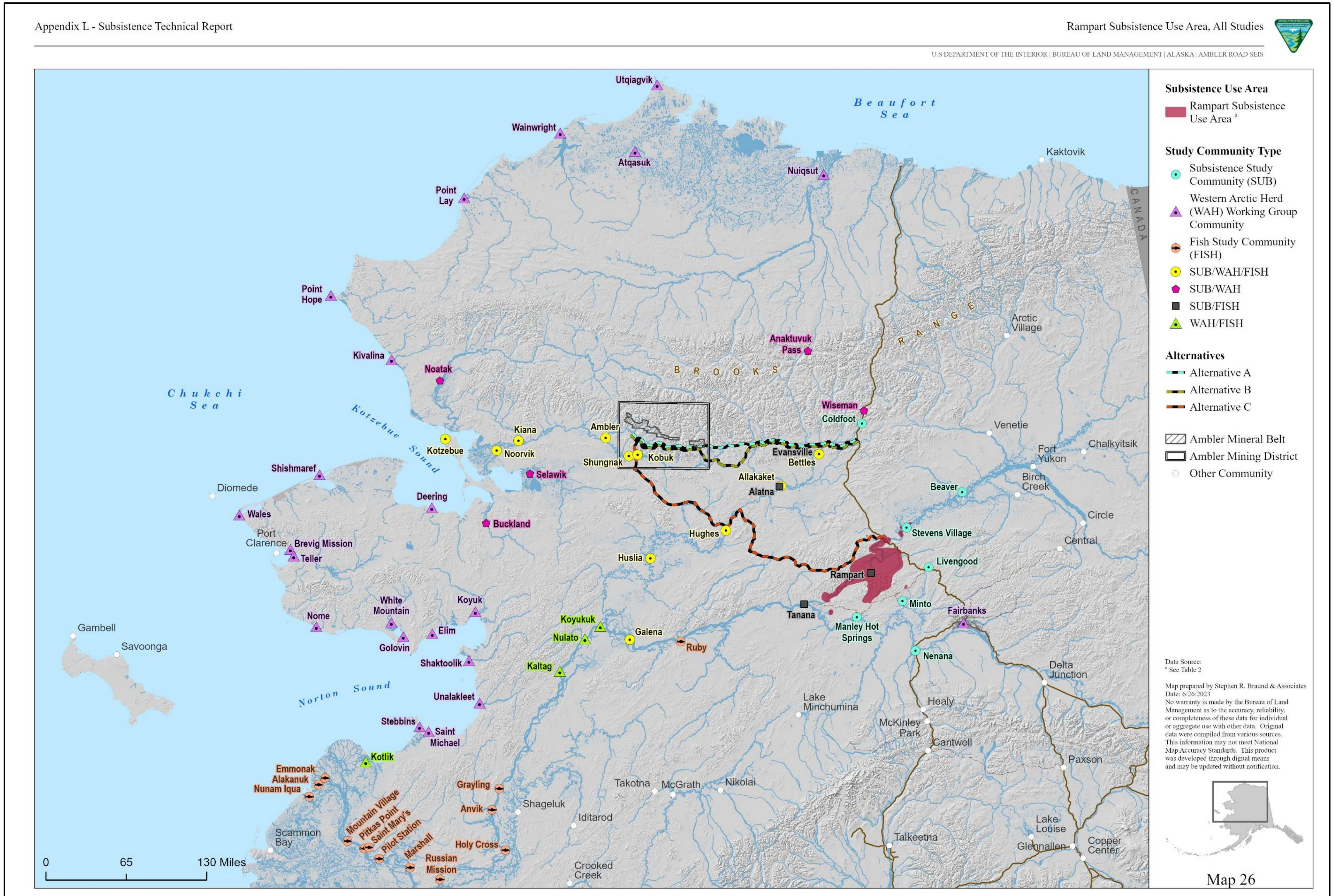

Map 26. Rampart subsistence use areas, all studies

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Stevens Village use areas (Map 27) for all available time periods (1974–1984; 2006–2015) extend along the Yukon River from the mouth of Birch Creek downriver to Rampart, in addition to larger overland use areas primarily to the north of the river. While most Stevens Village use areas remain to the east of the Dalton highway, certain overland and riverine uses cross to the west of the highway and overlap with the eastern portion of the southern corridor alternative. The population of Stevens Village has declined in recent years and an ADF&G comprehensive survey in 2015 found four eligible households. While many have moved away from the community to Fairbanks and other communities, residents continue to return to the community seasonally to engage in subsistence activities. Based on a recent mapping study with community seasonal and permanent residents (SRB&A 2016a), contemporary use areas for the community are similar to historic use areas and are concentrated along the Yukon River between the Dalton Highway and Hodzana River, and in overland areas north and south of the Yukon River. The more recent research shows a greater extent of use areas extending downriver beyond the Dalton Highway with a high concentration of use areas near the mouth of the Ray River. Resource-specific use areas for the more recent mapping study are not available.

5.5.2 Harvest Data

Harvest data for the Yukon River study communities are provided on Figure 13 through Figure 15 and in Table 35. The percentage of total harvest, shown on Figure 13, is calculated by dividing the total pounds of subsistence harvest for all resources by the pounds harvested for individual species or resource categories. Based on an average of available data, salmon is the primary resource harvested among the study communities in terms of percentage of usable pounds (63 percent), followed by moose (20 percent) and non-salmon fish (9 percent). Other resources which contribute smaller amounts in terms of pounds include small land mammals, migratory birds, vegetation, bear, and caribou. Resource contribution is relatively similar among the Yukon River Region study communities, Stevens Village relies more heavily on salmon, at 81 percent of the total harvest, and less heavily on moose.

Average participation rates among Yukon River Region study communities, in terms of the average percentage of households attempting harvests by resource during individual study years, are shown on Figure 14. These data are based on averages across available study years; it is likely that in some years (or across all years) a higher percentage of households participates in each resource activity. Similar to other study regions, resources with the highest participation rates are not necessarily those that provide the greatest portion of the harvest. Across all Yukon River Region study communities, and similar to the other study regions, households most commonly participate in harvests of vegetation (74 percent of households). Other common subsistence activities across the study region include harvesting of non-salmon fish (60 percent of households participating), followed by migratory birds (56 percent), salmon (56 percent), moose (50 percent), and small land mammals/furbearers (50 percent).[6] A smaller percentage of households participate in harvests of upland bird, while participation in bird egg harvesting, caribou hunting, marine invertebrate harvesting, and other large land mammal harvesting is minimal. The average percentage of households receiving different resources is shown on Figure 15. In the Yukon River Region, the most widely received resources in the region are also the most widely harvested. Salmon is the most commonly received resource among Yukon River Region study communities, followed by moose, non-salmon fish, and small land mammals.

6 A Stevens Village commenter on the Draft EIS noted that the Stevens Village estimates for percentage of households using certain resources seemed low. The commenter indicated that 100 percent of Stevens Village households use chum salmon, Chinook salmon, whitefish, sheefish, and moose.

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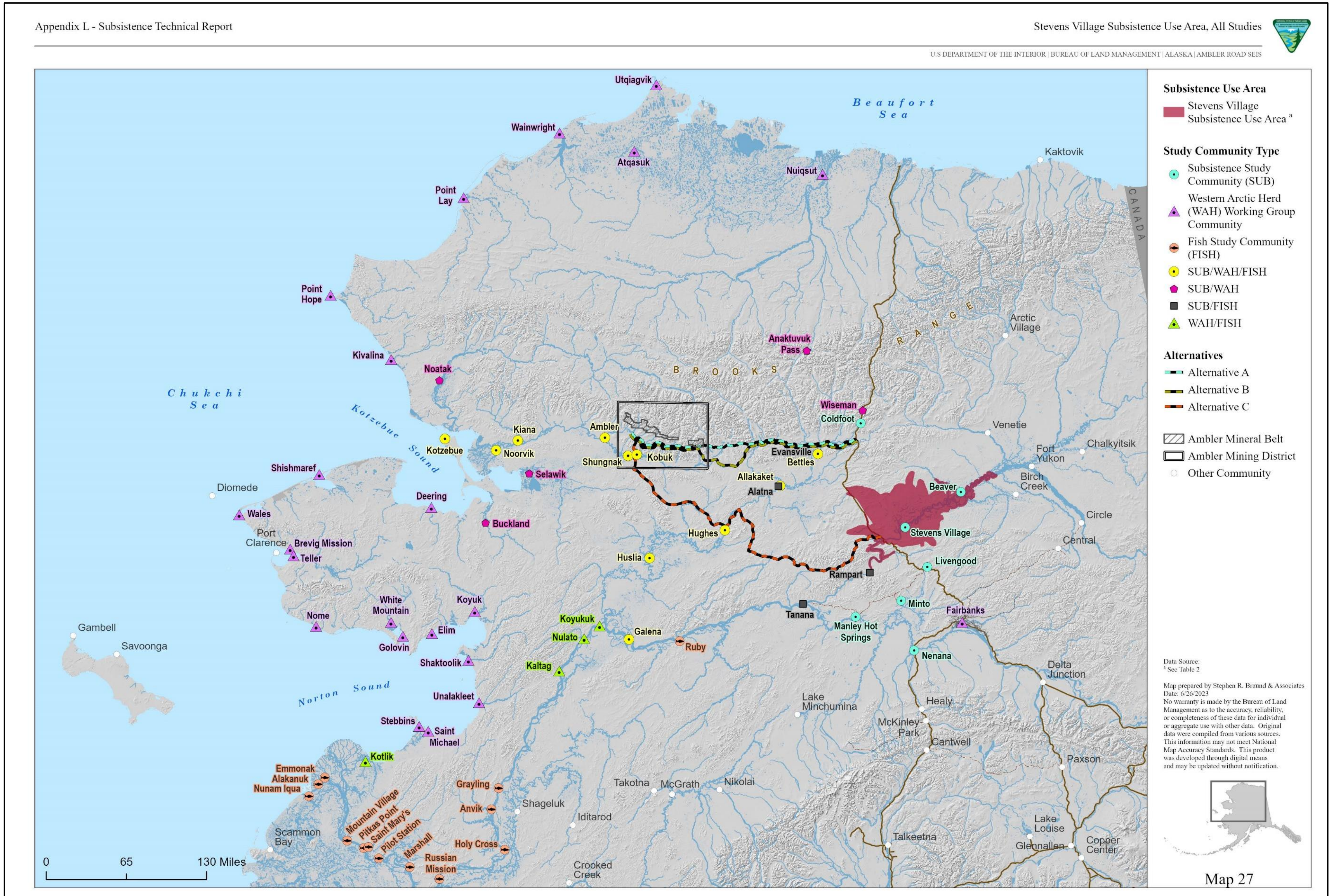

Map 27. Stevens Village subsistence use areas, all studies

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Table 35 shows average harvest and use data for the top five species harvested (in terms of average contribution toward the total subsistence harvest) by each of the Yukon River Region study communities. Chum salmon is the top species harvested among all study communities, contributing between 26 percent and 65 percent of the total subsistence harvest. Moose and other salmon species (coho and Chinook salmon) are also top species among all four study communities. Other top harvested species among the study communities include black bear (Beaver), white-fronted geese (Beaver), whitefish (Galena, Rampart, and Stevens Village), burbot (Rampart), and sheefish (Stevens Village). The data in Table 35 are based on an average of all available study years for each study community. Thus, recent harvest trends, particularly related to a decline in salmon, may not be reflected by these data. For example, according to Brown et al. (2023), the 2020 harvest of Chinook salmon according to subsistence permit data in the Yukon Area, was 45 percent lower than the historical average, and harvests of fall chum salmon were 94 percent lower than the historical average.

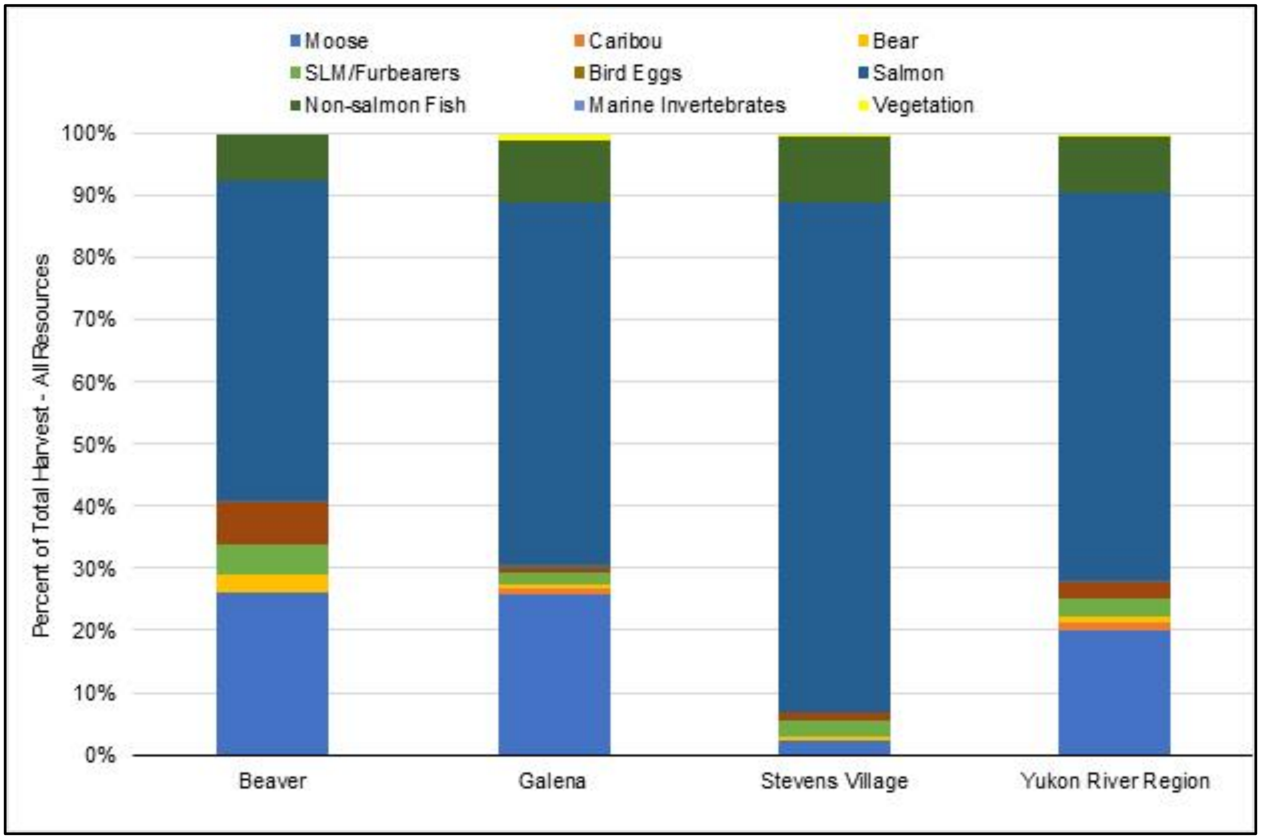

Figure 13. All resources percentage of total harvest by Yukon River region communities

Source: See Table 2 for citations, time period, and resources addressed

Notes: Data represent the average percentage of harvest across all available study years for comprehensive (i.e., all resources) household harvest surveys. In some cases, averages represent only a single study year. Available study years for each community are as follows: Beaver (1984-85, 2011); Galena (1985-1986, 2010); Stevens Village (1983-84, 2014).

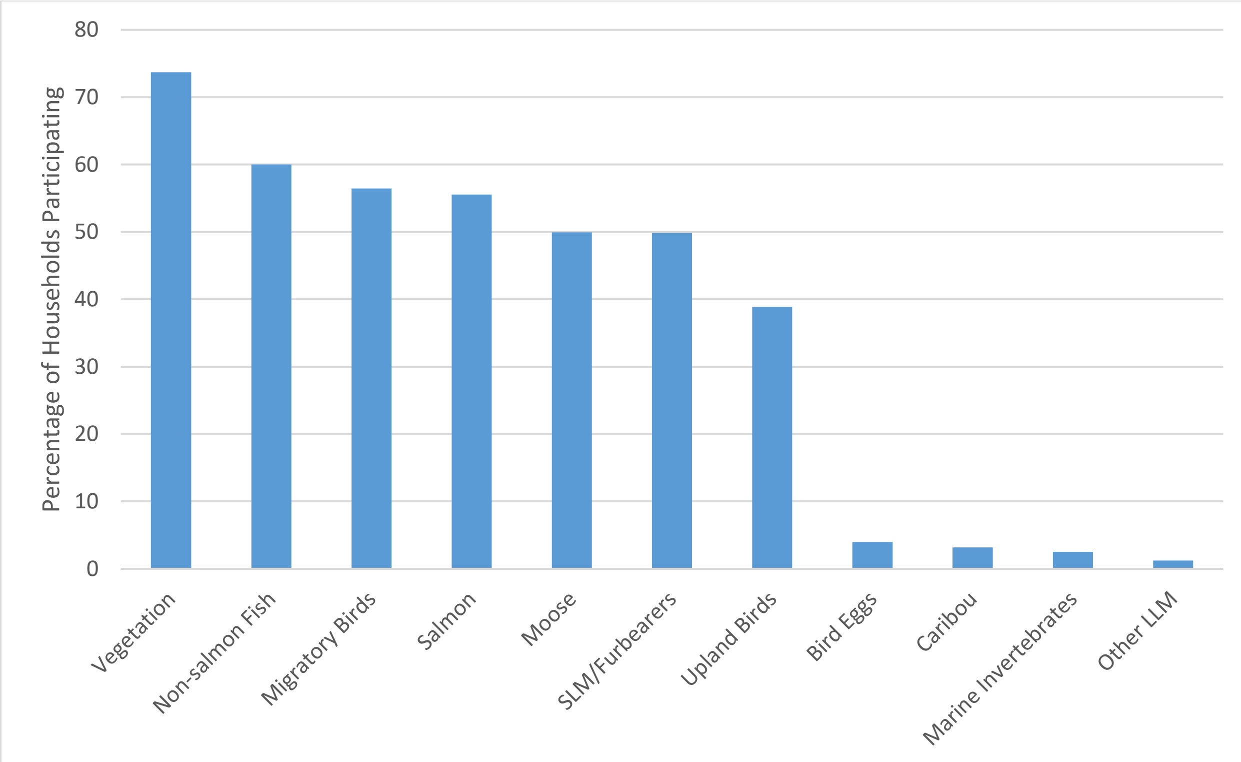

Figure 14. Percentage of households attempting harvests of resources, Yukon River region communities

Source: See Table 2 for citations, time period, and resources addressed

Notes: Data represent the average percentage of households across all available study years. Available study years for each community are as follows: Beaver (1984-85, 2000, 2005, 2008-09, 2009-10, 2010-11, 2011); Galena (1985-1986, 1996-97, 1997-98, 1998-99, 1999-00, 2001-02, 2002-03, 2006, 2010); Stevens Village (1983-84, 1996, 2008, 2008-09, 2009-10, 2010-11, 2014).

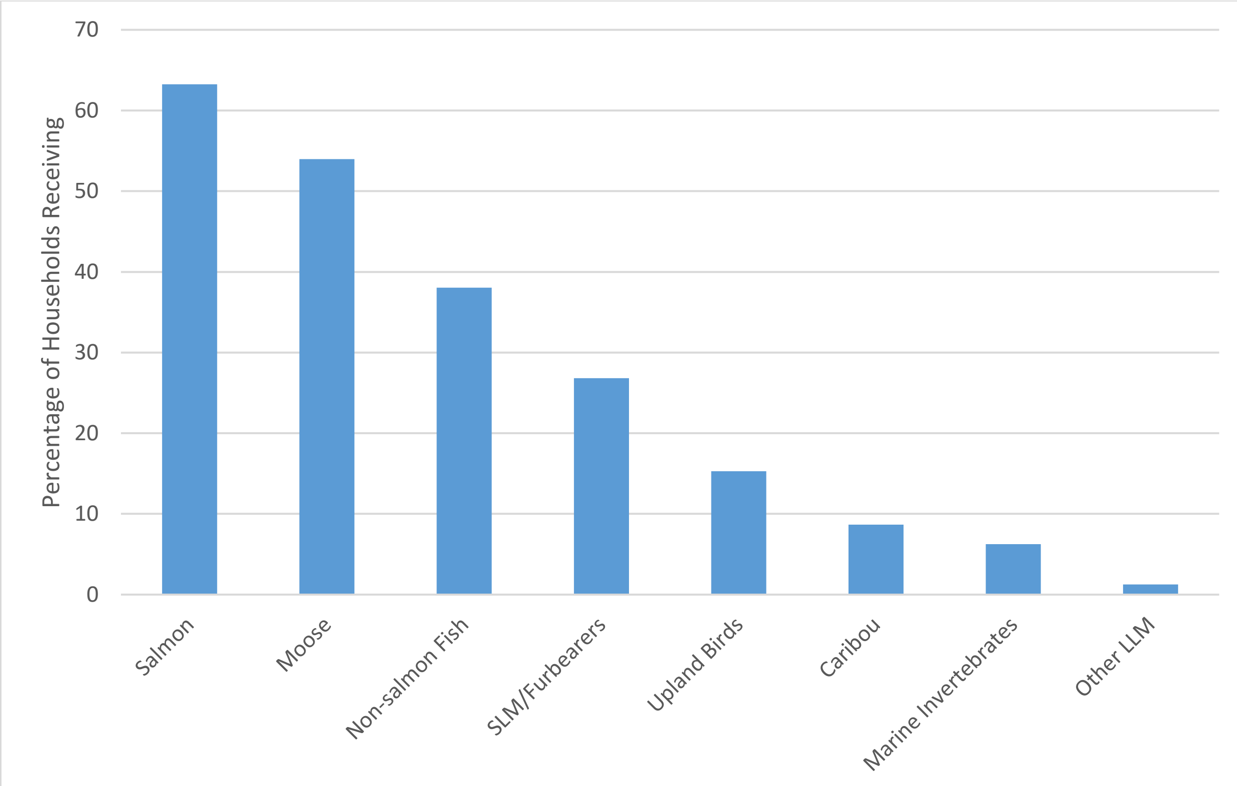

Figure 15. Percentage of households receiving resources, Yukon River region communities
Source: See Table 2 for citations, time period, and resources addressed
Notes: Data represent the average percentage of households across all available study years. Available study years for each community are as follows: Beaver (1984-85, 2000, 2005, 2008-09, 2009-10, 2010-11, 2011); Galena (1985-1986, 1996-97, 1997-98, 1998-99, 1999-00, 2001-02, 2002-03, 2006, 2010); Stevens Village (1983-84, 1996, 2008, 2008-09, 2009-10, 2010-11, 2014).

Table 35. Average harvest and use data, top five species, Yukon River region communities

Community	Species	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% Total harvest
Beaver	Chum salmon	44	30	28	11	25	2,578	12,689	377	157	25.7
Beaver	Moose	33	27	12	12	28	10	5,927	277	90	25.1
Beaver	Chinook salmon	96	36	34	29	66	775	9,369	277	118	21.8
Beaver	Black bear	13	15	8	7	9	7	684	37	10	4.7
Beaver	White-fronted geese	56	52	52	25	8	390	1,213	33	15	4.4
Galena	Chum salmon	59	26	26	15	35	37,770	180,319	876	274	43.4
Galena	Moose	90	64	48	34	55	106	60,907	316	108	25.6
Galena	Chinook salmon	71	41	31	20	46	2,373	29,060	150	49	11.3
Galena	Coho salmon	13	11	11	8	1	1,092	5,775	37	14	5.4
Galena	Humpback whitefish	16	14	14	8	7	5,322	15,965	83	30	3.9
Rampart	Chum salmon	57	57	57	29	29	500	4,673	359	120	31.7
Rampart	Coho salmon	100	71	71	57	100	450	4,319	332	111	29.3
Rampart	Moose	86	57	57	43	86	4	4,011	309	103	27.2
Rampart	Humpback whitefish	43	43	43	29	14	90	501	39	13	3.4
Rampart	Burbot	71	71	71	29	43	53	236	18	6	1.6
Stevens Village	Chum salmon	50	50	47	25	0	6,927	27,583	1,241	438	65.1
Stevens Village	Chinook salmon	63	48	55	21	21	738	12,036	428	148	16.1
Stevens Village	Whitefish	39	39	51	22	2	940	2,186	100	36	6.4
Stevens Village	Moose	56	52	13	16	47	2	2,140	132	31	2.4
Stevens Village	Sheefish	32	32	37	23	1	87	575	29	11	2.4

Source: See Table 2 for citations, time period, and resources addressed

Notes: HH = households

Notes: Data represent the average across all available study years for comprehensive (i.e., all resources) household harvest surveys. Available study years for each community are as follows: Beaver (1984-85, 2000, 2005, 2008-09, 2009-10, 2010-11, 2011); Galena (1985-1986, 1996-97, 1997-98, 1998-99, 1999-00, 2001-02, 2002-03, 2006, 2010); Stevens Village (1983-84, 1996, 2008, 2008-09, 2009-10, 2010-11, 2014).

5.5.3 Timing of Subsistence Activities

Data on the timing of subsistence activities for Yukon River study communities are provided in Table 36 This table shows the number of communities reporting subsistence activity or harvests within each month, based on the most recent data sources for each community. Overall, Yukon River communities target the greatest number of resources during September. In general, subsistence activities are at their highest between the spring months of April and May and late summer/fall months of August and September, with less activity in winter.

Spring (April–May) in the Yukon River Region is characterized by warming temperatures, breakup on the rivers, and lengthening days. Spring marks a decrease in seasonal harvests of furbearers and upland birds; however, it also marks the beginning of the waterfowl hunting season, as ducks and geese arrive in the area. Yukon River Region residents occasionally harvest small land mammals, including marten, hare, and beaver, in the springtime, but harvest by month data show harvests more commonly occurring over the winter months (Holen et al. 2012, Van Lanen et al. 2012). Fishing for non-salmon fish occurs in the region during the springtime, either through the ice or after breakup in the open water. The first salmon harvests may also occur in May. Harvests of caribou and bear may also occur in the springtime in a number of communities.

During summer (June–August) residents of the Yukon River Region focus on fishing and collecting plants and berries. Salmon harvesting is a strong focus of certain communities, including Beaver, Rampart, and Stevens Village. Non-salmon fish harvesting also occurs throughout most of the year. Berries are a particularly important resource in the region; they are among the highest- used resources (in terms of the percentage of households using) in many of the communities (Holen et al. 2012). Most large land mammal subsistence activity, more commonly a fall activity, occurs at the end of the summer in August, though communities may take moose or bear year-round. Following spring caribou hunting, residents resume caribou harvesting in August and continue into November. Harvests of waterfowl occur during the summer months, although harvesting decreases during the July nesting and rearing period.

Many subsistence activities which occur over the summer, including fishing, waterfowl hunting, and large land mammal hunting, continue or amplify during the fall (September–October). Moose harvests occur throughout the year but most commonly in the month of September. Bear harvests continue in early fall and berry picking may also continue from the summer into the early fall. Fall in the Yukon River Region marks the end of waterfowl subsistence activity and increased focus on upland birds, such as grouse and ptarmigan. Wood is collected beginning in the fall and is a particularly important resource to prepare for heating through the upcoming winter.

During the winter season (November–March), focus shifts to harvests of small land mammals and furbearers as watersheds freeze over creating conditions for travel to trapping grounds. Pelts of the small mammals and furbearers are prime over the winter season and residents of the region hunt or trap for the pelts and/or meat of small mammals for subsistence purposes. Large land mammal harvests, including caribou, moose, and bears in early winter, occur over the winter months although moose and bear harvests occur with more frequency during other seasons. Ice fishing for non-salmon fish occurs during the early winter months. Residents of the Yukon River Region harvest upland birds throughout the winter and into the spring as the annual cycle of subsistence activities begins again.

Table 36. Yukon River region timing of subsistence activities, number of communities reporting subsistence activity

Resources	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Freshwater non-salmon fish	N/A	N/A	3	3	4	4	4	4	4	4	4	1
Salmon	N/A	N/A	N/A	N/A	2	3	3	3	3	2	N/A	N/A
Caribou	N/A	N/A	N/A	1	1	N/A	N/A	1	1	1	1	N/A
Moose	3	3	3	3	3	3	3	3	3	3	3	3
Bear	1	1	1	3	4	3	3	3	3	3	2	1
Furbearers	1	2	1	1		N/A	N/A	N/A	N/A	N/A	1	1
Small land mammals	2	2	2	2	2	2	2	2	2	2	2	2
Upland birds	3	3	3	3	2	2	2	2	3	3	3	3
Waterfowl	N/A	N/A	N/A	2	3	3	2	3	3		N/A	N/A
Eggs	N/A	N/A	N/A	N/A	N/A	2	3	3	3	N/A	N/A	N/A
Plants and berries	2	2	2	2	1	N/A	N/A	N/A	1	2	2	2
Wood	N/A	N/A	3	3	4	4	4	4	4	4	4	1
Total number of resources per month	**6**	**6**	**7**	**9**	**9**	**8**	**8**	**9**	**10**	**8**	**8**	**7**

Source: Andersen et al. 2001; Betts 1997; Brown et al. 2010; Brown et al. 2016; Sumida 1988; Holen et al. 2012; SRB&A 2007; Stevens; Maracle n.d.

Notes: Apr = April; Aug = August; Dec = December; Feb = February; Mar = March; Jan = January; Jul = July; Jun = June; N/A = not applicable (no or limited subsistence activity); Nov = November; Oct = October; Sep = September

Yukon River Region Communities = five (Beaver, Galena, Livengood, Rampart, and Stevens Village)

Each cell contains the number of communities reporting subsistence activity or harvests during each month, based on the most recent data source for each community. Months with only one community report harvests or activity are not included in the table. Resources with no subsistence activity data available are not included in the table. No timing data exist for Livengood.

5.5.4 Travel Method

A recent subsistence mapping study (SRB&A 2016a) collected data on travel methods one of the Yukon River study communities (Stevens Village). In addition, previous research has documented travel methods and routes for Beaver (SRB&A 2007). For Stevens Village, the data show that a majority of use areas are accessed by boat with a much smaller percentage accessed by snowmachine, truck/car, or foot. Many use areas are accessible directly from the community. Primary travel methods used to search for resources within use areas are boat, snowmachine, with lesser use of foot and ATV (SRB&A 2016a). Based on SRB&A (2007), the community of Beaver accesses the highest percentage of their use areas by boat (51 percent), followed by snowmachine (33 percent), four-wheeler (15 percent), and foot (10 percent). Travel routes for Beaver occur along the Yukon River and overland alongside the Yukon River between the community and Stevens Village (SRB&A 2007).

5.5.5 Resource Importance

The relative importance of subsistence resources to the individual Yukon River Region study communities, based on selected variables, is provided in Table 37 through Table 40 (see Section 4.3, Resource Importance Data, for discussion of methods). Based on this analysis, moose, salmon, and vegetation are of high importance in all Yukon River Region study communities. Other resources of high importance in Yukon River Region study communities include migratory birds (two study communities), non-salmon fish (two study communities), and small land mammals (one study community). Marine mammals are of moderate importance in several study communities due to sharing and distribution networks from coastal communities; upland birds are also of moderate importance.

Table 37. Relative importance of subsistence resources based on selected variables, Beaver

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	27	28	25	H
2	Caribou	2	NA	NA	L
3	Dall sheep	NA	NA	NA	I
4	Bear	NA	NA	3	M
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/furbearers	64	31	5	H
7	Marine mammals	NA	4	NA	L
8	Migratory birds	78	41	6	H
9	Upland birds	53	19	0.4	M
10	Bird eggs	4	NA	NA	L
11	Salmon	41	68	50	H
12	Non-salmon fish	56	38	7	M
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	84	56	NA	H

Source: See Table 2
Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 38. Relative importance of subsistence resources based on selected variables, Galena

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	64	55	26	H
2	Caribou	5	10	1	L
3	Dall sheep	NA	NA	NA	I
4	Bear	NA	NA	1	L
5	Other large land mammals	1	1	0.3	L
6	Small land mammals/furbearers	29	23	2	M
7	Marine mammals	NA	10	NA	L
8	Migratory birds	30	19	1	M
9	Upland birds	49	9	1	M
10	Bird eggs	NA	NA	NA	I
11	Salmon	49	56	58	H
12	Non-salmon fish	48	38	10	H
13	Marine invertebrates	3	6	0.1	L
14	Vegetation	79	19	1	H

Source: See Table 2
Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 39. Relative importance of subsistence resources based on selected variables, Rampart

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	57	86	27	H
2	Caribou	NA	14	NA	L
3	Dall sheep	NA	NA	NA	I
4	Bear	NA	NA	NA	I
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/furbearers	57	29	1	M
7	Marine mammals	NA	57	NA	M
8	Migratory birds	43	57	2	M
9	Upland birds	29	29	0.2	L
10	Bird eggs	NA	NA	NA	I
11	Salmon	71	100	61	H
12	Non-salmon fish	86	71	8	H
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	57	86	0.2	H

Source: See Table 2
Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

Table 40. Relative importance of subsistence resources based on selected variables, Stevens Village

Number	Resource	% of HH trying	% of HHs receiving	% of total harvest	Final resource importance evaluation
1	Moose	52	47	2	H
2	Caribou	NA	2	NA	L
3	Dall sheep	NA	NA	NA	I
4	Bear	NA	NA	0.4	L
5	Other large land mammals	NA	NA	NA	I
6	Small land mammals/furbearers	50	25	3	M
7	Marine mammals	NA	25	NA	M
8	Migratory birds	75	23	1	H
9	Upland birds	25	5	0.2	L
10	Bird eggs	NA	NA	NA	I
11	Salmon	61	29	81	H
12	Non-salmon fish	50	5	11	M
13	Marine invertebrates	NA	NA	NA	I
14	Vegetation	75	25	1	H

Source: See Table 2
Notes: H = High; HH = Households; I = Indeterminate; L = Low; M = Moderate; NA = Not Available

5.6. Subsistence Uses of the Western Arctic Caribou Herd

Table 41 provides caribou use and harvest averages across all available study years for the 42 caribou study communities listed in Table 1 and shown on Map 1. The 42 caribou study communities are members of the WAH WG and are subsistence users of the WAH. Caribou is a key subsistence resource for many of the WAH WG study communities. Although caribou herd populations tend to fluctuate, the WAH population has declined substantially in recent years. Recent censuses estimated the herd’s population at 188,000 caribou in 2021 and 164,000 caribou in 2022, its lowest point in decades and below the WAH WG’s minimum objective of 200,000 caribou. Of particular concern to wildlife managers is a decrease in calving and cow survival rates. As a result, the WAH WG changed the herd management level from “conservative” to “preservative,” recommending limits on cow harvests and no harvests of calves (WAH WG 2022). In 2022, the Federal Subsistence Board approved a special action to close some Federal public lands in Units 23 and 26A (the Project is in Unit 23) to moose and caribou hunting by non-federally qualified users for the 2022-2024 hunting seasons. This was in response to a request by the Northwest Arctic Subsistence Regional Advisory Council as well as concerns raised by the WAH WG about the recent WAH population decline (Federal Subsistence Management Program 2022). During recent Regional Advisory Council meetings in both the Northwest Arctic and Western Interior regions, board members have expressed concerns about the availability of caribou, indicating that their migrations are less predictable and the herds are more scattered (Northwest Arctic Subsistence Regional Advisory Council 2023; Western Interior Federal Subsistence Regional Advisory Council 2022a). These concerns are particularly prevalent in the Northwest Arctic region. As one board member observed, the changes in caribou availability have had substantial social and economic effects:

> *I have a lot of concerns regarding caribou. We know that they don't come through here anymore. I haven't gotten any fresh caribou meat within well over a year. It*

> *is a big concern. You know, our grocery stores here in Kotzebue, the shelves are bare, man, I mean they get hit hard…. You know this Pandemic has really hit us hard, this winter has really hit us hard with all these storms. And I could just see how it would be in the villages. It's probably three times worse. You know I see pallets daily going to the villages. I'm pretty sure they're going through a very hard time…. And I know a lot of people, you know, like going out there and pooling their money together and, you know, putting all their fuel and their gas and grub into one boat, you know, with four hunters to go up and try to get caribou for themselves and, man, there's times when they come back with nothing. You know it's beginning to get, in a way, if someone told me this is beginning to get depressing because people aren't filling their freezers.*

With few exceptions, use of caribou among the 42 study communities is high, with over 50 percent of households in 30 of the 42 study communities using caribou. The contribution of caribou toward the total subsistence harvest is highest in the communities of Anaktuvuk Pass, Ambler, Shungnak, Deering, Koyuk, Noatak, and Buckland. Caribou contributes an average of at least one-third of the total harvest in those communities. Caribou sharing ranges widely, with between 2 and 71 percent of WAH WG households giving caribou, and between 3 and 84 percent receiving caribou. On average, caribou contribute approximately 25 percent toward the total harvest for the study communities. Nearly half of households (48 percent) participate in caribou hunting, and residents harvest an average of 101 pounds of caribou annually.

Some of the caribou study communities with the highest average per capita harvests are those with use areas overlapping or close to the project area. These include Ambler, Buckland, Shungnak, Anaktuvuk Pass, Noorvik, Selawik, Noatak, and Kiana. Other caribou study communities with high average per capita harvests (over 100 pounds) include Kobuk, Kivalina, Deering, Wainwright, Atqasuk, Nuiqsut, Point Lay, and Koyuk. Several of these communities, including Anaktuvuk Pass and Nuiqsut, rely more heavily on other caribou herds such as the Teshekpuk Herd (TH) and the CAH. While harvest data are only available for a limited number of study years for each community and therefore may not capture wide variations in annual harvests, review of individual study years suggest declining caribou harvests in several study communities. These include Elim, Kivalina, Kobuk, Kotzebue, Noatak, Selawik, and Shungnak. Thus, a number of study communities in the western portion of the project area may have experienced declines in caribou harvests in recent years. In contrast, several communities have seen a recent increase in caribou harvests in recent years, including Allakaket, Ambler, Deering, Hughes (based on two data points), Shishmaref, and Wainwright (based on two data points). A decline in resource harvests does not necessarily equate to a decline in resource dependence. Harvest declines could be a result of changes which are out of a community’s control, such as the availability of caribou within communities’ traditional harvesting areas; ability to access caribou herds due to increasing gas prices; and changes in the timing of the fall caribou migration (Watson 2018). Many communities that are located within the current “peripheral” range of the WAH were established in their present-day locations because of their proximity to key subsistence resources, including caribou. Many subsistence users report that caribou migration changed with the introduction of roads (e.g., DMTS Road) and pipelines (TAPS pipeline), resulting in reduced availability of the resource within their traditional hunting areas (Alatna Tribal Council 2022; Western Interior Federal Subsistence Regional Advisory Council 2022a). Other changes in caribou distribution have occurred over time. In recent years, the winter range of the WAH has shifted, with the primary range shifting from the Nulato Hills toward the Seward Peninsula; even more recently, a large portion of the WAH has wintered in the Brooks Range. Subsistence-based communities are vulnerable to even small changes in resource distribution, as these changes may have large impacts on residents' ability to access hunting grounds. During population lows, caribou tend to inhabit their core range, thus limiting their availability to communities whose use areas overlap with the peripheral range of a herd.

The centralization of previously semi-nomadic peoples reduced their ability to adapt to the changing distribution and migration patterns of the WAH and other caribou herds. Strong sharing networks between communities and regions ensure that residents of the study communities continue to receive and consume caribou, and the resource remains culturally important to all study communities regardless of current harvest levels. These networks extend from the study communities to other communities and regions throughout the state of Alaska.

5.7. Downstream Subsistence Uses of Fish

Table 42 provides Chinook salmon, chum salmon, and sheefish use and harvest averages across all available study years for the 32 fish study communities listed in Appendix F, Table 15, and depicted on Volume 4, Map 3-32. The 32 fish study communities are located downstream from tributaries crossed by the project and include six communities in the Kobuk-Selawik River basin, seven communities in the Koyukuk River basin, and 19 communities in the Yukon River basin. As discussed in Section 3.3.2 of the Supplemental EIS (Fish and Aquatics), several species (Chinook salmon, chum salmon, and sheefish) have key spawning grounds in the project area and are therefore vulnerable to downstream impacts from the project. Sheefish in particular require specialized spawning habitat, and the Upper Kobuk River supports the largest spawning population in the northwest region of Alaska. All three of these species are key subsistence species throughout the region. Key spawning drainages for salmon include Henshaw Creek, the Tozitna River, the Indian River, the South Fork Koyukuk River, and the Hogatza River (including Clear, Caribou, and Klikhtentotzna creeks) (see Section 3.3.2, Fish and Aquatics, of the Supplemental EIS). Key spawning drainages for sheefish are the upper Kobuk and Alatna rivers (see Section 3.3.2, Fish and Aquatics, of the Supplemental EIS). Other species which may occur in the project area include other species of whitefish (broad whitefish, humpback whitefish), Arctic grayling, burbot, northern pike, and Alaskan blackfish. Both anadramous and resident fish migrate seasonally between main river/stream channels and their tributaries; maintaining seasonal connectivity between these waterways is of critical importance to fish species (see Section 3.3.2, Fish and Aquatics, of the Supplemental EIS). This section focuses on three species (Chinook salmon, chum salmon, and sheefish) of particular concern.

With few exceptions, use of fish among the 32 study communities is high, with more than 50 percent of households in nearly all fish study communities using Chinook salmon, chum salmon, or sheefish. The contribution of Chinook salmon toward the total subsistence harvest is highest in the Yukon River communities of Kaltag, Anvik, Nulato, Ruby, Marshall, Russian Mission, and Grayling (more than 20 percent of the total harvest). In these and several other communities, at least 50 percent of households participate in harvesting of Chinook salmon. The reliance on Chinook salmon is somewhat more limited in communities on the Koyukuk and Kobuk-Selawik river drainages; however, in many of these communities a substantial percentage of households receive Chinook salmon from other households (see Appendix F, Table 18).

Compared to Chinook salmon, chum salmon is more widely harvested across the study region. In nearly half of the fish study communities (for which data are available), chum salmon account for an average 20 percent or more of the annual subsistence harvest. In two communities (Tanana and Hughes), chum salmon harvests contribute over half of the communities' subsistence harvest, on average. These high harvests are in part due to these communities having several households who have dog teams used for sled dog racing (personal communication, NPS, 2024). In nine of the 32 fish study communities, at least half of the households participate in chum salmon harvesting. Again, sharing of chum salmon is high across the region, with an average of 39 percent of households receiving chum salmon (see Appendix F, Table 18).

While typically not harvested in the same numbers as salmon, sheefish are still a key resource in the study region, contributing an average of over 10 percent of the harvest in six of the 32 study communities (Kobuk, Noorvik, Kotzebue, Kotlik, Allakaket, and Shungnak). While sheefish are important to communities in the Kobuk-Selawik river system, communities on the Koyukuk (Alatna, Allakaket) and Yukon (Kotlik, Nunam Iqua, Emmonak, Alakanuk) river drainages also harvest substantial quantities of this resource. Participation in whitefish harvesting is high, with over 50 percent of households in nearly half of the fish study communities attempting harvests of the resource. On average across all fish study communities, 33 percent of households receive sheefish annually (see Appendix F, Table 18).

