

NORTHWEST ALASKA TRANSPORTATION PLAN

WINTER TRAILS: CONDITIONS, ISSUES, AND TRENDS

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1 INTRODUCTION

Winter trails are a critical element of Northwest Alaska's transportation network. They connect communities, provide access to subsistence resources, and enable the transport of goods. Residents use snowmachines, dog teams, and even automobiles throughout the winter on a variety of trails. Recreational uses of trails include mushing and snowmachine races, skiing, and sport hunting. Winter trails are also used for resource development such as oil and gas exploration, forestry, and gravel mining.

1.1 Types of Trails

There are three types of trails used in the region:

- **Winter Trail:**
An unimproved, cross-country route suitable for snowmachines and dog teams; often marked with tripods or plastic stakes in treeless areas; marked with blazes or signs in forested areas; constructed across land, sea ice, rivers, and lakes
- **Snow Road:**
A route constructed of packed snow suitable for snowmachines, dog teams, and four-wheel-drive automobiles; limited to the North Slope at this time; construction methods dictate suitability for heavy equipment
- **Ice Road:**
A route constructed of frozen water (either artificially or naturally) suitable for snowmachines, dog teams, and automobiles; often used on the North Slope for oil and gas development activities; used on the Yukon River for community access to the road system; construction methods dictate suitability for heavy equipment



Figure 1 - Winter Trail



Figure 2 - Snow Road



Figure 3 - Ice Road

The use and character of trails is heavily influenced by topography and the presence of forests, rivers, and coasts. Treeless tundra requires closer spacing of trail markers due to the potential for drifting snow and low visibility conditions when windy. Likewise, the absence of trees often precludes using large woody debris for trail markers. Marking trails over water bodies requires new marking every year as the markers disappear when the water body melts. Table 1 summarizes each sub-region’s trail characteristics.

Table 1 - Sub-Regional Trail Characteristics That Influence Planning, Design, and Construction

Sub-region	Topography	Challenges
North Slope Borough	Predominantly flat, treeless, tundra Numerous lakes Lengthy coastline	Tripods or stakes needed Drifting snow/low visibility Large water crossings
Northwest Arctic Borough	Rolling hills Numerous lakes Lengthy coastline Tundra Forested away from coast	Large water crossings Tripods or stakes needed in treeless areas Drifting snow/low visibility
Seward Peninsula	Rolling hills/small mountains Lakes Lengthy coastline Numerous rivers Tundra Limited forests	Large water crossings Tripods or stakes needed in treeless areas Drifting snow/low visibility
Middle Yukon River	Rolling hills/small mountains Large rivers Extensive forests Seasonal connections to road system (e.g., Tanana Road; Bettles winter trail)	Forest fires can obliterate trails Seasonal break-up/freeze-up

Snowmachines are the most common method of transportation on winter trails, although dog teams are also in use throughout the region. Modern snowmachines are more reliable, have greater ranges, and are more environmentally friendly than older models. However, though snowmachines have advanced, the consequences of engine troubles in the backcountry can still threaten life when shelter is inaccessible.

Automobiles use snow roads and ice roads in some parts of the region. Most recently, the North Slope Borough has undertaken the construction of snow roads between North Slope villages. See the case study in section 5.1 for details on this program. The village of Tanana has developed an ice road on the Yukon River to access the contiguous road system. FHWA’s *Tribal Transportation Delivery Guide* includes a section on ice roads (10-step process for developing and maintaining ice roads) that includes best practices for markers, measuring ice thickness, and avoiding hazards.

Private ice roads are constructed by oil and gas companies across portions of the North Slope for exploration activities. These roads are constructed to more robust standards to accommodate heavy equipment.

2 MAJOR TRAILS WITHIN EACH SUBREGION

2.1 North Slope Borough

The NSB is characterized by treeless, arctic tundra and flat or gently rolling topography with communities separated across large distances. Short daylight hours during the winter and consistent winds also challenge overland travel. As such, trails connecting communities must be well-marked and travelers must be prepared for the climate.

In 2016, Barrow Search & Rescue kicked off a new trail-marking project funded by the Arctic Slope Community Foundation. Trails between Wainwright, Atkasuk, and Utqiagvik have been marked with stakes inserted into the permafrost. This effort will continue for additional trails in subsequent years as funding allows (North Slope Borough, 2019).