Chinook and chum salmon returns in northwest Alaska, including along the Kobuk, Koyukuk, and Yukon rivers, have declined since the 1990s, and the ADF&G considers Chinook salmon a “stock of yield concern” (see Section 3.3.2, Fish and Aquatics, of the Supplemental EIS). These populations have continued to decline since publication of the Final EIS. On January 11, 2024, NOAA received a petition from the Wild Fish Conservancy to list Alaska Chinook salmon as a threatened or endangered species and to designate critical habitat under the ESA. If the petition is accepted, NOAA will begin the process of determining whether the Chinook salmon should be listed under the ESA (see Section 3.3.2, Fish and Aquatics, of the Supplemental EIS). Since publication of the Final EIS, there have also been drastic declines in coho salmon. The declines in salmon have led to subsistence closures in the Yukon River drainages watershed (see Section 3.3.2, Fish and Aquatics, of the Supplemental EIS). Finally, the average body size of all salmon species in Alaska has declined since 2010; if these trends continue, subsistence users may require greater numbers of harvested salmon to meet their subsistence and nutritional needs. As salmon harvests have declined, some communities’ harvests have shifted to more non-salmon fish harvests, particular harvests of sheefish and other whitefish (Braem et al. 2015; Watson 2018). The decline in salmon has affected the subsistence economies of many communities in the study region, including a decline in use of fish camps, increased expenses and effort associated with salmon fishing, and a greater reliance on other fish species as well as sharing and bartering networks (Brown and Godduhn 2015). In the lower Yukon River basin, there has been an increase in harvests of chum salmon due to restrictions on Chinook salmon harvests (see Section 3.3.2, Fish and Aquatics, of the Supplemental EIS), although in recent years there have been restrictions on chum salmon harvests as well. An Allakaket resident and member of the Western Interior Regional Advisory Council described the lack of salmon in recent years and expressed concerns about the impacts to other key fish species:

> *Yeah, we never had salmon running for few years and it's getting worse. First it was king salmon crash and we were restricted to fish and then a couple years ago there was chum salmon decline and now last year there was no fishing except for small fish nets and the people around here are getting concerned about no fish. People hardly even go to fish camp around here anymore. Like when king salmon season was closed they -- king salmon is the main fish diet for people up and down the river and you can't fish for king salmon so they don't fish at all. So it's kind of hard time with no fish. We're depending kind of heavily on the whitefish and sheefish and I'm getting kind of worried that we don't want to deplete those sheefish and whitefish also -- whitefish is pretty good fish too but not as good as king salmon. (Western Interior Federal Subsistence Regional Advisory Council 2022a)*

Table 41. Caribou subsistence harvest and use data, caribou study communities

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
Allakaket	1981–82	NA	NA	6	NA	6	6	724	19	5	0.5
Allakaket	1982–83	NA	NA	0	NA	NA	0	0	0	0	0.0
Allakaket	1983–84	NA	NA	4	NA	NA	4	471	8	3	0.4
Allakaket	1997	42	15	6	10	39	11	1,375	25	8	NA
Allakaket	1998	100	55	26	20	86	43	5,623	92	29	NA
Allakaket	1999	93	34	12	15	86	13	1,719	29	10	NA
Allakaket	2001	21	7	7	3	15	9	1,170	19	7	NA
Allakaket	2002–03	96	68	44	32	68	106	13,728	312	53	NA
Allakaket	2011	76	48	33	48	62	95	12,350	217	84	16.0
Allakaket	Average	72	38	15	21	52	32	4,129	80	22	4.2
Ambler	2003	95	74	69	53	50	325	44,237	660	176	NA
Ambler	2009	78	78	76	52	44	456	61,962	925	260	NA
Ambler	2012	91	70	62	62	60	685	93,220	1,227	330	54.6
Ambler	Average	88	74	69	56	51	489	66,473	937	255	54.6
Anaktuvuk Pass	1990–91	NA	NA	55	NA	NA	592	69,964	985	223	NA
Anaktuvuk Pass	1991–92	NA	NA	51	NA	NA	545	66,712	940	245	NA
Anaktuvuk Pass	1992	NA	74	NA	NA	NA	600	70,222	889	260	82.6
Anaktuvuk Pass	1993–94	NA	NA	43	NA	NA	574	67,713	846	219	NA
Anaktuvuk Pass	1994–95	NA	NA	NA	NA	NA	322	43,846	516	153	83.5
Anaktuvuk Pass	1996–97	NA	NA	NA	NA	NA	210	28,587	362	93	90.5

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
Anaktuvuk Pass	1998–99	NA	NA	NA	NA	NA	500	68,000	756	220	91.3
Anaktuvuk Pass	1999–00	NA	NA	NA	NA	NA	329	44,785	560	143	89.6
Anaktuvuk Pass	2000–01	NA	NA	NA	NA	NA	732	99,579	1,071	353	90.8
Anaktuvuk Pass	2001–02	NA	NA	NA	NA	NA	271	36,910	415	122	78.2
Anaktuvuk Pass	2002–03	NA	NA	NA	NA	NA	436	59,310	666	193	92.2
Anaktuvuk Pass	2006–07	92	61	53	47	63	696	81,490	1,000	299	NA
Anaktuvuk Pass	2011	95	63	53	52	73	616	77,706	914	251	79.2
Anaktuvuk Pass	2014	89	45	40	47	68	770	104,664	1,057	330	84.2
Anaktuvuk Pass	Average	92	61	49	49	68	514	65,678	784	222	86.2
Atqasuk	1994	NA	NA	NA	NA	NA	282	38,352	685	167	61.7
Atqasuk	1996	NA	NA	NA	NA	NA	398	54,182	860	241	65.0
Atqasuk	1997	NA	NA	NA	NA	NA	266	36,176	613	152	65.3
Atqasuk	2003	93	66	61	66	66	189	NA	NA	NA	NA
Atqasuk	2004	100	79	79	69	74	314	NA	NA	NA	NA
Atqasuk	2005	96	70	59	74	63	203	NA	NA	NA	NA
Atqasuk	2006	95	67	60	76	57	170	NA	NA	NA	NA
Atqasuk	Average	96	70	65	71	65	260	42,903	719	187	64.0
Bettles	1982	NA	NA	0	NA	0	14	1,788	72	28	10.6
Bettles	1983	NA	NA	10	NA	NA	5	644	25	8	4.4
Bettles	1984	NA	NA	6	NA	NA	3	451	12	5	4.4

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
Bettles	1998	60	40	40	60	20	25	3,276	364	107	NA
Bettles	1999	67	44	44	33	33	21	2,773	173	52	NA
Bettles	2002	58	8	0	12	58	0	0	0	0	NA
Bettles	2011	63	25	25	25	50	6	780	98	65	37.1
Bettles	Average	62	29	18	32	32	11	1,387	106	38	14.1
Brevig Mission	1984	18	NA	0	7	18	NA	NA	NA	NA	NA
Brevig Mission	1989	27	0	0	0	27	0	0	0	0	0.0
Brevig Mission	2000	85	24	20	29	71	76	10,369	153	35	NA
Brevig Mission	2005	16	15	15	13	8	43	5,835	83	18	NA
Brevig Mission	2015–16	92	29	19	31	78	65	8,840	136	45	NA
Brevig Mission	Average	44	20	13	16	37	37	6,189	88	22	4.7
Buckland	2003	86	61	58	54	48	637	86,660	985	212	38.3
Buckland	2009	67	67	64	46	44	535	72,797	818	168	NA
Buckland	2016-17	99	86	83	72	81	693	94,217	942	179	NA
Buckland	2018	97	65	59	54	65	949	129,092	1,278	220	39.7
Buckland	Average	87	70	66	56	59	704	95692	1,006	195	39.0
Deering	1994	78	57	54	43	57	142	19,246	437	131	19.4
Deering	2007	87	55	45	55	74	182	24,743	526	162	NA
Deering	2013	100	44	38	56	72	404	54,978	1,250	430	64.8
Deering	2017	93	63	57	59	72	342	46539	878	254	-
Deering	Average	90	55	48	53	69	268	36376	773	244	42.1
Elim	1999	96	70	66	60	81	227	30,817	380	99	NA

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
Elim	2005	96	79	58	65	85	150	20,421	319	77	NA
Elim	2010	85	39	28	42	66	83	11,294	128	35	NA
Elim	Average	92	63	51	56	77	153	20,844	276	70	NA
Galena	1985	34	10	7	7	28	40	8,383	40	12	1.5
Galena	1996	12	10	10	8	4	40	5,224	29	10	NA
Galena	1997	16	7	6	8	12	39	5,008	27	9	NA
Galena	1998	15	4	3	4	12	7	936	5	2	NA
Galena	1999	9	2	2	2	8	8	999	5	2	NA
Galena	2001	5	0	0	0	5	0	0	0	0	NA
Galena	2002	6	2	2	2	4	8	1,091	5	2	NA
Galena	2010	8	3	1	1	6	6	770	5	2	0.7
Galena	Average	13	5	4	4	10	18	2,801	15	5	1.1
Hughes	1982	NA	NA	0	NA	21	0	0	0	0	0.0
Hughes	2014	31	27	12	4	15	21	2,720	80	30	8.4
Hughes	Average	31	27	6	4	18	10	1,360	40	15	4.2
Huslia	1983	NA	NA	25	23	18	53	6,880	121	36	3.3
Huslia	1997	47	21	16	14	31	56	7,343	94	34	NA
Huslia	1998	97	65	58	42	40	264	34,320	429	140	NA
Huslia	1999	81	33	30	18	51	78	10,152	124	40	NA
Huslia	2002	75	42	35	19	50	82	10,703	141	49	NA
Huslia	Average	75	40	33	23	38	107	13,880	182	60	3.3
Kaltag	1996	30	17	11	13	23	16	2,095	34	9	NA
Kaltag	1997	20	4	4	7	18	8	1,075	17	4	NA
Kaltag	1998	19	10	9	7	10	6	807	13	4	NA
Kaltag	2001	2	0	0	0	2	0	0	0	0	NA

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
Kaltag	2002	0	0	0	0	0	0	0	0	0	NA
Kaltag	2017	0	0	0	0	0	0	0	0	0	NA
Kaltag	Average	12	5	4	4	9	5	663	11	3	NA
Kiana	1999	97	68	65	52	75	488	66,316	691	174	NA
Kiana	2006	94	62	57	NA	NA	306	41,612	438	109	31.2
Kiana	2009	77	80	75	54	55	414	56,337	547	149	NA
Kiana	2021	98	60	43	74	76	295	40,061	393	106	27.6
Kiana	Average	91	67	60	60	69	376	51,082	517	135	29.4
Kivalina	1964	NA	NA	NA	NA	NA	256	36,338	1,398	209	15.6
Kivalina	1965	NA	NA	NA	NA	NA	1010	144,434	5,555	830	53.6
Kivalina	1982	NA	NA	NA	NA	NA	346	48,202	1,026	179	22.9
Kivalina	1983	NA	NA	NA	NA	NA	564	76,652	1,631	284	30.2
Kivalina	1992	97	77	74	53	68	351	47,539	660	138	18.2
Kivalina	2007	93	64	64	67	69	268	36,458	450	85	13.9
Kivalina	2010	79	67	29	51	73	86	11,657	130	32	NA
Kivalina	Average	90	69	56	57	70	412	57,326	1,550	251	25.7
Kobuk	2004	89	82	61	46	64	134	18,224	651	148	NA
Kobuk	2009	86	86	82	68	50	210	28,531	865	194	NA
Kobuk	2012	93	67	57	57	73	119	16,173	449	98	31.8
Kobuk	Average	89	78	66	57	63	154	20,976	655	147	31.8
Kotlik	1980	NA	NA	7	NA	NA	8	1,600	29	4	NA
Kotlik	Average	NA	NA	7	NA	NA	8	1,600	29	4	NA
Kotzebue	1986	88	50	45	40	58	1917	260,645	341	97	24.4
Kotzebue	1991	93	70	63	59	62	3782	514,362	636	141	23.8
Kotzebue	2012	82	44	39	49	59	1804	245,287	301	80	NA

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
Kotzebue	2013	84	43	34	42	71	1680	228,438	274	75	NA
Kotzebue	2014	84	39	29	47	72	1286	174,823	212	59	28.8
Kotzebue	Average	86	49	42	47	64	2094	284,711	353	90	25.7
Koyuk	1998	97	66	59	53	64	263	35,799	484	129	NA
Koyuk	2004	97	77	72	72	72	425	57,737	671	153	NA
Koyuk	2005	89	51	46	36	67	143	19,424	221	58	NA
Koyuk	2006	NA	NA	NA	NA	NA	447	60,759	683	168	40.0
Koyuk	2010	95	72	47	48	53	184	24,990	312	84	NA
Koyuk	2016-17	89	51	46	36	67	143	19,424	221	58	NA
Koyuk	Average	93	63	54	49	65	267	36,355	432	108	40.0
Noatak	1994	84	84	91	71	50	615	996	83,664	221	47.8
Noatak	1999	95.6	74.4	72	61.1	62.2	683	92,902	938	224	NA
Noatak	2002	91	76	71	61	64	410	55,733	552	120	NA
Noatak	2007	97	73	66	78	88	442	60,061	505	114	31.4
Noatak	2010	56	21	21	4	45	66	8,937	78	16	NA
Noatak	2010–1	95	62	50	51	78	360	48,918	391	90	NA
Noatak	2016–17	96	70	51	56	84	337	45,783	358	80	NA
Noatak	Average	88	66	60	54	67	416	44,761	12,355	124	39.6
Noorvik	2002	95	72	71	60	59	988	134,373	873	182	NA
Noorvik	2008	94	70	70	37	56	767	104,289	724	174	NA
Noorvik	2012	95	60	59	47	65	851	115,758	857	198	32.8
Noorvik	Average	95	67	67	48	60	869	118,140	818	184	32.8
Nuiqsut	1985	98	90	90	80	60	513	60,021	790	150	37.5
Nuiqsut	1992	NA	81	NA	NA	NA	278	32,551	NA	NA	21.7
Nuiqsut	1993	98	74	74	79	79	672	82,169	903	228	30.7

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
Nuiqsut	1994–95	NA	NA	NA	NA	NA	258	30,186	NA	NA	36.3
Nuiqsut	1995–96	NA	NA	NA	NA	NA	362	42,354	NA	NA	23.1
Nuiqsut	2000–01	NA	NA	NA	NA	NA	496	57,985	NA	NA	31.6
Nuiqsut	2002–03	95	47	45	49	80	397	NA	NA	118	NA
Nuiqsut	2003–04	97	74	70	81	81	564	NA	NA	157	NA
Nuiqsut	2004–05	99	62	61	81	96	546	NA	NA	147	NA
Nuiqsut	2005–06	100	60	59	97	96	363	NA	NA	102	NA
Nuiqsut	2006–07	97	77	74	66	69	475	NA	NA	143	NA
Nuiqsut	2010	94	86	76	NA	NA	471	55,107	593	NA	NA
Nuiqsut	2011	92	70	56	49	58	498	58,226	619	134	NA
Nuiqsut	2012	99	68	62	65	79	501	58,617	598	147	NA
Nuiqsut	2013	95	79	63	62	75	586	68,534	692	166	NA
Nuiqsut	2014	90	66	64	67	59	774	105,193	974	253	NA
Nuiqsut	2015	96	84	78	74	72	628	73,527	728	180	NA
Nuiqsut	2016	96	76	67	79	81	481	56,277	592	132	NA
Nuiqsut	2014	90	66	64	59	67	774	105,193	974	253	28.3
Nuiqsut	Average	96	72	67	71	75	507	63,281	746	165	29.9
Nulato	1996	7	5	5	5	4	13	1,642	18	5	NA
Nulato	1997	6	4	2	2	4	3	407	5	1	NA
Nulato	1998	9	8	6	5	6	5	711	10	3	NA
Nulato	2001	1	0	0	0	1	0	0	0	0	NA
Nulato	2010	2	0	0	0	2	0	0	0	0	0.0
Nulato	Average	5	3	3	2	3	4	552	7	2	0.0
Point Hope	1994	-	-	-	-	-	355	48239	309	67	23.2
Point Hope	2014	91	53	30	51	80	185	25,156	143	34	7.6

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
Point Hope	2015	NA	56	NA	NA	NA	422	49,374	NA	NA	NA
Point Hope	Average	91	55	30	51	80	394	48118	201	51	15.4
Point Lay	1987	94	72	72	63	73	157	18,418	428	153	17.2
Point Lay	1994	NA	NA	NA	NA	NA	223	30,260	522	171	31.3
Point Lay	2002	NA	NA	NA	NA	NA	154	20,944	322	85	22.1
Point Lay	2012	93	64	60	71	76	356	48,380	705	186	31.3
Point Lay	2015	NA	63	NA	NA	NA	224	NA	NA	NA	NA
Point Lay	Average	94	66	66	67	75	223	29,501	494	149	25.5
Selawik	1999	97	61	61	75	84	1289	175,335	1,124	249	NA
Selawik	2006	NA	65	63	NA	NA	934	127,120	757	165	NA
Selawik	2011	97	70	54	59	80	683	92,947	550	109	20.4
Selawik	Average	97	65	59	67	82	969	131,801	810	174	20.4
Shaktoolik	1998	94	59	53	51	88	167	22,699	405	97	NA
Shaktoolik	1999	94	47	45	29	78	125	16,992	288	73	NA
Shaktoolik	2003	98	58	58	56	77	198	26,991	450	122	NA
Shaktoolik	2009	51	51	47	35	25	133	18,100	302	81	NA
Shaktoolik	Average	84	54	51	43	67	156	21,196	361	93	NA
Shishmaref	1982	NA	12	12	NA	NA	NA	NA	NA	NA	NA
Shishmaref	1989	48	19	19	19	38	197	26,747	227	57	NA
Shishmaref	1995	78	33	31	56	67	342	46,542	332	83	10.5
Shishmaref	2000	85	39	34	36	69	299	40,651	271	73	NA
Shishmaref	2009	72	72	65	55	52	339	46,049	374	81	NA
Shishmaref	2014	92	51	47	57	69	487	66,197	473	107	17.0
Shishmaref	2017	97	67	54	63	77	376	51078	362	96	-
Shishmaref	Average	79	42	37	48	62	340	46211	340	83	13.7

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
St. Michael	2003	68	29	18	16	57	48	6,460	68	16	NA
St. Michael	2006	NA	NA	NA	NA	NA	17	2,366	25	5	NA
St. Michael	Average	68	29	18	16	57	33	4,413	47	10	NA
Stebbins	2013	9	3	3	3	6	26	3,482	26	6	1.8
Stebbins	2006	NA	NA	NA	NA	NA	0	0	0	0	NA
Stebbins	2002	5	6	0	0	5	0	0	0	0	NA
Stebbins	1980	NA	NA	0	NA	NA	0	0	0	0	0.0
Stebbins	Average	7	5	1	2	5	9	1,161	9	2	0.9
Teller	2000	59	8	6	6	54	21	2,823	40	12	NA
Teller	2005	9	0	0	0	9	0	NA	0	0	NA
Teller	2006	NA	NA	NA	NA	NA	0	0	0	0	NA
Teller	2015–16	47	18	17	13	39	29	3,944	51	16	NA
Teller	Average	34	4	3	3	32	11	2,823	20	6	NA
Unalakleet	2002	78	20	15	15	66	167	22,741	96	30	NA
Unalakleet	2004	88	63	59	50	62	723	98,348	477	140	NA
Unalakleet	2006	NA	NA	NA	NA	NA	554	75,314	378	108	NA
Unalakleet	Average	83	42	37	32	64	481	65,468	317	93	NA
Utqiagvik	1987	NA	NA	26	NA	NA	1595	186,669	199	62	30.1
Utqiagvik	1988	NA	NA	27	NA	NA	1533	179,314	191	59	29.2
Utqiagvik	1989	NA	NA	39	NA	NA	1656	193,744	207	64	22.2
Utqiagvik	1992	NA	46	NA	NA	NA	1993	233,206	NA	NA	17.1
Utqiagvik	1995–96	NA	NA	NA	NA	NA	2155	293,094	NA	NA	24.5
Utqiagvik	1996–97	NA	NA	NA	NA	NA	1158	157,420	NA	NA	13.3
Utqiagvik	2000	NA	NA	NA	NA	NA	3359	456,851	NA	NA	29.3
Utqiagvik	2001	NA	NA	NA	NA	NA	1820	247,520	NA	NA	22.9

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
Utqiagvik	2003	NA	NA	NA	NA	NA	2092	284,444	NA	NA	22.8
Utqiagvik	2014	70	38	33	38	52	4323	587,897	371	111	30.6
Utqiagvik	2015		44				3000	351,000	293		
Utqiagvik	2019						3273	382,941			
Utqiagvik	Average	70	43	31	38	52	2330	296,175	245	69	24.8
Wainwright	1988	NA	NA	57	NA	NA	505	59,085	476	117	23.0
Wainwright	1989	NA	NA	66	NA	NA	711	83,187	699	178	23.7
Wainwright	1992	NA	68	NA	NA	NA	947	110,851	NA	NA	34.3
Wainwright	2002	NA	NA	NA	NA	NA	866	117,149	806	221	19.1
Wainwright	2009	97	64	61	62	84	1231	167,356	1,073	284	41.7
Wainwright	2014	NA	NA	NA	NA	NA	951	111,267	725	NA	NA
Wainwright	2015	NA	NA	NA	NA	NA	756	88,452	573	NA	NA
Wainwright	2016	NA	NA	NA	NA	NA	914	106,938	690	NA	NA
Wainwright	2017	NA	NA	NA	NA	NA	806	94,302	608	NA	NA
Wainwright	2018	NA	NA	NA	NA	NA	1,012	118,404	772	NA	NA
Wainwright	2019	NA	NA	NA	NA	NA	804	94,068	NA	NA	NA
Wainwright	Average	97	67	61	62	84	864	104,696	714	200	28.3
Wales	1993	24	7	2	5	21	4	486	10	3	0.4
Wales	2000	21	2	0	7	23	0	0	0	0	NA
Wales	2010	13	0	0	3	13	0	0	0	0	NA
Wales	2017	31	0	0	4	31	0	0	0	0	NA
Wales	Average	22	2	1	5	22	1	122	2	1	0.4
White Mountain	1999	65	36	33	29	42	93	12,654	183	60	NA
White Mountain	2006	80	29	20	20	69	50	6825	114	35	8.8

Study community	Study year	% of HH using	% of HH trying	% of HH harvesting	% of HH giving	% of HH receiving	Estimated number harvested	Estimated total pounds	Estimated mean HH pounds	Estimated per capita pounds	% of total harvest
White Mountain	2008	85	46	33	34	70	99	13,477	207	69	NA
White Mountain	2015-16	92	29	19	31	78	65	8,840	136	45	NA
White Mountain	Average	80	35	26	28	65	77	10449	160	52	8.8
Wiseman	1991	NA	NA	NA	NA	NA	10	1,260	NA	NA	28.2
Wiseman	2011	80	80	60	60	20	4	520	104	40	13.6
Wiseman	Average	80	80	60	60	20	7	890	104	40	20.9
All Communities	Average	72	47	38	39	53	362	47,935	704	98	25.1

Source: For primary subsistence study communities, see Table 2; for all other WAH study communities, see ADF&G 2024.

Notes: HH = Households; NA = Not available

Harvest data not available for Livengood, Fairbanks, and Koyukuk.

Table 42. Fish subsistence harvest data, average across all available study years, fish study communities

Study community	Species	% HHs use	% HHs try to harvest	% HHs harvest	% HHs give	% HHs receive	Total # harvest	Estimated lbs harvested	Average HH lbs	Per capita lbs	% of total harvest
Alakanuk	Chinook Salmon	NA	NA	86	NA	NA	2,717	43,203	480	73	10.0
	Chum Salmon	NA	NA	100	NA	NA	13,693	66,821	742	112	15.5
	Sheefish	81	59	60	41	34	3,312	21,524	200	35	7.4
Alatna	Chinook Salmon	33	33	50	33	28	367	6,644	139	39	3.9
	Chum Salmon	50	33	42	33	33	8,865	54,036	1,157	321	44.3
	Sheefish	67	67	47	29	33	1,335	9,340	203	56	9.6
Allakaket	Chinook Salmon	48	29	39	24	33	317	5,374	111	32	4.4
	Chum Salmon	50	38	42	31	19	9,723	58,398	1,216	346	48.2
	Sheefish	72	53	55	34	27	1,968	13,111	266	80	12.5

Study community	Species	% HHs use	% HHs try to harvest	% HHs harvest	% HHs give	% HHs receive	Total # harvest	Estimated lbs harvested	Average HH lbs	Per capita lbs	% of total harvest
Ambler	Chinook Salmon	7	4	4	0	4	3	46	1	0	0.0
	Chum Salmon	76	53	52	34	57	2,902	20,262	281	80	5.4
	Sheefish	87	72	69	47	56	1,481	20,966	291	84	7.5
Anvik	Chinook Salmon	100	88	88	39	48	1,246	15,805	497	181	31.7
	Chum Salmon	58	42	42	13	21	1,072	5,434	172	60	10.8
	Sheefish	60	51	54	19	31	285	1,982	61	22	3.1
Bettles	Chinook Salmon	25	NA	2	13	13	9	159	5	2	1.0
	Chum Salmon	13	13	13	NA	0	338	2,057	79	29	14.3
	Sheefish	29	8	8	17	17	80	558	22	8	3.4
Emmonak	Chinook Salmon	89	55	62	35	65	2,649	33,404	266	59	10.6
	Chum Salmon	91	70	70	41	58	15,638	78,897	572	128	23.7
	Sheefish	70	51	55	28	40	3,390	27,115	222	50	8.7
Evansville	Chinook Salmon	46	8	6	15	28	8	133	5	2	2.3
	Chum Salmon	NA	NA	21	NA	5	447	2,725	103	38	13.7
	Sheefish	38	8	12	12	24	65	454	18	7	4.2
Galena	Chinook Salmon	71	41	31	20	46	2,373	29,060	150	49	11.3
	Chum Salmon	59	26	26	15	35	37,770	180,319	876	274	43.4
	Sheefish	36	26	25	13	13	1,008	6,308	33	12	1.8
Grayling	Chinook Salmon	97	84	81	46	48	1,894	24,940	539	143	20.3
	Chum Salmon	59	39	37	29	27	5,416	27,094	574	139	17.4
	Sheefish	76	67	72	34	44	786	5,515	116	29	3.9
Holy Cross	Chinook Salmon	NA	NA	NA	NA	NA	1,649	22,756	274	83	13.1
	Chum Salmon	NA	NA	NA	NA	NA	1,218	5,793	70	21	3.3
	Sheefish	4	2	21	2	2	376	2,816	34	10	3.2
Hughes	Chinook Salmon	NA	NA	68	NA	16	586	10,603	482	112	7.5
	Chum Salmon	46	19	19	15	39	15,195	56,895	2,474	603	56.8
	Sheefish	54	37	48	9	18	232	1,514	62	18	2.3

Study community	Species	% HHs use	% HHs try to harvest	% HHs harvest	% HHs give	% HHs receive	Total # harvest	Estimated lbs harvested	Average HH lbs	Per capita lbs	% of total harvest
Huslia	Chinook Salmon	NA	NA	34	13	39	297	4,072	71	21	2.0
	Chum Salmon	NA	NA	43	14	41	22,583	102,603	1,800	533	49.3
	Sheefish	60	31	34	20	37	896	5,815	85	27	3.0
Kaltag	Chinook Salmon	85	58	44	42	33	1,323	13,097	214	74	33.8
	Chum Salmon	67	44	42	27	29	20,905	85,002	1,352	335	13.2
	Sheefish	61	44	42	23	30	280	1,592	25	9	4.1
Kiana	Chinook Salmon	14	7	6	4	8	16	196	2	1	0.3
	Chum Salmon	86	61	57	41	73	3,661	20,270	207	51	18.8
	Sheefish	80	60	58	40	61	1,428	14,688	149	36	7.3
Kobuk	Chinook Salmon	4	4	4	0	0	2	24	1	0	0.0
	Chum Salmon	83	63	60	38	54	2,174	12,841	384	84	29.5
	Sheefish	94	81	79	42	43	903	10,199	306	67	23.3
Kotlik	Chinook Salmon	NA	NA	50	NA	NA	1,060	16,854	301	45	8.9
	Chum Salmon	NA	NA	86	NA	NA	6,884	33,594	600	89	17.8
	Sheefish	89	62	67	37	58	2,867	18,457	237	42	13.6
Kotzebue	Chinook Salmon	13	6	5	3	9	266	3,050	4	1	0.2
	Chum Salmon	84	47	45	41	60	32,714	199,009	244	59	17.0
	Sheefish	82	54	52	42	52	39,545	217,497	271	66	15.9
Koyukuk	Chinook Salmon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chum Salmon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sheefish	66	48	48	16	41	384	2,304	52	22	NA
Marshall	Chinook Salmon	89	72	67	50	39	3,304	31,186	367	91	23.2
	Chum Salmon	89	72	70	41	37	5,981	30,408	358	89	22.6
	Sheefish	19	13	12	8	10	838	4,750	47	12	3.8
Mountain Village	Chinook Salmon	85	53	70	38	57	2,260	28,838	249	49	9.4
	Chum Salmon	83	52	73	38	56	14,415	71,511	600	119	24.0
	Sheefish	60	40	46	34	45	2,906	16,147	133	28	6.4

Study community	Species	% HHs use	% HHs try to harvest	% HHs harvest	% HHs give	% HHs receive	Total # harvest	Estimated lbs harvested	Average HH lbs	Per capita lbs	% of total harvest
Noorvik	Chinook Salmon	8	5	4	2	4	25	236	2	0	0.0%
	Chum Salmon	89	47	45	42	66	15,408	93,115	719	165	16.3
	Sheefish	82	56	54	36	54	4,054	45,697	348	80	19.0
Nulato	Chinook Salmon	87	61	60	36	45	2,000	18,878	208	73	30.4
	Chum Salmon	37	30	27	13	14	991	5,039	56	19	8.1
	Sheefish	59	37	36	20	32	466	2,797	32	10	3.6
Nunam Iqua	Chinook Salmon	NA	NA	100	NA	NA	1,912	30,405	1,322	220	15.8
	Chum Salmon	NA	NA	100	NA	NA	11,487	56,056	2,437	406	29.2
	Sheefish	83	63	68	27	63	1,928	13,506	504	91	9.7
Pilot Station	Chinook Salmon	55	20	19	6	43	211	2,022	16	3	2.0
	Chum Salmon	92	35	35	26	78	24,273	24,273	190	39	24.5
	Sheefish	53	32	31	18	31	623	3,523	27	6	3.4
Pitka's Point	Chinook Salmon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chum Salmon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sheefish	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Rampart	Chinook Salmon	0	0	0	0	0	0	0	0	0	0.0
	Chum Salmon	57	57	57	29	29	500	4,673	359	120	31.7
	Sheefish	29	29	29	0	0	13	145	11	4	1.0
Ruby	Chinook Salmon	77	45	40	32	47	1,531	14,448	219	80	26.7
	Chum Salmon	55	40	38	17	23	2,735	13,907	211	77	25.7
	Sheefish	41	27	25	13	23	158	950	15	5	1.3
Russian Mission	Chinook Salmon	85	74	63	28	37	2,557	30,666	511	104	22.3
	Chum Salmon	NA	NA	37	NA	NA	2,731	14,596	252	51	9.0
	Sheefish	41	33	33	13	11	541	3,515	44	9	2.7
Saint Mary's	Chinook Salmon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chum Salmon	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Sheefish	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Study community	Species	% HHs use	% HHs try to harvest	% HHs harvest	% HHs give	% HHs receive	Total # harvest	Estimated lbs harvested	Average HH lbs	Per capita lbs	% of total harvest
Shungnak	Chinook Salmon	4	1	0	1	4	0	0	0	0	0.0
	Chum Salmon	78	52	50	30	58	4,691	28,070	452	105	14.8
	Sheefish	85	64	64	35	56	2,565	26,155	414	98	12.2
Tanana	Chinook Salmon	92	53	52	46	47	4,769	81,079	633	270	10.9
	Chum Salmon	70	66	62	28	27	67,411	400,317	3,127	1,158	53.7
	Sheefish	36	32	32	15	11	3,042	19,566	155	56	4.6
All Communities	Chinook Salmon	53	36	41	22	30	1,219	16,110	244	62	10.4
Average	Chum Salmon	67	45	50	29	39	12,132	60,483	747	195	24.2
	Sheefish	60	43	44	24	33	2,592	17,283	146	36	7.0

Source: For primary subsistence study communities, see Table 2; for all other fish study communities, see ADF&G 2024.

Notes: NA = not applicable

6. Potential Impacts of Proposed Project to Subsistence Uses

6.1. Impact Methods

The potential impacts of the AAP to subsistence uses are discussed under two primary headings: 1) Road Impacts and 2) Other Indirect and Cumulative Impacts/Indirect and Cumulative Impacts of Growth. The first section, Road Impacts, discusses the direct and indirect impacts of construction and operation of the Ambler Road. This section does not address potential impacts from development and activities that will result from operation of the road. The second section, Other Indirect and Cumulative Impacts/Indirect and Cumulative Impacts of Growth, addresses potential impacts associated with future mining development scenarios (facilitating access to the Ambler Mining District is a primary purpose of the road), in combination with other past, present, and reasonably foreseeable actions (RFAs) in the region.

The proposed subsistence impact analysis approach is organized as follows:

- Identify Potential Impact Categories
- Identify Impact Indicators
- Analyze Potential Impacts of the Road on Subsistence Uses
- Summarize Impact Indicators
- Discuss Other Indirect and Cumulative Impacts/Indirect and Cumulative Impacts of Growth

6.2. Impact Categories

Under both Construction and Operation headings, impacts are discussed under the following three subsistence impact categories:

1. Resource Abundance – Successful subsistence harvests depend on an adequate number of animals being available for harvest within a reasonable distance from one's community. While overall population levels within a region may appear stable, if a resource experiences a decline within a community's harvesting area (e.g., within a specific stream used commonly by the community) due to direct mortality or decreased egg or calf survival rates in the area, this would indicate a decrease in resource abundance for that community for that resource. While this section references the conclusions of the wildlife chapters in regards to potential population-level effects, more localized effects from a biological perspective may still affect resource abundance for an individual subsistence community.
2. Resource Availability - Successful subsistence harvests depend on continued availability of resources, of adequate quality and health, in traditional use areas. Subsistence availability can be affected by changes in resource health, resource displacement from traditional harvest locations due to altered distribution or migration, or resource contamination (including actual and/or perceived contamination of resources and habitat or habituation of resources to development activities). Similar to resource abundance, while this section references the conclusions of the wildlife chapters in regards to disturbance or displacement of subsistence resources, impacts which may be minimal from a biological perspective may have larger effects on individual subsistence users, and these impacts are also discussed under Resource Availability.

3. User Access - Successful subsistence harvests depend on continued access to subsistence resources and use areas without physical, regulatory, or social barriers. Avoidance of an area due to development activities, infrastructure, concerns over contamination and other project related reasons is also an impact to user access. Access could be negatively affected or enhanced by a project.

Competition, Costs and Time, and Culture are also categories of impacts and often occur as a result of changes in the above three categories of abundance, availability, or access. For example, changes in access can result in changes in harvester competition for resources. Increased access to an area may result in more competition for resources from outsiders and/or from community or nearby community residents who did not previously use the area. Other aspects of a project may result in increased or decreased competition between communities, within a community, or between local hunters and outsiders. Displacement of resources, resource population decline, competition, and economic changes (e.g., income changes, changes in employment levels) can also affect costs and effort associated with subsistence harvest activities. Harvest activity costs are often directly related to distance traveled, in addition to other factors (e.g., gas prices, time spent away from home). Indirect effects of increased travel distances or time required to locate and harvest subsistence resources include increased safety risks. Finally, disruption of harvest activities can also disrupt learning and transmission of subsistence skills, which are key components of Alaska Native cultural identity. Harvesting activities, including distribution and processing of harvest products, foster and maintain social ties that are also important to overall wellbeing. Disruption of harvest activities can weaken those social ties by reducing social interactions. In addition, satisfaction that comes from eating traditional foods is also important to overall wellbeing, and disruptions to harvests of resources can affect the ability to consume subsistence foods. Other potential impacts to culture include avoidance of traditional use areas, loss of the integrity of a culturally significant place, and decreased autonomy (i.e., control over traditional lands, tribal government, development activities). Impacts to competition, costs and time, and culture are identified under the abundance, availability, and user access headings where applicable, and summarized in a separate section following the discussions of impacts to resource abundance, resource availability, and user access.

6.3. Impact Indicators

Two primary impact indicators that could be quantitatively measured for the subsistence study communities are 1) Resource Importance (discussed above under Section 4.3) and 2) Subsistence Use Areas. These impact indicators are based on NEPA guidance, which requires consideration of both context and intensity when assessing significant impacts (40 CFR 1508.27). Understanding the relative importance of each subsistence resource (i.e., Resource Importance) and the location of where these uses occur (i.e., Subsistence Use Areas), helps to better analyze the context and intensity of impacts and which subsistence resources and activities are more vulnerable to impacts from the proposed Project.

This analysis assumes that if a project impact were to affect a resource of higher importance, then that effect would be of a greater intensity to a community compared to a similar effect to a resource of lesser importance. The rationale is based on the fact that resources of higher importance have a greater number of subsistence users who participate in the harvests of that resource, share the resource, or for which the resource contributes a higher amount to the overall subsistence diet.

Furthermore, communities whose use areas are located along the project alternative or whose use areas are bisected (e.g., intersecting in or near the middle of the use area) by the proposed Project would likely experience greater impacts versus those communities that are located farther away or only have a small portion of their use areas intersected by the proposed Project. The rationale that the intensity of an impact would be greater when the proposed Project bisects a community's use area (versus on the periphery of a community's use area) is based on an analysis of subsistence use area mapping studies that record the number of harvesters by use area (SRB&A 2013a, 2009b, 2007). These studies have shown that areas closest to the communities are generally used by more people than areas located farther from the community. Other studies have termed this use of an intensively used core area as a "central-based use area" pattern in which a core area surrounding the community supports most of the food production with larger, less frequently used subsistence use areas extending beyond the intensively-used core (Wolfe and Fischer 2003). The analysis for this report acknowledges exceptions can occur if the outer edge of a community's use area is close to the community and limited by a regulatory boundary (e.g., community's use along a National Park) or prominent natural feature (e.g., coastline or mountain range).

For the caribou and fish study communities, the focus is less on project overlap and more on the importance of the resource to the study communities, as these study communities have been included to address more indirect or downstream impacts of the community. Therefore, the impact indicators for the caribou and fish study communities are limited to resource importance.

The goal of this approach to use key impact indicators (i.e., resource importance, subsistence use areas) is to rely on systematically collected quantitative data to reduce subjective impact assessments, to avoid broad generalities in those analyses in the final assessment, and to allow for replication of the findings in both the baseline and impact assessment analyses. This impact analysis is the product of years of SRB&A research and development of systematic, quantitative, and replicable impact assessment methods. Other examples of quantitative data that have been collected in other subsistence studies around the state, and which could be used as impact indicators in order to provide a more specific and focused impact assessment, include travel methods by use area (to inform user access impacts), overlapping subsistence use areas (to inform the number of subsistence users potentially affected and where), and timing of subsistence activities by use areas (to inform likelihood for potential direct impacts at same time and place). However, these data are not available or were not systematically documented in a quantitative method during past studies in the subsistence study communities in order to incorporate them into the impact analysis as impact indicators. Where applicable, they are discussed in qualitative terms.

As discussed in Section 4.1, harvest data and subsistence use areas may not always accurately reflect a community's use areas and harvest amounts. Relying solely on these indicators may overestimate or underestimate potential impacts if, for example, a community uses a portion of the project area not reflected in previously collected subsistence use area data for the community. Indigenous Knowledge can fill in some of these gaps; for this reason, Indigenous Knowledge is incorporated into the impact discussion where appropriate.

6.4. Road Impacts

6.4.1 Impacts Common to All Alternatives

The following sections describe the potential impacts of the proposed Ambler Road which are common to all alternatives. Table 43 through Table 46 provides impact indicators for the primary study communities and shows the number of communities whose subsistence use areas are crossed by one or more of the project alternatives, by subsistence resource. The table also shows the relative importance of each subsistence resource to each community, in terms of selected measures of material and cultural importance (see Resource Importance sections above). The project alternatives cross subsistence use areas for 16 of the 27 subsistence study communities. Subsistence use areas are most commonly crossed for small land mammals (15 communities), caribou/moose (12 communities each), and non-salmon fish/vegetation (10 communities each) (see Table 46). Most of these resources (moose, caribou, vegetation, and non-salmon fish) are of high importance to a majority of potentially affected communities. In the case of small land mammals, these resources are generally of low to moderate resource importance to the study communities (see Table 43 through Table 45); while trapping and hunting of furbearers and small land mammals remains culturally important, these activities occur among a smaller subset of community harvesters and provide a minimal amount in terms of subsistence foods. However, fur sales contribute cash to the mixed subsistence-cash economies of these communities, which may be used to support other subsistence resource harvests. The study communities with the highest numbers of resource uses crossed by the proposed project alternatives are Hughes, Kobuk, Shungnak, Allakaket, Ambler, Bettles, and Evansville (eight or more resources each out of 14 resource categories) (see Table 43 through Table 45).

Data on resource importance for the caribou and fish study communities are provided in Table 48 and Table 49. In 27 of the 42 caribou study communities, caribou is a resource of high importance (see Table 48); data were not available for four study communities. Communities where caribou is of moderate resource importance based on selected material and cultural indicators include Bettles, Brevig Mission, Hughes, Huslia, and Teller. Communities where caribou is of low resource importance based on selected material and cultural indicators are Galena, Kaltag, Kotlik, Nulato, Stebbins, and Wales. The communities that would be most likely to experience the effects of a decline in caribou abundance or a change in caribou distribution or health are those for whom the resource is of high importance. However, the other communities may still experience impacts if they have traditional uses of the herd or participate in sharing networks with the affected communities.

For fish, most (24 out of 32) fish study communities have a high material and cultural reliance on one or more of the three key species of Chinook salmon, chum salmon, and sheefish (see Table 49). Data are not available for three communities, and for the remaining communities (Alkanuk, Bettles, Evansville, Holy Cross, and Kotlik), these resources are of moderate importance. Communities most reliant on sheefish (high resource importance) include those in the Kobuk (Ambler, Kiana, Kobuk, Noorvik, Shungnak) and Yukon (Grayling and Nunam Iqua) river basins. Communities most reliant on Chinook salmon include those in the Yukon River basin (Anvik, Emmonak, Grayling, Kaltag, Marshall, Nulato, Ruby, Russian Mission), and Shungnak in the Kobuk-Selawik River basin. Finally, a large number of communities have a high reliance on chum salmon, including communities in the Kobuk-Selawik, Koyukuk, and Yukon river basins (see Table 49). These communities would be most likely to experience the effects of a decline in fish abundance or a change in fish distribution or health, if impacts extend outside the project area. However, the other communities harvest these resources (albeit at lower levels) and would likely also experience impacts.

Table 43. Use areas crossing project corridor and resource importance, by community, Alternative A

Study community	Moose	Caribou	DS	Bear	Other LLM	SLM	MM	MB	UGB	Eggs	Salmon	NSF	MI	V	Number of known resource use areas crossed
Alatna	H[a]	M[a]	L[a]	L[a]	I[c]	M[b]	H[c]	H[b]	H[b]	I[c]	H[b]	M[b]	I[c]	H[b]	4
Allakaket	H[a]	H[a]	L[a]	L[a]	L[c]	M[b]	H[c]	M[b]	M[b]	I[c]	H[b]	H[b]	L[c]	H[b]	4
Ambler	M[a]	H[a]	L[b]	L[a]	L[c]	M[a]	H[b]	M[a]	M[b]	L[c]	H[a]	H[a]	L[c]	H[b]	7
Anaktuvuk Pass	M[b]	H[a]	M[b]	L[b]	L[c]	L[a]	H[c]	L[b]	L[b]	I[c]	M[b]	H[b]	I[c]	H[b]	2
Beaver	H[b]	L[b]	I[c]	M[b]	I[c]	H[b]	L[c]	H[b]	M[b]	L[b]	H[b]	M[b]	I[c]	H[b]	0
Bettles	H[a]	M[a]	L[a]	L[b]	I[c]	M[a]	I[c]	L[b]	L[a]	I[c]	M[a]	H[a]	I[c]	H[a]	8
Buckland	M[b]	H[b]	I[c]	L[b]	M[c]	L[b]	H[b]	M[b]	I[c]	M[b]	H[b]	H[b]	L[b]	H[b]	0
Coldfoot	L[a]	H[b]	I[b]	I[b]	I[c]	I[a]	I[c]	I[a]	L[a]	I[a]	L[b]	I[b]	I[c]	H[a]	6
Evansville	H[a]	H[a]	M[a]	L[b]	I[c]	L[a]	L[c]	L[a]	M[a]	I[c]	H[b]	H[a]	L[b]	H[a]	8
Galena	H[b]	L[c]	I[c]	L[c]	L[c]	M[b]	L[c]	M[b]	M[b]	I[c]	H[b]	H[b]	L[c]	H[b]	0
Hughes	H[b]	M[b]	I[a]	L[b]	I[c]	M[b]	M[c]	M[b]	M[b]	I[c]	H[b]	H[b]	I[c]	H[b]	1
Huslia	H[b]	M[b]	I[b]	L[b]	I[c]	M[b]	I[c]	M[b]	L[b]	I[c]	H[b]	H[b]	I[c]	L[b]	0
Kiana	M[b]	H[c]	L[b]	I[b]	I[c]	L[b]	H[b]	M[b]	L[c]	L[b]	H[b]	H[b]	L[c]	H[b]	0
Kobuk	M[a]	H[a]	I[b]	L[a]	I[c]	L[a]	H[b]	M[a]	M[b]	I[c]	H[b]	H[b]	I[c]	H[a]	6
Kotzebue	M[b]	H[b]	L[b]	L[b]	L[b]	L[b]	H[b]	M[b]	M[b]	L[b]	H[b]	H[b]	L[b]	H[b]	0
Livengood	I[c]	I[c]	I[c]	I[b]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	0
Manley Hot Springs	M[b]	L[c]	I[c]	L[b]	I[c]	L[b]	I[c]	L[b]	M[b]	L[c]	H[b]	M[b]	L[c]	H[c]	0
Minto	H[b]	L[b]	L[c]	L[b]	I[c]	M[b]	I[c]	H[b]	M[b]	L[b]	H[b]	M[b]	L[c]	H[b]	0
Nenana	H[b]	L[b]	L[b]	I[b]	I[c]	L[b]	I[c]	I[b]	H[b]	I[b]	H[b]	H[b]	I[b]	I[c]	0
Noatak	M[b]	H[b]	L[b]	L[b]	L[b]	L[b]	H[b]	M[b]	L[b]	L[b]	H[b]	H[b]	L[c]	H[b]	0
Noorvik	M[b]	H[b]	L[b]	L[b]	L[c]	L[b]	H[b]	M[b]	M[b]	L[b]	H[b]	H[b]	L[c]	H[b]	0
Rampart	H[b]	L[b]	I[c]	I[b]	I[c]	M[b]	M[c]	M[b]	L[b]	I[c]	H[b]	H[b]	I[c]	H[b]	0
Selawik	M[b]	H[a]	I[c]	L[b]	I[c]	L[b]	H[b]	M[b]	M[b]	L[b]	M[b]	H[b]	L[c]	H[b]	1
Shungnak	M[a]	H[a]	L[a]	L[a]	I[c]	M[a]	H[b]	H[a]	L[b]	L[c]	H[a]	H[b]	L[c]	H[a]	8

Study community	Moose	Caribou	DS	Bear	Other LLM	SLM	MM	MB	UGB	Eggs	Salmon	NSF	MI	V	Number of known resource use areas crossed
Stevens Village	H[b]	L[c]	I[c]	L[b]	I[c]	M[b]	M[c]	H[b]	L[b]	I[c]	H[b]	M[b]	I[c]	H[b]	0
Tanana	H[b]	L[b]	I[c]	L[b]	I[c]	H[b]	I[c]	M[b]	H[b]	I[b]	H[b]	M[b]	I[b]	H[b]	0
Wiseman	H[a]	H[c]	H[b]	I[b]	L[c]	M[a]	I[c]	M[a]	H[a]	I[a]	H[b]	H[b]	I[c]	H[a]	6

Source: see Map 2 through Map 27; Table 2

Notes: DS = Dall sheep; H = Resource of high importance; I = Resource of indeterminate importance (no community harvest data); L = Resource of low importance; LLM = Large land mammal; M = Resource of moderate importance; MB = Migratory bird; MM = Marine mammal; MI = Marine invertebrates; NSF = Non-salmon fish; SML = Small land mammal; UGB = Upland game bird; V = vegetation

[a]Project Crosses Community Subsistence Use Area Data.

[b]Project Does Not Cross Community Subsistence Use Area Data

[c]No community subsistence use area defined, so project impact or lack of impact cannot be determined.

Table 44. Use areas crossing project corridor and resource importance, by community, Alternative B

Study community	Moose	Caribou	DS	Bear	Other LLM	SLM	MM	MB	UGB	Eggs	Salmon	NSF	MI	V	Number of known resource use areas crossed
Alatna	H[a]	M[a]	L[a]	L[a]	I[c]	M[a]	H[c]	H[b]	H[b]	I[c]	H[b]	M[b]	I[c]	H[b]	5
Allakaket	H[a]	H[a]	L[a]	L[a]	L[c]	M[b]	H[c]	M[b]	M[b]	I[c]	H[b]	H[b]	L[c]	H[b]	4
Ambler	M[a]	H[a]	L[b]	L[a]	L[c]	M[a]	H[b]	M[b]	M[b]	L[c]	H[a]	H[a]	L[c]	H[a]	7
Anaktuvuk Pass	M[b]	H[a]	M[b]	L[b]	L[c]	L[a]	H[c]	L[b]	L[b]	I[c]	M[b]	H[b]	I[c]	H[b]	2
Beaver	H[b]	L[b]	I[c]	M[b]	I[c]	H[b]	L[c]	H[b]	M[b]	L[b]	H[b]	M[b]	I[c]	H[b]	0
Bettles	H[a]	M[a]	L[a]	L[b]	I[c]	M[a]	I[c]	L[b]	L[a]	I[c]	M[a]	H[a]	I[c]	H[a]	8
Buckland	M[b]	H[b]	I[c]	L[b]	M[c]	L[b]	H[b]	M[b]	I[c]	M[b]	H[b]	H[b]	L[b]	H[b]	0
Coldfoot	L[a]	H[b]	I[b]	I[b]	I[c]	I[a]	I[c]	I[a]	L[a]	I[a]	L[b]	I[b]	I[c]	H[a]	6
Evansville	H[a]	H[a]	M[a]	L[b]	I[c]	L[a]	L[c]	L[a]	M[a]	I[c]	H[b]	H[a]	L[b]	H[a]	8
Galena	H[b]	L[c]	I[c]	L[c]	L[c]	M[b]	L[c]	M[b]	M[b]	I[c]	H[b]	H[b]	L[c]	H[b]	0
Hughes	H[b]	M[b]	I[a]	L[b]	I[c]	M[b]	M[c]	M[b]	M[b]	I[c]	H[b]	H[b]	I[c]	H[b]	1
Huslia	H[b]	M[b]	I[b]	L[b]	I[c]	M[b]	I[c]	M[b]	L[b]	I[c]	H[b]	H[b]	I[c]	L[b]	0
Kiana	M[b]	H[b]	L[b]	I[b]	I[c]	L[b]	H[b]	M[b]	L[c]	L[b]	H[b]	H[b]	L[c]	H[b]	0

Study community	Moose	Caribou	DS	Bear	Other LLM	SLM	MM	MB	UGB	Eggs	Salmon	NSF	MI	V	Number of known resource use areas crossed
Kobuk	M[a]	H[a]	I[b]	L[a]	I[c]	L[a]	H[b]	M[a]	M[b]	I[c]	H[b]	H[b]	I[c]	H[a]	6
Kotzebue	M[b]	H[b]	L[b]	L[b]	L[b]	L[b]	H[b]	M[b]	M[b]	L[b]	H[b]	H[b]	L[b]	H[b]	0
Livengood	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	0
Manley Hot Springs	M[b]	L[c]	I[c]	L[b]	I[c]	L[b]	I[c]	L[b]	M[b]	L[c]	H[b]	M[b]	L[c]	H[b]	0
Minto	H[b]	L[b]	L[c]	L[b]	I[c]	M[b]	I[c]	H[b]	M[b]	L[b]	H[b]	M[b]	L[c]	H[b]	0
Nenana	H[b]	L[b]	L[b]	I[b]	I[c]	L[b]	I[c]	I[b]	H[b]	I[b]	H[b]	H[b]	I[b]	I[b]	0
Noatak	M[b]	H[b]	L[b]	L[b]	L[b]	L[b]	H[b]	M[b]	L[b]	L[b]	H[b]	H[b]	L[c]	H[b]	0
Noorvik	M[b]	H[b]	L[b]	L[b]	L[c]	L[b]	H[b]	M[b]	M[b]	L[b]	H[b]	H[b]	L[c]	H[b]	0
Rampart	H[b]	L[b]	I[c]	I[b]	I[c]	M[b]	M[c]	M[b]	L[b]	I[c]	H[b]	H[b]	I[c]	H[b]	0
Selawik	M[b]	H[a]	I[c]	L[b]	I[c]	L[b]	H[b]	M[b]	M[b]	L[b]	M[b]	H[b]	L[c]	H[b]	1
Shungnak	M[a]	H[a]	L[a]	L[a]	I[c]	M[a]	H[b]	H[a]	L[b]	L[c]	H[a]	H[b]	L[c]	H[a]	8
Stevens Village	H[b]	L[c]	I[c]	L[b]	I[c]	M[b]	M[c]	H[b]	L[b]	I[c]	H[b]	M[b]	I[c]	H[b]	0
Tanana	H[b]	L[b]	I[c]	L[b]	I[c]	H[b]	I[c]	M[b]	H[b]	I[b]	H[b]	M[b]	I[b]	H[b]	0
Wiseman	H[a]	H[b]	H[b]	I[b]	L[c]	M[a]	I[c]	M[a]	H[a]	I[a]	H[b]	H[b]	I[c]	H[a]	6

Source: see Map 2 through Map 27; Table 2

Notes: DS = Dall sheep; H = Resource of high importance; I = Resource of indeterminate importance (no community harvest data); L = Resource of low importance; LLM = Large land mammal; M = Resource of moderate importance; MB = Migratory bird; MM = Marine mammal; MI = Marine invertebrates; NSF = Non-salmon fish; SML = Small land mammal; UGB = Upland game bird; V = vegetation

[a]Project Crosses Community Subsistence Use Area Data.

[b]Project Does Not Cross Community Subsistence Use Area Data

[c]No community subsistence use area defined, so project impact or lack of impact cannot be determined.

Table 45. Use areas crossing project corridor and resource importance, by community, Alternative C

Study community	Moose	Caribou	DS	Bear	Other LLM	SLM	MM	MB	UGB	Eggs	Salmon	NSF	MI	V	Number of known resource use areas crossed
Alatna	H[a]	M[a]	L[b]	L[a]	I[c]	M[a]	H[c]	H[b]	H[b]	I[c]	H[b]	M[a]	I[c]	H[b]	5

Study community	Moose	Caribou	DS	Bear	Other LLM	SLM	MM	MB	UGB	Eggs	Salmon	NSF	MI	V	Number of known resource use areas crossed
Allakaket	H[a]	H[a]	L[a]	L[a]	L[c]	M[a]	H[c]	M[a]	M[a]	I[c]	H[b]	H[a]	L[c]	H[a]	9
Ambler	M[a]	H[a]	L[b]	L[a]	L[c]	M[a]	H[b]	M[a]	M	L[c]	H[a]	H[a]	L[c]	H[a]	8
Anaktuvuk Pass	M[b]	H[a]	M[b]	L[b]	L[c]	L[a]	H[c]	L[b]	L[b]	I[c]	M[b]	H[b]	I[c]	H[b]	2
Beaver	H[b]	L[b]	I[c]	M[b]	I[c]	H[b]	L[b]	H[b]	M[b]	L[b]	H[b]	M[b]	I[c]	H[b]	0
Bettles	H[b]	M[b]	L[b]	L[b]	I[c]	M[b]	I[c]	L[b]	L[b]	I[c]	M[b]	H[b]	I[c]	H[b]	0
Buckland	M[b]	H[b]	I[c]	L[b]	M[c]	L[b]	H[b]	M[b]	I[c]	M[b]	H[b]	H[b]	L[b]	H[b]	0
Coldfoot	L[b]	H[b]	I[b]	I[b]	I[c]	I[b]	I[c]	I[b]	L[b]	I[b]	L[b]	I[b]	I[c]	H[b]	0
Evansville	H[b]	H[b]	M[b]	L[b]	I[c]	L[b]	L[c]	L[b]	M[b]	I[c]	H[b]	H[b]	L[b]	H[b]	0
Galena	H[b]	L[c]	I[c]	L[c]	L[c]	M[b]	L[c]	M[b]	M[b]	I[c]	H[b]	H[b]	L[c]	H[b]	0
Hughes	H[a]	M[a]	I[a]	L[a]	I[c]	M[a]	M[b]	M[a]	M[b]	I[c]	H[a]	H[a]	I[c]	H[a]	9
Huslia	H[b]	M[a]	I[b]	L[b]	I[c]	M[a]	I[c]	M[b]	L[b]	I[c]	H[a]	H[b]	I[c]	L[b]	3
Kiana	M[b]	H[b]	L[b]	I[b]	I[c]	L[b]	H[b]	M[b]	L[c]	L[b]	H[b]	H[a]	L[c]	H[b]	1
Kobuk	M[a]	H[a]	I[b]	L[a]	I[c]	L[a]	H[b]	M[a]	M[a]	I[c]	H[a]	H[a]	I[c]	H[a]	9
Kotzebue	M[b]	H[b]	L[b]	L[b]	L[b]	L[b]	H[b]	M[b]	M[b]	L[b]	H[b]	H[b]	L[b]	H[b]	0
Livengood	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	0
Manley Hot Springs	M[b]	L[c]	I[c]	L[b]	I[c]	L[b]	I[c]	L[b]	M[b]	L[c]	H[b]	M[b]	L[c]	H[b]	0
Minto	H[b]	L[b]	L[c]	L[b]	I[c]	M[b]	I[c]	H[b]	M[b]	L[b]	H[b]	M[b]	L[c]	H[b]	0
Nenana	H[b]	L[b]	L[b]	I[b]	I[c]	L[b]	I[c]	I[b]	H[b]	I[b]	H[b]	H[b]	I[b]	I[b]	0
Noatak	M[b]	H[b]	L[b]	L[b]	L[b]	L[b]	H[b]	M[b]	L[b]	L[b]	H[b]	H[b]	L[c]	H[b]	0
Noorvik	M[b]	H[b]	L[b]	L[b]	L[c]	L[b]	H[b]	M[b]	M[b]	L[b]	H[b]	H[b]	L[c]	H[b]	0
Rampart	H[b]	L[b]	I[c]	I[b]	I[c]	M[b]	M[c]	M[b]	L[b]	I[c]	H[b]	H[b]	I[c]	H[b]	0
Selawik	M[b]	H[a]	I[c]	L[b]	I[c]	L[a]	H[b]	M[b]	M[b]	L[b]	M[b]	H[b]	L[c]	H[b]	2
Shungnak	M[a]	H[a]	L[a]	L[a]	I[c]	M[a]	H[b]	H[a]	L[b]	L[c]	H[a]	H[a]	L[c]	H[a]	9
Stevens Village	H[a]	L[c]	I[c]	L[a]	I[c]	M[a]	M[c]	H[a]	L[a]	I[c]	H[b]	M[a]	I[c]	H[a]	7
Tanana	H[a]	L[a]	I[c]	L[a]	I[c]	H[a]	I[c]	M[b]	H[b]	I[b]	H[b]	M[b]	I[b]	H[b]	4

Study community	Moose	Caribou	DS	Bear	Other LLM	SLM	MM	MB	UGB	Eggs	Salmon	NSF	MI	V	Number of known resource use areas crossed
Wiseman	H[b]	H[b]	H[b]	I[b]	L[c]	M[b]	I[c]	M[b]	H[b]	I[b]	H[b]	H[b]	I[c]	H[b]	0

Source: see Map 2 through Map 27; Table 2

Notes: DS = Dall sheep; H = Resource of high importance; I = Resource of indeterminate importance (no community harvest data); L = Resource of low importance; LLM = Large land mammal; M = Resource of moderate importance; MB = Migratory bird; MM = Marine mammal; MI = Marine invertebrates; NSF = Non-salmon fish; SML = Small land mammal; UGB = Upland game bird; V = vegetation

[a]Project Crosses Community Subsistence Use Area Data.

[b]Project Does Not Cross Community Subsistence Use Area Data

[c]No community subsistence use area defined, so project impact or lack of impact cannot be determined.

Table 46. Use areas crossing project corridor and resource importance, by community, any alternative

Study community	Moose	Caribou	DS	Bear	Other LLM	SLM	MM	MB	UGB	Eggs	Salmon	NSF	MI	V	Number of known resource use areas crossed
Alatna	H[a]	M[a]	L[a]	L[a]	I[c]	M[a]	H[c]	H[b]	H[c]	I[c]	H[b]	M[a]	I[c]	H[b]	6
Allakaket	H[a]	H[a]	L[b]	L[a]	L[c]	M[a]	H[c]	M[a]	M[a]	I[c]	H[b]	H[a]	L[c]	H[a]	9
Ambler	M[a]	H[a]	L[b]	L[a]	L[c]	M[a]	H[b]	M[a]	M[b]	L[c]	H[a]	H[a]	L[c]	H[a]	8
Anaktuvuk Pass	M[b]	H[a]	M[b]	L[b]	L[c]	L[a]	H[b]	L[b]	L[b]	I[c]	M[b]	H[b]	I[c]	H[b]	2
Beaver	H[b]	L[b]	I[c]	M[b]	I[c]	H[b]	L[c]	H[b]	M[b]	L[b]	H[b]	M[b]	I[c]	H[b]	0
Bettles	H[a]	M[a]	L[a]	L[b]	I[c]	M[a]	I[c]	L[b]	L[a]	I[c]	M[a]	H[a]	I[c]	H[a]	8
Buckland	M[b]	H[b]	I[c]	L[b]	M[a]	L[b]	H[b]	M[b]	I[c]	M[b]	H[b]	H[b]	L[b]	H[b]	0
Coldfoot	L[a]	H[b]	I[b]	I[b]	I[c]	I[a]	I[c]	I[a]	L[a]	I[a]	L[b]	I[b]	I[c]	H[a]	6
Evansville	H[a]	H[a]	M[a]	L[b]	I[c]	L[a]	L[b]	L[a]	M[a]	I[c]	H[b]	H[a]	L[b]	H[a]	8
Galena	H[b]	L[c]	I[c]	L[c]	L[c]	M[b]	L[c]	M[b]	M[b]	I[c]	H[b]	H[b]	L[c]	H[b]	0
Hughes	H[a]	M[a]	I[a]	L[a]	I[c]	M[a]	M	M[a]	M[b]	I[c]	H[a]	H[a]	I[c]	H[a]	9
Huslia	H[b]	M[a]	I[b]	L[b]	I[c]	M[a]	I[c]	M[b]	L[b]	I[c]	H[a]	H[b]	I[c]	L[b]	3
Kiana	M[b]	H[b]	L[b]	I[b]	I[c]	L[b]	H[b]	M[b]	L[c]	L[b]	H[b]	H[a]	L[c]	H[b]	1
Kobuk	M[a]	H[a]	I[b]	L[a]	I[c]	L[a]	H[b]	M[a]	M[a]	I[c]	H[a]	H[a]	I[c]	H[a]	9
Kotzebue	M[b]	H[b]	L[b]	L[b]	L[b]	L[b]	H[b]	M[b]	M[b]	L[b]	H[b]	H[b]	L[b]	H[b]	0

Study community	Moose	Caribou	DS	Bear	Other LLM	SLM	MM	MB	UGB	Eggs	Salmon	NSF	MI	V	Number of known resource use areas crossed
Livengood	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	I[c]	0
Manley Hot Springs	M[b]	L[c]	I[c]	L[b]	I[c]	L[b]	I[c]	L[b]	M[b]	L[c]	H[b]	M[b]	L[c]	H[b]	0
Minto	H[b]	L[b]	L	L[b]	I[c]	M[b]	I[c]	H[b]	M[b]	L[b]	H[b]	M[b]	L[c]	H[b]	0
Nenana	H[b]	L[b]	L[b]	I[b]	I[c]	L[b]	I[c]	I[b]	H[b]	I[b]	H[b]	H[b]	I[b]	I[b]	0
Noatak	M[b]	H[b]	L[b]	L[b]	L[b]	L[b]	H[b]	M[b]	L[b]	L[b]	H[b]	H[b]	L[c]	H[b]	0
Noorvik	M[b]	H[b]	L[b]	L[b]	L[c]	L[b]	H[b]	M[b]	M[b]	L[b]	H[b]	H[b]	L[c]	H[b]	0
Rampart	H[b]	L[b]	I[c]	I[b]	I[c]	M[b]	M	M[b]	L[c]	I[c]	H[b]	H[b]	I[c]	H[b]	0
Selawik	M[b]	H[a]	I[c]	L[b]	I[c]	L[a]	H[b]	M[b]	M[c]	L[c]	M[b]	H[b]	L[c]	H[b]	2
Shungnak	M[a]	H[a]	L[a]	L[a]	I[c]	M[a]	H[b]	H[a]	L[b]	L[c]	H[a]	H[a]	L[c]	H[a]	9
Stevens Village	H[a]	L	I[c]	L[a]	I[c]	M[a]	M	H[a]	L[a]	I[c]	H[b]	M[a]	I[c]	H[a]	7
Tanana	H[a]	L[a]	I[c]	L[b]	I[c]	H[a]	I[c]	M[b]	H[b]	I[b]	H[b]	M[b]	I[b]	H[b]	3
Wiseman	H[a]	H[b]	H[b]	I[b]	L[c]	M[a]	I[c]	M[a]	H[a]	I[a]	H[b]	H[b]	I[c]	H[a]	6

Source: see Map 2 through Map 27; Table 2

Notes: DS = Dall sheep; H = Resource of high importance; I = Resource of indeterminate importance (no community harvest data); L = Resource of low importance; LLM = Large land mammal; M = Resource of moderate importance; MB = Migratory bird; MM = Marine mammal; MI = Marine invertebrates; NSF = Non-salmon fish; SML = Small land mammal; UGB = Upland game bird; V = vegetation

[a]Project Crosses Community Subsistence Use Area Data.

[b]Project Does Not Cross Community Subsistence Use Area Data

[c]No community subsistence use area defined, so project impact or lack of impact cannot be determined.

Table 47. Number of communities with use areas crossing the project, by alternative and resource

Resource	Number of communities crossing Alternative A	Number of communities crossing Alternative B	Number of communities crossing Alternative C	Number of communities crossing any Alternative	Affecting greatest number of communities
Moose	9	9	8	12	A/B
Caribou	9	9	10	12	C
Dall sheep	6	6	3	6	A/B
Bear	5	5	7	7	C
Other large land mammals	0	0	0	0	N/A

Resource	Number of communities crossing Alternative A	Number of communities crossing Alternative B	Number of communities crossing Alternative C	Number of communities crossing any Alternative	Affecting greatest number of communities
Small land mammals	8	9	11	15	C
Marine mammals	0	0	0	0	N/A
Migratory birds	6	5	6	9	A/C
Upland game birds	4	4	3	7	A/B
Eggs	2	2	0	2	A/B
Salmon	3	3	5	6	C
Non-salmon fish	3	3	8	10	C
Marine invertebrates	0	0	0	0	N/A
Vegetation	6	7	6	10	B
Total Number of Communities Crossed	**12**	**12**	**12**	**16**	**N/A**

Source: see Map 2 through Map 27; Table 2

Notes: A = Alternative A; B = Alternative B; C = Alternative C; N/A = Not applicable; No. = Number

Table 48. Resource Importance of caribou, caribou study communities

Study community	Resource importance
Allakaket	H
Ambler	H
Anaktuvuk Pass	H
Atqasuk	H
Buckland	H
Deering	H
Elim	H
Golovin	H
Kiana	H
Kivalina	H
Kobuk	H
Kotzebue	H
Koyuk	H
Noatak	H
Noorvik	H
Nuiqsut	H
Point Hope	H
Point Lay	H
Selawik	H
Shishmaref	H
Shungnak	H
St. Michael	H
Unalakleet	H
Utqiagvik	H
Wainwright	H
White Mountain	H
Wiseman	H
Bettles	M
Brevig Mission	M
Hughes	M
Huslia	M
Teller	M
Galena	L
Kaltag	L
Kotlik	L
Nulato	L
Stebbins	L
Wales	L

Study community	Resource importance
Fairbanks	No Data
Koyukuk	No Data
Nome	No Data
Shaktoolik	No Data

Notes: H = Resource of High Importance; M = Resource of Moderate Importance; L = Resource of Low Importance

Table 49. Resource importance of chum salmon, Chinook salmon, and sheefish, fish study communities

Study community	Chinook salmon	Chum salmon	Sheefish	All
Alatna	M	H	M	H
Allakaket	M	H	M	H
Ambler	L	H	H	H
Anvik	H	M	M	H
Emmonak	H	H	M	H
Galena	M	H	M	H
Grayling	H	M	H	H
Hughes	M	H	M	H
Huslia	M	H	M	H
Kaltag	H	M	M	H
Kiana	L	H	H	H
Kobuk	L	H	H	H
Kotzebue	L	H	M	H
Marshall	H	H	M	H
Mountain Village	M	H	M	H
Noorvik	L	H	H	H
Nulato	H	M	M	H
Nunam Iqua	M	H	H	H
Pilot Station	M	H	M	H
Rampart	L	H	L	H
Ruby	H	H	L	H
Russian Mission	H	M	M	H
Shungnak	L	H	H	H
Tanana	M	H	M	H
Alakanuk	M	M	M	M
Bettles	L	M	M	M
Evansville	M	M	M	M
Holy Cross	M	M	M	M
Kotlik	M	M	M	M
Koyukuk	No Data			

Study community	Chinook salmon	Chum salmon	Sheefish	All
Pitka's Point		No Data		
St. Mary's		No Data		

Notes: H = Resource of High Importance; M = Resource of Moderate Importance; L = Resource of Low Importance

During scoping, Tribal, village, and corporation entities as well as Alaska Native resource co-management entities expressed concerns regarding potential road impacts. Based on the Indigenous Knowledge of the individuals living in the Project area, the scoping meeting participants described potential impacts to resource abundance, resource availability, and user access as well as compounded impacts resulting from changes to resource abundance and availability and user access. The Indigenous Knowledge observations and concerns are discussed below under the various impact headings.

Resource Abundance

Construction

Whereas many large-scale projects in Alaska have distinct construction and operation phases, the AAP will undergo several periods of construction (lasting approximately 2 years each) interspersed with longer periods of operation/exploration. Construction impacts will be greatest during Phase 1 when the majority of construction (e.g., culvert and bridge installation, primary placement of gravel) will occur. Construction activities which could affect resource abundance through removal or disturbance of habitat include blasting/mining, operation of construction equipment, excavation, placement of gravel, placement of ice roads and ice pads during initial road construction, construction noise, human presence, water withdrawal, installation of bridges and culverts, and air and ground traffic. Construction activities may also cause direct mortality to individual animals, including caribou, moose, fish, and waterfowl through vehicle and aircraft collisions, pile driving, and blasting.

The AAP could cause direct mortality to caribou resulting from construction vehicle strikes, particularly if the caribou use the road as a movement corridor or insect relief area. Individual caribou may become ill through ingestion of chemicals used during construction or mining. Fish may experience direct mortality through driving of bridge pile, and certain activities such as pile driving, construction sedimentation, and stream diversions, may alter or degrade fish habitat thereby reducing egg survival downstream. Road construction and operation can contribute to thawing of permafrost which could cause thaw slumps along river and stream banks. Slumping could increase sedimentation, degrade water quality, and affect fish spawning habitat (see Section 3.3.2, Fish and Aquatics, of the Supplemental EIS). Overall, increased sedimentation from construction activities, particularly in spawning grounds, can smother eggs, alter feeding habitat, and decrease fish production. Water withdrawal may kill individual fish but would likely not have population-level effects.

During the scoping period, the Indigenous Knowledge provided by the Native Village of Kotzebue indicated that silt and contaminants as well as changes to water flows in the Kobuk River region watersheds may lead to decreased health and abundance of sheefish, salmon, whitefish, and Dolly Varden char populations. The Native Village commented that these resources are essential to the livelihood of the community of Kotzebue, particularly due to the fact that they are inexpensive to harvest and are available throughout the year:

> *Healthy and abundant sheefish and salmon require pristine watersheds free from silt and contaminants, in addition to sufficient water flows and unfettered access to the most remote parts of the Kobuk River for their annual spawning runs. Salmon are critical to our members, representing a major source of*

> *income and subsistence resources necessary for their continued quality of life and livelihood. Sheefish are a major part of the annual cycle of subsistence for our members as they are commonly harvested near Kotzebue for the majority of the year. They somewhat uniquely represent an egalitarian resource, in that they are easily harvested for much of the year by the entire community because of their proximity and without requiring scarce, or expensive, methods and means. Whitefish that feed in the summer in coastal lagoons of Kotzebue Sound and continue to be harvested as a treasured food by our members, also use the Kobuk River and its tributaries for spawning and overwintering purposes, as do Dolly Varden char. (Native Village of Kotzebue 2018)*

Waterfowl nesting and feeding near the road corridor or gravel sites may also experience direct habitat loss or waterfowl may ingest chemicals associated with construction activities and dust deposition. Some individual mortalities of waterfowl would likely occur as a result of increased air traffic in the region. Direct loss of vegetation resulting from gravel mining, gravel placement, and fugitive dust would cause decreased abundance of vegetation (e.g., berries, wild greens) along the road corridor. In addition, clearing and grading along the road ROW could cause an increase in wildlife mortality (e.g., destruction of dens, clearing of habitat), particularly for resources such as small land mammals.

Operation

Operation activities which could affect resource abundance include the presence of roads and bridges (e.g., habitat fragmentation), the presence of other infrastructure such as communications towers and culverts, fuel or other contaminant spills, dust deposition, road and air traffic, and human activity. The presence of the road in addition to related culverts, bridges, and gravel infrastructure would alter and degrade fish habitat both upstream and downstream from the road, which could affect fish abundance for subsistence users in certain waterways crossed by the road corridor. Increased thawing of permafrost along the road could result in slumping along riverbanks which could also degrade water quality and affect fish abundance. It is not possible to predict the location and magnitude of such changes, although key sheefish spawning areas in the Kobuk River drainage and whitefish spawning in the Alatna River may be particularly vulnerable to population-level impacts.

Habitat fragmentation resulting from sustained disturbances could result in decreased abundance of certain resources over time. In the case of caribou, other Alaskan herds such as the CAH have maintained habitat connectivity and general migration patterns despite being intersected by highways and roads. Fragmentation of the WAH and RMH range resulting from a road may be more pronounced because the WAH and RMH ranges have less development and therefore have had less opportunity to habituate to human activity. The likelihood of longer term impacts on resource abundance vary by resource and are discussed below under the individual alternatives, under Indirect and Cumulative Impacts, and in individual biological resources discussions.

As with construction, some direct mortalities may occur as a result of collisions with vehicles, aircraft, or infrastructure during operations, particularly if animals such as moose are attracted to the road ROW as a movement corridor. Ingestion of contaminated water or vegetation as a result of spills could also cause illness in individual animals; larger spills into waterways would have larger effects on fish abundance, particularly in spawning streams.

Concerns about potential contamination of sheefish and chum salmon spawning grounds have already been voiced in the study communities (Watson 2014). The Kobuk River supports the largest population of spawning sheefish in Alaska, and the Alatna River is the only spawning habitat for sheefish in the upper Koyukuk River drainage. In addition, sheefish spawning grounds are particularly sensitive to changes in water velocity, temperature, pH, and other factors. Salmon spawning habitat is also vulnerable in changes to water chemistry. A member of the Western Interior Regional Advisory Council provided the following observations about water quality, salmon spawning, and the importance of smaller clearwater tributaries:

> *All my life I never did catch a fish in the silt water at all. So it’s something to think about. I hope they think about it because you come in here and older Natives that are alive right now they always say they don’t know what they’re talking about. For them to be 70, 80 years, they know what they’re talking about. They never did catch a salmon in those silt water places. It’s all flats, so there’s no drainages that run up into the mountains. Once you start going into elevation, that’s where you’re going to find your salmon. (Western Interior Federal Subsistence Regional Advisory Council 2022b)*

Changes to natural water chemistry resulting from exposure of geologic materials could affect egg survival and fish populations, having far-reaching effects on downstream subsistence users of whitefish and salmon. As discussed in Section 5.7, Downstream Subsistence Uses of Fish, Chinook and salmon returns have declined in recent years, increasing the reliance of some communities on harvests of non-salmon fish (e.g., sheefish). Thus, the study communities would be particularly vulnerable to additional changes in salmon and non-salmon fish abundance. Impacts related to changes in Chinook salmon abundance would be most likely among Yukon River study communities, while impacts related to changes in sheefish abundance would be most likely among Kobuk River communities. Chum salmon impacts would affect communities in all three river basins (Kobuk-Seward, Koyukuk, and Yukon) (see Table 22). Over time, fugitive dust along road corridors may increase the affected area of vegetation which could in turn affect caribou, waterfowl, and other animals feeding in the vicinity of the road but would likely not result in population-level effects. Of particular concern to caribou are declines in lichen cover along gravel roads as a result of dust deposition. Illegal use of the road by hunters may result in increased mortality of moose and caribou along the road corridor, although likely not to the level of reducing overall population numbers.

Ingestion of contaminated water or vegetation as a result of spills could also cause illness in individual animals. Mines would use the road to transport fuel and other chemicals and toxic materials. Key sheefish, whitefish, and salmon spawning streams crossed by the proposed road corridors and therefore vulnerable to spills and other contamination include the Kobuk River, Alatna River Henshaw Creek, South Fork Koyukuk River, and Hogatza River. Larger spills into waterways would have larger effects on fish habitat and abundance, particularly if spills occur in sheefish, whitefish, or salmon spawning streams, and could have population-level effects. A large-scale spill could result in reduced harvests of aquatic resources in addition to other resources that feed on aquatic species downstream from the road, including marine mammals that feed on potentially affected fish in river deltas downstream from the proposed road and mines. Spills could also affect feeding and other habitat for resources such as birds, caribou, and small land mammals. Local harvesters may avoid harvesting species from waterways perceived to be contaminated by the road and associated activities. In comments on the Draft Supplemental EIS, a Noorvik resident expressed concerns about the potential downstream effects on the Kobuk River Delta which is central to Noorvik subsistence uses and which supports various species of plants and wildlife. In addition to spills, leaching of acid rock into waterways would affect aquatic habitat quality for sheefish, whitefish, Chinook and chum salmon, and other aquatic resources. Small changes in water quality could have substantial impacts on fish populations.

Resource Availability

Many of the subsistence study communities have high unemployment rates, incomes below the poverty line, and high food insecurity (Guettabi, Greenberg, Little, and Joly 2016). Despite these factors, community populations are stable. Subsistence activities and harvests are a key component in maintaining residents' ability to remain in their communities (Guettabi et al. 2016). Because of the importance of subsistence to maintaining the stability of the mixed economy and resilience of the study communities, these communities are also particularly vulnerable to impacts on subsistence harvests and subsistence resource availability. Furthermore, many of the subsistence study communities do not currently have road access and have majority Alaska Native populations which have specific cultural, social, and spiritual identities and needs that are inextricably linked to subsistence, which adds to their vulnerability associated with change introduced through an industrial road. These communities would be most vulnerable to potential impacts subsistence resource availability resulting from the project.

The Ambler Access Project Subsistence Advisory Committee (SAC) has identified several resources of particular concern to subsistence, including caribou, moose, salmon, and sheefish. SAC members have noted declines in the availability some of these resources in recent years, including caribou, moose, and salmon (AIDEA 2022, 2023).

Harvest amounts are dependent on the availability and abundance of subsistence resources within a community's subsistence land use area and are not necessarily reflective of a community's dependence on or preference for a given resource. In prehistoric times, when the Athabascans and Iñupiat of the area lived semi-nomadic lifestyles, the response to a decline in resource availability may be to move to a more suitable location. With today's communities established in permanent locations, relocating to a more productive area, at least on a permanent or semi-permanent basis, is not an option for most individuals. Thus, today, communities adapt to the availability of resources within their subsistence use areas, and when one resource declines or is not available when harvesters can access them, residents may increase their harvest of a different resource in response. One example of this is the declining harvests of caribou within the Upper Koyukuk Region and corresponding increase in moose harvests starting in the late twentieth century. This shift in harvests was in response to changes in the distribution of caribou away from traditional land use areas, and the gradual appearance of moose within those areas. Another recent example is the decline in salmon runs in recent years, and the corresponding increase in harvests of other fish species. As the Alatna First Chief observed, "With the current salmon situation we have to start relying more and more on the local fishes" (Alatna Tribal Council 2022). Other recent trends within the region observed by local residents and wildlife biologists include declining chum salmon and Chinook salmon runs; changes in the distribution of the WAH and reduced availability for certain communities; and recent declines in the availability of moose in the Upper Koyukuk region, with increased availability in the Kobuk River region (Watson 2019). A decline in multiple resources at once would reduce a community's ability to adapt to these changes and to find suitable substitutions for the declining harvests.

Construction

Construction activities that may affect resource availability for subsistence users include excavation, blasting, mining, ROW clearing, gravel placement, construction of ice roads, and pads, operation of construction equipment, general construction noise, human activity, vehicle and air traffic, sedimentation from construction activity, and fuel or other contaminant spills. Infrastructure such as the pioneer road, ice roads, material sites, culverts, and bridge piles may also pose as physical obstructions for terrestrial mammals and fish. The 16 communities who have use areas overlapped by the project alternatives would experience direct impacts to resource availability; larger impacts to resource behavior, migration, or distribution could result in indirect impacts to resource availability for all 27 subsistence study communities, the 42 caribou study communities, and the 32 fish study communities.

In the short term, blasting may displace or divert resources such as large land mammals, small land mammals, and waterfowl, due to the noise associated with such activities (Section 3.2.6). Blasting also destroys vegetation and surrounding habitat for resources such as caribou, moose, and waterfowl. Clearing of trees and brush for the ROW and stripping of topsoil and organic material may alter or degrade resource habitat, particularly for herbivores that depend on surface vegetation or for fish in streams or rivers affected by erosion and sedimentation. In addition, these activities would remove berry, wild plant, and wood harvesting areas for study communities along the road corridor. Habitat alteration can affect resource distribution, thereby reducing the availability of those resources to subsistence users in traditional hunting or harvesting areas.

Construction of the action alternatives would result in direct habitat loss for WAH caribou. A reduction in lichen-dominated vegetation would have greater impacts to the WAH, as lichen is a particularly important food source to the WAH. One member of the Northwest Arctic Regional Advisory Council (2023) noted how forage availability has long-term effects on caribou migration:

> *They can't migrate in the same area years and years because they eat up all that food and it takes so long for the lichen to grow that the caribou won't come to there.*

The action alternatives would result in removal of habitat in the winter, migratory, and peripheral ranges of the WAH. Loss of winter habitat would be particularly detrimental to the WAH, as winter foraging can be limited (see Section 3.3.4, Mammals, of the Supplemental EIS). A member of the Northwest Arctic Regional Advisory Council noted that in recent years climate change has made winter foraging even more difficult for the caribou herds:

> *This climate change in the past maybe five, six years and knowing the caribou and stuff, after it snows in November we usually get rain and when it snows, that rain it'll freeze on top of the tundra and the caribou are having hard time feeding so – and we lose a lot of caribou due to starvation due to this climate change, so people out there need to be aware of that because a lot of people will wonder why are we losing so much caribou. So this climate change did lots of damage on our subsistence take on caribou… And the people should know that it affects the herd. (Northwest Arctic Regional Advisory Council 2022)*

If loss of foraging lands results in the WAH changing their distribution in search of more suitable habitat, then local communities could experience reduced hunting success or have to travel farther to locate caribou.

Resource movement, particularly for migratory animals such as caribou, may be diverted due to increased human and material presence, air and ground traffic, noise, and/or contamination and dust from construction activities (see detailed discussion below, under "Caribou"). This general disturbance of wildlife could result in subsistence resources being unavailable at the time and place that subsistence users are accustomed to finding them.

Noise from construction equipment, gravel placement, blasting, mining, vehicle traffic, aircraft and helicopters, and human activity, would likely displace or divert certain resources (Section 3.2.6). Traffic itself causes a physical barrier for migratory animals, particularly caribou, and can also displace or divert resources when herds are separated (Vistnes and Nellemann 2007). Some animals, such as certain species of small land mammals and caribou, can become habituated to certain development activities over time; however, this habituation can result in changes to resource distribution and may also cause increased mortalities due to vehicle strikes. During the construction years, estimated air traffic volumes are five to nine fixed-wing aircraft trips each week, and one helicopter trip per week. Ground traffic would increase over the three phases of the AAP but would be less during the construction phases.

Potential effects of construction activities on resource availability also include contamination resulting from fuel and other chemical spills, dust deposition, sedimentation due to erosion along river and stream banks, and increased emissions. Construction activity may lead to concerns by local residents about contamination of subsistence resources, particularly plants and berries, which are of high importance to nearly all potentially affected communities (see Resource Importance sections) and which could be directly affected by fugitive dust along the road corridors. This concern would be especially elevated in areas where naturally occurring asbestos is exposed during construction or contained in the gravel fills used for the project. Fuel spills and erosion may also result in contamination of waterways, affecting fish and other animals who ingest contaminated water. Contamination or perceived contamination can have indirect effects on subsistence, as subsistence users may reduce their consumption of a resource if there is a fear of contamination; thus, resources perceived as unhealthy or contaminated are considered unavailable to local residents.

The influx of workers during the multi-year construction period would also cause a substantial increase in human disturbance and activity within the region, which would likely result in decreased availability of certain resources in the vicinity of construction areas The potential for impacts to resource availability resulting from hunting or fishing by temporary construction workers is a key concern which has been raised by the study communities. This analysis assumes that no road users authorized by AIDEA (including construction workers) will be allowed to also hunt or fish from the road. In other words, construction workers or truck drivers will not be allowed to stop and hunt or fish using the road for access. However, it is possible that workers may choose to return to the area after construction is complete to engage in harvesting activities within the area, which could increase the number of hunters in the area over time and reduce resource availability for local residents.

The following sections provide a more in-depth discussion of potential impacts to the resources which are most commonly harvested by the study communities along the proposed road corridors and which are of high importance to a majority of those study communities. These resources include caribou, moose, fish, and vegetation.

Caribou

As noted above, the proposed road routes cross through community caribou hunting areas for 12 communities: Hughes, Kobuk, Shungnak, Allakaket, Ambler, Bettles, Evansville, Alatna, Huslia, Anaktuvuk Pass, Selawik, and Tanana. For seven of these communities, caribou are a resource a high importance (see Table 46), while for the remaining five communities, caribou are of moderate or low importance based on selected measures. While caribou are harvested in lesser quantities than in the past for a number of the study communities, changes to subsistence uses of caribou are often a result of changes in caribou migration or distribution which are out of a community’s control. In many cases, communities were originally situated in areas known to be productive for caribou harvests, only to witness shifts in the distribution of the caribou herds which made them difficult to access. In more recent years, construction of TAPS and the Dalton Highway was reported by local residents to shift the distribution of caribou, and residents within the eastern portion of the proposed road corridors, such as Bettles, Alatna, and Allakaket, experienced a decline in harvests. Today, some residents from the northern and eastern portions of the project area travel to the southwest of the community toward Buckland into the WAH wintering grounds to harvest caribou (see Sections 5.1 and 5.3). Without the means (e.g., transportation, funds) to access caribou herds, communities rely on sharing networks for their dependence on caribou and may shift their resource focus to other resources which are more available, such as moose. This does not mean that caribou is no longer culturally important to these communities, and if migration or distribution of the herds change in the future such that they are available, communities would likely resume previous levels of harvesting. In addition to the communities who have documented use of the proposed corridors, additional subsistence study communities and caribou study communities may experience impacts to caribou availability if the road causes larger impacts on caribou movement However, such large-scale changes in caribou movement and distribution are not expected to occur (see Section 3.3.4, Mammals, of the Supplemental EIS).

Impacts on the resource availability of caribou may result from changes in caribou migration, distribution, behavior, and health. In addition, changes in harvester access can affect resource availability by reducing or delaying access to productive hunting areas; these impacts are discussed in the section below, "User Access." Impacts to the abundance of caribou, in terms of overall population, are discussed above, under "Resource Abundance." This section addresses the potential for impacts to the availability of caribou within traditional harvesting areas. While certain local changes to caribou movement or distribution may seem minimal from a biological perspective (i.e., not affecting overall population levels, body condition, herd ranges, etc.), local changes can have much larger impacts on resource availability to local hunters. It is important to a harvester's success that caribou are available within traditional hunting areas at the expected time during the seasonal round, and that the resources are accessible via available forms of transportation. Small changes can result in decreased hunting success due to a variety of factors. For example, a later arrival of caribou into one's hunting area could reduce harvest success if the caribou arrive during freeze-up, when neither river nor overland travel is possible, or at a time when other resource harvesting activities are at their peak. In addition, behavioral responses to stimuli, such as caribou acting skittish or running away from riversides, can result in hunters not being able to harvest caribou within a reasonable hauling distance, thus forcing them to abandon a hunt (SRB&A 2018). Thus, while conclusions related to impacts on caribou availability draw on the conclusions of the terrestrial mammals sections of the EIS, there are many additional impacts which are not addressed in the biological analysis.

Future changes in the distribution or migration of the caribou resulting from the road and other factors may result in changes to boundaries for the winter, migratory, and peripheral ranges of the herd, thus affecting the availability of the herd to communities in different ways. Currently, the project area crosses through the winter, migratory (fall and spring), and peripheral range for the WAH; the total range, including calving grounds, for the Ray Mountains Herd (RMH); and the peripheral range of the Hodzana Hills Herd (HHH). All of the action alternatives overlap with fall migration routes near Kobuk; fall migration routes have become more concentrated to the southwest as winter distribution has shifted toward this area. The Native Village of Kotzebue commented on the supreme importance of caribou to their community and the profound cultural impacts that a decrease in the presence of the WAH would have on the community of Kotzebue. They commented that it is essential that the WAH be able to migrate freely:

> *It is impossible to overstate the importance of caribou to our members. Their absence in the annual subsistence cycle would irreversibly change the character of the culture and impose major hardship on the people as it would*

> *be impossible to replace the quantity and quality of food that caribou currently provide. (Native Village of Kotzebue 2018)*

The primary construction activities which may affect caribou availability to local communities include air and ground traffic, construction noise (e.g., blasting, machinery), the presence of linear infrastructure (e.g., pioneer road), and human activity. Air traffic has been a commonly reported and observed impact on caribou on the North Slope and in Northwest Alaska (SRB&A 2009b, 2018, Georgette and Loon 1988, Sullender 2017). Air traffic is observed to cause behavioral changes, skittish behavior, and delayed or diverted crossing behavior, which in turn has impacts on caribou hunting success for local hunters. These types of behaviors are most commonly observed in response to helicopter traffic, although fixed-wing aircraft have also been observed to elicit similar responses (Sullender 2017). In addition to changes in behavior, increased exposure to aircraft disturbance may also affected body condition through increased energy expenditures (e.g., more time fleeing versus feeding or resting) (Sullender 2017). Furthermore, increased energy expenditures may result in reduced foraging rates and, ultimately, decreased mating success/pregnancy rates.

Avoidance of development areas are most common in caribou during the calving season, but can occur at other times as well. On the North Slope, caribou have been found to reduce their use of habitat within 3.1 miles of development during the calving season, and 1.2 miles during the post-calving season. “Active infrastructure” (e.g., roads with traffic rather than just the roads themselves) may cause more avoidance behavior (see Section 3.3.4, Mammals, of the Supplemental EIS). Roads and road traffic are also believed to cause behavioral and migratory changes in caribou which can affect hunting success. Deflections or delays of caribou movement from roads and associated ground traffic and human activity have been documented in the Indigenous Knowledge of harvesters (SRB&A 2009b, 2014, 2018) and during behavioral studies on caribou, particularly for maternal caribou (displacement of between 1.24 and 2.5 miles [2 and 4 km] from roads) (ABR and SRB&A 2014). In recent years, reports of ground traffic–related impacts on the North Slope caribou hunting, particularly in the vicinity of Nuiqsut, have increased with the construction of gravel roads in the area (SRB&A 2016b, 2017, 2018). Impacts and road have also been observed by Noatak and Kivalina caribou hunters in regards to the Red Dog DMTS (SRB&A 2014). Residents have observed that some caribou will stop once they reach the DMTS, sometimes traveling alongside the road before crossing, and other times bypassing the road altogether. As the chairman of the Western Interior Federal Subsistence Regional Advisory Council stated at a February 2022 meeting,

> *My comment would be that caribou are pretty afraid of the roads. It’s graphic with GPS collars on caribou at the Red Dog Road. It’s graphic on the Dalton Highway when the Porcupine Herd was unfamiliar with this road and came straight perpendicular to it. They kept moving back for four years. Finally they started to cross the road. Those roads really impeded caribou migrations. (Western Interior Federal Subsistence Regional Advisory Council 2022)*

As indicated in the above quote, such behavior has also been documented through radio collar observation. A study conducted by (Wilson, Parrett, Joly, and Dau 2016), found that the DMTS influenced the movements of approximately 30 percent of radio-collared WAH caribou, and of those individuals, the average delay in crossing was 33 days. Caribou from the TH that approached the DMTS were not similarly affected, which could be due to greater exposure of the TH to industrial development in the eastern portion of its range. In general, observed caribou behavior in response to the DMTS is variable: in some cases caribou cross seemingly without delay, while in other cases herds scatter and migration is delayed for multiple days (Wilson et al. 2016, ABR and SRB&A 2014). Responses to roads also seem to vary from year to year based on the context in which roads are encountered including the motivation of the caribou to cross (e.g., during mosquito and oestrid fly harassment seasons) (see Section 3.3.4, Mammals, of the Supplemental EIS). Recent studies specific to the WAH show that current herd movements avoid existing roads.