In 2018, the NSB began a 5-year pilot project to develop snow roads between North Slope communities and the Dalton Highway. The goals of the Community Winter Access Trails (CWAT) project are:

- Provide an alternative to air freight and seasonal barge hauling
- Establish the viability of seasonal overland transportation access
- Support local and regional economic development opportunities
- Identify preferred routing for a permanent transportation corridor

In winter 2017-18 and winter 2018-2019, the NSB built approximately 300 miles of roads connecting four communities at a cost of about \$5,000 per mile. Permitted by the BLM, the NSB must follow rules/best practices throughout the program, such as:

- Roads are constructed when snow depth/frost depth minimums met
- Must travel in convoys – no independent travel allowed
- Vehicles must be inspected before hitting the road to ensure they are capable
- BLM to inspect the roads and ensure tundra isn't damaged
- Wildlife interaction procedures in-place



Figure 4 - North Slope Borough Winter Trails & CWAT Routes

Trail	Distance (miles)
Point Hope – Kivalina	80
Utqiagvik – Atqasuk	60
Deadhorse – Nuiqsut	60
Atqasuk – Wainwright	70
Utqiagvik – Wainwright	90
Wainwright – Point Lay	100
Point Lay – Point Hope	120
Nuiqsut – Anaktuvuk Pass	140
Nuiqsut – Atqasuk	150

Table 2 – North Slope Borough – Major Trails

2.2 Northwest Arctic Borough (NWAB)

The NWAB maintains trail markers and shelter cabins along approximately 1,000 miles of trails that connect the region’s 11 communities. Distances between villages ranges from approximately 10 miles to over 120 miles. The region’s trails cross a variety of ecosystems – tundra, coastline, lakes, forests - and varying topography – hills, lowlands, river valleys. Consequently, travel via trail is impacted by freeze-up and break-up of rivers and lakes.

The borough publishes bi-weekly “Trail Staking & Travel Updates,” which provides seasonal updates on trail conditions and advises levels of caution to travelers. The publication advises on alternative routes, the status of trails traversing open water, and other seasonal particulars that can make certain routes unusable. NWAB’s trail network connects 14 populated locations, provides 12 shelter cabins along the routes, and includes 43 trail waypoints.



Figure 5 - Primary Northwest Arctic Borough Winter Trails

Trail	Distance (miles)
Kobuk – Shungnak	10
Kiana – Noorvik	20
Shungnak – Ambler	25
Buckland – Deering	40
Kivalina – Noatak	45
Deering – Lane River (Shishmaref trail)	50
Noatak – Kotzebue	50
Kiana – Kotzebue	50
Noorvik – Kotzebue	50
Selawik – Buckland	50
Kivalina – Point Hope	80
Shungnak – Selawik	80
Kivalina – Kotzebue	85
Noatak – Kiana	120
Kiana – Ambler	80

Table 3 - Northwest Arctic Borough – Major Trails

2.3 Norton Sound/Seward Peninsula

The Seward Peninsula is home to one of the most famous trails in the country—the Iditarod Trail. As the terminus of the Iditarod Trail Dog Sled Race, Nome sees a significant economic impact from this race. Additionally, the Iron Dog snowmachine race and the Nome-Council 200 dogsled race both use Seward Peninsula trails.

Most of the sub-region is treeless tundra, with some spruce forests away from the coast. The topography includes rolling hills and small mountains with numerous rivers, lakes, and lowlands. The area experiences significant winter storms with blowing snow and high winds.

Kawerak, the non-profit corporation of the Bering Straits Native Association, plans and manages winter trails in the Nome Census Area (Norton Sound and Seward Peninsula) for 17 villages.