In addition to impacts to resource abundance, the Alaska Native entities present at the scoping meetings also described potential impacts to resource availability in traditional use areas. A majority of the Indigenous Knowledge comments noted the potential for altered migration, particularly in regards to caribou as well as aquatic resources. The Western Interior Alaska Subsistence Regional Advisory Council noted that noise disturbances resulting from increased traffic will decrease availability of key terrestrial and aquatic resources within at least a 50 mile radius of the Project:

> *The Council emphasizes that the impacts of developing the Ambler Road Project will have adverse and far reaching effects within at least 50 miles of each side of the road. These impacts include noise disturbance to terrestrial and aquatic wildlife resulting from increased motorized off-road vehicle traffic and boat use extending up the coast and into the Kobuk River Drainage. The increased motorized off-road vehicle traffic and boat use resulting from development of the Amber Road will also have significant adverse impacts up and down the Koyukuk River, John River, and Alatna River drainages. (Western Interior Alaska Subsistence Regional Advisory Council 2018)*

The tendency for caribou to divert around areas of disturbance is evidenced by traditional hunting methods which are still observed today. According to the (WAH WG 2017), caribou hunting traditions ensure that caribou migratory paths are well established before hunting begins:

> *Hunters in Kiana were instructed to wait two days after the first caribou passed through for the migration to be established. By waiting to harvest caribou, the community protected the migration for years to come.*

Other traditions indicate that residents should camp and hunt on the south sides of rivers in the fall so that caribou cross these linear features before encountering hunters. This reduces the likelihood of further deflection away from the river and overall changes in migratory paths.

Both large and small changes and delays in caribou movement could have substantial impacts to hunters waiting for the caribou migration. In the case of the proposed Ambler Road, WAH caribou typically migrate through the Kobuk River Valley area twice a year (fall and spring migration) and some WAH caribou winter in the area as well. The fall migration is the most intensive caribou hunting season for most communities, although residents may also hunt small groups of overwintering caribou or during their spring migration (Braem et al. 2015) Table 6). In general, the westernmost subsistence study communities have more access to the WAH, while communities on the periphery of the herd's range (e.g., Alatna, Allakaket) may be more vulnerable to smaller changes in the herd's annual movements (Guettabi et al. 2016). In 2017, residents from Allakaket noted that a poor snow year in combination with few caribou migrating near their village had resulted in low caribou hunting success rates that year (WAH WG 2017). Despite their greater proximity to the WAH migratory range, communities along the western end of the proposed road corridors (e.g., Ambler, Kobuk, and Shungnak) have indicated that the WAH has altered its migratory path farther west toward Buckland, which has caused community residents to shift their hunting focus to the west and south of their communities (Watson 2018). Thus, further changes to this migration could cause other shifts in the availability of caribou to these communities. Larger changes to the migration of the WAH or reduced availability or large diversions in individual study years could affect resource availability to any of the 42 caribou study communities.

The Native Village of Kotzebue Indigenous Knowledge comments during scoping emphasized the point that changes in resource availability will affect subsistence communities that are not located within the path of, or directly adjacent to, the Project. They noted that this is particularly true when considering the migratory nature of certain key species, particularly caribou which are essential to the health and wellbeing of the community of Kotzebue:

> *While the area in question is only infrequently visited by our tribal members, sheefish, salmon and caribou – three of the most critical resources to the Tribe, are dependent on the continued health and wellbeing of this area…. Caribou which are the mainstay for Kotzebue cultural, nutritional and spiritual connection to the country use the entire Region at various times of the year. The migratory nature of these species should be taken into account so that communities not located directly adjacent to the proposed road (like Kotzebue), but who rely on the migratory resources using this area, are overtly acknowledged as directly impacted with a vested interest in this project and are included alongside the affected communities with closer proximity to the actual road for the purpose of impacts. (Native Village of Kotzebue 2018)*

The Native Village of Kotzebue also provided their Indigenous Knowledge on the ways in which a road corridor can affect caribou migration, noting that caribou are sensitive to noise and development and are able to see, hear, and feel development long before they reach a road or construction area. The Native Village used Red Dog Road (i.e., DMTS) as an example to illustrate the effects that development of roads has had on the WAH. They noted that while the Red Dog Road is shorter and therefore not directly comparable to the proposed Ambler Road, it can still be used as an example to demonstrate impacts to caribou including habitat fragmentation and disruption of migration paths.

> *The major consideration with the road and the route selection would be to minimize the impact to their ability to freely migrate from the northern Brooks Range in the fall to their southern wintering habitat and back again in the spring and a road running east to west in the middle of this migratory route is a serious cause for concern. This type of migration impact has already been documented in regards to the much shorter Red Dog road. The related issue of habitat fragmentation is also detrimental to caribou and development and this road and the expected related spur roads, along with the increasing ability to develop future roads connected to this road in the future, is of serious concern for the long-term health of the western Arctic caribou herd. It has also to be kept in mind that even with the proactive approach taken along the relatively short Red Dog road in regards to stopping traffic while caribou are near the road there are still demonstrable impacts. It is unknown if such a strategy will, or even could, be put in place on the Ambler road, given the differing ownership and political affiliations of the mine developers in the Ambler District, in addition to the totally different logistical challenges in regards to the hauling season and distances that would be covered by the*

> *trucks. It also needs to be kept in mind that while it is practical to stop trucking on the Red Dog road due to its short length and nearby facilities on both ends, which would be totally different on the Ambler road, it also is exclusively tundra/willow habitat and herds of caribou can be relatively easily spotted at a distance. This will not be the case on the Ambler road, where both the topography and the spruce dominated areas will make it impossible in many places along the road to even observe caribou until they are right next to the road, but of course the caribou will still be able to smell, feel and hear the road and its associated traffic well before they reach it. (Native Village of Kotzebue 2018)*

Effects on caribou movement are most likely to occur when linear structures are placed parallel to the herd's primary movement (Wilson et al. 2016). Perpendicular roads may also intercept caribou and cause delayed crossing (CPAI 2018; BLM 2018a). In the case of the proposed Ambler Road, Alternatives A and B are located perpendicular to the WAH's primary north-south movement and will thus likely cause deflections or delays in caribou movement at least during peak migratory periods. Alternative C would be less likely to intercept caribou because it is outside the main migratory range. While temporary disruptions to caribou movement in the WAH range have not been shown to alter overall migration patterns or reduce connectivity between seasonally-important ranges, the frequency and magnitude of caribou responses to roads would likely increase as the density of roads increases. In addition, even small changes in caribou distribution and movement from a biological perspective can have large impacts on hunter success.

Louden Tribal Council in Galena provided their Indigenous Knowledge comments and summarized many of the above described impacts regarding the potential impacts of the Project on the migratory behavior and overall health of the WAH, noting that the ambient stress created by roads may cause migration route changes, avoidance, decreased populations, and habitat fragmentation. The Tribal Council also commented on the potential impacts that the road and road corridor may present including increased hunting pressure, increased predation, and increased mortality by traffic collisions:

> *BLM needs to consider the full range of potentially serious impacts a project of this scale could have on the migratory behavior, habitat, and health of the Western Arctic Caribou Herd. The proposed road would cut east to west through a significant portion of the migratory range of the Western Arctic Caribou Herd, one of North Amerca's largest existing wild caribou herds. Risks to caribou from roads include impeding migration routes, habitat fragmentation, and possibly local extinctions. Increased noise levels from road and air traffic in the region may lead to caribou avoidance of the road and displacement from their historical range. Roads create ambient stress in caribou, which results in less energy available for feeding, mating, and calving. Further, caribou may suffer direct mortality by traffic collisions, increased pressure from recreational hunting, and increased predation risk by wolves due to clear cutting in the road corridor and more efficient travel routes into caribou range. (Louden Tribal Council 2018)*

Moose

The proposed road corridors cross moose hunting areas for 12 communities and are of high importance to eight of these communities. In some subsistence study communities located within the WAH's peripheral range (e.g., Alatna and Allakaket), moose has supplanted caribou as the primary large land mammal harvested, as caribou have become less available and moose have become more available in the region (Watson 2018).

Impacts to moose availability would generally be on a smaller geographic scale than for caribou, as moose have smaller ranges and residents do not rely on seasonal migratory movements when hunting them. Thus, impacts to moose hunting would occur primarily in the vicinity of the road where moose could exhibit avoidance or other behavioral changes. Because a majority of moose hunting in the region occurs along rivers during the fall months, impacts would be most likely to occur in areas where the road corridor crosses key moose hunting rivers such as the Koyukuk and Kobuk rivers and smaller drainages such as the Alatna, John, and Wild Rivers. Residents may experience decreased success in these areas due to moose remaining farther from the riversides or in deeper brush. However, impacts to moose availability would be localized.

While moose may initially exhibit avoidance of the road corridor, they also tend to habituate relatively quickly to human activity (see Section 3.3.4, Mammals, of the Supplemental EIS). Moose may also be attracted to the ROW as a movement corridor or because of the availability of new vegetation in maintained areas of the ROW (see Section 3.3.4, Mammals, of the Supplemental EIS). This could increase their availability to hunters in those areas but could also result in higher rates of injury or mortality due to traffic collisions.

Fish

As noted above, the proposed road routes cross through community non-salmon fishing areas for 10 communities: Hughes, Kobuk, Shungnak, Allakaket, Ambler, Bettles, Evansville, Alatna, and Kiana. For eight of these 10 communities, non-salmon fish are a resource a high importance (see Table 46), while for the remaining two communities, non-salmon fish are of moderate importance based on selected measures. Key fish species for these study communities include chum salmon, sheefish, and humpback and broad whitefish and, to a lesser extent, cisco, northern pike, Arctic grayling, burbot, and trout. The AAP crosses streams and rivers which support spawning habitat for both sheefish and chum salmon. In particular, the Kobuk and Alatna rivers are key spawning grounds for sheefish and are also important fishing areas for the subsistence study communities. Both of these drainages are crossed by proposed project corridors. In addition to the communities who have documented use of the rivers crossed by the project corridors, communities upstream and downstream from the project corridors could experience impacts on fish availability if larger impacts to fish movement or health occur.

Construction activities which may affect fish availability to subsistence communities include installation of bridges and culverts, related pile installation, stream diversions, and stream excavation, water withdrawal, blasting at material sites, and contamination. Fish could be temporarily diverted, displaced, or obstructed due to culvert placement, excavation, or stream diversion. Ice roads and pads may also temporarily block fish passage if the compacted ice takes longer to melt. While impacts to fish resulting from construction activities are expected to be localized, subsistence users often harvest fish in specific locations along rivers; thus, localized changes in fish distribution could have impacts on resource availability for individual harvesters. Construction activities in waterways could also increase stream turbidity that could affect downstream harvesting areas or make these areas less desirable for fishing in the short-term. Construction of ice roads and pads would require water withdrawals from lakes and rivers near construction activity. Water withdrawal would be limited to 15 percent in waterbodies with sensitive fish species such as salmon and whitefish. Water withdrawal may kill individual fish but would likely not have population-level effects, as ADF&G's fish habitat permits include requirements for water intakes to avoid fish injury (see Section 3.3.2, Fish and Aquatics, of the Supplemental EIS). Water withdrawals for ice roads would alter water quality and water flows, and could potentially affect fish habitat, although these impacts are expected to be temporary and short term. Runoff from melting ice roads and pads could also have temporary effects on water quality.

Changes in the availability of fish species could affect subsistence users throughout the project area and downstream from the project area, particularly if the project results in changes in fish distribution or the timing of fish migrations. Subsistence users often harvest specific resources at specific times and places, and if these patterns are disrupted they may experience declines in harvest success or have difficulty accessing traditional use areas when resources become available in those areas (e.g., if the fish arrive late and subsistence users cannot use boats to access them).

Concerns about potential contamination of sheefish and chum salmon spawning grounds have already been voiced in the study communities (Watson 2014). The Kobuk River supports the largest population of spawning sheefish in Alaska, and the Alatna River is the only spawning habitat for sheefish in the upper Koyukuk River drainage. In addition, sheefish spawning grounds are particularly sensitive to changes in water velocity, temperature, pH, and other factors. Salmon spawning habitat is also vulnerable in changes to water chemistry. Changes to natural water chemistry resulting from exposure of geologic materials could affect egg survival and fish populations, having far-reaching effects on downstream subsistence users of whitefish and salmon. As discussed in Section 5.7, Downstream Subsistence Uses of Fish, Chinook and salmon returns have declined in recent years, increasing the reliance of some communities on harvests of non-salmon fish (e.g., sheefish). Thus, the study communities would be particularly vulnerable to additional changes in salmon and non-salmon fish abundance. Impacts related to changes in Chinook salmon abundance would be most likely among Yukon River study communities, while impacts related to changes in sheefish abundance would be most likely among Kobuk River communities. Chum salmon impacts would affect communities in all three river basins (Kobuk-Seward, Koyukuk, and Yukon) (see Table 49).

The introduction of invasive species (both fish and/or aquatic plants) could also impact fish habitat and/or productivity and impact fish availability to subsistence users. Unlike other construction impacts that are expected to be more short-term, the introduction of invasive species could become a long-term impact if their spread is uncontrolled, reducing fish availability for subsistence users along the AAP. If fuel or other contaminant spills occur near fish bearing streams, subsistence harvesters along may avoid harvesting fish if they are perceived (or confirmed) to be contaminated or unhealthy. In the case of larger spills, contamination concerns and avoidance may extend to communities located downstream from the AAP (e.g., Huslia, Noorvik, and Kiana). A study in six communities on the North Slope found that between 22 and 54 percent of household heads had avoided eating certain subsistence foods in the previous year because of concerns about contamination (SRB&A 2017).

Vegetation

The proposed road corridors cross vegetation harvesting areas for 10 communities (see Table 46) and are of high importance to all of these communities. Construction activities which may affect the availability of vegetation, including berries, wild plants, and wood, include clearing of the ROW, fugitive dust resulting from the road and ore concentrate trucks, and contamination from fuel spills.

AAP construction will result in the removal of vegetation harvesting areas for local residents and the introduction of invasive plants along roadways which may reduce the availability of native plant and berry species. In addition, a larger area surrounding the road will likely be removed from use for some individuals due to concerns about contamination. Impacts to vegetation harvest areas resulting from roads has been documented in relation to the Red Dog DMTS (SRB&A 2009b). Residents form Kivalina have reported observing dust on vegetation and changes in the taste or appearance of berries. In addition, some individuals have reported that they no longer use traditional vegetation harvesting areas along the DMTS due to concerns about contamination. Communities along the proposed road corridors may also experience reduced availability of vegetation in traditional harvesting areas during and after construction of the road. Because core harvesting areas for vegetation often occur in close proximity to communities, those communities in closest proximity to the road corridor would be most likely to experience impacts on their vegetation harvesting areas. Dust deposition could eliminate vegetation within 16 feet of roads and may cause avoidance of vegetation harvesting at greater distances (see Section 3.3.1, Vegetation and Wetlands, of the Supplemental EIS).

Operation

Disturbance, displacement, or contamination of subsistence resources during operations could result in these resources being unavailable at the time and place that local harvesters are accustomed to finding them. In general, impacts would be similar to the construction impacts (discussed above) pertaining to traffic, dust deposition, human activity, contamination, and infrastructure. However, the impacts would occur over a longer time frame and would occur with either greater or lesser frequency or intensity depending on the impact source. Under Phase 3, the final road would be larger and access roads and maintenance stations would be in place.

During operation, the availability of subsistence resources could be affected through human activity, air and ground traffic, and maintenance activities, resulting in skittish behavior, changes in local distribution of resources, and/or diversion from usual migration routes. In addition, road and other infrastructure may physically divert certain animals. Spills or other contamination could also affect the local distribution of resources such as fish and vegetation or may result in resources being considered unavailable to local harvesters due to concerns of contamination.

Sources of noise from maintenance and operation of the road would include vehicle traffic, small fixed-wing aircraft, helicopters, maintenance equipment and activities (grading, sanding, plowing, gravel placement), and human activity. Noise above ambient levels may displace or divert resources from traditional areas (see discussion above, under Construction) (Section 3.2.6). The frequency of truck traffic would increase over the three phases of the AAP, and would be substantially higher once mine production began, with up to 200 trips per day at peak mine production. Increased traffic along the Dalton Highway may also displace caribou from the HHH thus affecting resource availability to users of that herd, although documented harvests from the HHH by local residents are relatively limited. While the road under Phase 2 would be a single-lane road and traffic would occur in one-way convoys, the road would be upgraded to a two-lane road under Phase 3 and traffic would not occur in convoys. Air traffic would decline slightly during operations, with an estimated two to six aircraft trips weekly (one to two to each maintenance station) and an additional helicopter trip per week. While overall ground traffic would be higher during mine production, human activity would be lower once construction is complete.

The cleared area within the ROW and road may create a travel corridor for large land mammals which could lead to a two-fold effect on resource availability. First, if the cleared area draws large land mammals to the corridor there could be a corresponding decline in large land mammals in areas they were previously found. Furthermore, a cleared area within the ROW with a high concentration of large land mammals could be a draw for local hunters traveling overland in the winter by snowmachine or by off-road vehicle during other times of the year. This could cause a reduction in the availability of certain resources in other traditional harvest areas. In addition, in the long-term, if the road facilitates access into the area after reclamation, the availability of moose in the area may decrease due to increased hunting.

During operations, the final two-lane road combined with an increase in traffic would likely increase the potential for deflection or delay of caribou movements, particularly during the fall migration south (see above under Construction). Over time, local caribou distribution may be altered to the extent that residents no longer find caribou within their usual hunting areas or experience reduced hunting success in those areas. Some industrial road projects in the state of Alaska provide for access to roads for local residents. In other communities where roads have been built, access to private roads has in some way offset some of the impacts to resource availability; however, lack of access to local hunters for the AAP would introduce subsistence impacts with no offsetting subsistence benefit.

Stream and riverbeds may experience increased sedimentation or alteration over time due to the presence of culverts and bridge piers. The impacts of erosion and beaver dams on salmon spawning grounds was a topic discussed during a recent meeting of the Northwest Arctic Subsistence Regional Advisory Council (2022), highlighting the importance of access to spawning grounds:

> *I think some of them creeks are dammed up, pretty much dammed with the beaver and that's one thing that's causing the fish not to come out, and no air and stuff like that happening statewide,'it's not just happening here. But salmon spawning, man, I tell you the erosion t'at's happening and'it's turning the river shallower, seems like, and I ha'en't gone up river for quite awhile it seems like the ri'er's changed abo– -- above Kobuk'it's really changing... But salmon spawning, oh, man, t'ey're going to be lower and lower down this way for salmon spawning because getting pret– -- a lot of dead salmon on the sides after spawning.*

If culverts and bridges are not properly maintained or if erosion control measures are not taken, fish migrations could be temporarily disrupted or blocked, which could reduce fish availability for subsistence users. Erosion from improperly maintained culverts could also increase sedimentation in fish spawning habitat. Ice roads and pads may also temporarily block fish passage if the compacted ice takes longer to melt. The risk of contamination from dust deposition and fuel would continue through the life of the project and depending on the magnitude of spills could have far-reaching impacts on upstream and downstream subsistence users. Changes in the availability of fish species could affect subsistence users throughout the project area and downstream from the project area, particularly if the project results in changes in fish distribution or the timing of fish migrations. Subsistence users often harvest specific resources at specific times and places, and if these patterns are disrupted they may experience declines in harvest success or have difficulty accessing traditional use areas when resources become available in those areas (e.g., if the fish arrive late and subsistence users cannot use boats to access them). At a meeting of the Northwest Arctic Subsistence Regional Advisory Council in November 2022, one board member noted the impact of changes in the timing of fish migrations on harvesting success in recent years:

> *We are in a time right now that this weather, the climate change and when we're out in the springtime waiting for the whitefish to come out of the lakes and we're trying to put away and dry whitefish and it's cold. We don't have -- maybe some days we'd have two to three warm days that would help dry our fish and stuff but with this climate change and stuff now we're missing the spawning whitefish and stuff going up the river. They're going up early and the water is so high all summer, all fall so most of us really didn't get a chance to get our whitefish and stuff... that's what we really live on is the nice big (in*

> *Iñupiaq) they are called, the whitefish. And now everybody's having a hard time and it's continuing every year. We don't know when the fish are going to move. Springtime we usually have a -- we know when they're supposed to be coming out. I missed pike, most of us did because we didn't even know when they came out of the lakes or anything. I didn't really get any pike to dry this spring. (Northwest Arctic Subsistence Regional Advisory Council 2022)*

Gravel mining and associated blasting will continue throughout operations for roadway maintenance, and thus some individual loss or displacement of fish will continue during operations. =The introduction of invasive plants along road corridors could impact resource habitat and/or productivity and impact the availability of certain resources, including wild edible plants and berries, to subsistence users (see Section 3.3.1, Vegetation and Wetlands, of the Supplemental EIS). Invasive aquatic plants could also alter aquatic and wetland habitat and reduce the availability of fish and other resources in certain areas. Unlike other construction impacts that are expected to be more short term, the introduction of invasive species could become a long-term impact if their spread is uncontrolled, potentially reducing plant and berry availability for subsistence users along the road corridors. However, Appendix N includes mitigation measures to help control and minimize the spread of NNIS.

Most of the restrictions to availability would cease once the road was fully reclaimed and closed. The noise and activity of the reclamation process itself, including the removal of bridges and culverts that would increase water turbidity, may displace animals and fish that are subsistence resources and make them unavailable. After closure was complete, and as stream channels settled into equilibrium and the corridor gradually revegetated, the corridor likely would become habitat for plants and animals. It is not clear that this would necessarily reestablish previous (year 2020) resource availability patterns, but a source of disturbance would be gone.

User Access

Construction

Sixteen of the 27 subsistence study communities have subsistence use areas crossing one or more of the proposed road corridor alternatives (see Table 46). These communities would be the most likely to experience direct impacts to user access resulting from the proposed road. Of these communities, five have use areas which are bisected by one or more of the road alternatives, meaning that access to a large portion of their hunting, fishing, and gathering areas would require crossing the road corridor (depending on the chosen alternative). These communities are Bettles, Evansville, Hughes, Kobuk, and Shungnak. Alatna, Allakaket, and Ambler are also bisected but to a lesser degree (i.e., the road crosses more on the periphery rather than through the center of their use areas) than the above five communities. In some cases, the use areas that are partially bisected are areas of high use by the communities and therefore impacts could occur somewhat frequently (see Section 5.3.1, discussion of Alatna/Allakaket subsistence use areas). As shown in Table 46 above, the subsistence activities which most commonly occur in the vicinity of the proposed corridors include hunting and trapping of small land mammals and furbearers, hunting of moose and caribou, vegetation harvesting, non-salmon fish harvesting, and migratory bird hunting. Other resource harvesting activities that could be affected include hunting of other large land mammals (Dall sheep and bear), hunting of upland game birds, salmon fishing, and to a lesser extent, egg harvesting.

Impacts to harvester access would occur within the vicinity of the road corridor, where harvesters could be faced with physical obstructions to access or by causing harvesters to avoid construction work areas. Construction infrastructure such as the pioneer road, ice roads, construction laydown materials, and heavy equipment could present physical barriers to subsistence users. In addition, individuals traveling overland may have to divert around material sites and other areas which are unsafe for travel. Although the road will include crossing ramps for local residents to use when traveling overland, hunters may not be permitted to cross construction-phase roads until crossing areas are established, thus obstructing travel altogether for a period of time. Potential impacts of the physical road to user access are discussed in further detail under Operation.

Physical obstructions to access would be most common for residents traveling overland by snowmachine or off-road vehicle. Harvesters traveling overland to access use areas for caribou, furbearers, and geese may be diverted around construction areas if there are physical obstructions. Overland trails, routes, or traplines would be bisected by the project. In these cases, residents may abandon or alter traplines to avoid regular crossing of the project corridor, including construction-phase roads and ice roads. In addition, there may be periods of time during construction where access along certain river drainages, which can serve as both winter and summer travel corridors, is obstructed due to bridge construction activities (e.g., installation of bridge pilings).

The degree of impacts from construction would depend on whether the timing of construction activities conflicts with subsistence use areas and activities for a community. Because construction would occur year-round, it is likely that there would be direct conflicts with construction activities for certain subsistence use areas. According to data collected for several communities whose use areas are bisected by the AAP (Hughes, Bettles, and Evansville), in addition to several additional communities whose use areas overlap with portions of the AAP (Alatna, Allakaket, and Wiseman/Coldfoot), residents of the region primarily use boats and snowmachines to access hunting and gathering areas, although road-connected communities (Wiseman/Coldfoot) also commonly use road vehicles to access harvesting areas (see travel method discussions above). Subsistence activities occur year-round, peaking in the fall (August and September) and again in the mid-winter and early spring (February through April) for most study communities with available data. The project corridors cross areas used for both riverine and overland travel, and construction activities would occur year-round; thus, residents may experience impacts to construction during all subsistence seasons and activities which are overlapped by the AAP.

In addition to physical barriers to subsistence users during construction, residents may also experience reduced access due to security restrictions around construction work areas or general avoidance of development areas. Even if regulatory and physical barriers do not exist in certain areas of the project area, subsistence users may choose not to access nearby subsistence use areas any longer because construction-related sites, smells, lights, noises, and activities can disturb resources, reduce the potential for a successful harvest, and negatively affect the harvester’s experience (Section 3.2.6). In addition, residents may avoid hunting in the vicinity of the road due to concerns about shooting near infrastructure and human activity, or because of a lack of knowledge regarding security protocols. Any incidences of spills or other forms of uncontrolled hazardous waste discharge that occur during construction could lead to harvester concerns of contamination (real or perceived) and result in users avoiding subsistence use areas near the contaminated areas, thereby reducing user access. Finally, subsistence users may avoid hunting near construction work areas due to a general discomfort with conducting traditional subsistence activities near non-local workers and industrial activity.

Avoidance of industrial areas by subsistence users has been documented on the North Slope of Alaska, particularly for the community of Nuiqsut. In a recent study monitoring the impacts of oil and gas development on Nuiqsut caribou hunters, between 51 percent and 61 percent of caribou harvesters reported avoidance of any subsistence use area during 4 years of the Nuiqsut Caribou Subsistence Monitoring Project, and between 33 percent and 46 percent did so for development reasons (CPAI 2018, SRB&A 2018). Residents have noted that avoidance of industrial areas varies from year to year depending on activity levels within a given area and other factors. Thus, it is likely that a proportion of hunters from the subsistence study communities will avoid certain areas of the proposed road corridor at some point during the life of the AAP. Avoidance may be higher during construction due to the higher activity and noise levels.

Operation

As noted above, 16 of the 27 subsistence study communities have subsistence use areas crossing one or more of the proposed road corridor alternatives, and the road and other project related infrastructure will represent a direct loss of traditional subsistence hunting and harvesting areas for these communities. During AAP operation, residents would continue to experience physical barriers to access resulting from infrastructure such as roads, although the presence of crossing ramps would help reduce those impacts. Harvesters traveling overland to access use areas for caribou, furbearers, and geese may be diverted around operational infrastructure if there are physical obstructions. Physical obstructions to harvesters traveling by boat along river channels would be unlikely during operation. In addition to physical obstructions, residents from the subsistence study communities will also experience reduced access resulting from road use policies, user avoidance, and contamination concerns throughout the life of the project.

Scoping comments shared concerns regarding user access to traditional subsistence use areas. They noted that user access may be decreased due to a tendency for subsistence hunters to avoid areas of development:

> *Subsistence harvesters often avoid areas of development. As a result, avoidance areas will extend far beyond the immediate footprint of the road, causing the loss of subsistence use areas across a broad area. (Louden Tribal Council 2018)*

> *A proposed Ambler Mining Road that severs Evansville Incorporated's land base would create a physical encumbrance that would adversely impact management and enjoyment of the land. (Evansville Inc. 2017)*

As noted above, the AAP will not permit access to local residents for subsistence purposes but will allow for residents to cross the road at established crossing areas. AIDEA has indicated they will establish a committee which will help identify appropriate locations for crossings. The efficacy of crossing ramps to reduce access impacts for local hunters will depend on the location, design, and frequency of the ramps. Because subsistence users do not always use or follow established trails when pursuing resources overland, instead traveling in various directions based on environmental factors (e.g., weather, snow and ice conditions) and Indigenous Knowledge of resource distribution and behavior, the presence of crossing ramps will not eliminate impacts to user access. Subsistence users may have to travel additional distances when pursuing resources in order to locate approved crossing areas, or they may take safety risks by crossing in areas not approved for crossing. In addition, despite the presence of crossing ramps, some individuals may still have difficulty using crossing ramps, especially when hauling sleds. Subsistence users in the community of Nuiqsut have reported difficulty under certain conditions when using crossing ramps on industrial roads near their community (SRB&A 2018).

While road access for local subsistence users will not be permitted, it is possible that residents from nearby study communities will use the cleared area within the ROW alongside the road as a travel corridor for overland (snowmachine or off-road vehicle) travel, particularly if resources such as moose concentrate in these corridors. Use of the ROW may facilitate access to hunting areas farther from the community as well as between communities. AIDEA indicates that ROW travel will be prohibited, and security will patrol the roads to prevent violations. Enforcement measures will reduce but not eliminate use of the ROW. Restrictions on use of the ROW, particularly by local residents when certain areas of the road will be crossable, may be difficult to enforce. Increased non-local access would be less likely but may affect subsistence uses for residents of the subsistence study communities by increasing human activity and competition in the area.

Competition from non-local hunters, facilitated by guiding and air charter services, is an existing source of impacts to subsistence users within the region. Sport hunting of the WAH has increased substantially since 2000, and conflicts between locals and sport hunters related to aircraft disturbances are commonly reported (see Section 3.3.4, Mammals, of the Supplemental EIS). Residents have reported actions from non-local hunters which are inconsistent with traditional Athabascan and Iñupiaq values, such as hunting for sport, wasting meat, hunting in key migration corridors, or targeting the "lead caribou" in a herd, thus deflecting them from their usual routes (Braem et al. 2015). A potential for increased access by outside hunters is a primary concern which has been voiced by a number of subsistence study communities (Watson 2014). Local harvesters are often at a disadvantage when in direct competition with non-local harvesters, as they do not have the financial means to cover large areas using planes and other modes of travel in search of subsistence resources, and their cultural values preclude them from harvesting resources in way that benefits only themselves (e.g., intercepting a migrating herd). The magnitude of impacts related to competition will depend on the ability to control access along roads and ROWs. The likelihood of non-local hunters accessing the ROW would depend on policies regarding ROW use in addition to measures taken to prevent or limit access to the ROW (e.g., boulders, berms, or fencing near entry points). Preventative measures would help lessen the impact of increased use along the ROW but would likely not eliminate the impact, as some individuals would likely use the ROW regardless of use policies. The use of cleared ROWs regardless of use policies has been documented by rural residents throughout the state of Alaska associated with TAPS and other local development and transportation projects (SRB&A 2016). While less likely, it is also possible that individual hunters, including local and non-local hunters, may trespass and use the road itself to access hunting areas during periods of low activity on the road. Security gates at the road entrance will reduce the likelihood of trespassing with road vehicles; however, trespassing with off-road vehicles may still occur. Several Alaska Native entities expressed similar concern regarding the potential for increased access to traditional subsistence use areas by non-local hunters. They indicated that increased competition and hunting pressure will decrease resource abundance and availability and negatively impact subsistence harvesting success by local residents. While the proposed Road will be commercial access only, scoping meeting participants highlighted the lack of specific information on how public access will be restricted and indicated that restricting all public access will be impossible.

> *The potential for unauthorized use of the road and right-of-way, as well as possible future authorized public use of the road, presents additional concerns. For instance, unauthorized individuals could use the road to access areas that would not otherwise be accessible, and compete for subsistence resources traditionally used and relied on by residents of the local community. (Doyon Ltd. 2018)*

> *BLM should assume the public will be able to access the road, because there is no information on how public access will be restricted. Unrestricted access and illegal road use may lead to increased hunting pressure. Further, poaching by construction and mining workers should be considered. Even if road use is limited to industrial access and poaching is limited, the estimated*

400 trucks per day on a long industrial road has the potential to greatly impact subsistence hunting and harvesting success. (Louden Tribal Council 2018)

During operations, harvester avoidance of the project area may be reduced from construction levels due to decreased noise and human activity disturbances, although avoidance responses would likely continue throughout the life of the project for certain individuals. In general, the total area of infrastructure would be greater under operations and would include a two-lane road, bridges, road maintenance stations, vehicle turnouts, material sites, water source access roads, road maintenance access roads, air strips, and communications towers. Thus, the area of infrastructure-related avoidance by local residents would be larger during operations. For some individuals, avoidance may extend to a larger area than the footprint if they perceive that resources are less available due to noise, traffic, and human activity associated with road operation. As with construction, any spills or other forms of uncontrolled hazardous waste discharge that occur during operations could lead to harvester concerns of contamination (real or perceived). These concerns could result in users avoiding subsistence use areas near contaminated areas, thereby reducing user access and also impacting resource availability.

Because the road corridor bisects subsistence use areas for a number for communities (Bettles, Evansville, Hughes, Kobuk, and Shungnak), residents from these communities may not have the option to avoid the road altogether to continue accessing traditional subsistence use areas. Thus, total avoidance of the AAP area may be more likely for residents from communities whose use areas are on the periphery of the AAP area.

Socio-Cultural Impacts

Impacts to resource abundance, resource availability, and user access would likely affect the costs and time associated with conducting subsistence activities and could have larger socio-cultural impacts on residents in the AAP area. Decreased abundance or availability of resources may result in residents spending more time and effort in the pursuit of those resources, with greater risks to hunter safety. Some residents may reduce the time spent harvesting subsistence resources if the resources are unavailable in traditional harvesting areas and residents do not have the money to expend on traveling farther. These impacts could be further compounded by increased unauthorized access by non-local harvesters with greater means to access resources and harvesting practices which are in direct conflict with traditional Athabascan and Iñupiaq values. Impacts related to resource availability, such as decreased community subsistence harvests, would likely have greater impacts to vulnerable low income, unconnected, and low-harvest households (Kofinas et al. 2016). Decreased harvests among the study communities could also have more wide-ranging effects due to the potential impacts on sharing networks within the region in addition to networks which extend to other regions (Kofinas et al. 2016). Sharing is a key value across the study region which is central to subsistence and which strengthens social and kinship ties across communities and regions. Such impacts have already been felt across the region in recent decades due to declining salmon returns (Brown and Godduhn 2015), and these impacts could be compounded by the project if there are further reductions in the availability of salmon, sheefish, caribou, and other resources.

In addition to sharing networks, communities throughout the region are connected through cultural and kinship ties, and therefore impacts to an individual community would likely be felt by residents throughout the region who have cultural and kinship ties to that community or lands near that community. While the Athabascan and Iñupiaq residents of the region today are primarily based in permanent, year-round communities, their ancestors engaged in a semi-nomadic lifestyle which involved moving to seasonal camps and villages throughout the year based on the availability of resources. Many of these seasonal camps remain in use today (Watson 2018). Thus, most residents of the region have ties to a much larger territory than that of the contemporary villages in which they reside. Furthermore, while some residents may remain in a community for their entire leaves, movement between communities throughout one's lifetime is common across the region. Many of today's Elders were born in seasonal camps and moved from village to village before settling in one community (Project Jukebox 2024). Residents also frequently travel to other communities to visit with family and friends and to engage in subsistence activities which may be less available to them in their home community (e.g., Bettles residents traveling to Kobuk to harvest sheefish; Hughes, Huslia, and Bettles/Evansville residents traveling up Alatna River with Alatna/Allakaket residents to hunt Dall sheep) (Watson 2018). Thus, while the Supplemental EIS analyzes impacts at the community level, it is important to acknowledge that impacts to a community's subsistence uses may reverberate throughout the region due to these strong cultural and kinship ties.

Changes in traditional land use areas over time could also have effects on cultural identity, as a community's identity is inextricably tied to the lands of their ancestors. The proposed road corridor bisects an area that is a traditional boundary between the Iñupiat and Athabascans, including an area of shared use; impacts to resource availability and changes in subsistence use patterns could disrupt these traditional boundaries and associated cultural identity of the residents of the area (Watson 2018). In the case of the Iñupiat of the Koyukuk River valley, their identity continues to be strongly associated with traditional use areas north of the Kobuk River and into the Brooks Range, despite recent shifts in contemporary subsistence patterns resulting from changes in resource availability, land management, and access. Further changes to the availability of caribou and other resources and a shifting away from the traditional use areas of their ancestors could erode resident's sense of identity. Finally, if the road reduces the availability of key subsistence resources such as caribou, moose, or sheefish, communities may experience negative social effects (e.g., increased drug and alcohol use, increased depression) resulting from poor harvests of those resources in a given year, and perceived degradation of culturally or spiritually important places and resources. In addition, if subsistence harvests decline, then residents will have to offset this decline by purchasing expensive store-bought foods, thus increasing food insecurity in households that use subsistence hunting and fishing to supplement their low income.

Participation in subsistence contributes to the physical and psychological well-being of Indigenous people by promoting exercise and consumption of nutritious foods and by strengthening social and familial ties (Burnette et al. 2018). Disruptions to residents' ability to hunt, harvest, distribute, and consume subsistence resources can cause psychological stress and increased rates of depression, anxiety, and substance use disorders (Palinkas et al. 1993). These types of impacts have been documented both in response to large-scale disasters (e.g., Exxon Valdez oil spill; Palinkas et al. 1993) and to impacts brought about by climate change which can cause reduced resource availability and dangerous travel and hunting conditions (Mason and Craver 2023). The psychological and spiritual benefits of being on the land was described by a Kotzebue Talking Circle attendee as follows:

> God's honest truth when I saw what Reed River looked like all my problems went away for the moment. I felt at home, and I felt at peace and felt like I was doing something. The most healing. I have traveled a lot. Reed River has got to be the most beautiful spot in the world. No people, no nothing, mountains around and pretty beautiful colors. That is what makes me want to lean toward opposing of the road. Because it deals with all of our people from inside out. Right. When you go berry picking, you think about all the things you can do better. Letting go of all the worldly things affecting me. It is a place where I go, and it is just sorting out my thoughts. Sort out my life. Invisible therapist. What our nature provides. Whether out on Loop Road or Reed River or Jade Mountains. The land has that power to keep us whole as a person. I think. Once that land is disturbed, then we get disturbed. (Ambler Road SEIS Kotzebue Talking Circle)

The study communities participate in a mixed cash economy whereby residents use income from jobs and other economic pursuits to purchase subsistence equipment (e.g., boats, snowmachines, guns, ammunition, fuel, clothing, freezers). These cash investments allow residents to harvest large amounts of subsistence foods which help offset the high cost of living in rural communities. Economic opportunity associated with increased revenue/dividends, job opportunities, and income, can have positive effects on rural communities and on subsistence use patterns by encouraging residents to remain in their home communities and invest their income into to subsistence technologies and pursuits. Increased income and job opportunities can also have negative impacts on subsistence use patterns by changing the socioeconomic status of certain community members, reducing the time available to engage in subsistence activities, facilitating a shift toward store-bought goods, and altering social roles within a community. Local jobs directly associated with road construction and operation will be limited in number, temporary, and requiring skills and qualifications which most local residents do not have (see EIS Section 3.4.5, Socioeconomics and Communities).

Job opportunities would be greatly reduced after construction, with the road employing between nine and 15 local residents, depending on the alternative. The relatively lucrative mining jobs are more likely to go to NANA shareholders and to residents of the closest communities (Kobuk, Ambler, Shungnak), because two of the largest mines are on NANA land or subject to NANA agreements. Such jobs, which allow both for relatively high income and for chunks of time off that may be used for subsistence activities, are less likely to go to Doyon shareholders whose subsistence areas would be equally affected. Those communities in the Doyon region with fewer job benefits coupled with distance from the new road would be further affected because they would not benefit from reduced costs of supplies and fuel; only communities close to the road, such as Bettles/Evansville (Alternatives A and B) and Hughes (Alternative C) have potential to see benefits from reduced costs of fuel, goods, and groceries, including fuel, fishing and hunting tools, snowmobiles and boats that help in the subsistence harvest. Other subsistence communities in the Doyon region would experience the impacts of the road crossing their subsistence use areas but would be too far from the road to benefit from the reduced costs of subsistence activities.

All alternatives would cross ANCSA Native corporation land (see EIS Appendix F, Table 5), some of it Doyon Limited land and some NANA land (regional corporations) and some of it land associated with smaller Native corporations. It is likely the corporations would sell gravel from their lands for road construction and maintenance, and may collectively receive tens of millions of dollars (Cardno 2015). Shareholders likely would receive dividends from the regional corporations bolstered by those payments. NANA shareholders would be expected to benefit substantially more because of payments from the mines in addition to payments for gravel. These funds may help individuals adapt to subsistence impacts by providing funds toward subsistence equipment and supplies, but the funds would not go solely to shareholders in communities experiencing project impacts to subsistence; the funds would go all shareholders.

Those communities close to the road that end up connecting by spur road or trail, or just by snowmobile or boat, could experience a change in the balance between the subsistence economy and cash economy. For instance, a study on the economic benefits and subsistence impacts of public-use roads found that communities' locations along public roads were associated with an approximately one-third decrease in subsistence harvests, with little to no benefit in terms of increased personal incomes (Magdanz et al. 2016). The impacts of a private use road have not been well investigated.

Over time, decreased abundance and availability of resources, in combination with decreased access to or avoidance of traditional harvesting areas, may reduce overall participation rates in subsistence or harvest amounts. When subsistence users' opportunities to engage in subsistence activities are limited, then their opportunities to transmit knowledge about those activities, which are learned through participation, are also limited. If residents stop using portions of the project area for subsistence purposes, either due to avoidance of development activities or reduced availability of subsistence resources, the opportunity to transmit Indigenous Knowledge to younger generations about those traditional use areas would be diminished. While communities would likely maintain a cultural connection to these areas and acknowledge these areas as part of their traditional land use area, the loss of direct use of the land could lead to reduced knowledge among the younger generation of place names, stories, and traditional ecological knowledge associated with those areas. There would also be fewer opportunities for residents to participate in the distribution and consumption of subsistence resources, ultimately affecting the social cohesion of the community. Reduced opportunities to participate in subsistence activities and harvest subsistence resources could also reduce opportunities for hunters and harvesters to fill traditional social roles within communities, which are integral to maintaining cultural identity and important to mental and physical well-being. Any changes to residents' ability to participate in subsistence activities, to harvest subsistence resources in traditional places at the appropriate times, and to consume subsistence foods could have long-term or permanent effects on the spiritual, cultural, and physical well-being of the study communities by diminishing social ties that are strengthened through harvesting, processing, and distributing subsistence resources, and by weakening overall community well-being. To Alaska Natives in particular, their traditional lands, the wildlife that inhabits those lands, and the subsistence activities that have sustained Indigenous people on those lands for millennia, have a value that is priceless and irreplaceable.

6.4.2 Alternative A: AIDEA Proposed Route (GAAR North) to the Dalton Highway

Alternative A crosses use areas for 12 subsistence study communities, including Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Coldfoot, Evansville, Hughes, Kobuk, Selawik, Shungnak, and Wiseman. Thus, these communities would likely experience direct impacts of the AAP on their subsistence uses in terms of direct loss of subsistence use areas, impacts on user access, and direct impacts to resource availability (e.g., localized disruptions to resource behavior or distribution resulting from project activities and infrastructure). Impacts to resource abundance or larger impacts to resource availability resulting from changes to migration routes or habitat use could extend to other subsistence study communities or, the 42 WAH WG study communities, and the 32 fish study communities.