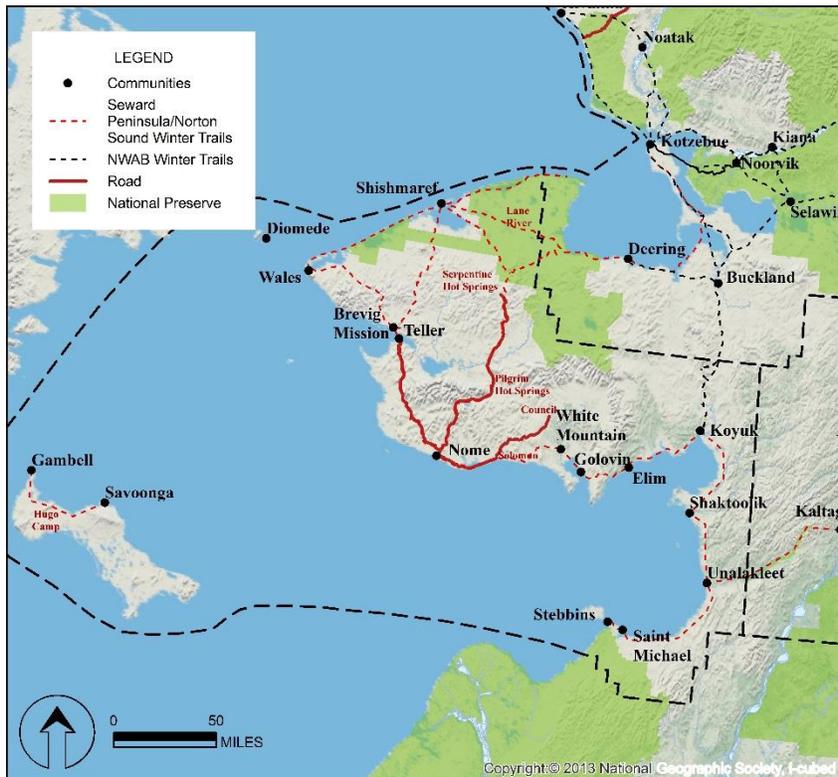


Figure 6 - Primary Norton Sound / Seward Peninsula Winter Trails

Trail	Distance (miles)
Shishmaref – Lane River (Deering trail)	50
Shishmaref – Teller	80
Shishmaref – Serpentine Hot Springs	40
Unalakleet – St. Michael	60
Unalakleet – Shaktoolik	44
Unalakleet – Kaltag	80
Shaktoolik – Koyuk	50
Koyuk – Elim	45
Koyuk – Buckland	80
Elim – Golovin	30
Golovin – White Mountain	20
White Mountain – Council	20
White Mountain – Solomon	30
Solomon – Nome ¹	28
Nome – Teller ¹	80
Nome – Serpentine Hot Springs ¹	110
Taylor Highway – Pilgrim Hot Springs	14
Wales – Brevig Mission	50
Wales – Shishmaref	70
Gambell – Hugo Camp	40
Gambell – Savoonga	50
Savoonga – Hugo Camp	50

Table 4 – Seward Peninsula – Major Trails

¹ Follows highway for all or a portion of the route

2.4 Middle Yukon River

The Middle Yukon River sub-region is distinct from the other sub-regions in several ways that impact trails.

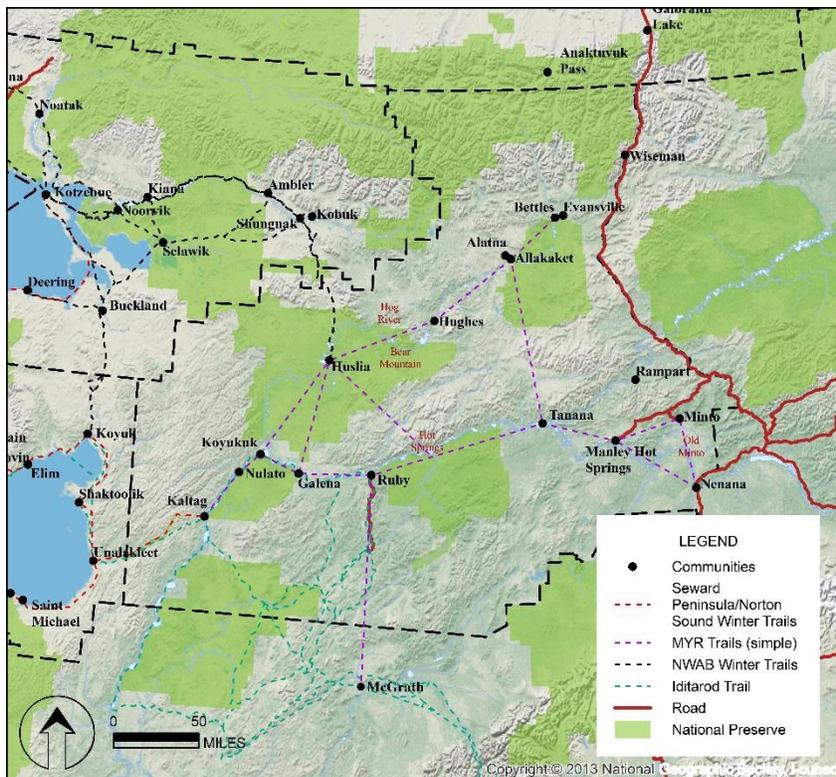
- It is more heavily forested, which means trails can be marked differently, they require a different type of maintenance (e.g., brush cutting), and can be severely impacted by forest fires
- There is no single entity that provides trail marking or trail shelters
- Connectivity to the road system and Fairbanks urban area

Historically, each village was responsible for marking and maintaining local trails. DOT&PF also provided funds to villages for trail marking projects. Tanana Chiefs Conference (TCC) has recently begun coordinating transportation planning activities for the region that may centralize trail planning, marking, and maintenance.

The Middle Yukon River region has several trail connections to the contiguous road system. Two notable examples are the Bettles Winter Road and a Yukon River ice road.

The Bettles Winter Road connects Bettles to the Dalton Highway near Prospect Creek. The BLM manages the land the road crosses and declares when the Bettles Winter Road is open. Opening of the road is based on enough snow cover to protect the tundra and solid ice at the river crossings.