Communities with the highest number of resource uses crossed (five or more resources) include Bettles, Evansville, Shungnak, Ambler, Coldfoot, Kobuk, and Wiseman. Alternative A bisects community uses for Bettles, Evansville, Kobuk, and Shungnak, (i.e., community residents would need to cross or detour around the road in order to access a large portion of their subsistence use area), and therefore in terms of access these communities would be most heavily impacted by Alternative A. Bettles, Evansville, and Kobuk would be located closest to the road corridor and would therefore be more likely to experience benefits of the road related to lowered costs of subsistence supplies/equipment and other goods in the event that these communities can develop a way to create an access route from their community to the nearby corridor (Kobuk is the only community that will have direct access). Potential negative impacts of increased access to communities are often associated with the increased potential or ease of bringing drugs, alcohol, and other prohibited substances into communities and the negative sociocultural impacts that could ensue. The attending Alaska Native entities during scoping expressed concerns that increased access to subsistence use areas and increased access to and from communities may negatively impact the cultural wellbeing of many in the area. The Native Village of Allakaket discussed the potential effects of outside access to their community, noting that while road access to the community will likely not be of much benefit to residents, it may create opportunities for bootleggers and drug dealers to access the community:

> *The road is too far north from our village to make it practical to bring in groceries and goods to reduce the cost of living, but it is not so far as to prevent those who want to make a great deal of money from drugs and*

> *alcohol from driving down the road and then by snowmachine or four-wheeler to Allakaket. Regardless of whether mining or trucking companies prohibit substance abuse, there will be individuals willing to bring it into Allakaket. We have seen no plans on the part of the state or federal government to provide a greater police presence to stop this. We in Allakaket do not even have a public safety officer to address this. (Allakaket Tribal Council 2018)*

> *[The Project] should take into account the potential for reduced subsistence diets and increases in access to alcohol and drugs. (Allakaket Tribal Council 2018)*

Key subsistence harvesting areas that Alternative A would cross through include the Ambler River, Kobuk River, Mauneluk River, Beaver Creek, Reed River, Alatna River, Malamute Fork of the Alatna River, Upper Koyukuk River, Iniakuk River and Lake area, John River, Wild River, and South and North Fork Koyukuk river. Each of these locations are traditional harvesting areas for multiple communities, particularly among the Kobuk River Region and Koyukuk River Region communities and for multiple resources (see Sections 5.1 and 5.3).

Resources for which availability could be directly affected under Alternative A include caribou (nine communities), moose (nine communities), small land mammals (eight communities), migratory birds (six communities), Dall sheep (six communities), and vegetation (six communities) (see Table 43). Of these resources, moose, caribou, and vegetation are resources of high importance to majority of the potentially affected study communities (see Table 43). For a smaller number of communities, harvests of salmon, non-salmon fish, bear, and eggs could be directly affected.

Alternative A crosses through key migratory range for the WAH and could therefore affect the availability of WAH caribou to the south (in the fall) and north (in the spring/summer) of the road. The road runs perpendicular to the primary direction of movement during migration, thus introducing an impact source that could lead to caribou being diverted and delayed during migration. Caribou cross the Alternative A corridor during both the fall and winter (see Section 3.3.4, Mammals, of the Supplemental EIS). Alternative A is to the north of a majority of the study communities whose caribou hunting activities peak in the fall. Deflections of caribou to the north of these communities during the fall months could have substantial impacts on resource availability to subsistence harvesters. The likelihood of such deflections would vary annually based on environmental and development-related (e.g., traffic and noise levels) factors. The importance of maintaining the north-south migration is evident in traditional hunting methods which place hunting camps to the south of rivers and allow the first of the caribou herd to pass by before hunting them (WAH WG 2017). Direct impacts to caribou availability along the road corridor resulting from smaller-scale disruptions may occur for the communities of Bettles, Evansville, Shungnak, Ambler, Kobuk, Alatna, Allakaket, Anaktuvuk Pass, and Selawik. For Anaktuvuk Pass, the road corridor is on the periphery of their caribou hunting areas. Larger-scale disruptions may extend to other users of the WAH. Alternative A does not occur within the range of the RMH. Traffic increases on the Dalton Highway may affect the HHH and may affect subsistence activities near the Dalton Highway.

Alternative A directly overlaps with fish subsistence use areas for four study communities: Bettles, Evansville, Shungnak (for salmon), and Ambler (see Table 43). Non-salmon fish are a resource of high importance to these communities. In particular, sheefish spawning grounds which are particularly sensitive to changes in environmental conditions, occur along the Alatna and Kobuk rivers, which are crossed by the Alternative A corridor. Any impacts from construction or operation of the road corridor which change water quality downstream could affect sheefish spawning grounds and could impact communities downstream from the corridor on the Koyukuk and Ambler River drainages, including Alatna, Allakaket, Hughes, Huslia, Ambler, Kobuk, Shungnak, Kiana, and Noorvik. In the Kobuk-Selawik river basin, sheefish are a resource of high importance to the communities of Ambler, Kiana, Kobuk, and Noorvik. If impacts extend outside the Kobuk-Selawik river basin, then other communities with a high reliance on sheefish (Grayling, Nunam Iqua) could also be affected (see Table 49). These communities could experience indirect impacts if larger changes to fish health or availability occur. Alternative A has a greater potential to directly affect sheefish spawning grounds compared to Alternative C. In addition to sheefish spawning grounds, Alternative A also crosses streams in the Upper Koyukuk drainage which support spawning for Chinook, chum salmon, and whitefish, including the Alatna River, Henshaw Creek, North Fork Koyukuk River, Wild River, and John River. Chum salmon are a resource of high importance to most communities in the Koyukuk River basin (see Table 49). Impacts to these spawning grounds could also have larger effects to communities who harvest salmon downstream from the road corridor.

6.4.3 Alternative B: AIDEA Alternative Route (GAAR South) to the Dalton Highway

Alternative B is similar to Alternative A in terms of the communities which could be directly affected and the nature of the potential impacts. Alternative B crosses use areas for 12 subsistence study communities: Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Coldfoot, Evansville, Hughes, Kobuk, Selawik, Shungnak, and Wiseman (see Table 44). Thus, these communities would likely experience direct impacts of the AAP on their subsistence uses in terms of direct loss of subsistence use areas, impacts on user access, and direct impacts to resource availability (e.g., localized disruptions to resource behavior or distribution resulting from project activities and infrastructure). The primary difference between Alternatives A and B in terms of direct community impacts is that the route would not overlap with migratory bird hunting areas for Ambler but would overlap with vegetation harvest areas for that community. Alternative B would cross through similar key subsistence harvesting areas as Alternative A, with the addition of the Hogatza River area and Norutak Lake which are used by multiple Kobuk and Koyukuk River Region communities (see Sections 5.1 and 5.3). Alternative B would cross within about 7 miles of sheefish spawning habitat on the Reed River and would therefore introduce higher potential for degradation and contamination of that habitat from spills (see Section 3.3, Fish and Aquatics, of the Supplemental EIS). Such changes would particularly affect communities for which this resource is of high importance (Ambler, Kiana, Kobuk, and Noorvik). If impacts extend outside the Kobuk-Selawik river basin, then other communities with a high reliance on sheefish (Grayling, Nunam Iqua) could also be affected (see Table 49). In addition, impacts related to water withdrawals would be somewhat higher under Alternative B due to ice roads (and water withdrawals) occurring closer to key sheefish spawning habitat. For caribou, the effects would the same as under Alternative A (see Section 3.3.4, Mammals, of the Supplemental EIS). Impacts to resource abundance or larger impacts to resource availability resulting from changes to migration routes or habitat use could extend to other subsistence study communities or, in the case of caribou, to the 42 WAH WG study communities.

6.4.4 Alternative C: Diagonal Route to the Dalton Highway

Alternative C crosses use areas for 12 subsistence study communities (see Table 47), including Alatna, Allakaket, Ambler, Anaktuvuk Pass, Hughes, Huslia, Kiana, Kobuk, Selawik, Shungnak, Stevens Village, and Tanana. These communities would likely experience direct impacts of the AAP on their subsistence uses in terms of direct loss of subsistence use areas, impacts on user access, and direct impacts to resource availability (e.g., localized disruptions to resource behavior or distribution resulting from project activities and infrastructure). Impacts to resource abundance or larger impacts to resource availability resulting from changes to migration routes or habitat use could extend to other subsistence study communities or, in the case of caribou, to the 42 WAH WG study communities. However, larger migratory changes are less likely under Alternative C than Alternatives A and B (see discussion below).

Communities with the highest number of resource uses crossed (five or more resources) include Allakaket, Hughes, Kobuk, Shungnak, Ambler, Stevens Village, and Alatna. Alternative C bisects community uses for Hughes, Kobuk, and Shungnak (i.e., community residents would need to cross or detour around the road in order to access a large portion of their subsistence use area), and therefore in terms of access these communities would be most heavily impacted by Alternative C. These three communities would also be most likely to experience benefits of the road related to lowered costs of subsistence supplies/equipment and other goods in the event that these communities can develop a way to create an access route from their community to the nearby corridor. The community of Kobuk would be located directly along the Alternative C route.

Key subsistence harvesting areas that Alternative C would cross through include the Lower Kobuk River, Pah River Flats, Hogatza River, Hughes Creek, Indian River, Melotzina River, Ray Mountains, and Ray River. Each of these locations are traditional harvesting areas for multiple communities, particularly among the Koyukuk, Tanana, and Yukon River Region communities (see Sections 5.3, 5.4, and 5.5).

Resources for which availability could be directly affected under Alternative C include small land mammals (11 communities), caribou (10 communities), non-salmon fish (eight communities), moose (eight communities), bear (seven communities), vegetation (six communities), migratory birds (six communities), and salmon (five communities) (see Table 45). For a smaller portion of communities, harvests of Dall sheep and upland game birds could be affected. For a majority of the study communities, caribou, moose, non-salmon fish, salmon, and vegetation are resources of high importance (see Table 45). Alternative C would have greater noise impacts compared to Alternatives A and B as it will affect more previously undisturbed land than Alternatives A and B, and noise would spread wider under Alternative C due to terrain differences. Thus, impacts on resource availability and user avoidance related to noise may occur over a greater area under Alternative C (Section 3.2.6)

Alternative C does not cross through the current primary migratory range for the WAH and does not intersect the primary north-south migratory movement of the herd. Therefore, the alternative would be less likely to affect migration routes and behavior for WAH caribou and less likely to have direct and indirect effects on resource availability to the caribou study communities. Indigenous Knowledge of residents from Alatna, Allakaket, Hughes, and Huslia stresses the variable nature of caribou migratory patterns, with elders indicating that caribou were once much more prevalent in their area and that the area was "good caribou country" until about the 1970s when the TAPS pipeline was constructed (Beetus 1996, Beetus 2004). Johnson Moses (1993) recalled a period when caribou migrated above Tanana from the south and wintered in the Kanuti Flats, followed by a period when the WAH would migrate from the north into the Allakaket and Alatna area. Thus, the potential for impacts on caribou migration under Alternative C may change as caribou migratory patterns change in the future.

Alternative C does occur within the wintering grounds for the WAH and affects an overall greater amount of WAH habitat, and therefore direct impacts to caribou availability along the road corridor may occur for the communities of Allakaket, Hughes, Kobuk, Shungnak, Ambler, Alatna, Huslia, Anaktuvuk Pass, Selawik, and Tanana, all of whom have caribou hunting areas overlapped by the alternative. Loss of winter habitat would be particularly detrimental to the WAH due to the difficulty in accessing lichen. Reduced survival during winter resulting from a lack of foraging opportunities could have larger effects outside the immediate area and affect more distant WAH communities. As noted above, some past population declines in the WAH have been attributed to extreme winter weather conditions, lack of access to lichen, and high winter mortality rates (see Section 3.3.4, Mammals, of the Supplemental EIS). For Anaktuvuk Pass, the road corridor is on the periphery of their caribou hunting areas. Alternative C bisects the overall and summer ranges of the RMH; due to the small size of population and herd range, impacts to this herd could be more amplified; however, the RMH is difficult to access and hunted by the subsistence study communities only occasionally and therefore direct impacts to local hunters would be possible but unlikely. No impacts to the HHH would occur as a result of Alternative C.

Compared to Alternatives A and B, Alternative C crosses areas of higher value moose habitat and therefore could have greater impacts to moose availability in nearby communities. Impacts would be relatively localized along the road system and therefore would affect communities with moose hunting areas closest to the road corridor (e.g., Hughes, Kobuk, and Shungnak).

Compared to Alternatives A and B, under Alternative C, fish availability could be directly affected for a greater number of communities (eight communities versus four). While Alternative C is less likely to have direct impacts to sheefish spawning grounds, the route crosses Kobuk River directly downstream from sheefish spawning habitat. Thus, any changes to waterways which obstruct access to spawning grounds or affect water quality could have larger indirect impacts to communities who harvest sheefish upstream and downstream from the road corridor, including Alatna, Allakaket, Bettles, Evansville, Hughes, Kobuk, Shungnak, Ambler, Huslia, and Kiana. Alternative C would cross more fish streams than alternatives A and B, it would construct more bridges and substantially more minor culverts which are more likely to obstruct fish passage. In addition, over 80 miles of the Alternative C route (compared to 20 or fewer miles under Alternative A and B) would occur within 1,000 feet of major floodplains or streams, increasing the risk of downstream effects to fish and subsistence uses of fish. Alternative C would also have more impacts related to ice roads and water withdrawals due to more miles of ice roads under this alternative. In addition to sheefish spawning grounds, Alternative C also crosses streams which support spawning for Chinook and chum salmon. For many Yukon River communities, Chinook salmon is a resource of high importance (see Table 49) and is also a resource of yield concern to the ADF&G. Chum salmon is a resource of high importance in most communities in the Kobuk-Selawik, Koyukuk, and Yukon river basins. Impacts to salmon spawning grounds could also have larger effects to communities who harvest salmon downstream from the road corridor along the Yukon and Koyukuk rivers.

6.4.5 Combined Phasing Option

Under the combined phasing option, the road would be constructed over two, rather than three, phases. This alternative would not involve construction of a pioneer road; instead, the construction road would be constructed to Phase 2 standards. Reducing the overall length of construction from 3 to 4 years to 2 to 3 years would reduce the duration of construction-related noise and activity, thus reducing long-term impacts to subsistence users and resources. Initial construction of a wider road would require longer culverts and more water withdrawals for ice roads and ice pads, thus having greater potential short-term impacts to fish related to water quantity and quality. While impacts would continue during operation, human activity and noise from air traffic would likely be less. Both air traffic and human activity can cause disturbances to wildlife, resulting in skittish behavior and changes in resource distribution and movement. Constructing the road to Phase 2 standards may lessen, but not eliminate, subsistence user concerns related to fish and water impacts.

6.5. Community Impact Indicator Summaries

This section presents a summary of impact indicators by community and alternative. Subsistence study communities with the greatest number of resources of high importance and use areas bisected by the project (compared to having partial, peripheral, isolated, or no use areas crossed by the project) would likely experience the greatest intensity of effects related to the project. The following definitions are used in defining the level of project intersection with community use areas:

- Bisect – proposed project crosses through the center or large portions of a community's use areas
- Partial – proposed project intersects a portion of use areas near the community
- Periphery – proposed project intersects use areas located on the outer edge of the community's use areas
- Isolated – proposed project intersects community use areas in one specific, contained location
- None – proposed project does not intersect with the community's use areas

In summary, for Alternatives A and B, Shungnak, Evansville, Bettles, and Kobuk would experience the greatest intensity of impacts due to the greater number of resources of high importance that are overlapped with the Project and that their subsistence use areas are bisected by the Project (Table 50, Table 51). Ambler, Allakaket, and Alatna could also experience a higher intensity of impacts due to greater numbers of resources of higher importance and larger portions of use areas potentially affected. Alternative C would be similar except Bettles and Evansville would be unlikely to experience effects and Hughes would be added to the list of communities that would experience greater impacts from the Project (Table 52). These tables do not account for the potential for larger indirect effects that could occur, particularly for resource availability impacts, which are more uncertain and for which systematic, quantifiable impact indicators are not readily available.

Table 50. Alternative A impact indicator summary – resource importance and use areas

Community	Number of high resources crossed	Number of moderate resources crossed	Number of low resources crossed	Number of resource of indeterminate importance crossed	Level of project intersection with use areas
Shungnak	4	2	2	0	Bisect
Evansville	4	2	2	0	Bisect
Bettles	3	3	2	0	Bisect
Kobuk	2	2	2	0	Bisect
Ambler	3	3	1	0	Partial
Allakaket	2	0	2	0	Partial
Alatna	1	1	2	0	Partial
Wiseman	3	2	0	1	Periphery
Selawik	1	0	0	0	Periphery
Hughes	0	0	0	1	Periphery
Coldfoot	1	0	2	3	Isolated
Anaktuvuk Pass	1	0	1	0	Isolated
Beaver	0	0	0	0	None
Buckland	0	0	0	0	None
Galena	0	0	0	0	None
Huslia	0	0	0	0	None
Kiana	0	0	0	0	None
Kotzebue	0	0	0	0	None
Livengood	0	0	0	0	None

Manley Hot Springs	0	0	0	0	None
Minto	0	0	0	0	None
Nenana	0	0	0	0	None
Noatak	0	0	0	0	None
Noorvik	0	0	0	0	None
Rampart	0	0	0	0	None
Stevens Village	0	0	0	0	None
Tanana	0	0	0	0	None

Table 51. Alternative B impact indicator summary – resource importance and use areas

Community	Number of high resources crossed	Number of moderate resources crossed	Number of low resources crossed	Number of resource of indeterminate importance crossed	Level of project intersection with use areas
Evansville	4	2	2	0	Bisect
Shungnak	4	2	2	0	Bisect
Bettles	3	3	2	0	Bisect
Kobuk	2	2	2	0	Bisect
Ambler	4	2	1	0	Partial
Alatna	1	2	2	0	Partial
Allakaket	2	0	2	0	Partial
Wiseman	3	2	0	1	Periphery
Selawik	1	0	0	0	Periphery
Hughes	0	0	0	1	Periphery
Coldfoot	1	0	2	1	Isolated
Anaktuvuk Pass	1	0	1	0	Isolated
Beaver	0	0	0	0	None
Buckland	0	0	0	0	None
Galena	0	0	0	0	None
Huslia	0	0	0	0	None
Kiana	0	0	0	0	None
Kotzebue	0	0	0	0	None
Livengood	0	0	0	0	None
Manley Hot Springs	0	0	0	0	None
Minto	0	0	0	0	None
Nenana	0	0	0	0	None
Noatak	0	0	0	0	None
Noorvik	0	0	0	0	None
Rampart	0	0	0	0	None
Stevens Village	0	0	0	0	None

Tanana	0	0	0	0	None

Table 52. Alternative C impact indicator summary – resource importance and use areas

Community	Number of high resources crossed	Number of moderate resources crossed	Number of low resources crossed	Number of resource of indeterminate importance crossed	Level of project intersection with use areas
Shungnak	5	2	1	0	Bisect
Kobuk	4	3	2	0	Bisect
Hughes	4	3	1	1	Bisect
Allakaket	4	3	2	0	Partial
Ambler	4	3	1	0	Partial
Alatna	1	3	1	0	Partial
Stevens Village	3	2	2	0	Periphery
Tanana	2	0	1	0	Periphery
Huslia	1	2	0	0	Periphery
Selawik	1	0	1	0	Periphery
Anaktuvuk Pass	1	0	1	0	Isolated
Kiana	1	0	0	0	Isolated
Beaver	0	0	0	0	None
Bettles	0	0	0	0	None
Buckland	0	0	0	0	None
Coldfoot	0	0	0	0	None
Evansville	0	0	0	0	None
Galena	0	0	0	0	None
Kotzebue	0	0	0	0	None
Livengood	0	0	0	0	None
Manley Hot Springs	0	0	0	0	None
Minto	0	0	0	0	None
Nenana	0	0	0	0	None
Noatak	0	0	0	0	None
Noorvik	0	0	0	0	None
Rampart	0	0	0	0	None
Wiseman	0	0	0	0	None

Project intersection is less relevant to determining indirect and downstream impacts on subsistence uses of caribou and fish. Instead, the relative importance of these resources to individual communities is most relevant to the likelihood and magnitude of these impacts. The relative importance of caribou, sheefish, Chinook salmon, and chum salmon to the caribou and fish study communities are summarized in Table 48 and Table 49. The methods for calculating resource importance are provided in Section 6.3, Impact Indicators.

Caribou are of high importance to 27 of the 42 caribou study communities, most of which are located in the Kobuk-Selawik and Koyukuk drainages and on the North Slope. These are the communities that would be most likely to be affected under each of the action alternatives. Caribou study communities with a lower reliance on caribou are located primarily on the Yukon River (see Table 48).

Non-salmon fish species are of high importance to 24 of the 32 fish study communities. Specifically, sheefish are of high importance to seven of the 32 fish study communities, and these communities are located on the Kobuk and Yukon river drainages. Chinook salmon are of high importance to nine of 32 fish study communities, and these communities are located primarily on the Yukon River drainage. Finally, chum salmon are of high importance to 19 of the 32 study communities, and these communities are located throughout the Kobuk-Selawik, Koyukuk, and Yukon river drainages (see Table 49).

6.6. Other Indirect and Cumulative Impacts/Indirect and Cumulative Impacts of Growth

This section discusses other indirect and cumulative impacts of the AAP and associated growth in the region, including mining development and other road access. Various economic, social, and environmental changes throughout history have affected subsistence use patterns of the study communities and required subsistence users to be highly adaptive. Major historic events that have affected subsistence in the region include pre-contact trade and contact between Iñupiat and Athabascans; initial European contact that introduced western trade goods; the fur trade in the early nineteenth century that introduced a market economy and the use of firearms; the late nineteenth and early twentieth century gold rush that resulted in territorial shifts, establishment of new comm unities, intermarriage, and a subsequent starvation period compounded by a caribou decline; introduction of new technologies such as outboard motors; and missionaries and school requirements that resulted in the centralization of communities and abandonment of semi-nomadic subsistence patterns (Watson 2018).

More recent actions which have affected subsistence uses and resources within the study region include the establishment of GAAR, mineral exploration (e.g., South32 mining exploration between the Dalton Highway and GAAR), mining development (including the Red Dog Mine), infrastructure projects, scientific research, recreation and tourism, sport hunting and fishing, hunting and harvesting regulations, establishment of wildlife refuges and national parks, and environmental changes resulting from climate change. Construction of the TAPS and Dalton Highway have affected subsistence access and resource availability for communities in the eastern portion of the project area, with many residents believing that the highway and pipeline have resulted in changes to caribou migration across the region. The Red Dog Mine, including the DMTS and port site, has introduced contamination concerns for local residents, particularly Kivalina residents who are situated downstream from the mine, and have affected resource distribution and migration for resources such as caribou and marine mammals possibly resulting in decreased harvests of these resources over time (EPA 2009). Increased sport hunting and fishing in the region and associated air traffic have resulted in increased competition for local subsistence users in addition to disturbance and displacement of subsistence resources such as caribou. The establishment of GAAR in the 1980s also affected access to and use of traditional harvesting areas for residents of nearby communities within the northeastern portion of the project area (Watson 2018). Current subsistence use patterns, as described in Section 5, are the result of the adaptation of communities to all of the above forces of change. Any future actions, regardless of how minor they seem at the time, will also contribute to changes in subsistence patterns. Talking Circle participants in multiple communities along the proposed route emphasized the importance of addressing the potential impacts of the project in the context of ongoing change and adaptation:

> It is important to highlight that when you hear us talking about where we used to go here and there, that there has already been things impacting abundance and population. One, it is important to keep memory of these places, but two, to close the colonization gap and teaching them to return to that lifestyle and the scarcity and impacts of climate change which are reflective of government to respect ANILCA rights. Climate related events. They are having to travel farther. (Ambler Road SEIS Evansville Talking Circle)

Impacts of climate change include changes in the predictability of weather conditions such as the timing of freeze-up and breakup, snowfall levels, storm and wind conditions, and ice conditions (e.g., ice thickness on rivers and lakes), all of which affect individuals' abilities to travel to subsistence use areas when resources are present in those areas. In addition, subsistence users may experience greater risks to safety when travel conditions are not ideal. Changes in resource abundance or distribution resulting from climate change can also affect the availability of those resources to subsistence users or may cause subsistence users to travel farther and spend more time and effort on subsistence activities (Brinkman 2016).

Construction and operation of the AAP would likely result in changes to resource abundance, resource availability, and user access for many of the subsistence study communities. The project would introduce a large industrial road corridor into an area that was previously undeveloped and which was used primarily for subsistence and recreational purposes. Under any alternative, 12 communities have direct uses of the project corridor(s), and a majority of these communities are rural, low-income, non-road-connected communities who rely on subsistence to support their mixed economy. The AAP would introduce impacts to resource abundance and resource availability for key resources such as sheefish, whitefish, salmon, and caribou, while also reducing (rather than facilitating) access to traditional harvesting areas. The road itself may increase access to and reduce costs of commercial goods for certain communities; however, few local jobs directly associated with the road (e.g., maintenance and operation) will be available after construction. Impacts to resource availability and user access will be most pronounced for communities who do not experience increased income associated with the road (i.e., road or mining jobs) and/or do not experience benefits of the road related to lowered costs of subsistence supplies/equipment, food, or other goods. These communities would have less opportunity to purchase or invest in fuel and equipment to adjust to changes in access and resource availability.

RFAs within the region that could contribute to subsistence impacts include development of the Ambler Mining District (Arctic, Bornite, Sun, and Smucker projects); additional mining development along the three alternative routes; use of the AAP for commercial access; use of the AAP for commercial use by local communities and Native Allotment owners. Secondary access roads connecting the AAP to other mining areas and claims, Air Force lands, and local communities are also a potential. Other RFAs that could contribute to the impacts of the AAP include mining projects outside the Ambler Mining District (Manh Choh Mine), infrastructure projects (OTZ Telephone Cooperative project, Dalton Highway improvements, broadband connectivity projects), and changes in land management. See Appendix H for more details.

The AAP will facilitate additional mining and other development throughout the study region, which will contribute to impacts on subsistence resource abundance, resource availability, and user access for subsistence users across the region. The hypothetical development scenario assumes that the road would result in aggressive exploration of the Ambler Mining District and that the four most advanced mining projects would be developed. With production activities at each development expected to occur over 5 to 35 years, the overall life of mining development associated with the road would likely extend well beyond 35 years. While the proposed road would be the primary access to the District, access roads would likely occur to individual developments, contributing to habitat fragmentation in the region and impacts on user access for local subsistence users. During the comment period for the Draft Supplemental EIS, one individual from Kobuk reported that the Bornite exploration road has already disrupted travel to hunting grounds and affected when and where residents can hunt due to safety concerns. Construction and mining activities associated with development of these projects would result in a long-term increase in impacts associated with human activity, noise, traffic, infrastructure, and contamination, which could affect the abundance and availability of resources such as caribou, moose, fish, waterfowl, vegetation, and other large and small land mammals. Caribou have been documented avoiding active mine sites (Supplemental EIS, Section 3.3.4). Noise can displace wildlife and cause skittish behavior, resulting in reduced resource availability and harvest success for hunters. Direct impacts would be highest for the communities closest to these four development projects: Kobuk, Shungnak, and Ambler, although indirect impacts would also occur for communities who harvest fish downstream from the projects and communities who harvest WAH caribou.

Mining development will result in the physical removal of traditional subsistence hunting and harvesting areas for the study communities in addition to decreased access to these areas through security/access restrictions and through user avoidance of development areas. Changes in resource availability or abundance within the project area and resulting changes in hunting regulations, in combination with security and firearms restrictions along the proposed road and near associated mine projects, could add to the complexity of hunting regulations and uncertainty among local subsistence users. The overall area available for subsistence use will likely shrink over time due to the increasing presence of infrastructure and human activity within traditional use areas.

Construction of additional access roads to mines, communities, and other locations will contribute to fragmentation of habitat for resources such as caribou and moose, which would remove usable habitat for these resources and in the case of caribou could cause substantial changes in range distribution. While the construction of roads would result in a net loss of current habitat areas, clearing and maintenance of ROWs may also create new movement corridors and feeding areas, particularly for moose. Direct mortalities may occur as a result of collisions with vehicles, particularly if animals such as moose are attracted to the road ROW as a movement corridor. Impacts to migrating caribou increase with density of roads and infrastructure (see Section 3.3.4, Mammals, of the Supplemental EIS). Impacts to caribou migration and abundance could reverberate throughout the communities who rely on the WAH. These impacts would be particularly likely among communities for whom caribou is a resource of high importance (see Table 21), but could extend beyond those communities if a decline in caribou harvests affects sharing networks or results in higher harvests of other resources (e.g., moose).

Mining activities would cause further disturbance to wildlife through the presence of mine pits and noise and disturbance from heavy machinery, blasting, and human activity. Mine development and additional road construction would also contribute to further contamination and alteration of waterways which may cause substantial degradation to spawning grounds and other habitat for non-salmon fish (sheefish and other whitefish) and salmon that are key subsistence species across the region. Mining and further road development could have population-levels effects on certain fish species, particularly if mine activities result in contamination or degradation of Kobuk River sheefish spawning grounds and Alatna River whitefish spawning grounds. As discussed in Section 3.3.2 of the Supplemental EIS (Fish and Aquatics), mining activities, particularly in the absence of proper mitigation, can alter water flows, reduce water quantity, and cause contamination and changes in water chemistry which could affect essential fish habitat. Such impacts have been seen within the study region with past mining activities, such as placer gold mines. Potential cumulative impacts of potential large scale mining projects on fish health and abundance, including impacts of tailings management and release of toxic materials, changes in water chemistry, transport and movement of soil and rock, construction of additional infrastructure, surface and groundwater disruptions, dewatering, and toxic water treatment are discussed in Section 3.3.2 of the

Supplemental EIS (Fish and Aquatics). Mining related removal of groundwater would lower the water table well below natural stream or lake levels and considerably reduce flow into streams and the hyporheic zone. Depending on the location and scale of operation, dewatering has the potential to substantially reduce groundwater flows into important spawning, egg incubating, and wintering habitats relied upon by salmon, sheefish, whitefish, and other important subsistence species which could have potential population level impacts (Supplemental EIS Section 3.3.2, Fish and Aquatics). One of the four potential mine projects is located on a stream that is a direct tributary of the Kobuk River's only sheefish spawning grounds, the other three enter downstream of that spawning ground. Contamination of these tributaries could have population level impacts on sheefish, a key subsistence resource in the study region. Many communities across the region, including in the Kobuk-Seward, Koyukuk, and Yukon river basins, have a moderate to high reliance on sheefish (see Table 22). Impacts of a decline in sheefish could have effects on all of these communities, and may have larger impacts if the decline in sheefish results in a higher harvest of other resources.

In addition to mine developments within the District, development of mines in other areas could be facilitated by the Ambler Road alternatives. The Alternative C route could provide access to mining claims near the Zane Hills (northwest of Hughes) and Ray Mountains. Alternatives A and B could provide access to mining districts to the east of the District and north of Alatna/Allakaket and Evansville/Bettles within areas used by those communities for subsistence. Development of these mining claims would further contribute to the network of infrastructure and activity along the proposed Ambler Road. As noted in Section 3.3.4 (Mammals), habitat loss and alteration resulting from development of the District could be greater than the road itself, increasing habitat fragmentation and potential impacts on caribou abundance, distribution, and migration. Multiple connected roads as depicted in the hypothetical development scenario would increase the likelihood of large-scale changes in caribou migration, thus increasing the likelihood of impacts on subsistence resource availability outside the immediate area of the road.

In recent years, there has been a shift toward developing small mineral prospects throughout Alaska relying on using the public highway system for transport of ore. It is reasonably foreseeable that additional projects near the Dalton Highway, and the proposed Ambler Road, would also propose to rely on the highway system to transport ore from the mine to a central processing facility such as Fort Knox near Fairbanks. The potential for increased access into the project area resulting from local and non-local use of the project road and ROW (regardless of legality) may increase competition in the region for certain resources and decrease harvesting success for local hunters. Secondary access roads developed by communities would likely be used, at least by local residents, for subsistence harvesting activities and could create harvesting corridors and increase competition within those areas. Even if the road is reclaimed, the remaining cleared area within ROW would likely become accessible for local and non-local hunters traveling by snowmachine and off-road vehicles. If the road, ROW, or reclaimed ROW increases access into the region, state and federal regulators may respond by introducing stricter hunting and harvesting regulations as well, which would affect availability of resources to local communities. Increased competition and decreased resource availability may result in residents having to travel farther and spend more time, money, and effort to harvest resources such as moose and caribou.

The potential for increased access into the region was a key concern voiced by residents during both scoping and Indigenous Knowledge studies associated with the AAP (Watson 2014, BLM 2018b). Many residents do not believe that the road will remain private and point to previous roads which they believed to have restricted access which were eventually opened to the public (e.g., the Dalton Highway). The WAH WG cited the Dalton Highway as an example of how restricted access roads can easily be opened to the public due to political and public pressure:

> *The WACH declined for much of the last two decades. Reduced population levels during that time led to harvest restrictions. Although the most recent caribou count indicates a population that is stabilizing or possibly starting to increase, concerns remain that increased access due to roads could greatly compound user conflict and limited availability of caribou. We recognize that the proposed road is currently specified as being commercial-only. However, history (e.g., with the Dalton Highway) suggests that once roads are established they eventually become used by the public. We are greatly concerned that the Ambler Road will not remain closed to public use given this history and the multiple jurisdictions (State, Federal and Native) that the proposed road would cross. (Western Arctic Caribou Herd Working Group 2018)*

In addition, it is unclear whether the road would allow access to small mining claims; while large mines would likely have policies regarding hunting and fishing by workers, smaller mining outfits or individuals may allow these activities. According to Guettabi et al. (2016), increased access resulting from the road and/or ROW would likely reduce harvest success for local hunters, particularly for moose. Specifically, the study analyzed harvest rates by the number of hunters in game management units (GMUs) and found that the quantity of moose harvested was inversely related to the number of moose hunters within a GMU. The study estimated that for every 1 percent increase in the number of moose hunters in the project area, communities along the project corridor would harvest approximately 1.09 times less moose than if there were no additional access to the region. Unauthorized public use of the road may result in use of the road corridor by non-local hunters, increasing competition for local communities and potentially affecting resource availability. Increased hunting activity along a road corridor into a previously road-free region could result in changes to resource distribution and behavior along the road corridor, particularly if hunting activity deflects migrating resources such as caribou. Increased access of the area resulting solely from illegal trespass of restricted roads and/or ROWS would likely not have the same level of impacts on harvesting success as a public road would. According to the WAH WG (2017), communities within the region have already experienced increased competition in traditional hunting areas, with greater numbers of hunters concentrated within smaller areas. Sport hunting is a key issue within the region for subsistence harvesters, and illegal access to the area via a road or ROW would contribute to these impacts. In comparing harvests of non-road connected communities near the Ambler Road to non-project-zone (i.e., road connected) communities, Guettabi et al. (2016) found that replacement values for decreased subsistence harvests resulting from the Ambler Road becoming a public road would range from approximately $6,900 per year to $10,500 per year based on a replacement value of $8 per pound.

The BLM is currently preparing an EIS regarding potential revocation of ANCSA 17(d)(1) withdrawals, including parcels in the Kobuk-Seward planning area. Revocation of withdrawals on certain parcels of land could result in changes in subsistence management, including the loss of federal subsistence priority on those lands for local residents. Such changes, in combination with increased hunting competition in the region, could affect subsistence uses and harvest success for certain study communities.

If the AAP results in reduced availability of subsistence resources such as moose, caribou, sheep, small land mammals, fish, waterfowl, or vegetation, or if it decreases access to traditional use areas, then residents from the study communities may have to spend greater amounts of time, effort, and money in order to locate and procure these resources. Residents may also have to travel farther to less familiar areas to find resources, with greater risks to health and safety. While some hunters respond to changes in resource availability by taking more trips and increasing costs in order to harvest what they need, others may choose to take fewer trips because of lack of funds or reduced success.

Communities in the study region currently have high levels of unemployment and low income with high costs of living; despite these factors, many of the study communities have remained stable and resilient through a mixed economy which revolves around subsistence hunting and harvesting (Guettabi et al. 2016). Construction of the AAP and associated mining development would result in increased employment opportunities and income for residents of some of the subsistence study communities. Residents may invest the income from construction, operation, and mining jobs into supplies and equipment (e.g., snowmachines, outboards, fuel, ammunition) to support subsistence activities. In addition, the ability to use the road to transport commercial goods, including subsistence supplies and equipment, may also reduce certain costs associated with subsistence. However, at this time, there is no guarantee that this benefit is certain for any community. In addition, benefits associated with increased employment and income would be most likely to occur for NANA shareholders and communities due to agreements between mining companies on NANA lands regarding local hire policies. Thus, interior communities such as Alatna, Allakaket, Bettles, and Evansville may experience subsistence impacts (e.g., reduced resource availability and access to traditional harvesting areas) without the counter benefits of increased income and employment associated with mine development.

Those individuals who obtain long-term employment associated with the AAP or associated mining developments may experience reduced time to engage in subsistence activities, although they may continue to invest monetarily in and support subsistence activities for others in the community. Those with mining jobs may move away from their communities, as some have done in association with the Red Dog Mine, to larger urban centers. The benefits of increased employment and income will likely only occur for certain households and certain communities and could cause social tensions associated with increased inequality. As noted in BurnSilver and Magdanz (2019), household responses to social, economic, and environmental change are not homogenous, and benefits of economic growth are generally not distributed equally. Certain households are more vulnerable to changes in community economic status and disruptions in subsistence harvesting, social ties, and sharing. Household sensitivity and adaptive capacity are good indicators of how households will respond to sudden change. Factors determining household sensitivity include low-harvest, low-income households, or households that are “unbalanced” or “spread thin” (e.g., medium-harvest, low income; or low harvest, high income). Certain communities have greater adaptive capacity, overall, than others, but all communities show significant variation among individual households. Thus, increased economic benefits to a region will not be distributed equally to all households and the most vulnerable households will likely experience the greatest consequences of subsistence disruptions through weakened social networks and the inability to adapt to changes in resource availability.

In rural Alaska, certain households or individuals play a particularly important role in harvesting and distributing subsistence foods to households and individuals who are unable to hunt or harvest for themselves. Research from the ADF&G has found that as a general rule, 30 percent of households, referred to as “super-harvester households,” generally harvest 70 percent of the total community harvest (Wolfe 2004). Harvests may be even more concentrated for specific resources such as caribou (SRB&A Forthcoming, Kofinas, BurnSilver, Magdanz, Stotts, and Okada 2016). An increase in employment associated with the road and mine developments may result in some households or individuals shifting away from their roles as super-harvesters as they have less time to engage in subsistence activities as they once did. Subsistence roles within a community regularly change and evolve due to household circumstances (e.g., age and number of household members, employment levels, income, health), and communities generally adapt to these changes, with new harvesters filling or returning to previous subsistence roles as their circumstances allow and as the need presents itself. In addition, the roles of super-harvester households and high-earning households are not mutually exclusive; in fact, Kofinas et al. (2016) found that many super-harvester households are high income households, and the vast majority of high harvesting households have at least one employed household member. Other research has shown an inverse relationship between income and harvesting levels, with high income associated with lower harvests (Guettabi, Greenberg, Little, and Joly 2016). On a community scale, Magdanz, Greenberg, Little, and Koster (2016) found a 2.5 percent decrease in in household mean harvests for each 10 percent increase in household income. In a single study community controlling for household size, the harvest-income association disappeared. Thus, recent research suggests that at a community and household level, increased income is not associated with increased harvest.

It is likely that responses to increased income will vary by households; some households will invest their increased income into subsistence pursuits (including providing gas and supplies to active harvesters from other households), while others may gradually participate less in the subsistence economy. A sudden increase in employment levels in a community may cause at least a temporary disruption in social ties and roles within the subsistence study communities, which could cause a decline in the distribution of subsistence foods for a period of time.

A number of studies have documented the resilience of subsistence communities in the face of sudden or dramatic changes, noting that communities and households often respond to scarcity of one resource (caribou) by increasing their harvests of another, or by increasing income sources when subsistence foods are less available (Martin 2015). Resilience allows communities and households to adjust to changes while maintaining access to key cultural resources and activities. However, the ability of households to be resilient in the face of change does not negate the existence of impacts, nor does it imply that households can simply adapt to all forces of change. In addition, as discussed above, communities and households are not homogenous in their capacity to adapt to sudden change (BurnSilver and Magdanz 2019) Larger disruptions to subsistence ties, particularly in combination with decreased availability of key subsistence resources, could affect social, cultural, and economic well-being, particularly to the more vulnerable low income, unconnected, and low-harvest households who rely on strong sharing networks for their food security (Kofinas et al. 2016). Over time, if communities in the region become road-connected, the availability of goods, increased income and employment opportunities, and decreased harvesting opportunities could result in an overall decrease in subsistence harvests among the study communities.

Ultimately, the cumulative impacts to subsistence resulting from the AAP, other reasonably foreseeable developments, and climate change could result in reduced harvesting opportunities for local residents and alterations in subsistence harvesting patterns. A recent analysis comparing road-connected communities to non-road-connected communities showed that road-connected communities have substantially lower subsistence harvests than non-road-connected communities (Guettabi et al. 2016). Other research (e.g., Magdanz et al. 2016) has shown an estimated decline of one-third of subsistence harvests for communities along a publicly accessible road, with the potential for a relatively modest increase in income; thus, the loss to subsistence would likely not be offset by an increase in income, nor would increase income address the social or cultural losses to communities. These studies analyzed socio-economic impacts of a road into the study region based on the assumption that the road would eventually become public. The road-connected communities in its analysis were located on publicly-accessible roads in more densely populated areas. It is reasonable to assume that a road into the area, with associated development activities and the potential for increased employment opportunities and transport of commercial goods, could affect income and subsistence harvest levels for the study communities. If the road eventually became open to authorized public access, then communities would experience much more substantial impacts on subsistence harvests and uses.

The potential for increased access to the region resulting from a publicly accessible road is a primary concern that has been voiced by a number of subsistence study communities (Watson 2014). While the BLM is not considering issuance of a ROW for a public road, it is reasonably foreseeable that the road would become open to public access in the future (see Appendix H, Section 2.2.2). Public use of the road may increase to the project area by non-local hunters, increasing competition for local communities and potentially affecting resource availability. Increased hunting activity along a road corridor into a previously road-free region could result in changes to resource distribution and behavior along the road corridor, particularly if hunting activity deflects migrating resources such as caribou. In addition, an increase in outsiders in the region may have cultural and spiritual effects on local residents if they witness hunting behavior that is inconsistent with traditional Athabascan and Iñupiaq values (e.g., not targeting the "lead caribou" in a herd, wasting meat). Overall, increased non-local access into the region would increase subsistence competition and reduce resource availability and harvest success for local residents.

The combination of reduced resource availability, decreased user access, increased income (for some communities), and increased access to commercial goods (for some communities), will likely alter subsistence harvesting patterns across the region and affect overall subsistence harvests for many of the study communities, particularly those located along the road corridor. The likelihood and magnitude of these effects would increase substantially if the road becomes open to authorized public use. Decreased harvests among the study communities could have wide-ranging effects due to the potential impacts on sharing networks within the region in addition to networks which extend to other regions (Kofinas et al. 2016). Sharing is a key value across the study region which is central to subsistence. Decreased harvests could disrupt existing sharing networks to other communities and regions if residents are unable to share as widely or frequently as they are accustomed.

In addition to sharing networks, the interconnectedness of communities through kinship and ancestral ties means that impacts to subsistence in one community could reverberate throughout the region. While most residents in the region today live in permanent communities, these communities are not static. Movement between communities is common over one's lifetime as is traveling between communities to engage in subsistence activities and harvest subsistence resources which may be less available in one's current community of residence. Therefore, a person's area of use, and the area with which they identify culturally, is often much larger than the subsistence use area associated with their community.

Cumulative impacts of Alternative A and B related to resource abundance of sheefish and resource availability of caribou would likely be greater than those under Alternative C, as they would be more likely to affect resource availability of migrating caribou to the subsistence study communities, particularly during the fall months, and are most likely to have population-level effects on sheefish and whitefish, all key subsistence species among the study communities. These alternatives would also be more likely to have larger indirect effects on caribou availability to the 42 caribou study communities, and downstream effects on the 32 fish study communities. Alternative C would potentially have a greater overall effect on fish habitat due to its greater length and larger number of bridges and culverts. Alternative C is also more likely than Alternatives A and B to impact caribou abundance through impacts on wintering habitat. Impacts related to user access and direct impacts on resource availability along the road corridors would be similar across all alternatives and would affect a similar number of study communities. Alternative C would cross within approximately 5 miles of several communities (Kobuk, Shungnak, and Hughes), while Alternatives A and B would cross within 10 miles of Bettles and Evansville. All alternatives overlap with key subsistence hunting and harvesting areas for multiple communities.

When subsistence users' opportunities to engage in subsistence activities are limited, then their opportunities to transmit knowledge about those activities, which are learned through participation, are also limited. If residents stop using portions of the project area for subsistence purposes, either due to avoidance of development activities or reduced availability of subsistence resources, the opportunity to transmit Indigenous Knowledge to younger generations about those traditional use areas would be diminished. While communities would likely maintain a cultural connection to these areas and acknowledge these areas as part of their traditional land use area, the loss of direct use of the land could lead to reduced knowledge among the younger generation of place names, stories, and traditional ecological knowledge associated with those areas. There would also be fewer opportunities for residents to participate in the distribution and consumption of subsistence resources, ultimately affecting the social cohesion of the community. Any changes to residents' ability to participate in subsistence activities, to harvest subsistence resources in traditional places at the appropriate times, and to consume subsistence foods could have long-term or permanent effects on the spiritual, cultural, and physical well-being of the study communities by diminishing social ties that are strengthened through harvesting, processing, and distributing subsistence resources, and by weakening overall community well-being.

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Appendix M. ANILCA Section 810 Evaluation

Note: This entire Appendix has been revised from the previous version and replaced with new content that is specific to the Supplemental EIS process only. Therefore, none of the text has been highlighted to indicate new or substantially revised text.

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Table of Contents

A. ANILCA Section 810 Final Evaluation

This analysis of subsistence impacts is prepared for the Ambler Road Supplemental Environmental Impact Statement (EIS) that analyzes the environmental consequences of a proposed road to the Ambler Mining District (District). In 2020, the U.S. Bureau of Land Management (BLM) issued an EIS and an associated evaluation under Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA) in response to a right-of-way (ROW) application from the Alaska Industrial Development and Export Authority (AIDEA). AIDEA is proposing to construct an all-season industrial access transportation corridor extending from the Dalton Highway to the Ambler Mining District in Northwest Alaska. The road would provide access for exploration and development of the Ambler Mining District and is referred to as the Ambler Access Project (AAP) by AIDEA. The Final EIS and Section 810 Evaluation, published in March 2020, analyzed the potential impacts of the road on physical characteristics, biological resources, and social systems, including subsistence uses and resources. The BLM and the U.S. Army Corps of Engineers issued a Joint Record of Decision (ROD) in July 2020, subsequently, two groups of plaintiffs challenged the decision in the U.S. District Court for the District of Alaska (District Court). In February 2022, the U.S. Department of the Interior (DOI) sought a voluntary remand of the decision in part due to identified deficiencies with the Section 810 evaluation, which was granted by the District Court in May 2022. The BLM has prepared this analysis, on behalf of the DOI, to fulfill the departmental requirements pursuant to Section 810 of ANILCA, as part of the Supplemental EIS to address AIDEA's ROW application.

AIDEA proposes to construct, operate, and remove a 211-mile, all-season, industrial access road from the existing Dalton Highway at milepost (MP) 161 westerly to the District, located within the Northwest Arctic Borough (NAB) in the southern foothills of the Brooks Range of north-central Alaska. Under AIDEA's proposal, approximately 25 miles of the 211 miles of road would cross BLM-managed lands and approximately 26 miles would cross NPS-managed lands. According to AIDEA, the road would provide access for mineral exploration, mine development, and mining operations in the District as well as commercial commerce to communities if spur access roads are developed in the future. The proposed road would not be open to public access. There is currently no road or other surface access to the District from the existing transportation network. The District has long been recognized as containing a variety of mineral deposits, which have been explored or evaluated for more than a century (AIDEA 2016; Grybeck 1977). There are more than 1,300 active mining claims in the District vicinity (ADNR 2018). A 2015 economic analysis identified four major mineral deposits, with Ambler Metals' (formerly Trilogy Metals Inc.) Arctic and Bornite deposits the most active (Cardno 2015), which would benefit from an industrial access road to develop the deposits and improve economics.

The Supplemental EIS provides detailed analysis of the following three action alternatives and a no action alternative:

- No Action Alternative: The No Action Alternative evaluates what would occur if the BLM does not grant a road ROW to AIDEA. The No Action Alternatives provides a baseline for comparison to the other alternatives and it is a potential outcome of the Supplemental EIS.
- Alternative A: Alternative A is AIDEA's proposed alternative. It starts at MP 161 of the Dalton Highway and is 211 miles long with 3,498 acres of DOI-managed lands. The distance from Fairbanks to the road terminus would be 456 miles.
- Alternative B: Alternative B is an alternate route proposed by AIDEA across NPS lands in Gates of the Arctic National Park and Preserve (GAAR). It is a variation on Alternative A, with the same beginning point (MP161) and termini. It is 228 miles long with 3,083 acres of Department

of Interior (DOI)-managed lands. The distance from Fairbanks to the road terminus would be 473 miles.

- Alternative C: Alternative C grew out of scoping comments. The route begins at MP 59.5 of the Dalton Highway and is 332 miles long with 19,090 acres of DOI-managed land. The distance from Fairbanks to the road terminus would be 476 miles.

In addition to the three action alternatives, the Supplemental EIS also analyzed a phasing option which could be applied to any of the three action alternatives. Under the phasing option, the road would be constructed over two rather than three phases. Alternatives would not involve construction of a pioneer road and therefore the construction period would be reduced from three to four years to two to three years.

This ANILCA 810 evaluation has been prepared to incorporate the expanded analysis contained in the associated Supplemental EIS. Namely, increased environmental effects to caribou habitat, forage, and population; the dewatering of streams and groundwater and its impact to salmon, sheefish, and other fish species; spawning areas and other aquatic habitat; and related subsistence uses. New information has been considered about declines in salmon population in the adjacent Yukon River drainage and reduction in the Western Arctic Caribou Herd. The analysis has been expanded to include other potentially affected communities within the entire range of the Western Arctic Caribou Herd and down-stream communities along the Yukon River.

The ANILCA 810 evaluation is informed by Indigenous Knowledge. Indigenous Knowledge, also referred to as traditional knowledge, is a body of observations, oral and written knowledge, innovations, practices, and beliefs developed by Tribes and Indigenous Peoples through interaction and experience with the environment. The information gathered as part of the Ambler Road project is from ethnographic interviews, Tribal consultation, published and archival materials, and advisory bodies of traditional knowledge holders formed specifically to address subsistence issues.

This Final ANILCA 810 evaluation was further informed by public testimony given at the subsistence hearings that were held during the public comment period on the Draft Supplemental EIS in Alatna, Allakaket, Ambler, Anchorage, Evansville, Fairbanks, Huslia, Kiana, Kobuk, Kotzebue, Selawik, and Shungnak (see Transcripts posted at: www.blm.gov/AmblerRoadEIS), and by associated Talking Circle meetings held in the rural communities listed above (see Appendix Q, Talking Circle Summary Report).

A.1. Subsistence Evaluation Factors

Section 810(a) of ANILCA, 16 United States Code (USC) 3120(a), requires that an evaluation of subsistence uses and needs be completed for any federal determination to “withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands.” Because the proposed ROW would meet this standard, an evaluation of potential impacts on subsistence under ANILCA Section 810(a) must be completed for the Ambler Road Supplemental EIS, referred to as a Tier-1 evaluation. ANILCA requires that this evaluation include findings on three specific issues:

- The effect of use, occupancy, or disposition of public lands on subsistence uses and needs;
- The availability of other lands for the purposes sought to be achieved; and,
- Other alternatives that would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes.

Three factors were considered when determining if a significant restriction of subsistence uses and needs may result from the proposed action, alternatives, or the cumulative case, as follows:

- Reduction in the abundance of harvestable resources used for subsistence purposes;
- Reduction in the availability of resources used for subsistence caused by alteration of their distribution, migration patterns, or location; and,
- Legal or physical limitations on access of subsistence users to harvestable resources.

Each alternative and the cumulative case were analyzed according to these criteria. This approach helps the reader separate subsistence restrictions that could be caused by activities proposed under the four alternatives, including the no action alternative, from those that could be caused by past, present, or future activities that have occurred or could occur in the surrounding area.

An alternative would be considered to significantly restrict subsistence uses if, after consideration of protection measures, such as lease stipulations or required operating procedures, it can be expected to substantially reduce the opportunity to use subsistence resources. Substantial reductions are generally caused by large reductions in resource abundance, a major redistribution of resources, extensive interference with access, or major increases in the use of those resources by non-subsistence users.

If the analysis determines that the proposed action, alternatives, or the cumulative case may significantly restrict subsistence uses, the head of the Federal agency having jurisdiction over the federal public lands in question is required to conduct ANILCA Section 810 hearings in potentially affected communities. It is possible that the finding may be revised to “will not significantly restrict subsistence uses” based on changes to alternatives, new information, or new mitigation measures resulting from the hearings.

If the significant restriction remains, the head of the Federal agency having jurisdiction may not approve an action alternative until the State of Alaska and appropriate regional and local subsistence committees are notified, and the following determinations are made:

- A significant restriction of subsistence uses would be necessary, consistent with sound management principles for the use of public lands;
- The proposed activity would involve the minimal amount of public land necessary to accomplish the purpose of the use, occupancy, or other disposition; and,
- Reasonable steps would be taken to minimize adverse effects on subsistence uses and resources resulting from such actions (Section 810(a)(3)).

B. ANILCA Section 810(A) Evaluations and Findings for All Alternatives and the Cumulative Case

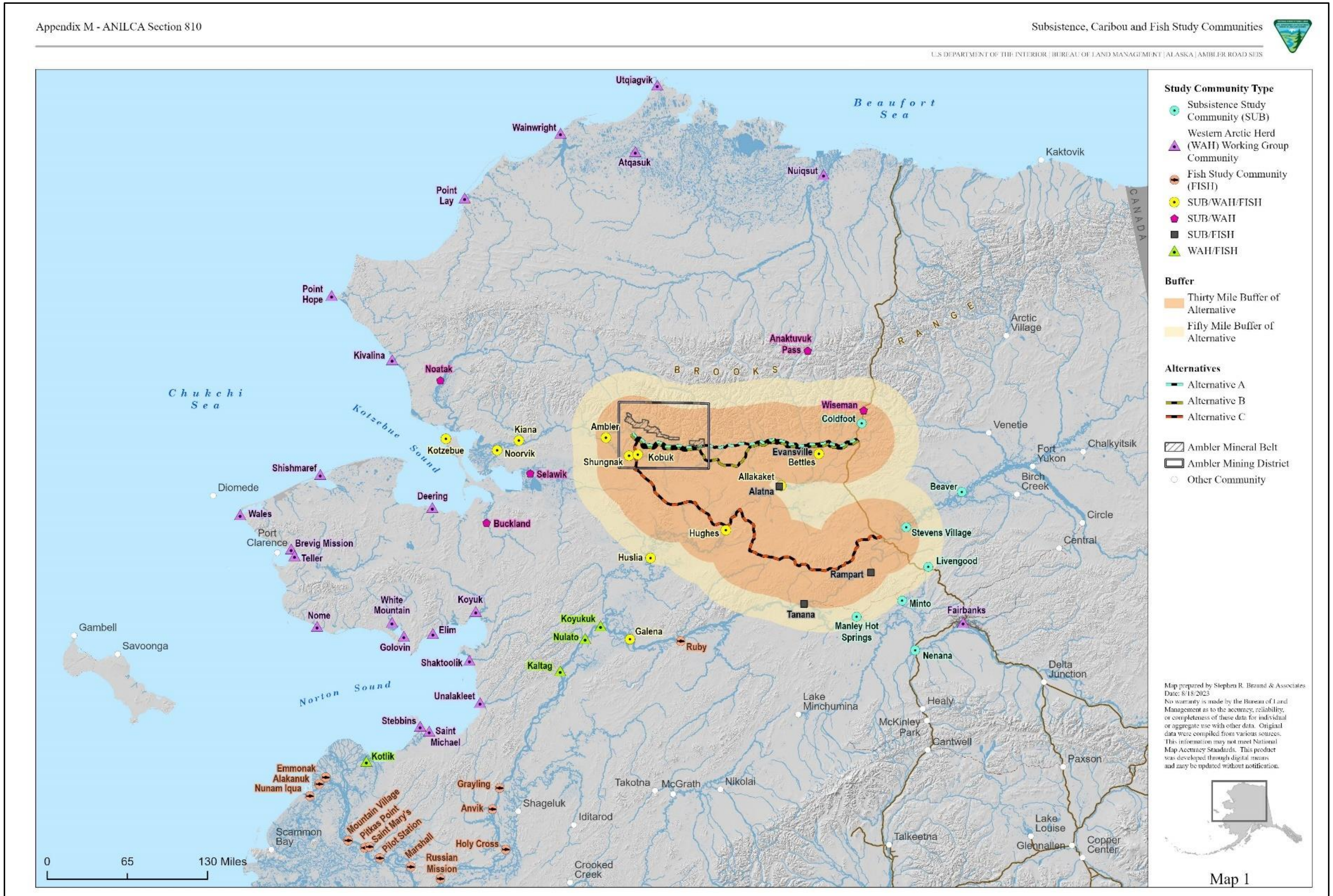
Chapter 2 of the Supplemental EIS includes a detailed description of the sequencing of construction, operation and maintenance, and decommissioning of the road. Road construction includes procurement and use of gravel resources, timing of construction, construction equipment and uses, personnel camps and support logistics, including air traffic support for personnel and material. Construction of the road would be in three separate phases, projected to span 10 years, except under the phasing option that would construct the road over two phases and reduce overall construction time by one to two years. Operations and maintenance include mine operations, material and ore transport, transport of fuel and chemicals, maintenance of material sites and facilities and communications. Decommissioning includes the proposed decommissioning of the project and potential reclamation. The evaluation and findings following this introductory section include short summaries of the alternatives descriptions otherwise described in detail in the Supplemental EIS.

Chapter 3 of the Ambler Road Supplemental EIS describes the current environmental status of the project area and potential effects of the alternatives to subsistence and subsistence resources in addition to the indirect and cumulative impacts of the road. Appendix L of the Ambler Road Supplemental EIS: Subsistence Technical Report provides detailed information regarding subsistence uses for the study communities and in the project area, as well as a detailed analysis of potential impacts. This Section 810 analysis uses the above information from the Supplemental EIS to evaluate potential impacts to subsistence pursuant to Section 810(a) of ANILCA.

While the original EIS analyzed impacts to 27 primary study communities, the Supplemental EIS analyzes impacts on 66 study communities, including the 27 primary subsistence study communities, caribou subsistence study communities, and fish subsistence study communities. These are shown in Appendix F, Table 23 of the Ambler Road Supplemental EIS and on Map 1. Primary subsistence study communities are those located within 50 miles of the project alternatives, or with subsistence use areas documented within 30 miles of the project alternatives; there are 27 of these primary study communities. In addition to the primary subsistence study communities, the Supplemental EIS analyzes communities who may experience indirect and/or downstream impacts resulting from changes in caribou and fish abundance, distribution/migration, and health. For caribou, these are the 42 communities that are members of the Western Arctic Caribou Herd Working Group (WAH WG). For fish, these are the 32 communities that are located downstream from where the project crosses tributaries in the Kobuk, Selawik, Koyukuk, and Yukon River basins. The caribou and fish study communities include overlap with one another and with the primary subsistence study communities. Subsistence is a fundamental component of maintaining the study community's traditional cultural connection with the natural world. To these communities, subsistence is more than an act of sustaining themselves, it is a part of their well-being, it serves as a connection to their ancestors, and ensures that cultural knowledge is being transmitted to the next generation. As indicated by anthropologist Richard Nelson regarding subsistence on the Koyukuk River,

> *Perspectives of nature are aligned on two interconnected levels. The first is empirical knowledge. The practice challenges of survival by hunting, fishing, and gathering required a deep objective understanding of the environment and* the methods for utilizing its resources….But their perception of the natural environment extends b*eyond what Westerners define as the empirical level, into the realm of the spiritual….Ideology is a fundamental element of subsistence, as important as the tangible practicalities of harvesting and utilizing natural resources. Most interactions with natural entities are governed in some way by a moral code that maintains proper spiritual balance between the human and nonhuman worlds* (Nelson 1983:15–16).

For the Koyukuk River Dene and Kobuk River Iñupiat, the Indigenous populations which compose much of the study region, traditional stories begin in the "distant or before time" known as *Kk'adonts'idnee* (Koyukon Dene) and *Taimani* (Kobuk River Iñupiaq) (Attla 1990, 1996; Attla and Davis 1983; Cleveland and Foot 1980; Nelson 1983; Watson 2018). During the distant time, the natural world (rocks, flora, water, etc.), animals, and humans were all the same, and shared similar personalities and attributes. When distant time ended, the natural beings were unable to transform back into their human-like forms, however these beings retained the vestiges of their former personalities within their spirit (Cleveland and Foote 1980; Nelson 1983). Indigenous peoples of the study region recognize how to properly treat the natural world according to the different personality types from the before time. They also know how these spirits may interact with them and this is vital for retaining subsistence practices, cultural norms, and spiritual well-being. For example, in Koyukon Dene children should not eat blackfish because it is said blackfish are slow and lazy and if children eat blackfish they will too become slow and lazy (Attla 1996). Thus, in Dene and Kobuk River Iñupiaq subsistence also is an act of respecting and honoring their ancestor's knowledge and carrying on this knowledge regarding the natural world to the next generation. During Government-to-Government consultation, communities stressed that without the ability to subsist, these deep-rooted religious beliefs would be impacted.



Map 1. Subsistence, Caribou, and Fish Study Communities

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The evaluation of potential impacts to subsistence resources was conducted by identifying impact indicators and analyzing potential impacts of the proposed road and its alternatives on subsistence uses. These impacts were compared to the following three subsistence impact categories: resource abundance, resource availability, and user access. Two impact indicators were identified that could be quantitatively measured for the primary subsistence communities: resource importance and subsistence use areas. Resource importance is measured in three categories: high, moderate, and low. Resource importance is established by analyzing harvests from the potentially affected communities based on available subsistence harvest data. Subsistence use areas were quantified from years of subsistence use data collected primarily by ADF&G. A detailed discussion of this methodology is available in Appendix L of the Ambler Road Supplemental EIS: Subsistence Technical Report, Section 5. For the caribou and fish study communities, the focus is more on the importance of the resource to the study communities, as these study communities have been included to address more indirect or downstream impacts on the community, and less on project overlap with subsistence use areas.

These impact indicators are based on NEPA guidance, which requires consideration of both context and intensity when assessing significant impacts (40 Code of Federal Regulations 1508.27). By understanding the relative importance of each subsistence resource and/or the location of where these subsistence resources are used, as well as the context and intensity of impacts to subsistence resources and activities, vulnerable impacts from the proposed project can be better analyzed.

Subsistence uses and resources are discussed in detail in the Ambler Road Supplemental EIS Section 3.4.7 and in Appendix L (Subsistence Technical Report). Tables 43–46 in Appendix L of the Ambler Road Supplemental EIS illustrate the resource importance to each community whose subsistence use area would potentially be affected by the proposed road, by alternative. Table 47 (see Appendix L) summarizes the number of communities with use areas crossing the project, by alternative, and Tables 48 and 49 (see Appendix L) provide the resource importance of caribou and key fish species (Chinook salmon, chum salmon, and sheefish) to the caribou and fish study communities. Each alternative of the proposed road is evaluated for the availability, abundance, and access to subsistence resources of importance to communities: caribou, moose, fish (salmon and non-salmon), vegetation, and other resources (large land mammals, marine mammals, migratory birds, etc.).

B.1. Evaluation and Findings for No Action Alternative

Under the No Action Alternative, the BLM would not grant a ROW. The No Action Alternative provides a baseline against which impacts under other alternatives can be evaluated.

B.1.1 Evaluation of the Effect of Use, Occupancy or Disposition on Subsistence Use and Need

Under the No Action Alternative, there would be no reduction in the abundance of harvestable resources (caribou, moose, salmon, non-salmon fish, vegetation, and other) used for subsistence purposes. There would be no adverse impacts on wildlife habitats, direct impacts on subsistence resources, or increased harvest and increased competition from non-subsistence users resulting from construction of a large industrial road. There would be no reduction in the availability of subsistence resources caused by an alteration in their distribution, migration, or location. There would be no limitation on the access of subsistence users to harvestable resources, including physical and legal barriers. Under the No Action Alternative, small scale mining exploration and development would likely continue to occur in the area but at much lower levels than under the action alternatives. Air traffic to support mineral exploration would continue at lower levels under the No Action Alternative and may cause deflection of subsistence resources such as caribou and moose, but at lower levels than under the action alternatives.

B.1.2 Evaluation of the Availability of Other Lands

Under the No Action Alternative, construction and operation of the road would not occur on federally managed public lands. Therefore, there would be no need to evaluate other lands for the access road.

B.1.3 Evaluation of Other Alternatives That Would Reduce or Eliminate the Use, Occupancy or Disposition of Public Lands Needed for Subsistence Purposes

Under the No Action Alternative, construction and operation of the road would not occur. Therefore, there would be no need to evaluate other ways to accommodate the proposed action.

B.1.4 Findings

The No Action Alternative would not result in a significant reduction in the availability or abundance of subsistence resources, nor would it alter or restrict subsistence uses. A positive determination pursuant to ANILCA Section 810 is not required.

B.2. Evaluation and Findings for Alternative A (AIDEA Proposed Route (GAAR North) to the Dalton Highway)

Alternative A is AIDEA's proposed route. This Alternative is a 211-mile alignment, accessing the District from the east, with its eastern terminus at MP 161 of the Dalton Highway. It is a total length of 456 miles to Fairbanks. It runs almost directly west to the District across primarily state-managed, BLM-managed, and NPS-managed lands. The ROW would traverse the south side of the Brooks Range, following a series of stream and river valleys oriented roughly east-west, separating the Schwatka Mountains from a series of smaller mountain ranges and foothills, including the Ninemile Hills, Jack White Range, Alatna Hills, Helpmejack Hills, Akoliakruich Hills, Angayucham Mountains, and Cosmos Hills. This route crosses GAAR farther north than Alternative B. See Ambler Road Supplemental EIS, Volume 4, Map 2-3.

B.2.1 Evaluation of the Effect of Use, Occupancy or Disposition on Subsistence Use and Need

Subsistence Resource Abundance

Construction and operation of Alternative A could result in impacts to the abundance of subsistence resources. Construction activities could affect resource abundance through removal or disturbance of spawning and other fish habitat, calving and other caribou habitat, foraging, and nesting habitat. These activities include blasting/mining, operation of construction equipment, excavation, placement of gravel, construction noise, human presence, water withdrawal, installation of bridges and culverts, placement of a winter construction access trail (e.g., ice roads, bridges, and ice pads) during initial road construction, and air and ground traffic. Operation activities that could affect resource abundance include the presence of roads and bridges (e.g., habitat fragmentation), the presence of other infrastructure (e.g., communications towers, culverts), fuel or other contaminant spills, dust deposition, road and air traffic, and human activity. Road construction and operation activities may cause direct mortality to individual animals (e.g., caribou, fish, moose, waterfowl) through vehicle and aircraft collisions, pile driving, and blasting. Construction and operation activities as described in the proposed road Supplemental EIS Section 3.4.7 could affect abundance by causing:

- direct mortalities;
- loss, degradation, and fragmentation of habitat; and
- Contamination.

Alternative A crosses subsistence use areas for 12 subsistence communities (Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Coldfoot, Evansville, Hughes, Kobuk, Selawik, Shungnak, and Wiseman). The communities of Bettles, Evansville, Shungnak, Ambler, Coldfoot, Kobuk, and Wiseman all have five or more resource uses crossed by the Alternative A project area.

Potential impacts to resource abundance for individual subsistence resources are discussed below.

Caribou

Caribou is the most commonly harvested large land mammal available to many of the potentially affected communities (Supplemental EIS Section 3.3.4, Mammals). The Western Arctic Caribou Herd is the primary herd that occurs in the project area, with seasonal migrations occurring during the spring and fall, as well as wintering habitat occurring in the project area. The Western Arctic Caribou Herd population has declined substantially in recent years, adding to concerns about the potential impact of a road on the health of the population (Government-to-Government and Village Public Meetings). The 2023 census estimated the Western Arctic Caribou Herd population at 152,000 caribou, its lowest point in decades (Supplemental EIS Section 3.3.4, Mammals). During Government-to-Government consultation, all WAH WG communities expressed deep concern over the population decrease and stressed their fears that construction and use of the proposed road may further decrease the population. WAH communities indicated if the caribou disappeared from their resource use areas it would cause loss of traditional knowledge and fragmentation in the community as more people would leave to find jobs in urban areas.

Because of the large range of the Western Arctic Caribou Herd, impacts to resource abundance could extend beyond the project area to other communities that hunt from the Western Arctic Caribou Herd; this could include any of the 42 caribou study communities but would be particularly likely for communities for which caribou is a resource of high importance (see Appendix L, Table 48). Of the 42 caribou study communities, 30 have over 50 percent of households using caribou. On average, caribou contributes approximately 25 percent of the total annual subsistence harvest for the study communities (see Appendix L, Section 5.6). In 27 of the 42 caribou study communities, caribou is a resource of high importance (see Appendix L, Table 48). Some communities have reported a decline in resource harvests in recent years due to changes in the distribution and migration of the caribou herd. These communities may increase their reliance on caribou in the future if the Western Arctic Caribou Herd becomes more available within their traditional harvesting areas.

Alternative A passes through key migratory range of the Western Arctic Caribou Herd, including fall migratory and wintering habitat. Alternative A does not occur within the range of the Ray Mountains Herd or the Hodzana Hills Herd, although increased traffic along the Dalton Highway may result in an increase in mortalities for the Hodzana Hills Herd. Direct mortalities of Western Arctic caribou could occur as a result of vehicle strikes, with up to 168 trips per day expected during peak mine production. This would be most likely in the western portion of the road corridors, where caribou density is highest. While direct mortalities may occur, the significance of individual collisions on the herd population would be minor. Potential mitigation measures requiring that vehicles slow down or stop when wildlife are crossing, and temporary cessation of traffic by the Authorized Officer during known caribou migration, would help reduce mortalities resulting from the road (Supplemental EIS Appendix N, Section 3.3.5).

In addition to direct mortalities, habitat fragmentation could result in decreased abundance of caribou over time. The proposed road runs perpendicular to the primary direction of movement (north/south) for the Western Arctic Caribou Herd, making it more likely to affect caribou migration. Caribou would cross Alternative A during the fall, winter, and spring. While the project represents a small proportion of the total Western Arctic Caribou Herd range, a substantial portion of the Western Arctic Caribou Herd encounter the project area annually. Fragmentation of the range resulting from a road may be more pronounced because the Western Arctic Caribou Herd has had less exposure to development infrastructure and activities than other herds such as the Teshekpuk and Central Arctic herds (see Supplemental EIS Section 3.3.4, Mammals). If fragmentation limits caribou seasonal movements, it could result in large negative impacts on caribou survival and productivity. Caribou may see the road as a physical barrier that may alter their behavior or shift their migratory patterns. This may lead to a change in body condition due to increased energy expenditure (Sullender 2017). Increased energy expenditures may result in reduced foraging rates and, ultimately, decreased breeding success/pregnancy rates. In addition, caribou migration may be altered to the point where winter survival and calving success are affected. These would both have major impacts on the herd population. Contamination may also affect caribou abundance. Individual caribou may become ill through ingestion of chemicals used during construction or mining. In particular, declines in lichen cover as a result of fugitive dust along the road could affect foraging rates for caribou.

Moose

Under Alternative A, the proposed road corridor crosses subsistence moose hunting areas for nine communities. Moose is considered a resource of high importance for five of the subsistence study communities (Alatna, Allakaket, Bettles, Evansville and Wiseman), and of moderate importance for three communities (Ambler, Kobuk, and Shungnak) (see Appendix L, Table 42). In some caribou study communities, moose have supplanted caribou as the primary large land mammal harvested, as caribou have become less available (see Appendix L, Section 6.4.1). Since moose have smaller ranges than caribou, impacts to resource abundance of moose would be more localized and most likely to affect communities whose use areas are crossed by the proposed road corridor.

Direct mortalities could occur during construction and operation from vehicle-moose collisions. An estimated 168 trips on the road daily would substantially increase the probability of a collision. This probability would be the same all year long. Moose may also be attracted to the ROW as a movement corridor, particularly during periods of deep snow, or because of the availability of new vegetation in maintained areas of the ROW (Section 3.3.4). This could result in higher rates of injury or mortality due to traffic collisions. Construction would also affect moose through removal or disturbance of habitat; however, some habitat disturbance can be beneficial to moose as it encourages successional growth.

Fish

Key fish species within the project area include multiple species of whitefish, sheefish, Chinook salmon, and chum salmon and, to a lesser extent, cisco, northern pike, Arctic grayling, and burbot. Under Alternative A, the proposed ROW would cross subsistence fishing areas for seven communities: Shungnak, Ambler, Kobuk, Alatna, Allakaket, Bettles, and Evansville. Fish is considered a resource of high importance to all these communities (see Appendix L, Table 46; Government-to-Government; personal communication). In addition to the above communities for who the proposed ROW would cross subsistence fishing areas, communities upstream and downstream that rely on salmon, sheefish, and other fish species (Hughes, Huslia, Anaktuvuk Pass, Wiseman, Buckland, Kiana, Noorvik, Selawik, Noatak and Kotzebue) could experience impacts to the abundance of fish harvest if larger impacts to fish movement, reproductive success, or health occur (Supplemental EIS Section 3.3.2, Fish and Aquatics). Traditionally certain members of these communities spent their entire summers fishing along the Kobuk and Koyukuk River and tributaries, including rivers crossed by Alternative A (Anderson et al. 1998; Nelson 1983; Nictune 1988). Fishing and preparing dried and smoked fish are cornerstones of the traditional diet and continue to play a major role in the subsistence lifestyle of these communities (Georgette and Shiedt 2005).

Salmon are particularly important to communities along the upper Kobuk River. According to "fish stories" told by the late Elder Nasruk (Robert) Cleveland of Shungnak, salmon travel up the Kobuk River to their spawning spots to "leave their old boats (or bodies) there."

> *As soon as they finish spawning, they age and their teeth become bared. It may be that this isn't so noticeable as they migrate, but when they age, their teeth do become bared…The old people also said that the salmon don't actually die. This knowledge must have been passed down for many many generations by word of mouth. They said that salmon leaves its old boat, or physical body, and enters the body of a land animal* [typically bear]. *They then travel overland to the north until they reach the ocean, where they depart from the shore, once again in the form of a salmon. This is what they people said about them long ago* (Cleveland and Foot 1980:55).

Stories told by Elders of the Upper Kobuk identify salmon as a fundamental aspect of the yearly cycle, as salmon bodies are primarily consumed by bear and then carried back to the coast to begin the cycle anew; without access to salmon the large land animals in the region would also suffer (Cleveland and Foot 1980). Kobuk residents also rely heavily on whitefish and sheefish runs, during Government-to-Government consultations, the Upper Kobuk communities shared concern about key spawning rivers and lakes that would be downstream of the proposed Alternative A corridor. Additionally, late Elder Joe Sun of Shungnak recalled the importance of the Ambler, Kogoluktuk, and Mauneluk rivers for Arctic grayling; stating,

> *You can stop anyplace along the way on one of those rivers and fish for grayling..we would have to carry hooks with us to at all times because there's always grayling* (Sun 1983).

Residents of Alatna, Allakaket, Bettles, and Evansville rely less on salmon because salmon are infrequent and 'spawned out' when they reach the upper Koyukuk River communities. Instead, these communities have come to rely heavily on whitefish, sheefish, and Arctic grayling. As stated by multiple Allakaket residents in Government-to-Government consultations:

> *Can we add different species of fish to our concerns (regarding the SEIS)? We started getting low salmon counts over 15 years ago…Grayling stay here through the winter.*
>
> *I understand that for whitefish, all measures would be taken to protect the whitefish. I hope that can be added because this has been expressed before, the people are not dependent on king salmon, but they are on whitefish.*
>
> *My dad was ice fishing and he started to do that back in November, and in the span of a month he only caught 20 fish; that's not much. That's a very grave concern for us.*
>
> *Every year I catch 10-15 sheefish during the sheefish run, this year I didn't catch any.*

In addition to the above communities that have documented use of the rivers crossed by the proposed project corridor, impacts to resource abundance could extend to other fish study communities that harvest whitefish, sheefish, Chinook salmon, or chum salmon downstream from the road corridor (Supplemental EIS Section 3.3.2, Fish and Aquatics). Twenty-four of the 32 fish study communities have a high material and cultural reliance on one or more of the key fish species (whitefish, sheefish, Chinook salmon, and chum salmon) (see Appendix L, Table 49).

The Native Village of Kotzebue commented that these resources are essential to the livelihood of the community of Kotzebue, particularly due to the fact that they are inexpensive to harvest and are available throughout the year:

> Healthy and abundant sheefish and salmon require pristine watersheds free from silt and contaminants, in addition to sufficient water flows and unfettered access to the most remote parts of the Kobuk River for their annual spawning runs. Salmon are critical to our members, representing a major source of income and subsistence resources necessary for their continued quality of life and livelihood. Sheefish are a major part of the annual cycle of subsistence for our members as they are commonly harvested near Kotzebue for the majority of the year. They somewhat uniquely represent an egalitarian resource, in that they are easily harvested for much of the year by the entire community because of their proximity and without requiring scarce, or expensive, methods and means. Whitefish that feed in the summer in coastal lagoons of Kotzebue Sound and continue to be harvested as a treasured food by our members, also use the Kobuk River and its tributaries for spawning and overwintering purposes, as do Dolly Varden char. (Native Village of Kotzebue 2018)

Impacts to fish under Alternative A could include:

- direct mortality;
- spawning habitat loss and degradation;
- increased turbidity from sedimentation and erosion;
- contamination from accidental spills; and
- introduction of invasive species.

Fish may experience direct mortality through certain activities such as pile driving, sedimentation, and stream diversions. These actions may alter or degrade fish habitat thereby reducing egg survival downstream. Large amounts of water would be required for temporary ice roads and pads and other construction and maintenance activities and would be withdrawn from lakes or large rivers near the proposed road corridor. The late Elder Nasruk (Robert) Cleveland remarks on his observations of water level drop and salmon decline throughout his life on the Upper Kobuk River. He states that once water levels start to drop the salmon start to spawn in *tunuġutit* (waterways behind sandbars) and that the eggs then die when the water levels drop any amount.

> *I journeyed up the river and saw many salmon die. I think that the number of salmon decreased when they started entering the creeks behind the sandbars because that is where they spawned upon entering. However, the water level goes down and the eggs end up on the dry creek bed. Although water level fluctuates, the eggs do not have a chance to develop properly, thus resulting in less number of salmon. I have seen what happens to the salmon that migrate up the Kobuk River and die in the Upper Kobuk area* (Cleveland and Foot 1980:56).

Water withdrawal in itself may kill individual fish but would likely not have large effects on the abundance of resident and anadromous fish populations, as ADF&G's fish habitat permits include requirements for water intakes to avoid fish injury and maximum amounts of water withdrawn from each water source (see Supplemental EIS Section 3.3.2, Fish and Aquatics). Sedimentation, especially when increased over naturally occurring levels, adversely affects habitat quality and function. Increased fine sediments can smother incubating eggs, decrease fry emergence, reduce the amount of suitable habitat for juvenile fish, and decrease benthic community production (Limpinsel et al. 2017). Elevated turbidity from suspended solids diminishes habitat quality, and may decrease primary production, elevate water temperatures, and affect feeding behavior; large plumes can damage gills and impair organ function (Limpinsel et al. 2017). Road construction and operation can contribute to thawing of permafrost which could cause thaw slumps along river and stream banks. Increased thawing of permafrost along the road could result in slumping along riverbanks which could also degrade water quality and affect fish abundance. Slumping could increase sedimentation, degrade water quality, and affect fish spawning habitat (Section 3.3.2, Fish and Aquatics). Tribal councils remarked on the increased slumping occurring along the Koyukuk, Alatna, and Kobuk rivers occurring in their lifetime. The councils attributed the slumping to global warming and also tied the slumping to the declining fisheries in their regions. The councils were concerned that further slumping would harm spawning fish particularly along the Alatna and Upper Kobuk rivers. Overall, increased sedimentation from construction and operation activities and infrastructure, particularly in spawning grounds, can smother eggs, alter feeding habitat, and decrease fish production. If sedimentation increased in any of the spawning areas, there would be a significant impact to spawning success.

Removing gravel from a stream channel changes the structure of its natural habitat for aquatic species, sediment transport dynamics, and flow processes; degrades quality and habitat function upstream and downstream of mined areas; and alters fish and invertebrate communities (Brown et al. 1998). Removing streambed gravel from relic channels in the floodplain would degrade habitat quality by reducing habitat complexity and altering dynamics, which may affect survival rates of incubating eggs (Kondolf et al. 2002). Adverse impacts to fish may be fairly localized during the activity, although the full magnitude of effects is difficult to quantify given the lack of specific gravel extraction methods and plans. Studies have shown that attempts to mitigate or restore streams impacted by gravel mining may be ineffective because impacts often extend kilometers upstream and downstream of mined sites (Brown et al. 1998). Gravel mining near sheefish and other whitefish spawning areas would have especially negative consequences to fish populations, since these fish have specific spawning requirements and large numbers of fish spawn in relatively small, distinct areas.

The presence of the road in addition to related culverts, bridges, and gravel infrastructure would also alter and degrade fish habitat both upstream and downstream from the road, which could affect fish abundance for subsistence users in certain waterways crossed by the road corridor. Bridges and culverts would eliminate and alter fish habitat (see Supplemental EIS Section 3.3.2, Fish and Aquatics). Culverts would eliminate portions of natural stream channels by routing flow underneath the roadway embankment. The project proponent proposes to use stream simulation design principles that more replicate natural stream conditions, which will minimize but not eliminate impacts to waterways. Replacing natural habitat with culverts and confining flow through culverts and bridges would reduce habitat complexity, increase sedimentation and scour potential, and degrade habitat quality both upstream and downstream throughout the life of the road.

The Kobuk and Alatna rivers are key spawning grounds for sheefish and whitefish and are also important fishing areas. The upper Kobuk River supports the largest spawning concentration of sheefish in Alaska. Sheefish habitat is limited with only 13 documented spawning areas in Alaska (Underwood et al. 1998; Brown et al 2012; Savereide and Huang 2016; Stuby 2018). Sheefish require specialized spawning habitat limited by water temperature, substrate composition, and specific water quality characteristics influenced by geologic features (Alt 1994; Braem et al. 2015; Savereide and Huang 2016) (see Volume 4, Map 3-18). They typically exhibit a high degree of spawning site fidelity, not only to spawning streams but to specific areas within a reach of stream (Savereide and Huang 2016). Maintaining spawning habitat is critical to the survival of the Kobuk and Yukon rivers sheefish and whitefish populations because a large fraction of any given spawning population may spawn in a small, distinct geographic area. When the

BLM visited the Native Village of Kobuk in early June 2023 for a public meeting, multiple community members remarked that they wished their oldest community member would attend, but she likely wouldn't because she was out by the river getting her nets ready for fishing. Surprisingly, the 88-year-old Elder took a break from net fixing and joined the meeting. Speaking in Iñupiaq, while her niece translated, the Elder remarked that her childhood was spent living on the Upper Kobuk with her family at summer fish camp and then in the winter moving to the Ambler Lowlands to hunt caribou. The Elder commented particularly on the extensive use of fish including salmon, whitefish, and sheefish by the community and her concern for the future health of the species. She remarked if these fish were impacted it would impact her children's ability to continue the traditional subsistence lifestyle.

The Alatna River is the most important spawning area for sheefish and other whitefish species in the upper Koyukuk River drainage (see Supplemental EIS Section 3.3.2, Fish and Aquatics). The ROW would cross both the Kobuk and Alatna river drainages under Alternative A. If construction removed suitable spawning habitat directly, the loss would cause a decrease to spawning success. Alternative A also crosses streams in the Upper Koyukuk drainage (Alatna River, Henshaw Creek, North Fork Koyukuk River, Wild River, John River), which support spawning for Chinook, chum salmon, and whitefish. Chum salmon is a resource of high importance in most communities in the Kobuk-Selawik, Koyukuk, and Yukon river basins. For many Yukon River communities, Chinook salmon is a resource of high importance (see Supplemental EIS Appendix F, Table 22) and is also a resource of yield concern to the ADF&G. A member of the Western Interior Regional Advisory Council provided the following observations about water quality, salmon spawning, and the importance of smaller clearwater tributaries:

> All my life I never did catch a fish in the silt water at all. So it's something to think about. I hope they think about it because you come in here and older Natives that are alive right now they always say they don't know what they're talking about. For them to be 70, 80 years, they know what they're talking about. They never did catch a salmon in those silt water places. It's all flats, so there's no drainages that run up into the mountains. Once you start going into elevation, that's where you're going to find your salmon. (Western Interior Federal Subsistence Regional Advisory Council 2022b)

Potential contamination of sheefish, whitefish, salmon, and other fish species spawning grounds and other habitat are of particular concern to the study communities. Spills have the potential to substantially degrade habitat quality and affect the long-term health of individual fish and fish populations. Habitat located in the vicinity of road crossing sites, which includes spawning, rearing, feeding, wintering, and migratory habitat, would be most susceptible to contamination from potential spills. Such a spill, particularly if near a stream, would substantially alter water chemistry, cause fish mortality, substantially degrade habitat quality and function, and cause population-level effects.

The introduction of invasive species could also impact fish habitat and/or productivity. Unlike other ROW impacts that are expected to be more short-term, the introduction of invasive species could become a long-term impact if their spread is uncontrolled. This would cause a significant effect because of the long-term nature of the impact.

While it is not possible to predict the exact location and magnitude of impacts to fish resulting from road construction and operation, sheefish may be particularly vulnerable to population-level impacts as their spawning grounds are particularly sensitive to changes in water velocity, temperature, pH, and other factors. Salmon spawning habitat is also vulnerable in changes to water chemistry.

Potential mitigation measures that may reduce potential impacts to fish abundance include erosion and sedimentation measures to minimize sedimentation impacts to fish habitat; culvert and bridge inspection and maintenance plans; and restrictions on the use of potentially harmful dust suppressants or pesticides within 328 feet of fish-bearing streams and high value wetlands (Supplemental EIS Appendix N, Sections 3.3.3, 3.4.7).

Vegetation

Alternative A crosses vegetation subsistence use areas for seven study communities (Bettles, Coldfoot, Evansville, Alatna, Kobuk, Shungnak, and Wiseman), and vegetation is considered a resource of high importance to all of these communities. The Wiseman and Coldfoot subsistence use areas are located on the periphery of the project area or are isolated use areas. Subsistence and usable vegetation of primary concern (as indicated in Government-to-Government and personal communication with the BLM) include multiple berry species (raspberries, blueberries, cranberries), wild edible plants still used by the communities such as *masu* (Hedysarum *alpinum*: alpine sweetvetch), and wood (spruce and birch) used for construction of traditional use items and firewood.

Residents of the Native Village of Kobuk indicated that they traverse up the Kogoluktuk River and across the Ambler Lowlands for berry picking. One Kobuk Elder also indicated that she and her family pick berries along the mountain ridge overlooking Kollioksak Lake and within the Alternative A corridor. On the eastern extent of Alternative A, during a trip to the Alatna River with BLM personnel, two Alatna Village residents reminisced on their grandmother's multiple solo journeys on the Alatna River. When BLM employees asked what their grandmother subsisted on along the way, the cousins were quick to point out she knew which bend of the rivers contained edible wild plants especially blueberries and raspberries. Within the Alternative A corridor, the Alatna residents pointed to multiple raspberry patches they still gathered from during hunting trips. Alatna and Allakaket residents also talked about gathering *masu* on the Alatna River during the early spring and fall. Additionally, along the project corridor there are multiple Iñupiaq Place Names indicating the area is a good place for gathering wood (NPS placename database), including south of Walker Lake and along the Reed River. When the BLM visited the Native Village of Kobuk in spring 2023 residents were travelling up the Kogoluktuk River to the Alternative A corridor to collect firewood.

Construction and operation activities that may affect the abundance of vegetation, including berries, wild plants, and wood include:

- clearing of the ROW;
- fugitive dust; and
- contamination from accidental spills.

ROW construction would result in the removal of vegetation harvesting areas for residents. Communities along the proposed road corridors may also experience reduced availability of vegetation in traditional harvesting areas during and after construction of the road. This may lead to an overall decline in the abundance of harvestable vegetation. Permanent loss of native vegetation would occur from construction of the main road, landing strips, material and rip-rap sources, and construction access roads, due to vegetation clearing and the placement of gravel fill. Loss of vegetation through an undisturbed landscape would result in several effects to the surrounding environment, including alteration of adjacent vegetation community composition and loss or alteration of fish and wildlife habitat. Removal of native vegetation in this area, particularly in boreal forest, could take decades to recover (Supplemental EIS Section 3.3.1, Vegetation and Wetlands).

Spills have the potential to substantially degrade vegetation. Vegetation located in the vicinity of road would be most susceptible to contamination from potential spills. Introduction of toxicants from petroleum products associated with vehicle use and road run-off can impact vegetation (see Supplemental

EIS Section 3.3.1, Vegetation and Wetlands). Accidental spills along the ROW may reduce harvestable vegetation in the direct vicinity of the road.

Other Resources

Other subsistence resources such as Dall sheep, bear, muskoxen, small land mammals, marine mammals, migratory birds, upland game birds and eggs are considered of moderate or low importance or have fewer communities depending on them for subsistence (Supplemental EIS Section 3.4.7, Subsistence Uses and Resources). Despite the relatively low harvest counts for these resources, subsistence activities associated with the resources remain integral for cultural transmission and the well-being of the study communities. Impacts to availability of these resources in traditional subsistence locales may impact communities' ability to transmit cultural knowledge.

To the Koyukon Dene, bears are spiritually powerful and acquiring bear meat is integral to potlaches in honor of the deceased. Black bears and brown bears are considered mostly equal in their spiritual power, but black bears are far more significant to the subsistence economy. Black bears rank high as an esteemed food and as ceremonial delicacy. If a black bear hunt is successful there is a ceremonial feast or "bear party" held, additionally this bear meat is saved for potlaches and is used in communication with the dead (Nelson 1983). Bears are held in extremely high regard and never spoken of casually, women generally don't talk about bears or mention their name (Nelson 1983; Allakaket personal communication). Bears are traditionally hunted while hibernating in the den however, more often today they are hunted in the late fall before hibernation. Alatna and Allakaket residents relayed that they find a bear trail to the river and hide by the trail at night until the bears come down to the water. As the bear walks the trail they are shot. Bears are regularly hunted along the Upper Koyukuk and Alatna rivers. The locations of bear dens, which are often used year after year, are known to residents, and these locations are passed down through Indigenous Knowledge. Steven Attla, Sr., of Huslia, noted that some bear dens are so well known that they have names. He described a particular bear den where his grandfather had harvested a bear in the 1800s, and people were still harvesting bears at that den when he was a child. Bear dens can be an important reliable source of meat for residents when other resources are scarce (Attla 1995).

Bears are also hunted along the Upper Kobuk. One Native Village of Kobuk resident indicated he participates in bear hunting trips traveling by boat in the late fall up the Kobuk River towards the Walker Lake headwaters and up the Mauneluk River to Avaraart Lake. Effects from construction and operation activities from the proposed road may impact the availability of bears to be taken in traditional hunting areas like the Upper Kobuk, the Koyukuk, and Alatna rivers. The lack of availability of these resources in traditional hunting locations, including traditional black bear dens, may impact the subsistence and ceremonies associated with hunting bear.

Similarly, Dall sheep are considered culturally powerful entities especially to the Upper Kobuk and Alatna Village residents. Sheep are hunted in the fall in the Brooks Range and are used for ceremonial potlaches. Boys participating in their first sheep hunt with the older men is an extremely important rite of passage (Nictune 1988). One Alatna village resident recalls killing his first sheep and taking the sheep's horns to a special mountain where all the men in the community had been taking the horns for generations. He recalled the horns are lined up overlooking a valley and the first horn is so old and degraded it is no longer visible. This was how long his family had been hunting sheep in the area (Alatna resident personal communication). Sheep are generally hunted to the north of the proposed road, and the construction and operation of the road would likely have little immediate impact on the availability of sheep.

Winter trapping of furbearers is important to the subsistence round of the study communities and provides products for making traditional clothing and can contribute to the local cash economy. Local traplines are likely to occur along the Alternative A route and the construction and operation could impact the availability of the resource by direct mortality or contamination. Additionally, the lack of availability of these resources in traditional trapping locations may impact the overall use of the small furbearing animals.

Overall the likelihood of large-scale impacts to the abundance of these other resources is relatively low. Impacts from construction and operation could occur and would be similar to those discussed for the resources above. Potential impacts to resource abundance of other resources include direct mortality or contamination of resources such as waterfowl and small land mammals. A large-scale spill could have more wide-ranging effects if the spill contaminates water and/or reduces the availability of fish, affecting resources that feed in downstream waters (e.g., marine mammals such as seals and beluga, birds, bears, and muskoxen).

Subsistence Resource Availability

Subsistence activities and harvests are key to rural residents' ability to remain in their communities and continued cultural transmission despite high unemployment rates, low incomes, and food insecurity. Because of the importance of subsistence harvests to the mixed economy, a key component of rural life, rural communities are particularly vulnerable to changes in subsistence resource availability. Residents may adapt to changes in resource availability by increasing harvests of other resources; however, in the face of large-scale changes, residents may be less able to adapt.

Construction activities that could affect subsistence resource availability include excavation, blasting, mining, ROW clearing, installation of bridges and culverts, gravel placement, water withdrawal, construction of ice roads, bridges and ice pads, heavy equipment operation, noise, human activity, vehicle and air traffic, sedimentation, and fuel or other contaminant spills. Operation activities that could affect resource availability include the presence of roads and bridges, the presence of other infrastructure (e.g., communications towers, culverts), fuel or other contaminant spills, dust deposition, road and air traffic, and human activity. The above construction and operation activities could affect availability by causing changes in resource migration or distribution, changes in resource behavior, or changes in resource health or quality.

While certain local changes to resource movement or distribution may seem minimal from a biological perspective (i.e., not affecting overall population levels, body condition, herd ranges, etc.), local changes can have much larger impacts on resource availability to local hunters. Subsistence harvest success depends on resources being available within traditional hunting areas at the expected time, and that the resources are accessible from a subsistence user's community using available transportation.

Since the 1990s, chum and Chinook salmon returns have declined. Chum and Chinook salmon runs have declined even further since publication of the Final EIS, leading to subsistence closures in the Yukon River watershed (see Supplemental EIS Section 3.4.7, Subsistence Uses and Resources). Recent harvest trends within the region observed by local residents and wildlife biologists include changes in the distribution of the Western Arctic Caribou Herd and reduced availability for certain communities; an increase in moose hunting in communities with less access to caribou; and recent declines in the availability of moose in the Upper Koyukuk region, with increased availability in the Kobuk River region (Watson 2019). A decline in multiple resources at once would reduce a community's ability to adapt to these changes and to find suitable substitutions for the declining harvests. An Evansville tribal member commented that the Upper Koyukuk is starvation country and without continued moose harvest everyone would leave.

As discussed above (Section B.2.1.1, Subsistence Resource Abundance), Alternative A crosses subsistence use areas for 12 subsistence communities (Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Coldfoot, Evansville, Hughes, Kobuk, Selawik, Shungnak, and Wiseman). The communities of Bettles, Evansville, Shungnak, Ambler, Coldfoot, Kobuk, and Wiseman all have five or more resource uses crossed by the Alternative A project area. Smaller-scale impacts to resource availability are most likely to occur for communities who use the project area, while larger-scale impacts could affect communities outside the project area who use migratory resources such as caribou and fish. See below for a resource-specific discussion of potential impacts to resource availability.

Caribou

The proposed route under Alternative A crosses caribou subsistence use areas for nine subsistence study communities: Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Evansville, Kobuk, Selawik and Shungnak. Caribou is considered a resource of high importance for all but two of these communities (Alatna and Bettles). Both of these communities are on the periphery of the Western Arctic Caribou Herd range and once harvested caribou in larger numbers; however, in recent years the availability of caribou has declined in their traditional use areas. Wiseman, Selawik, and Hughes subsistence use areas for caribou are on the periphery of the proposed project, and caribou is a resource of moderate (Hughes) to high (Wiseman and Selawik) importance for these communities. While direct impacts may be less likely for these and other caribou study communities, they may still experience indirect impacts resulting from a change in caribou migration or distribution.

Some residents from the northern and eastern portions of the project area travel to the southwest of the community toward Buckland into Western Arctic Caribou Herd wintering grounds to harvest caribou. In addition, residents from communities with limited access to caribou often rely on sharing from communities with more access. A lack of caribou harvests does not mean that caribou is no longer culturally important to these communities; if caribou became more available within their hunting area, residents would likely resume previous levels of harvesting. As noted above, large-scale changes to migration or distribution resulting from a road corridor could have impacts extending to some or all of the 42 WAH WG communities. However, while localized changes to movement patterns are likely, with potential impacts to caribou energetics and subsistence harvest, the migratory patterns of the Western Arctic Caribou Herd as a whole would likely remain intact unless the road creates a barrier to movement (see Supplemental EIS Section 3.3.4, Mammals).

The primary construction and operation activities that may affect caribou availability to local communities include:

- air and ground traffic;
- construction noise (e.g., blasting, machinery);
- presence of linear infrastructure (e.g., road); and
- human activity.

Air traffic has been a commonly reported and observed impact on caribou on the North Slope and in Northwest Alaska (SRB&A 2009, 2018; Georgette and Loon 1988; Sullender 2017). Air traffic is observed to cause behavioral changes, skittish behavior, and delayed or diverted crossing behavior, which in turn has impacts on caribou hunting success. These types of behaviors are most observed in response to helicopter traffic, although fixed-wing aircraft have also been observed to elicit similar responses.

Roads, road traffic, and construction noise are also known to cause behavioral and migratory changes in caribou that can affect hunting success. Alternative A crosses through key migratory range for the

Western Arctic Caribou Herd and could affect availability of the Western Arctic Caribou Herd to the north and south of the road. The road runs perpendicular to the primary direction of Western Arctic Caribou Herd movement during migration, which increases the likelihood of delays and deflections, and caribou cross the road corridor during the fall and winter.

Deflections or delays of caribou movement from roads and associated ground traffic and human activity has been documented in the traditional knowledge of harvesters (SRB&A 2009, 2014, 2018a) and during behavioral studies on caribou, particularly for maternal caribou (ABR and SRB&A 2014; Johnson et al 2019). During Government-to-Government consultations, subsistence users from the Western Arctic Caribou Herd region compared the proposed road to large waterways like the Kobuk River. Community members indicated that caribou will linger along the northern edge of the river for days waiting for the lead caribou to cross. Once the lead caribou crosses, the rest follow. The subsistence hunters always camp from the south side of the river, and they wait until the lead caribou is across before commencing any hunt. If the subsistence hunters scare the caribou before the lead has crossed the river, there is potential for the whole migration to be rerouted away from the area for years. Several elders expressed the importance of adhering to these practices and teaching young hunters to let the first caribou pass through before beginning to hunt. Subsistence users expressed concern that human activity on the road would scare away the lead caribou before the lead had a chance to cross the road. If the lead caribou is scared back to the north of the proposed road, this would impact the migration to the Kobuk River region.

On the North Slope, caribou have been found to reduce their use of habitat within areas of development. In recent years, reports of ground traffic–related impacts on the North Slope caribou hunting, particularly in the vicinity of Nuiqsut, have increased with the construction of gravel roads in the area (SRB&A 2016, 2017, 2018a, 2022). Impacts of roads have also been observed by Noatak and Kivalina caribou hunters regarding the Red Dog Delong Mountain Transportation System (DMTS) (SRB&A 2014). Residents have observed that some caribou may stop once they reach the DMTS, sometimes traveling alongside the road before crossing, and other times bypassing the road altogether. Such behavior has also been documented through radio collar observation. Wilson et al. (2016), found that the DMTS influenced the movements of approximately 30 percent of radio-collared Western Arctic caribou, and the average delay in crossing was 33 days. These delays were often accompanied by notable changes in movements rates by collared caribou. Animals would linger north of the road through much of migration, but then would cross the DMTS and move quickly through migration corridors, arriving on the winter range in a shorter amount of time compared to animals that did not encounter the road (Dau 2023). Caribou from the Teshekpuk Herd that approached the DMTS were not similarly affected, which could be due to greater exposure of the Teshekpuk Herd to industrial development in the eastern portion of its range. In general, observed caribou behavior in response to the DMTS is variable: in some cases, caribou cross seemingly without delay, while in other cases herds scatter and migration is delayed for multiple days or weeks (Wilson et al. 2016; ABR and SRB&A 2014). Responses to roads also seem to vary from year to year based on the context in which roads are encountered. The Native Village of Kotzebue noted the differences between the Red Dog Road and the Ambler Road, indicating that the longer length and different topography of the Ambler Road may make mitigation less effective:

> It has also to be kept in mind that even with the proactive approach taken along the relatively short Red Dog road in regards to stopping traffic while caribou are near the road there are still demonstrable impacts. It is unknown if such a strategy will, or even could, be put in place on the Ambler road, given the differing ownership and political affiliations of the mine developers in the Ambler District, in addition to the totally different logistical challenges in regards to the hauling season and distances that would be covered by the trucks. It also needs to be kept in mind that while it is practical to stop trucking on the Red Dog road due to its short length and nearby facilities on both ends,

> which would be totally different on the Ambler road, it also is exclusively tundra/willow habitat and herds of caribou can be relatively easily spotted at a distance. This will not be the case on the Ambler road, where both the topography and the spruce dominated areas will make it impossible in many places along the road to even observe caribou until they are right next to the road, but of course the caribou will still be able to smell, feel and hear the road and its associated traffic well before they reach it. (Native Village of Kotzebue 2018)

During operations, the final two-lane road combined with an increase in traffic would likely increase the potential for deflection or delay of caribou movements, particularly during the fall migration south (see Appendix L, Section 6.4.1). Over time, local caribou distribution may be altered to the extent that residents no longer find caribou within their usual hunting areas or experience reduced hunting success in those areas. The upper Kobuk River communities observed that the Western Arctic Caribou Herd are migrating to the Kobuk River up to two months later than normal, and this is already straining subsistence. During Government-to-Government consultations, some residents of the Upper Kobuk were concerned that if the road were built the increased delay would stop the Western Arctic Caribou Herd from coming to the Kobuk River all together. Some industrial road projects in the state of Alaska provide for access to roads for local residents. In other communities where roads have been built, access to private roads has in some way offset some of the impacts to resource availability; however, lack of access for local hunters to the Ambler Road would introduce subsistence impacts with no offsetting subsistence benefit. The Western Interior Alaska Subsistence Regional Advisory Council noted that noise disturbances resulting from increased traffic will decrease availability of key terrestrial and aquatic resources within at least a 50-mile radius of the Project:

> The Council emphasizes that the impacts of developing the Ambler Road Project will have adverse and far reaching effects within at least 50 miles of each side of the road. These impacts include noise disturbance to terrestrial and aquatic wildlife resulting from increased motorized off-road vehicle traffic and boat use extending up the coast and into the Kobuk River Drainage. The increased motorized off-road vehicle traffic and boat use resulting from development of the Amber Road will also have significant adverse impacts up and down the Koyukuk River, John River, and Alatna River drainages. (Western Interior Alaska Subsistence Regional Advisory Council 2018)

In addition to causing physical obstructions to hunters and caribou, roads and related infrastructure would also introduce visual disturbances in an area where existing infrastructure is limited to small communities, camps, and cabins. A large industrial road is more likely to stand out on the landscape and cause displacement of wildlife. Caribou may also react to changes in smells. Animals use odor when selecting feeding grounds, water sources, and when traveling (see Supplemental EIS Section 3.4.7, Subsistence Uses and Resources). Changes in smells resulting from construction activities, vehicle emissions, introduction of new materials, and accidental spills could affect caribou distribution and behavior thus reducing their availability to hunters in certain areas.

Habitat alteration may also affect the distribution of the Western Arctic Caribou Herd. Construction of the proposed road would result in direct habitat loss for the Western Arctic Caribou Herd, including habitat in the winter, migratory, and peripheral ranges of the Western Arctic Caribou Herd. There would be a loss of lichen-dominated vegetation, which is a particularly important food source for the Western Arctic Caribou Herd. In winter, low abundance of forage may result in caribou migrating farther in search of suitable habitat.

Although public access to the area would be prohibited, it is reasonably foreseeable that unauthorized use of the ROW and road would occur. Unauthorized use of the project area by non-local hunters could increase disturbances, as well as increasing competition for the resource between non-local and local hunters.

Impacts to resource availability of the Western Arctic Caribou Herd could result in subsistence users having to travel farther and longer to harvest caribou than they previously did. It could also cause less overall hunter success, meaning subsistence users would have to increase their reliance on other subsistence resources or other non-traditional food sources (e.g., store bought food).

Subsistence study area communities along the eastern side of Alternative A including Alatna, Allakaket, Evansville, and Hughes have repeatedly indicated to the BLM that their ability to harvest caribou from the Western Arctic Caribou Herd and the Central Arctic Herd was impacted by the construction of the Dalton Highway. Traditionally the Central Arctic Herd moved through Anaktuvuk Pass down the Alatna and John River corridors to south of the Brooks Mountain Range where they were hunted by the forementioned communities. Tribal councils from these communities have attributed the lack of caribou migration to their region to the construction of the Dalton Highway running east of the proposed Ambler Road.

During a meeting with the BLM in Allakaket an Elder held up a pair of caribou boots and indicated they were from the last caribou she had seen in the region since the 1970s. Another Elder from Alatna recounted hunting caribou for the first time as a boy right outside the community and grieved that children in the region would not have the same experience. A couple who maintain a subsistence camp along the Alatna River, and along the proposed Alternative A corridor, tie a caribou antler to a tree along the river. The couple indicated the antler is hung on the tree to symbolize the caribou that still infrequently migrate to the region, and to remind their children of the resource. If the proposed road is constructed there could be further fragmentation of the caribou herds that, according to the communities, still infrequently travel down the Alatna and John River corridors.

Potential mitigation measures that may reduce potential impacts to caribou availability include temporary cessations of road traffic during known migrations; minimizing snowbank height to allow caribou passage; the establishment of a Subsistence Advisory Committee which that will advise on road design, construction, and operation; and the hiring of subsistence monitoring representatives and wildlife observers to communicate subsistence concerns (Supplemental EIS Appendix N, Sections 3.3.5 and 3.4.7).

Moose

The proposed route under Alternative A crosses moose subsistence use areas for nine subsistence study communities: Alatna, Allakaket, Ambler, Bettles, Coldfoot, Evansville, Kobuk, Shungnak, and Wiseman. Moose is considered a resource of high importance for five of these communities (Alatna, Allakaket, Bettles, Evansville, and Wiseman). Impacts to moose availability would be most likely to occur for these communities.

Impacts to moose availability would generally be on a smaller geographic scale than for caribou, as moose have smaller ranges and residents do not rely on seasonal migratory movements when hunting them. Thus, impacts to moose hunting from construction and operation of the road would occur primarily in the vicinity of the road where moose could exhibit avoidance or other behavioral changes. Sources of impacts to moose availability are similar to those discussed above under Caribou. Because a majority of moose hunting in the region occurs along rivers during the fall months, impacts would be most likely to occur in areas where the road corridor crosses key moose hunting rivers such as the Koyukuk and Kobuk rivers, and smaller drainages such as the Alatna, John, and Wild rivers. Residents may experience decreased success in these areas due to moose remaining in deeper brush (see Appendix L, Section 6.4.1).

Because intersections with the road are a very small portion of the rivers, this would not have a significant effect on overall hunter success.

Moose tend to habituate quickly to disturbances. The cleared area within the ROW and road may create a travel corridor for moose that could lead to a two-fold effect on resource availability. First, if the cleared area draws large land mammals to the corridor there could be a corresponding decline in large land mammals in areas they were previously found. Furthermore, a cleared area within the ROW with a high concentration of large land mammals could be a draw for local hunters traveling overland in the winter by snowmachine or by off-road vehicle during other times of the year. Unauthorized use of the ROW by non-local hunters may also occur, thus increasing local competition. Unless large scale changes in moose distribution occur, impacts to moose resource availability would likely be temporary and affect individual hunters rather than reducing overall availability for the study communities.

Fish

The proposed route under Alternative A crosses salmon and non-salmon fish subsistence use areas for seven subsistence study communities: Alatna, Allakaket, Ambler, Bettles, Evansville, Kobuk, and Shungnak. These are the communities most likely to experience direct impacts to fish availability. Non-salmon fish are a resource of high importance to all of these communities, and salmon is a resource of high importance to all but one community (Bettles). Fish migrate seasonally between mainstem, tributary, and connected off-channel habitats to access preferred feeding, rearing, spawning, or overwintering areas, resulting in fish moving between subsistence use areas in and out of the project area. If impacts to fish availability extend outside the project area, then additional upstream and downstream communities could experience impacts. In particular, communities upstream and downstream from the corridor along the Koyukuk and Kobuk river drainages (Ambler, Anaktuvuk Pass, Hughes, Huslia, Kiana, Noorvik, Shungnak, and Wiseman) could experience indirect impacts to fish availability.

Construction activities that may affect fish availability to subsistence communities include:

- installation of bridges, culverts and related pile installation;
- stream diversion and excavation;
- water withdrawal;
- gravel mining; and
- Contamination.

Fish could be diverted, displaced, or obstructed due to culvert placement, excavation, or stream diversion. Ice roads and pads may also temporarily block fish passage if the compacted ice takes longer to melt. Water withdrawal may kill individual fish but would likely not have population-level effects, as ADF&G's fish habitat permits include requirements for water intakes to avoid fish injury and maximum amounts of water withdrawn from each source (see Supplemental EIS Section 3.3.2, Fish and Aquatics). Water withdrawals for ice roads would alter water quality and water flows, and could potentially affect fish habitat, although these impacts are expected to be temporary and short term. Temporary changes to habitat resulting from water withdrawals, runoff from melting ice roads, and construction activities could affect fish distribution. In addition, areas with increased sedimentation or recent evidence of runoff may be perceived as unsuitable for fishing by local residents.

The impacts of erosion and beaver dams on salmon spawning grounds was a topic discussed during a recent meeting of the Northwest Arctic Subsistence Regional Advisory Council (2022), highlighting the importance of access to spawning grounds:

> I think some of them creeks are dammed up, pretty much dammed with the beaver and that's one thing that's causing the fish not to come out, and no air and stuff like that happening statewide, It's not just happening here. But salmon spawning, man, I tell you the erosion that's happening, and it's turning the river shallower, seems like, and I haven't gone up river for quite a while it seems like the river's changed above Kobuk; it's 'eally changing... But salmon spawning, oh, man, they're going to be lower and lower down this way for salmon spawning because– -- a lot of dead salmon on the sides after spawning.

While direct impacts to fish availability resulting from construction activities are expected to be localized, subsistence users often harvest fish in specific locations along rivers; thus, localized changes in fish distribution could have impacts on resource availability for individual harvesters, particularly for the seven communities with use areas overlapping the Alternative A corridor.

Potential effects of construction and operation activities on resource availability also include contamination resulting from fuel and other chemical spills, dust deposition, sedimentation due to erosion along river and stream banks, and increased emissions. NOA and acid-generating rocks occur throughout the study area. There is the potential that NOA released into rivers could lead to higher concentrations of some trace metals in fish tissues (Schreier et al. 1987). Contamination or perceived contamination can have indirect effects on subsistence, as subsistence users may reduce their consumption of a resource if they fear contamination; therefore, resources perceived as unhealthy or contaminated are considered unavailable to local residents. This response has been systematically documented in household harvest surveys and hunter interviews on the North Slope of Alaska, with between 22 and 54 percent of respondents indicating that they had avoided eating certain subsistence foods in the previous year because of concerns about contamination (SRB&A 2017). Concern for contamination of waterways and fish has been a key issue during Government-to-Government meetings with the high impact communities.

Changes in the availability of fish species could affect subsistence users throughout the project area and upstream and downstream from the project area, particularly if the project results in changes in fish distribution or the timing of fish migrations. Subsistence users often harvest specific resources at specific times and places, and if these patterns are disrupted they may experience declines in harvest success or have difficulty accessing traditional use areas when resources become available in those areas (e.g., if the fish arrive late and subsistence users cannot use boats to access them). The impacts of changes in the timing of fish migrations on harvest success have been reported by local subsistence users in recent years (Northwest Arctic Subsistence Regional Advisory Council 2022).

Potential mitigation measures to address potential impacts to fish availability include erosion and sedimentation measures to minimize sedimentation impacts to fish habitat; culvert and bridge inspection and maintenance plans; culvert and crossing designs that allow free movement of all occurring fish species; restrictions on activities during periods of spawning, rearing, and migration; restrictions on the use of potentially harmful dust suppressants or pesticides within 328 feet of fish-bearing streams and high value wetlands; and the implementation of subsistence monitoring plans to document harvests and monitor impacts to subsistence communities (Supplemental EIS Appendix N, Sections 3.3.3 and 3.4.7).

Vegetation

Potential impacts to resource availability of vegetation are the same as those discussed above (Section B.2.1.1, Subsistence Resource Abundance). Clearing of the ROW, dust deposition, and contamination would reduce the local abundance and availability of plants and berries along the road corridor for six study communities. Potential mitigation measures to reduce contamination of roadside vegetation may reduce impacts to vegetation availability along the road corridor (Supplemental EIS Appendix N, Section 3.3.1).

Other Resources

Availability of all other subsistence resources would vary from season to season and resource to resource. Construction activities may impact hunting for land mammals (bears, sheep, furbearers, small land mammals) and birds (waterfowl and upland), and harvesting of eggs. In most communities, these are resources of low to moderate importance based on selected measures, and do not contribute a large amount to the communities' annual subsistence harvest. Despite the relatively low harvest counts for these resources, subsistence activities associated with the resources remain integral for cultural transmission and the well-being of the study communities. The lack of abundance of these resources in traditional hunting locations may impact the subsistence and ceremonies especially those associated with bear and sheep.

Activities that may affect resource availability for other subsistence resources include:

- construction noise and activity;
- physical obstructions from infrastructure;
- vehicle and air traffic; and
- accidental fuel or other contaminant spills.

In the short term, construction activity may displace or divert resources such as large land mammals (e.g., bear), small land mammals (including furbearers), and waterfowl. Clearing of trees and brush for the ROW and stripping of topsoil and organic material may alter or degrade resource habitat, particularly for herbivores that depend on surface vegetation. Habitat alteration can affect resource distribution, thereby reducing the availability of those resources to subsistence users in traditional hunting or harvesting areas. Equipment, material storage sites and related infrastructure associated with construction may act as a physical barrier to wildlife. During construction and operation, the availability of subsistence resources would be affected through air and ground traffic, resulting in changes in behavior, changes in local distribution of resources, and/or avoidance of the ROW.

Specifically, furbearers are particularly sensitive to noise and human activity and tend to avoid developed areas (SRB&A 2009). Thus, furbearer hunters and individuals with traplines may experience reduced success along the ROW during the construction season or even during operation, depending on traffic levels. Waterfowl may experience a reduction in nesting habitat and would also be displaced by blasting, construction noise, and traffic.

This general disturbance of wildlife could result in subsistence resources being unavailable at the time and place that subsistence users are accustomed to finding them. Effects from the road on other subsistence resources would likely be more localized to the general vicinity of the ROW.

More indirectly, reduced availability or abundance of prey species (e.g., fish) resulting from the road could also affect the distribution or feeding behaviors of predators such as marine mammals (e.g., seals) or bear, who feed on fish in rivers downstream from the road and proposed mines. Finally, if the availability of key resources such as caribou and fish declines, then residents may shift their focus to other resources such as moose, black bear, or other non-salmon fish species, thus increasing pressure on these animals and reducing their availability in the future.

Subsistence User Access

Alternative A crosses subsistence use areas for 12 subsistence study communities: Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Coldfoot, Evansville, Hughes, Kobuk, Selawik, Shungnak, and Wiseman (see Appendix L, Table 43). Bettles, Evansville, Kobuk and Shungnak would have their hunting areas bisected by the project. Allakaket, Alatna and Ambler would have their subsistence hunting area partially intersected, while Selawik would be on the periphery of the project. The communities that would have their use areas bisected or partially intersected would likely see the largest impact on their subsistence activities. However, there may be instances where peripheral use areas are particularly important for a specific resource.

The subsistence activities that most commonly occur in the direct vicinity of the Alternative A corridor include caribou and moose hunting (nine communities each), small land mammal hunting/trapping (eight communities), Dall sheep (likely in the higher elevations) and waterfowl hunting (six communities each), and bear hunting (five communities). Impacts to individual resource uses are discussed above in Sections B.2.1.1 (Subsistence Resource Abundance) and B.2.1.2 (Subsistence Resource Availability).

Impacts to harvester access would occur within the vicinity of the road corridor. Potential sources of impacts to user access include:

- physical barriers: road, construction laydown materials, pilings and heavy equipment, other infrastructure;
- diversion: avoidance of material sites and other areas which are unsafe for travel; rerouting previously used travel routes, trails, and traplines; and
- security restrictions.

The degree of user access impacts would depend on whether the timing of activities conflicts with subsistence use areas and activities for a community. Because construction would occur year-round, it is likely that there would be direct conflicts with construction activities for certain subsistence uses. Based on available data, subsistence activities occur year-round, peaking in the fall (August-October) and again in the spring (April-May) for most study regions (see Appendix L, Section 5). The project corridors cross areas used for both riverine and overland travel, and construction and operation activities would occur year-round; thus, residents may experience impacts to user access for all subsistence activities that are overlapped by the proposed ROW.

The road itself, in addition to ice and snow roads, gravel mine sites, and other material sites, would act as a physical barrier to overland use. Most residents of the region use boats and snowmachines to access subsistence use areas, although some communities in the eastern portion of the project area (Wiseman and Coldfoot) also use road vehicles as they are road-connected communities. Hunters may not be able to cross over a high road or snow berm on their snowmobiles, particularly if they are pulling a heavy load. In addition, individuals traveling overland may have to divert around material sites and other areas that are unsafe for travel. Overland trails, travel routes, subsistence camps, and traplines would be bisected by the project (see Supplemental EIS Section 3.4.7, Subsistence Uses and Resources).

Residents of the Native Village of Kobuk identified a traditional caribou hunting trail, the Kogoluktuk Trail, which would bisect the Alternative A and B route by approximately 25 miles from the Kogoluktuk River to the Selby River. Residents from Kobuk indicated that they and Shungnak residents use snowmachines to travel north along the Kogoluktuk River and then would hunt in the Ambler Lowlands following the Kogoluktuk Trail to the east, and then down the Mauneluk or Selby rivers back to the Upper Kobuk River. The residents indicated that this trail is often used in the winter and early spring for caribou hunting and can be a day trip or broken into multiple days. Residents of the Upper Kobuk also use the Kogoluktuk Trail from the spring to the fall to travel via ATV into the Ambler Lowlands and access berry picking areas and to hunt migrating waterfowl.

The Kogoluktuk Trail would be directly impacted by the construction and use of the proposed road. The trail likely would cross the road, or follow the road, in multiple segments and during construction and operation of the road the trail would likely no longer be usable by the local subsistence users. Abandoning previously used trails could result in greater risks to hunter safety as residents may travel farther or through unfamiliar terrain to access harvesting areas.

Additionally, residents may abandon or alter traplines to avoid regular crossing of the road and may reroute around the road system or use areas that require crossing the road less often. Subsistence users of the Upper Kobuk indicated that they had traplines in the Ambler Lowlands (likely accessed via the Kogoluktuk Trail) or along the hillsides just south of the Alternative A and B route. Alatna Village residents indicated there were traplines near the Malamute Fork of the Alatna River and within the Helpmejack Hills. Residents of Evansville Village indicated there were traplines near the Koyukuk River. These traplines could intercept with the proposed road and would be unusable due to the construction and operation of the road.

In addition to trails and travel routes, the road corridor would cross near community and family camps (e.g., traditional caribou, moose, and fish camps). If the road crosses too close to an existing camp, subsistence users may abandon the camp altogether due to avoidance by subsistence resources, concerns about safety, or difficulty accessing the area. Subsistence communities have notified the BLM about three subsistence camps that would be directly impacted by the construction and operation of the proposed road on Alternative A and B, though it is highly likely that there are more subsistence camps along the route not yet known by the BLM especially along Alternative C. An Evansville Village resident identified his moose hunting camp that he has been using for about 50 years, and his direct family has been subsisting in the area for over 100 years. The moose camp is about 500 feet from the proposed Alternative A and B, and if the road is constructed, the resident indicated he would no longer use the camp due to the road’s physical barrier to the moose hunting territory.

Another moose camp is located about three miles south of the proposed Alternative A on the confluence of the Alatna and the Malamute Fork of the Alatna River. The Alatna resident and his children use this camp for hunting moose and indicated if the road was constructed the individual would no longer use this camp due to proximity. Another subsistence camp along the Alatna River is in use by an Allakaket family, and is directly in the path of Alternative A and B. The family said this camp is used for moose hunting, fishing, and as a staging point for sheep hunting further in the Brooks Mountain Range. This is the same family who have an antler tied to a tree to show their children this is a place caribou occasionally still migrate to. This camp would be demolished by the construction of the road. Finally, in comments on the Draft Supplemental EIS, one resident of Shungnak reported a family fish camp (in an area referred to as Qalugrivik), near the mouth of Mauneluk River, which is less than one mile from the Alternative A and B corridors.

While travelling in the area along the Alatna River, an Alatna resident indicated to the BLM that the foothills of the Brooks Mountain Range between the John River and Walker Lake is a very important location because it’s at the confluence of the three major animal resources: moose, sheep, and caribou. Additionally, directly to the west of the Alatna River, within Alternative A, along the Helpmejack hills is an important bear hunting area, though no direct camps were identified (Nictune 1988).

Within the Ambler Lowlands, Native Village of Kobuk residents identified a caribou hunting area with associated camps just south of Alternative A and B. The placename for this area is Kangingiiqsivik and it means “To Drive Caribou” (NPS Placename Database). Residents of Kobuk also call it California Ridge and identified it as a narrow canyon through which migrating caribou will get stuck for the winter. Historically Upper Kobuk residents used caribou drivelines throughout the canyon, but now subsistence users will travel north with snowmachines along the Kogoluktuk River and then into the narrow valley to check for caribou. This caribou hunting location was told to BLM by multiple Upper Kobuk residents in different contexts, and it is also important to the residents as a place where their ancestors subsisted (Cleveland and Foot 1980). The proposed Alternative A and B route would cut off the trail from the Kogoluktuk River to the California Ridge and may stop people from traveling back into the valley due to physical barriers and from security restrictions.

While most direct impacts to user access would involve overland travel, there may be periods of time during construction where access along certain river drainages is obstructed due to bridge construction activities. This would block subsistence users from accessing upstream fishing, caribou hunting, and sheep hunting areas. It is anticipated that bridges would be designed with adequate clearance. However, it is possible that bridges may also obstruct boat travel along certain smaller waterways; the likelihood of this impact depends on individual bridge height and design.

In addition to physical barriers to subsistence users during construction, residents may also experience reduced access due to security restrictions around construction work areas and along the road. Residents may not hunt near the road due to restrictions on discharging firearms near roads (shooting from or across a road is contrary to Alaska law) and lack of knowledge or communication regarding security protocols.

The proposed ROW would not permit access for residents to use the road for subsistence purposes but would allow residents to cross the road at established crossing areas. The efficacy of crossing ramps to reduce access impacts for local hunters would depend on the location, design, and frequency of the ramps along the ROW. In addition, ramps would likely not be built immediately. During construction, there would likely be times (e.g., during active construction) where hunters may not be permitted to cross roads at all. Subsistence users do not always use or follow established trails when pursuing resources overland; instead traveling in various directions based on environmental factors (e.g., weather, snow and ice conditions) and traditional knowledge of resource distribution and behavior. Therefore, the presence of crossing ramps would not eliminate impacts to user access. Subsistence users may have to travel additional distances when pursuing resources to locate approved crossing areas, or they may take safety risks by crossing in areas not approved for crossing. In addition, despite the presence of crossing ramps, some individuals may still have difficulty using crossing ramps, especially when hauling sleds. Subsistence users in the community of Nuiqsut have reported difficulty under certain conditions when using crossing ramps on industrial roads near their community, although recent upgrades to the ramps have addressed some of these concerns (SRB&A 2018a). AIDEA has established a Subsistence Advisory Committee (SAC) made up of local residents who will provide input on road design, operations, and maintenance, and identify and communicate potential impacts to subsistence (Supplemental EIS Appendix N, Section 3.4.7).

While road access for local subsistence users would not be permitted, it is possible that residents from local communities would use the cleared area of the ROW alongside the road as a travel corridor, particularly if game such as moose concentrate in these corridors. In addition, it is reasonable to assume that some unauthorized use of the road or ROW may occur, particularly where the road meets the main road system. Use of the ROW may facilitate access to hunting areas farther from the community as well as between communities. AIDEA has proposed staffed gatehouses be in place at each end of the road to ensure only authorized use of the road occurs. Enforcement measures would reduce but not eliminate use of the ROW. Restrictions on use of the ROW, particularly by residents when certain areas of the road would be crossable, may be difficult to enforce.

B.2.2 Evaluation of the Availability of Other Lands

Alternative A and B are both similar in the amount of federal land used by the ROW (3,498 and 3,083 acres, respectively). The only variation in public land between the alternatives would occur within GAAR. The remainder of the two routes would be located on State and Native Corporation land. Alternative C proposes to use BLM managed land for most of the route (19,090 acres), with Native Corporation land and State of Alaska land managing less. Other DOT&PF previously identified alternative corridors considered include the Original Brooks East, Kanuti Flats, Elliot Highway, Parks Highway Railroad, DMTS Port, Cape Blossom, Selawik Flats and Cape Darby. These routes did not meet screening criteria and were not considered further (see Supplemental EIS, Appendix G for further discussion).

Of the feasible alternatives carried forward for evaluation, the proposed route was designed and engineered to optimize many environmental and economic considerations. Alternative A is the most economically feasible route and it has a smaller overall footprint than the other proposed routes. The National Park Service, in their Ambler Mining District Industrial Access Project Environmental and Economic Analysis (EEA), found Alternative B to have less of an impact to caribou habitat than Alternative A within the boundary of GAAR. While Alternative A would have more suitable lichen habitat removed for construction and there would be an increased chance of a caribou vehicle strike within GAAR boundaries, Alternative A would have a lesser impact to resources over the entire Ambler Road Project footprint. While Alternative C crosses the subsistence use area of 12 communities, A and B both cross only subsistence use areas of 11 communities.[1] Alternatives A and B both have the largest project area in the Western Arctic Caribou Herd habitat (4,161 and 4,775 acres, respectively), while Alternative C has an area of 4,120 total acres. Alternative C, unlike Alternatives A and B, would also intersect the range of the Ray Mountains Herd, a small, non-migratory herd centered on the Ray Mountains.

The purpose of constructing and operating the proposed road would be to access the District. As such, there is no other feasible terminus for the road. Therefore, the only options are the starting point and the route the road would follow.

B.2.3 Evaluation of Other Alternatives That Would Reduce or Eliminate the Use, Occupancy or Disposition of Public Lands Needed for Subsistence Purposes

AIDEA and DOT&PF considered numerous transportation modes and route alternatives for accessing the District. Their screening process eliminated many of those options as either not physically or economically feasible. Consideration of air travel only was an option; a rail system was another. Using existing infrastructure, such as the DMTS, for part of the route was considered. These options did not meet the criteria established for this project. Only physically and economically feasible alternatives were carried through for analysis in the Supplemental EIS.

B.2.4 Findings

Alternative A would not result in a significant restriction to subsistence uses for the communities of Beaver, Coldfoot, Livengood, Manley Hot Springs, Minto, Nenana, Stevens Village, Rampart, Tanana, Galena, Alakanuk, Anvik, Emmonak, Grayling, Holy Cross, Marshall, Mountain Village, Nunam Iqua,

[1] Note: For Alternatives A and B the only resource used by Hughes that could be affected would be Dall sheep. Some hunters from Hughes travel to Allakaket and hunt sheep with Allakaket hunters in the southern Brooks Range (personal communication, ADF&G 2024). The resource importance of Dall sheep to the community of Hughes, in terms of selected resource importance measures, is not known. Only high and moderate valued resources were analyzed in detail for in this Section 810 Analysis.

Pilot Station, Pitka's Point, Ruby, Russian Mission, St. Mary's, Atqasuk, Brevig Mission, Nuiqsut, St. Michael, Stebbins, Teller, Utqiagvik, Wales, Kaltag, Kotlik, Koyukuk, and Nulato.

Alternative A may result in a significant restriction to subsistence uses for the communities of Alatna, Evansville, Anaktuvuk Pass, Buckland, Noatak, Selawik, Wiseman, Allakaket, Ambler, Bettles, Hughes, Huslia, Kiana, Kobuk, Kotzebue, Noorvik, Shungnak, Deering, Elim, Golovin, Kivalina, Koyuk, Nome, Point Hope, Point Lay, Shaktoolik, Shishmaref, Unalakleet, Wainwright, and White Mountain.

This is based on the following findings:

- The construction and operation of the Ambler Road could cause population level impacts to the Western Arctic Caribou Herd and a reduction in the abundance of caribou available for residents of Alatna, Evansville, Anaktuvuk Pass, Buckland, Noatak, Selawik, Wiseman, Allakaket, Ambler, Bettles, Huslia, Kiana, Kobuk, Kotzebue, Noorvik, Shungnak, Deering, Elim, Golovin, Kivalina, Koyuk, Nome, Point Hope, Point Lay, Shaktoolik, Shishmaref, Unalakleet, Wainwright, and White Mountain. The road could delay and deflect migrating caribou, which could increase energy expenditure, impact body condition, reduce foraging rates, increase winter mortality, and decrease breeding success, pregnancy rates, and calf recruitment. Such impacts could exacerbate or prolong population declines and hinder the herd's ability to naturally recover from low population levels. Impacts to Western Arctic Caribou Herd abundance would affect communities throughout the herd's range; particularly those to which caribou are of moderate and high importance.
- The construction and operation of the Ambler Road could cause a reduction in the availability of caribou for residents of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Evansville, Huslia, Kiana, Kobuk, Kotzebue, Noorvik, Selawik, Shungnak, and Wiseman. A portion of the herd would likely be delayed or deflected by the road. If the lead caribou are disrupted then the majority of the herd could be impacted. Caribou could reduce their use of habitat within seasonal ranges, limiting availability of the resource for residents in the periphery of the herd's range. Disrupted migratory groups could scatter, reducing subsistence hunters' ability to harvest adequate numbers of caribou efficiently. Deflected caribou would remain north of the road and would not be available for harvest in subsistence use areas for communities in the migratory or winter ranges. Delayed caribou could move through traditional hunting areas later in the year, which could preclude the availability of bulls for subsistence harvest due to the timing of the rut. Delayed animals could move through areas faster, limiting their availability for communities along migratory routes. Caribou movements and migration are often predictable but are also inherently variable. As such, the magnitude of impacts to caribou availability would likely vary from year to year but would not affect all communities equally. It is likely these communities would experience long term reductions in caribou availability if historic migratory routes and movement patterns are disrupted due to delays or deflections as described above.
- The construction and operation of the Ambler Road could cause population level impacts to fish and a reduction in the abundance of harvestable fish for the communities of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Buckland, Evansville, Hughes, Huslia, Kiana, Kobuk, Kotzebue, Noatak, Noorvik, Selawik, Shungnak, and Wiseman. Increased sedimentation from construction and operation activities and infrastructure, particularly in spawning grounds, could smother eggs, alter feeding habitat, and decrease fish production. If sedimentation increased in any of the spawning areas, there could be adverse impacts to spawning success of sheefish, salmon, whitefish, and other resident species. The presence of the road in addition to related culverts, bridges, and gravel infrastructure could also alter and degrade fish habitat both upstream

and downstream from the road, which could affect fish abundance. Spills could substantially degrade habitat quality and affect the long-term health of individual fish and fish populations.

- The construction and operation of the Ambler Road could cause a reduction in the availability of fish for the communities of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Buckland, Evansville, Hughes, Huslia, Kiana, Kobuk, Kotzebue, Noatak, Noorvik, Selawik, Shungnak, and Wiseman. Changes in the availability of fish species from the proposed action could affect subsistence users throughout the project area upstream and downstream from the project area, particularly if the project results in changes in fish distribution or the timing of fish migrations. Fish could be diverted, displaced, or obstructed due to culvert placement, excavation, or stream diversions. Temporary changes to habitat resulting from water withdrawals, runoff from melting ice roads, and construction activities, could affect fish distribution. Potential contamination from dust deposition, spills, or perceived contamination from asbestos and other toxic chemicals could have indirect effects on subsistence, as subsistence users could reduce their consumption of a resource if they fear contamination; therefore, resources perceived as unhealthy or contaminated are considered unavailable to local residents.
- The construction and operation of the Ambler Road could cause a reduction in access for the communities of Alatna, Allakaket, Ambler, Bettles, Evansville, Kobuk, and Shungnak. Overland access to subsistence use areas would likely be impeded by the road. If delayed or deflected caribou migrate through areas later in the year, access to these animals could be impossible due to ice conditions on river systems that subsistence hunters use to access traditional caribou crossing and hunting areas. Road and bridge construction could result in subsistence users being unable to access subsistence use areas.

B.3. Evaluation and Findings for Alternative B (AIDEA Alternative Route (GAAR South) to the Dalton Highway)

Alternative B is similar to Alternative A, but it differs in the route through GAAR. It is 228 miles long with a total distance to Fairbanks of 473 miles. This routes crosses GAAR further south than Alternative A.

B.3.1 Evaluation of the Effect of Use, Occupancy or Disposition on Subsistence Use and Need

Impacts to subsistence uses under Alternative B are similar to those described under Alternative A (see Section B.2.1.1 of this evaluation), with differences discussed below.

Subsistence Resource Abundance

The route chosen through GAAR for Alternative B would place a river crossing on the Reed River approximately seven miles from sheefish spawning habitat on the mainstem of the Kobuk River and closer to sheefish spawning habitat than any other alternative. This may increase the likelihood of resource abundance impacts to the resource. Moving a crossing closer to sheefish spawning habitat, especially with the concentrated spawning area located there, would increase impacts related to sediment from construction, erosion, and potential degradation and contamination of the habitat from accidental spills. This may impact reproductive success of sheefish in the Kobuk River. As stated in B.2.1.3 of this evaluation, this particular stretch of the Kobuk River has the highest concentration of sheefish spawning habitat in Alaska. Any effect on spawning success may affect sheefish abundance. Impacts to the sheefish population would affect any community along the potentially affected drainages who harvest sheefish. Impacts would be particularly severe for communities in the Kobuk River watershed for which sheefish are a resource of high importance (Ambler, Kiana, Kobuk, Noorvik, and Shungnak).

Subsistence Resource Availability

Impacts to subsistence resource availability under Alternative B are the same as those discussed under Alternative A, but with a potentially greater amount of direct impacts to sheefish availability resulting from its greater proximity to key sheefish spawning habitat (see Section B.3.1.1, Subsistence Resource Abundance).

Subsistence User Access

Alternative B would have direct impacts to user access for the same 12 communities listed under Alternative A. Alternative B crosses through similar subsistence harvesting areas as Alternative A, with the addition of the Hogatza River area and Norutak Lake, which are both used by Kobuk and Koyukuk River Region communities, and therefore user access would be affected for some harvesters in these areas. Alternative B also differs from Alternative A in that the ROW would overlap a portion of Ambler's harvest area for vegetation, a resource of high importance to the community. This may lead to a direct impact by removal of harvestable vegetation or contamination (real or perceived) to harvestable vegetation by fugitive dust and accidental spills (see Section B.2.1.1). The direct loss of harvestable vegetation by construction of the road would last for the life of the project. If reclamation occurs, even after reclamation of the road, vegetation can take decades to recover.

B.3.2 Evaluation of the Availability of Other Lands

See Section B.2.2 of this evaluation.

B.3.3 Evaluation of Other Alternatives That Would Reduce or Eliminate the Use, Occupancy or Disposition of Public Lands Needed for Subsistence Purposes

See Section B.2.3 of this evaluation.

B.3.4 Findings

Alternative B would not result in a significant restriction to subsistence uses for the communities of Beaver, Coldfoot, Livengood, Manley Hot Springs, Minto, Nenana, Stevens Village, Rampart, Tanana, Galena, Alakanuk, Anvik, Emmonak, Grayling, Holy Cross, Marshall, Mountain Village, Nunam Iqua, Pilot Station, Pitka's Point, Ruby, Russian Mission, St. Mary's, Atqasuk, Brevig Mission, Nuiqsut, St. Michael, Stebbins, Teller, Utqiagvik, Wales, Kaltag, Kotlik, Koyukuk, and Nulato.

Alternative B may result in a significant restriction to subsistence uses for the communities of Alatna, Evansville, Anaktuvuk Pass, Buckland, Noatak, Selawik, Wiseman, Allakaket, Ambler, Bettles, Hughes, Huslia, Kiana, Kobuk, Kotzebue, Noorvik, Shungnak, Deering, Elim, Golovin, Kivalina, Koyuk, Nome, Point Hope, Point Lay, Shaktoolik, Shishmaref, Unalakleet, Wainwright, and White Mountain.

This is based on the following findings:

- The construction and operation of the Ambler Road could cause population level impacts to the Western Arctic Caribou Herd and a reduction in the abundance of caribou available for residents of Alatna, Evansville, Anaktuvuk Pass, Buckland, Noatak, Selawik, Wiseman, Allakaket, Ambler, Bettles, Huslia, Kiana, Kobuk, Kotzebue, Noorvik, Shungnak, Deering, Elim, Golovin, Kivalina, Koyuk, Nome, Point Hope, Point Lay, Shaktoolik, Shishmaref, Unalakleet, Wainwright, and White Mountain. The Alternative A analysis of impacts to caribou abundance would apply similarly to Alternative B. See Section B.2.4 of this evaluation for discussion.
- The construction and operation of the Ambler Road could cause a reduction in the availability of caribou for residents of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Evansville, Huslia,

Kiana, Kobuk, Kotzebue, Noorvik, Selawik, Shungnak, and Wiseman. The Alternative A analysis of impacts to caribou availability would apply similarly to Alternative B. See Section B.2.4 of this evaluation for discussion.

- The construction and operation of the Ambler Road could cause population level impacts to fish and a reduction in the abundance of harvestable fish for the communities of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Buckland, Evansville, Hughes, Huslia, Kiana, Kobuk, Kotzebue, Noatak, Noorvik, Selawik, Shungnak, and Wiseman. The majority of the analysis of Alternative A would apply similarly to Alternative B. See Section B.2.4 of this evaluation for discussion. Additionally, the route for Alternative B would place a river crossing seven miles from sheefish spawning habitat on the Reed River. Moving a crossing closer to the concentrated area of sheefish spawning habitat could increase the potential for sediment impacts from construction, erosion, degradation, and contamination of the habitat from accidental spills.
- The construction and operation of the Ambler Road could cause a reduction in the availability of fish for the communities of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Buckland, Evansville, Hughes, Huslia, Kiana, Kobuk, Kotzebue, Noatak, Noorvik, Selawik, Shungnak, and Wiseman. The majority of the analysis of Alternative A would apply similarly to Alternative B. See Section B.2.4 of this evaluation for discussion.
- The construction and operation of the Ambler Road could cause a reduction in access for the communities of Alatna, Allakaket, Ambler, Bettles, Evansville, Kobuk, and Shungnak. The majority of the analysis of Alternative A would apply similarly to Alternative B. See Section B.2.4 of this evaluation for discussion.

B.4. Evaluation and Findings for Alternative C (Diagonal Route to the Dalton Highway)

The BLM developed this alternative based on scoping comments received pursuant to the 2017 notice of intent to prepare an environmental impact statement (82 FR 12119). The 332-mile route is longer than the other alternatives but has a similar driving length (476 miles) to Fairbanks. This alternative would have a logical terminus connecting into the road and rail network to provide year-round access to existing port facilities.

B.4.1 Evaluation of the Effect of Use, Occupancy or Disposition on Subsistence Use and Need

Under Alternative C, the types of impacts to subsistence uses are similar to those described under Alternative A, Section B.2.1. Alternative C would affect a different set of communities and would cross through different key habitat areas. Differences in impacts under Alternative C are discussed below.

Subsistence Resource Abundance

Alternative C would be less likely to have direct impacts on sheefish spawning grounds in the Kobuk and Alatna rivers. Alternative C crosses the Kobuk River directly downstream from known sheefish spawning habitat. Alternative C would require a crossing on the Koyukuk River near Hughes in a documented sheefish spawning habitat. As discussed above (Section B.2.1.1), any changes to waterways that obstruct access to spawning grounds could have larger indirect impacts to communities that harvest sheefish upstream and downstream from the road corridor. In addition to sheefish spawning grounds, Alternative C also crosses streams that support spawning for Chinook and chum salmon. Impacts to salmon spawning grounds under Alternative C could have larger effects to communities that harvest salmon downstream from the road corridor along the Yukon and Koyukuk rivers. For many Yukon River communities, Chinook salmon is a resource of high importance (see Appendix L, Table 49), and it is also a species of yield concern to the ADF&G. Chum salmon is a resource of high importance to most communities in the Kobuk-Selawik, Koyukuk, and Yukon river basins. Over 80 miles of the Alternative C route (compared to 20 or fewer miles under Alternatives A and B) would occur within 1,000 feet of major floodplains or streams, increasing the risk of downstream effects to fish (see Supplemental EIS Section 3.3.2, Fish and Aquatics) and subsistence uses of fish.

Alternative C would occur within the Western Arctic Caribou Herd wintering grounds and affects an overall greater amount of Western Arctic Caribou Herd habitat. Loss of winter habitat would be particularly detrimental to the Western Arctic Caribou Herd due to the herd's difficulty in accessing lichen during winter. Past Western Arctic Caribou Herd population declines have been attributed to extreme winter weather conditions, a resulting lack of access to lichen, and high winter mortality (see Supplemental EIS Section 3.3.4, Mammals).

Subsistence Resource Availability

For several resources (caribou, small land mammals, salmon, and non-salmon fish), Alternative C would cross subsistence use areas for a greater number of communities, thus increasing the number of communities with the potential for direct effects to the availability of these resources.

Alternative C could result in direct impacts to fish resource availability for a greater number of communities (eight) compared to under Alternative A (seven communities). Alternative C would cross more fish streams than alternatives A and B, and it would require more bridges and substantially more minor culverts that are more likely to obstruct fish passage. This would increase the likelihood of impacts to resource availability for communities both in the vicinity of the road, as well as upstream and downstream from the road. Alternative C would also have more impacts related to ice roads and water withdrawals due to more miles of ice roads under this alternative. Alternative C would more frequently be routed along floodplains and near streams, which may put waters at higher risk for spills and sedimentation (Supplemental EIS Section 3.3.2, Fish and Aquatics).

Compared to Alternatives A and B, Alternative C crosses areas of higher value moose habitat and therefore could have greater impacts to moose availability in nearby communities for whom moose is a resource of high importance (Hughes, Huslia, Alatna, Allakaket).

For caribou, Alternative C would cross caribou subsistence use areas for 10 communities (versus nine communities under Alternative A). Alternative C places the ROW through the middle of the entire Ray Mountains Herd range; it bypasses the Hodzana Hills Herd range and passes through the peripheral and winter range of the Western Arctic Caribou Herd. This alternative intercepts only a small portion of the migratory area of the Western Arctic Caribou Herd. While Alternative C crosses more Western Arctic Caribou Herd habitat than the other alternatives and would be more likely to affect wintering habitat, the alternative may have a lesser impact on fall and spring migrations because it only intercepts a small portion of their migratory range. This would reduce the potential for impacts to caribou resource availability resulting from road deflection and displacement. The Ray Mountains Herd may experience a direct impact from this alternative. However, because the Ray Mountains Herd is a smaller herd (812 as of last census) and access to it by subsistence harvesters is currently limited, potential impacts to subsistence resource availability are low (see Supplemental EIS Section 3.3.4, Mammals).

Subsistence User Access

In terms of user access, Alternative C crosses subsistence use areas for the same number of communities as Alternative A (12 communities), but a different set of communities: Alatna, Allakaket, Ambler, Anaktuvuk Pass, Hughes, Huslia, Kobuk, Selawik, Shungnak, Stevens Village, and Tanana. Communities with the highest number of resource use areas crossed (five or more) include Allakaket, Hughes, Kobuk, Shungnak, Ambler, Stevens Village, and Alatna. Hughes, Kobuk, and Shungnak would have their hunting areas bisected by the project. The community of Kobuk would be located directly along the Alternative C route and Hughes is within four miles of the route. Allakaket, Alatna and Ambler would have their subsistence hunting area partially intersected, while Stevens Village, Tanana, Huslia, and Selawik have use areas on the periphery of the project. The communities that would have their use areas bisected or partially intersected would likely see the largest impact on their subsistence access. However, there may be instances where peripheral use areas are particularly important for a specific resource or activity, and these communities may also experience impacts to user access resulting from the road.

B.4.2 Evaluation of the Availability of Other Lands

See Section B.2.2 of this evaluation.

B.4.3 Evaluation of Other Alternatives That Would Reduce or Eliminate the Use, Occupancy or Disposition of Public Lands Needed for Subsistence Purposes

See Section B.2.3 of this evaluation.

B.4.4 Findings

Alternative C would not result in a significant restriction to subsistence uses for the communities of Alakanuk, Anvik, Atqasuk, Beaver, Brevig Mission, Coldfoot, Emmonak, Galena, Grayling, Holy Cross, Kaltag, Kotlik, Koyukuk, Livengood, Manley Hot Springs, Marshall, Minto, Mountain Village, Nenana, Nuiqsut, Nulato, Nunam Iqua, Pilot Station, Pitka's Point, Rampart, Ruby, Russian Mission, St. Mary's, St. Michael, Stebbins, Tanana, Teller, Utqiagvik, and Wales.

Alternative C may result in a significant restriction to subsistence uses for the communities of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Buckland, Deering, Elim, Evansville, Golovin, Hughes, Huslia, Kiana, Kivalina, Kobuk, Kotzebue, Koyuk, Noatak, Nome, Noorvik, Point Hope, Point Lay, Selawik, Shaktoolik, Shishmaref, Shungnak, Stevens Village, Unalakleet, Wainwright, White Mountain, and Wiseman.

This is based on the following findings:

- The construction and operation of the Ambler Road could cause population level impacts to the Western Arctic Caribou Herd and a reduction in the abundance of caribou available for residents of Alatna, Evansville, Anaktuvuk Pass, Buckland, Noatak, Selawik, Wiseman, Allakaket, Ambler, Bettles, Huslia, Kiana, Kobuk, Kotzebue, Noorvik, Shungnak, Deering, Elim, Golovin, Kivalina, Koyuk, Nome, Point Hope, Point Lay, Shaktoolik, Shishmaref, Unalakleet, Wainwright, and White Mountain. The Alternative A analysis of impacts to caribou abundance would apply similarly to Alternative C. See Section B.2.4 of this evaluation for discussion, though impacts may be lessened due to the proposed routes' orientation relative to migratory paths. The route proposed under Alternative C would bisect more of the Western Arctic Caribou Herd winter range and could impact access to important winter habitat. Caribou abundance could be impacted if caribou movements are impeded by the road along this route.
- The construction and operation of the Ambler Road could cause a reduction in the availability of caribou for residents of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Huslia, Kobuk, Selawik, and Shungnak. The Alternative A analysis of impacts to caribou availability would apply similarly to Alternative C. See Section B.2.4 of this evaluation for discussion.

- The construction and operation of the Ambler Road could cause a reduction in the availability of caribou for residents of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Evansville, Huslia, Kiana, Kobuk, Kotzebue, Noorvik, Selawik, Shungnak, and Wiseman. The Alternative A analysis of impacts to caribou availability would apply similarly to Alternative B. See Section B.2.4 of this evaluation for discussion.
- The construction and operation of the Ambler Road could cause population level impacts to fish and a reduction in the abundance of harvestable fish for the communities of Alatna, Allakaket, Ambler, Buckland, Hughes, Huslia, Kiana, Kobuk, Kotzebue, Noatak, Noorvik, Selawik, Shungnak, and Stevens Village. The majority of the analysis of Alternative A would apply similarly to Alternative C. See Section B.2.4 of this evaluation for discussion. Additionally, Alternative C would be less likely to have direct impacts on sheefish spawning grounds and abundance in the Kobuk and Alatna rivers and would be more likely to impact spawning grounds and abundance in the Koyukuk River. This could potentially lead to potentially greater impacts to those communities in the Koyukuk River watershed.
- The construction and operation of the Ambler Road could cause a reduction in the availability of fish for the communities of Alatna, Allakaket, Ambler, Buckland, Hughes, Huslia, Kiana, Kobuk, Kotzebue, Noatak, Noorvik, Selawik, Shungnak, and Stevens Village. The majority of the analysis of Alternative A would apply similarly to Alternative C. See Section B.2.4 of this evaluation for discussion. Additionally, due to its greater length Alternative C would have greater impacts from bridges, culverts, ice roads, and water withdrawal on fish availability than Alternatives A and B.

The construction and operation of the Ambler Road could cause a reduction in access for the communities of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Hughes, Huslia, Kobuk, Selawik, Shungnak, Stevens Village, and Tanana. The majority of the analysis of Alternative A would apply similarly to Alternative C. See Section B.2.4 of this evaluation for discussion.

B.5. Evaluation and Findings for the Cumulative Case

The goal of the cumulative case analysis presented in Appendix H of the Supplemental EIS is to evaluate the incremental impact of the action alternatives considered, in conjunction with all past, present, and reasonably foreseeable future activities in or near the Ambler Road. Past and present actions that have affected subsistence uses and resources within the study region include mineral exploration, mineral development, infrastructure projects, scientific research, recreation and tourism, sport hunting and fishing, hunting and harvesting regulations, establishment of wildlife refuges, national parks and preserves, and environmental changes resulting from climate change. Actions included in the cumulative case analysis are listed in Appendix H Section 2 and are summarized below.

B.5.1 Evaluation of the Effect of Use, Occupancy or Disposition on Subsistence Use and Need

The cumulative impacts to subsistence resulting from the proposed road, other reasonably foreseeable developments, and climate change could result in reduced harvesting opportunities for local residents and alterations in subsistence harvesting patterns. The cumulative effects of the road, in combination with past, present, and reasonably foreseeable future actions, are discussed in detail below.

Past and Present Actions

A discussion of historic events that have affected subsistence in the region is provided in Section 3.4.7 of the Supplemental EIS and in Appendix L, Section 6.6. More recent past and present actions that have affected subsistence and resources are:

- mineral exploration inside the District (e.g., Arctic, Bornite, Smucker, and Sun projects);
- mineral exploration outside the District (e.g., South 32 mining exploration);
- Red Dog Mine, including the DMTS and port site;
- oil exploration and extraction, including Trans-Alaska Pipeline System (TAPS);
- infrastructure projects, including construction of the Dalton Highway;
- sport hunting and fishing;
- hunting and harvesting regulations;
- passage of ANILCA; and
- impacts of climate change.

Many of these actions are ongoing and will continue into the future (see Section B.5.1.3 below).

Construction of the TAPS and Dalton Highway have affected subsistence access and resource availability for communities in the eastern portion of the project area, with many residents believing that the highway and pipeline have resulted in changes to caribou migration across the region. Impacts to vegetation within this area include construction of the Dalton Highway and other roads and airports in rural Alaska communities, which has resulted in loss of harvesting areas within the footprints, alteration beyond the footprints, and the spread and establishment of non-native invasive species near developments.

Mineral exploration both within and outside of the District has had effects on subsistence resource availability and user access. Red Dog Mine, the largest operating mine in the region, has introduced contamination concerns for local residents, particularly Kivalina residents who are situated downstream from the mine, and has affected resource distribution and migration for resources such as caribou and marine mammals possibly resulting in decreased harvests of these resources over time (EPA 2009). These impacts are a result of the mine itself, in addition to the DMTS and port site. Residents have observed that some caribou would stop once they reach the DMTS, sometimes traveling alongside the road before crossing, and other times bypassing the road altogether. Such behavior has also been documented through radio collar observation. Other mining activities have occurred in the region, and residents have reported concerns about the effects of these activities on the health of subsistence resources such as fish (see Supplemental EIS Section 3.4.7, Subsistence Uses and Resources).

In addition to mineral exploration, oil and gas exploration, development, and production is ongoing and planned within the onshore North Slope, State and Federal waters in the Beaufort Sea, and in the Western Canadian Arctic. These activities include exploration work, infrastructure development, construction, maintenance, gravel mining, and production associated with existing wells. Effects of oil and gas development on the North Slope have included changes in the availability of resources such as caribou, furbearers, and waterfowl, and impacts to harvester access. Oil and gas activities are expected to continue under all alternatives.

Other past and present actions in the study region include sport fishing, recreation and tourism, land management changes, and regulation of hunting and harvesting activities. Increased sport hunting and fishing in the region and associated air traffic have resulted in increased competition for local subsistence users in addition to disturbance and displacement of subsistence resources such as caribou. Government regulation of hunting and harvesting activities in addition to land access have also had effects on subsistence. Hunting and harvesting regulations are sometimes at odds with the traditional timing of subsistence activities, or put limits on harvests. The establishment of GAAR in the 1980s also affected access to and use of traditional harvesting areas for residents of nearby communities within the northeastern portion of the project area by limiting use of ATVs in national parkland (Watson 2018).

Climate change is an ongoing factor considered in cumulative effects analyses of the Ambler Road. Climate change could affect the habitat, behavior, distribution, and populations of fish and wildlife within the program area. Impacts of climate change include changes in the predictability of weather conditions such as the timing of freeze-up and breakup, snowfall levels, storm and wind conditions, and ice conditions (e.g., ice thickness on rivers and lakes), all of which affect individuals' abilities to travel to subsistence use areas when resources are present in those areas. In addition, subsistence users may experience greater risks to safety when travel conditions are not ideal. Changes in resource abundance or distribution resulting from climate change can also affect the availability of those resources to subsistence users or may cause subsistence users to travel farther and spend more time and effort on subsistence activities (Brinkman 2016). Impacts to key subsistence resources resulting from climate change include a loss of foraging (lichen) habitat and loss of access to winter forage for caribou (see Supplemental EIS Section 3.3.4, Mammals), as well as changes in fish distribution and productivity due to loss of habitat and warmer temperatures (see Supplemental EIS Section 3.3.2, Fish and Aquatics).

Reasonably Foreseeable Future Actions

Reasonably foreseeable actions within the region that could contribute to subsistence impacts include:

- exploration and development of mineral prospects within the District (Arctic, Bornite, Sun, and Smucker projects);
- exploration and development of mineral prospects outside the District (e.g., Manh Choh Mine, South 32's Roosevelt Project);
- use of the proposed road for commercial access;
- use of the proposed road for commercial use by local communities and Native Allotment owners;
- secondary access roads to other mining areas and claims as well as local communities;
- infrastructure projects (e.g., Dalton Highway improvements, OTZ Telephone Cooperative communication project);
- changes in land management; and
- eventual public use of the road.

The project would introduce a large industrial road corridor into an area that was previously undeveloped and used primarily for subsistence and recreational purposes. Under any alternative, 12 communities have subsistence resource use areas impacted by the project corridor(s), and a majority of these communities are rural, low-income, non-road-connected communities that rely on subsistence to support their mixed economy.

The road and associated mineral development, in addition to other reasonably foreseeable activities, would likely contribute to cumulative impacts on subsistence resource abundance and availability. The development of mines within the District and secondary access roads would result in habitat loss, alteration, and fragmentation of Western Arctic Caribou Herd caribou migratory and winter range, which could affect the abundance and availability of caribou to some or all of the 42 WAH WG communities. The mines, mining roads, and secondary access roads would increase habitat fragmentation exponentially. The fragmentation of habitat would further remove usable habitat for caribou during migration and winter, which could force substantial range shifts, increased competition for resources, or increased predation (NCASI 2008). Alternatives A and B both place the ROW in more migratory habitat than

Alternative C, which may spatially alter Western Arctic Caribou Herd migration away from subsistence use areas of Alatna, Allakaket, Ambler, Bettles, Evansville, Hughes, Kobuk, Shungnak, Selawik and Wiseman. But Alternative C places the ROW more in the winter range of the Western Arctic Caribou Herd. This may alter Western Arctic Caribou Herd use of winter range and impact Alatna, Allakaket, Ambler, Hughes, Huslia, Kobuk, Selawik, Tanana and Shungnak. Impacts to wintering habitat and lichen availability could affect winter survival rates for the Western Arctic Caribou Herd. A member of the Northwest Arctic Regional Advisory Council noted that in recent years climate change has made winter foraging even more difficult for the caribou herds:

> This climate change in the past maybe five, six years and knowing the caribou and stuff, after it snows in November we usually get rain and when it snows, that rain it'll freeze on top of the tundra and the caribou are having hard time feeding so – and we lose a lot of caribou due to starvation due to this climate change, so people out there need to be aware of that because a lot of people will wonder why are we losing so much caribou. So this climate change did lots of damage on our subsistence take on caribou… And the people should know that it affects the herd. (Northwest Arctic Regional Advisory Council 2022)

Population-level impacts could extend to the 42 WAH WG communities, particularly those with a moderate to high reliance on the resource (see Appendix L, Table 48).

In addition to physical obstructions and habitat fragmentation, noise associated with mine operation, including helicopter, plane, and ground traffic, blasting at the mine site, and operation of heavy equipment and machinery, would further displace animals, such as caribou, moose, small land mammals, and waterfowl, around mine sites. Caribou have been documented avoiding active mine sites (Supplemental EIS, Section 3.3.4). Noise can displace wildlife and cause skittish behavior, resulting in reduced resource availability and harvest success for hunters.

Reasonably foreseeable future actions that would impact fish include advanced mining development and secondary access roads. The Ambler Road in addition to associated mining development and future infrastructure development would increase potential impacts to resource abundance and resource availability for key fish resources such as sheefish, whitefish, and salmon. Direct and indirect chemical stressors such as mining-related pollution, acid mine drainage, and the release of toxic materials have the potential to significantly impact aquatic life health and the survival of fish populations (Limpinsel et al. 2017). Toxic metals that bioaccumulate in fish tissue can lead to fish mortality, increased susceptibility to disease, reduced growth rates, and pose health risks to human consumers (Hughes et al. 2016). Mining related removal of groundwater would lower the water table well below natural stream or lake levels and considerably reduce flow into streams and the hyporheic zone. Depending on the location and scale of operation, dewatering has the potential to substantially reduce groundwater flows into important spawning, egg incubating, and wintering habitats relied upon by salmon, sheefish, whitefish, and other important subsistence species, which could have potential population level impacts (see Supplemental EIS Section 3.3.2, Fish and Aquatics). Alternative A and B cross more key spawning habitat for sheefish compared to Alternative C. However, Alternative C crosses streams that support spawning for Chinook salmon and chum salmon, and Alternative C would have direct effects on fish subsistence use areas for a greater number of communities (eight versus four).

Sheefish typically exhibit a high degree of spawning site fidelity, not only to spawning streams but to specific areas within a reach of stream (Savereide and Huang 2016). They require specialized spawning habitat limited by water temperature, substrate composition, and specific water quality characteristics influenced by geologic features (Alt 1994; Braem et al. 2015; Savereide and Huang 2016) (see Volume 4, Map 3-18). Given the proximity of the four most advanced mine projects to the Kobuk River sheefish spawning grounds and the large numbers of sheefish that spawn in this habitat, sheefish may be especially vulnerable to population-level effects (see Supplemental EIS Section 3.3.2, Fish and Aquatics) from mine related dewatering, large scale spills, or leaching of acid rock into waterways (see Appendix L, Section 6.6). Maintaining spawning habitat is critical to the survival of the Kobuk and Yukon rivers sheefish and whitefish populations because a large fraction of any given spawning population may spawn in a small, distinct geographic area. Cumulative impacts to sheefish populations would most likely occur for fish study communities in the Kobuk-Selawik and Koyukuk river basins. In particular, sheefish are a resource of high importance to the communities of Ambler, Kiana, Kobuk, and Noorvik. If impacts to sheefish extended to the Koyukuk River basin, then communities such as Alatna, Allakaket, Hughes, Huslia, Bettles, Evansville (for whom sheefish is a resource of medium importance) could also be affected (see Appendix L, Table 49).

Salmon populations are also vulnerable to cumulative impacts. Since the 1990s, chum and Chinook salmon returns have declined, and the ADF&G considers Chinook salmon as a “stock of yield concern”. Chum and Chinook salmon runs have declined even further since publication of the Final EIS, leading to subsistence closures in the Yukon River watershed (see Supplemental EIS Section 3.4.7, Subsistence Uses and Resources). If these trends continue, and in combination with the cumulative impacts of the road, mining activity, and other reasonably foreseeable future actions, communities in the Kobuk-Selawik, Koyukuk, and Yukon river basins could experience reduced harvest success for this key resource. For many Koyukuk and Yukon river communities, Chinook salmon is a resource of medium and high importance (see Supplemental EIS Appendix L, Table 49). Chum salmon is a resource of high importance throughout the Kobuk-Selawik, Koyukuk, and lower Yukon river basins.

In addition to caribou and fish, mining and its associated activities also have the potential to cause substantial impacts to vegetation. Open pit and underground mining would result in loss of vegetation within the project area and alteration of vegetation beyond project areas from disturbance of surface and groundwater flow, lowering of the water table from dewatering activities, and fugitive dust from heavy metals and accessory roads. As has been shown at Red Dog Mine, fugitive dust from heavy metals can travel thousands of feet to several kilometers in distance, particularly if strict mitigation measures are not employed or practiced. In addition, hundreds of thousands of acres of mining claims exist in the advanced mining scenario, which could result in more loss and alteration than initially predicted if more claims are developed. Fugitive dust from roads and mining activities would reduce the overall area available to local communities for subsistence harvesting of berries and other plants. While not harvested in the quantity that caribou and fish are, vegetation is a resource of high cultural and/or material importance in nearly all of the 27 primary subsistence study communities. If the road and/or future mining and infrastructure projects overlap with key berry harvesting areas for an individual community, then vegetation harvesting for that community could be reduced.

In addition to mine developments within the District, development of other mines could be facilitated by the Ambler Road alternatives. The Alternative C route could provide access to mining claims near the Zane Hills (northwest of Hughes) and Ray Mountains. Alternatives A and B could provide access to mining districts to the east of the District and north of Alatna/Allakaket and Evansville/Bettles within areas used by those communities for subsistence. Development of these mining claims would further contribute to the network of infrastructure and activity along the proposed Ambler Road. As noted in Section 3.3.4 (Mammals), habitat loss and alteration resulting from development of the District could be greater than the road itself, increasing habitat fragmentation and potential impacts on caribou abundance, distribution, and migration. Multiple connected roads, as depicted in the hypothetical development scenario, would increase the likelihood of large-scale changes in caribou migration, thus increasing the likelihood of impacts on subsistence resource availability outside the immediate area of the road.

In recent years, there has been a shift toward developing small mineral prospects throughout Alaska relying on use of the public highway system for transport of ore. It is reasonably foreseeable that additional projects near the Dalton Highway, and the proposed Ambler Road, would also propose to rely on the highway system to transport ore from the mine to a central processing facility such as Fort Knox near Fairbanks.

After reclamation of the road (assuming the road is not maintained for future public access or otherwise remains), the remaining cleared ROW would likely become a route for local and non-local hunters traveling by off-highway vehicles. If the reclaimed road alignment increases access into the region, state and federal regulators may respond by introducing stricter hunting and harvesting regulations, which would affect availability of resources to local communities. Impacts on resource availability due to increased competition and changes in hunting regulations would be most likely to occur for large land mammals such as caribou and moose.

The potential for increased access to the region resulting from a publicly accessible road is a primary concern that has been voiced by residents during both scoping and traditional knowledge studies associated with the Ambler Road (Watson 2014; Allakaket Tribal Council 2022; BLM 2018). Many residents do not believe that the road will remain private and point to previous private access roads that eventually opened to the public (e.g., the Dalton Highway). While the BLM is not considering issuance of a ROW for a public road, it is reasonably foreseeable that there may be some public uses of the road, including local resident use of the Ambler Road for subsistence purposes, trespass, commercial use of the road by local communities, uses by individuals with existing land use rights, and, after the useful life of the road for mineral development, efforts to convert the road to a public road. If there is illegal trespass on the project road or these additional roads, it could result in higher levels of harvest, increased displacement from roads, and higher energetic expenditures from disturbance. If the road is eventually opened to the public, this could result in higher levels of human activity along the road, higher levels of recreational use of areas adjacent to the road, and higher levels of hunting and trapping. While regulation of hunting could partially mitigate the impacts of increased hunter access on caribou, increases in human activity would likely increase the energetic impacts to caribou along the road and decrease the use of the area by caribou. These activities would occur in addition to habitat loss and human activities in Western Arctic Caribou Herd summer range or elsewhere on their migratory range. Public access to the road for outsiders would likely have substantial negative impacts to subsistence users by increasing competition for subsistence resources, increasing disturbances to wildlife, and decreasing harvest success for local residents. According to Guettabi et al. (2016), increased outsider access resulting from the road and/or ROW would likely reduce harvest success for local hunters, particularly for moose (see Appendix L for more detailed discussion). The WAH WG cited the Dalton Highway as an example of how restricted access roads can easily be opened to the public due to political and public pressure, and how public roads can affect resource availability for local communities:

> The WACH declined for much of the last two decades. Reduced population levels during that time led to harvest restrictions. Although the most recent caribou count indicates a population that is stabilizing or possibly starting to increase, concerns remain that increased access due to roads could greatly compound user conflict and limited availability of caribou. We recognize that the proposed road is currently specified as being commercial-only. However, history (e.g., with the Dalton Highway) suggests that once roads are established they eventually become used by the public. We are greatly concerned that the Ambler Road will not remain closed to public use given this history and the multiple jurisdictions (State, Federal and Native) that the proposed road would cross. (WAH WG 2018)

The BLM is currently preparing an EIS regarding potential revocation of ANCSA 17(d)(1) withdrawals, including parcels in the Kobuk-Seward Planning Area, and associated changes in land management could affect subsistence resource availability. Revocation of withdrawals on certain parcels of land could result in changes in subsistence management, including the loss of Federal subsistence priority on those lands for local residents, or an increase in lands available for Federal subsistence priority. Such changes, in combination with increased hunting competition in the region, could affect subsistence uses and harvest success for certain study communities, either negatively or positively.

Overall, cumulative impacts of Alternatives A and B related to resource abundance of fish and resource availability of caribou would likely be greater than those under Alternative C, as they would be more likely to affect resource availability of migrating caribou to the subsistence study communities, particularly during the fall months, and are most likely to have population-level effects on sheefish and whitefish, all key subsistence species among the study communities. These alternatives would also be more likely to have larger indirect effects on caribou availability to the 42 caribou study communities, and downstream effects on the 32 fish study communities. Alternative C would potentially have a greater overall effect on fish habitat due to its greater length and larger number of bridges and culverts. Alternative C is also more likely than Alternatives A and B to impact caribou abundance as it overlaps with a greater portion of wintering habitat.

In addition to potential cumulative impacts on resource availability and abundance, the road, in combination with present and reasonably foreseeable actions, could also increase the potential for cumulative impacts to user access. Cumulative impacts to user access would likely be similar regardless of the alternative, as the different alternatives affect the same number (albeit a different set) of communities). Alternative C would cross within approximately five miles of several communities (Kobuk, Shungnak, and Hughes), while Alternatives A and B would cross within 10 miles of Bettles and Evansville. All alternatives overlap with key subsistence hunting and harvesting areas for multiple communities.

Mining development will result in the physical removal of traditional subsistence hunting and harvesting areas for the study communities in addition to decreased access to these areas through security/access restrictions. The overall area available for subsistence use will likely shrink over time due to the increasing presence of infrastructure and human activity within traditional use areas. Increased infrastructure across the region associated with the road, mines, and other infrastructure projects, would increase the number of physical barriers to overland travel. Access impacts will most likely affect the 12 communities with subsistence use areas overlapping each of the proposed routes but could also affect additional communities as development and infrastructure expands. Under the proposed alternatives, the communities mostly likely to experience direct impacts to access include Shungnak, Evansville, Bettles, Kobuk, Ambler, Allakaket, Alatna, and Hughes. Further mineral development throughout the District, in addition to other reasonably foreseeable actions within the region could result in a larger area of development and more communities being affected.

The potential for increased access into the project area resulting from unauthorized use of the road and ROW may increase competition in the region for certain resources and decrease harvesting success for local hunters. Illegal trespass by unauthorized users along the Ambler Road will likely occur by both local/regional residents and non-local individuals, particularly during the hunting season. While these instances may be sporadic, they may also increase disturbances to resources and competition for local hunters, particularly in areas where existing trails and roads intersect with the road alignment.

> *Would it ever become public in the future? That’s always the scary thing about roads once they become publicly accessible anybody from anywhere has access to that road.*

> *Whether it be from within the State of Alaska or outside.* (Noatak Government-to-Government Meeting with BLM, April 2023)

Secondary access roads developed by communities would likely be used, at least by local residents, for subsistence harvesting activities. If the Ambler Road also becomes open to local use for subsistence purposes, then such a road could have positive and negative impacts on subsistence. Some residents would likely use the road to access subsistence hunting and harvesting areas. The use of industrial roads for subsistence purposes has been documented on the North Slope of Alaska. Roads provide easy access to hunting areas, particularly for individuals who do not have access to snowmachines and ATVs, who have limited time to engage in subsistence activities, or who have health or other issues that make overland travel difficult. Access to the road may also help to mitigate some of the effects of the road on resource migration and distribution, as residents may be able to travel farther to access areas with heavier concentrations of the resource.

It is unclear whether the road would allow access to small mining claims; while large mines would likely have policies regarding hunting and fishing by workers, smaller mining outfits or individuals may allow these activities. According to the WAH WG (2017), communities within the region have already experienced increased competition in traditional hunting areas, with greater numbers of hunters concentrated within smaller areas. Sport hunting is a key issue within the region for subsistence harvesters, and public access to the area via a road or ROW would contribute to these impacts.

Ultimately, the cumulative impacts to subsistence resulting from the Ambler Road, other reasonably foreseeable developments, and climate change could result in reduced harvesting opportunities for local residents and alterations in subsistence harvesting and land use patterns, particularly if the road eventually becomes open to public use. A recent analysis comparing road-connected communities to non-road-connected communities showed that road-connected communities have substantially lower subsistence harvests than non-road-connected communities (Guettabi et al. 2016). Other research (e.g., Kofinas et al. 2016) has shown an estimated decline of one-third of subsistence harvests for communities along a publicly accessible road, with the potential for a relatively modest increase in income; thus, the loss to subsistence would likely not be offset by an increase in income, nor would increased income address the social or cultural losses to communities. The potential impacts of increased income and/or employment on subsistence are discussed in further detail in the Supplemental EIS, Section 3.4.7.

Decreased harvests among the study communities could have wide-ranging effects due to the potential impacts on sharing networks within the region in addition to networks that extend to other regions (Kofinas et al. 2016). Sharing is central to subsistence and is a key value across the study region. Decreased harvests could disrupt existing sharing networks to other communities and regions if residents are unable to share as widely or frequently as they are accustomed. A study in the Upper Kobuk Region documented sharing networks which extended to the major urban centers of Alaska, the North Slope, and Northwest, Southeast, Southwest, and Interior Alaska, during a single study year (Braem et al. 2015). Because of the large number of communities that harvest from the Western Arctic Caribou Herd and the extensive sharing networks maintained by these communities, a decline in herd size or a substantial change in the migration or distribution of the herd could have wide-reaching impacts on sharing networks that extend well outside the study region to other regions of Alaska. In addition to sharing networks, the interconnectedness of communities through kinship and ancestral ties means that impacts to subsistence in one community could reverberate throughout the region. While most residents in the region today live in permanent communities, these communities are not static. Movement between communities is common over one's lifetime as is traveling between communities to engage in subsistence activities and harvest subsistence resources that may be less available in one's current community of residence. Therefore, a person's area of use, and the area with which they identify culturally, is often much larger than the subsistence use area associated with their community.

A number of studies have documented the resilience of subsistence communities in the face of sudden or dramatic changes, noting that communities and households often respond to scarcity of one resource (caribou) by increasing their harvests of another or by increasing income sources when subsistence foods are less available (Martin 2015). Resilience allows communities and households to adjust to changes while maintaining access to key cultural resources and activities. However, the ability of households to be resilient in the face of change does not negate the existence of impacts, nor does it imply that households can simply adapt to all forces of change. In addition, as discussed above, communities and households are not homogenous in their capacity to adapt to sudden change (BurnSilver and Magdanz 2019). Larger disruptions to subsistence ties, particularly in combination with the decreased availability of key subsistence resources, could affect social, cultural, and economic well-being, particularly to the more vulnerable low-income, unconnected, and low-harvest households that rely on strong sharing networks for their food security (Kofinas et al. 2016). Over time, if communities in the region become road connected; experience an increase in the availability of goods, income, and employment opportunities; and also experience decreased harvesting opportunities, this could result in an overall decrease in subsistence harvests among the study communities (Magdanz et al. 2016).

When subsistence users' opportunities to engage in subsistence activities are limited, their opportunities to transmit knowledge about those activities, which are learned through participation, are also limited. If residents stop using portions of the project area for subsistence purposes, either due to avoidance of development activities or reduced availability of subsistence resources, the opportunity to transmit Indigenous Knowledge to younger generations about those traditional use areas would be diminished. While communities would likely maintain a cultural connection to these areas and acknowledge them as part of their traditional land use area, the reduction in direct use of the land could lead to reduced knowledge among the younger generation regarding place names, stories, and traditional ecological knowledge associated with those areas. There would also be fewer opportunities for residents to participate in the distribution and consumption of subsistence resources, ultimately affecting the social cohesion of affected communities. Degradation of traditional lands can also have spiritual effects on subsistence users; the Iñupiaq and Dene view their lands as sacred and have a cultural obligation to protect them. Any changes to residents' ability to participate in subsistence activities, harvest subsistence resources in traditional places at the appropriate times, and consume subsistence foods could have long-term or permanent effects on the spiritual, cultural, and physical well-being of the study communities by diminishing social ties that are strengthened through harvesting, processing, and distributing subsistence resources and by weakening overall community well-being.

B.5.2 Evaluation of the Availability of Other Lands

See Section B.2.2 of this evaluation.

B.5.3 Evaluation of Other Alternatives That Would Reduce or Eliminate the Use, Occupancy or Disposition of Public Lands Needed for Subsistence Purposes

See Section B.2.3 of this evaluation.

B.5.4 Findings

The cumulative case would not result in a significant restriction to subsistence uses for the communities of Alakanuk, Anvik, Atqasuk, Beaver, Brevig Mission, Emmonak, Galena, Grayling, Holy Cross, Kaltag, Kotlik, Koyukuk, Livengood, Manley Hot Springs, Marshall, Minto, Mountain Village, Nenana, Nulato, *Nunam Iqua, Pilot Station, Pitka's Point, Rampart, Ruby, Russian Mission, St. Mary's St. Michael, Stebbins, Tanana, Teller, and Wales.*

The cumulative case may result in a significant restriction to subsistence uses for the communities of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Buckland, Coldfoot, Deering, Elim, Evansville, Golovin, Hughes, Huslia, Kiana, Kivalina, Kobuk, Kotzebue, Koyuk, Noatak, Nome, Noorvik, Nuiqsut, Point Hope, Point Lay, Selawik, Shaktoolik, Shishmaref, Shungnak, Stevens Village, Unalakleet, Utqiagvik, Wainwright, White Mountain, and Wiseman.

This is based on the following findings:

- The construction and operation of the Ambler Road could cause population level impacts to the Western Arctic Caribou Herd and a reduction in the abundance of caribou available for residents of Alatna, Evansville, Anaktuvuk Pass, Buckland, Noatak, Selawik, Wiseman, Allakaket, Ambler, Bettles, Huslia, Kiana, Kobuk, Kotzebue, Noorvik, Nuiqsut, Shungnak, Deering, Elim, Golovin, Kivalina, Koyuk, Nome, Point Hope, Point Lay, Shaktoolik, Shishmaref, Unalakleet, Utqiagvik, Wainwright, and White Mountain. The Alternative A analysis of impacts to caribou abundance would apply similarly to the cumulative case. See Section B.2.4 of this evaluation for discussion. Development of mines and secondary access roads within the District would contribute to habitat loss, alternation, and fragmentation of the Western Arctic Caribou Herd migratory and winter range. Oil and gas development on the North Slope would continue and impact the range and movements of not only the Western Arctic Caribou Herd, but also the TCH and the Central Arctic Herd as well. Communities that rely jointly on these herds for their subsistence needs would likely be impacted under the cumulative case. Additionally, future public use of the road could result in major increases in non-rural resident hunting, contributing to a decrease in the abundance of the herd. Climate change would reduce caribou forage and limit animals' ability to reliably access winter forage. Changing weather and vegetation patterns could affect winter survival rates for the Western Arctic Caribou Herd and other large migratory herds. This would likely exacerbate impacts described in B.2.4.
- The construction and operation of the Ambler Road could cause a reduction in the availability of caribou for residents of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Evansville, Huslia, Kiana, Kobuk, Kotzebue, Noorvik, Selawik, Shungnak, and Wiseman. The Alternative A analysis of impacts to caribou availability would apply similarly to the cumulative case. See Section B.2.4 of this evaluation for discussion. In addition, future public use of the road by non-rural users hunting along or in the vicinity of the road could further deflect and/or delay the herd.
- The cumulative case could cause population level impacts to fish and a reduction in the abundance of harvestable fish for the communities of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Buckland, Evansville, Hughes, Huslia, Kiana, Kobuk, Kotzebue, Noatak, Noorvik, Selawik, Shungnak, Stevens Village, and Wiseman. Much of the analysis of Alternative A would apply similarly to the cumulative case. See Section B.2.4 of this evaluation for discussion. Additionally, advance mining development and secondary road access could release mining related pollution, acid mine drainage, and toxic materials that could significantly impact aquatic life health and the survival of fish populations. Large mine dewatering could reduce groundwater flows into important spawning, egg incubating, and wintering habitats relied upon by salmon, sheefish, whitefish, and other important subsistence species, which could have potential population level impacts. Given the proximity of the four most advanced mine projects to the Kobuk River sheefish spawning grounds and the large numbers of sheefish that spawn in this habitat, sheefish could be especially vulnerable to population-level effects. These impacts in conjunction with climate driven changes in fish productivity due to loss of habitat and warmer

temperatures and recent declines in salmon abundance could lead to reductions in harvestable resources.

- The cumulative case could cause a reduction in the availability of fish for the communities of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Buckland, Evansville, Hughes, Huslia, Kiana, Kobuk, Kotzebue, Noatak, Noorvik, Selawik, Shungnak, Stevens Village, and Wiseman. Much of the analysis of Alternative A would apply similarly to the cumulative case. See Section B.2.4 of this evaluation for discussion. Additionally, advanced mining development could release mining related pollution, fugitive dust, acid mine drainage, and toxic materials and contaminate fish downstream of the mine sites. This potential contamination from spills or perceived contamination could have indirect effects on subsistence, as subsistence users may reduce their consumption of a resource if they fear contamination; therefore, resources perceived as unhealthy or contaminated are considered unavailable to local residents.
- The construction and operation of the Ambler Road could cause a reduction in access for the communities of Alatna, Allakaket, Ambler, Anaktuvuk Pass, Bettles, Evansville, Hughes, Huslia, Kiana, Kobuk, Selawik, Shungnak, and Stevens Village. Mining development will result in the physical removal of traditional subsistence hunting and harvesting areas for the study communities in addition to decreased access to these areas through security/access restrictions. Increased infrastructure across the region associated with the road, mines, and other infrastructure projects, would increase the number of physical barriers to overland travel. Climate change would affect seasonal access to traditional hunting and fishing areas, and may make access to these areas unpredictable or unreliable. Access impacts will most likely affect the 12 communities with subsistence use areas overlapping each of the proposed routes but could also affect additional communities as development and infrastructure expands.

C. Notice and Hearings

ANILCA Section 810(a) provides that no “withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be effected” until the federal agency gives the required notice and holds a hearing in accordance with ANILCA Section 810(a)(1) and (2). The BLM provided notice in the Federal Register that it made positive findings pursuant to ANILCA Section 810 that Alternatives A, B, and C and the cumulative case presented in the Ambler Road Draft Supplemental EIS met the “may significantly restrict” threshold. Therefore, the BLM held public hearings on subsistence resources and activities in conjunction with the public meeting on the Draft Supplemental EIS in the vicinity of potentially affected communities. Information about public meetings and subsistence hearings was made available on the BLM’s website at eplanning.blm.gov and was announced through additional public notices, news releases, and mailings.

D. Subsistence Determinations under ANILCA Section 810(a)(3)

ANILCA Section 810(a) provides that no “withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be effected” until the federal agency gives the required notice and holds a hearing in accordance with ANILCA Sections 810(a)(1) and (2), gives notice to the appropriate State agency, local committees, and regional councils, and makes the three determinations required by ANILCA Section 810(a)(3). The three determinations that must be made before such a use can be authorized are 1) that such a significant restriction of subsistence use is necessary, consistent with sound management principles for the utilization of the public lands; 2) that the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other such disposition; and 3) that reasonable steps will be taken to minimize adverse impacts to subsistence uses and resources resulting from such actions (16 USC 3120(a)(3)(A), (B), and (C)).

The BLM conducted the requirements of notice and hearings under ANILCA, as outlined in this appendix, but has not made the determinations required for an action alternative because the agency has identified the No Action Alternative as its preferred alternative in the Final Supplemental EIS. In the event that the Record of Decision would approve an action alternative, the BLM would make the required determinations based on that alternative.

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