The village of Tanana has used the frozen Yukon River as a road to connect the village with the Road to Tanana (which ends upstream of the community) and the Elliot Highway.



Trail	Distance (miles)
Allakaket – Bettles	40
Hughes – Allakaket	75
Hughes – Bear Mountain	50
Hughes – Hog River	40
Hughes – Huslia	90
Huslia – Galena	100
Huslia – Hot Springs	50
Huslia – Koyukuk	120
Koyukuk – Galena	25
Koyukuk – Nulato	35
Manley – Minto	50
Manley – Nenana	120
Manley – Tanana	65
Minto – Nenana	40
Minto – Old Minto	15
Nulato – Kaltag	30
Ruby – Galena	60
Ruby – McGrath	150
Ruby – Tanana	120
Tanana – Allakaket	120

Table 5 – Middle Yukon River – Major Trails

Figure 7 – Middle Yukon River Winter Trails

3 TRAIL PLANNING

The following entities play a significant role in trail planning, funding, or maintenance in the region.

3.1 Alaska Department of Transportation & Public Facilities

DOT&PF has recognized the important role of trails as transportation corridors and has worked with its federal partners to develop a winter trail staking program. DOT&PF has a funding program for various winter trail staking projects across the state and a working group to establish trail marking best practices.

Since the 1980s, DOT&PF has used a standard design for trail-marking tripods that has been used throughout the state (Alaska Department of Transportation & Public Facilities, 2004). Recent updates to the tripod design recommend construction with fiberglass rods rather than wood. DOT&PF works with each community to identify the most cost-effective design for their specific needs.

3.2 National Park Service (NPS)

NPS considers winter trails to be major contributors to Alaska's winter tourism economy. Although Alaska has a rich trail history, the NPS is worried that existing transportation trail rights-of-way are being lost to development pressures. A mission of the NPS is to retain and reestablish trail connections from National Parks and Preserves, National Forests, and public lands to nearby communities and transportation corridors.

The NPS is acutely aware of the "conflicting pressures to develop natural resources, accommodate a growing population, convey public lands to private ownership, and extend the road, rail, and marine transportation systems." The NPS recommends incorporating trail planning into oil, gas, minerals, and timber extraction planning, including building trails on seismic lines; converting logging and haul roads to trails; relocating displaced trails; and converting staging areas to trailheads.

Many important trails exist on undeveloped private land, including large tracts of ANCSA lands, but do not have protection or provisions for public access and use. The Alaska's Landowner Liability Act (SB 45, 1999) protects private landowners from liability if they grant a trail easement across their property, but landowners may not be aware of this legislation.

There are several NPS trails in the project area, with discrete characteristics in the four regions. On the Seward Peninsula, there are many old mining trails, connected to the 300 miles the main road system around Nome. These comprise historical trails to and from villages and active mining areas on the Seward Peninsula.

The NPS sees an immediate need for the Alaska Department of Natural Resources, Division of Mining, Land and Water, to formalize procedures statewide for securing trail easements or rights-of-way and recording them on state status plats. When finished, local governments, trail users, and organizations can proceed with identifying, prioritizing, surveying, and submitting trail nominations for recording.

4 SPECIAL CONSIDERATIONS

The following section outlines considerations that are unique to trails (as compared to other modes of transportation).

4.1 Search and Rescue (SAR)

Becoming lost or overdue from a trip on a winter trail is one of the top responses for regional search and rescue crews. SAR efforts are organized at the local and regional levels. Both the NSB and the NWAB fund SAR departments within their borough's organization. Communities also maintain volunteer SAR teams. These local teams can request assistance through the Alaska State Troopers or the Wilderness Search and Rescue. Wilderness Search and Rescue also provides training to community SAR volunteers.

In the Norton Sound and Middle Yukon regions, individual communities and Village Public Safety Officers provide SAR services. The Norton Sound Economic Development Corporation (NSEDC) also sponsors SAR activities such as training (Norton Sound Economic Development Corporation, 2019).

There are several preventative efforts throughout the region, including trail marking programs and trail shelters. The Northwest Arctic Borough SAR maintains a series of trail shelters for travelers that need to take refuge along the trails, as well as providing trail maps and waypoints to aid in navigation (Northwest Arctic Borough, 2019). Some communities in the Middle Yukon River region (e.g., Hughes, Allakaket) also maintain trail shelters, although there is no region-wide program.

4.2 Funding

Funds for trail projects, both capital and maintenance, come from a variety of sources. The cost to install trail markers can be burdensome to small communities with limited funds. Most sub-regions have on-going trail marking programs that are intended to help residents navigate safely from community to community.

- Norton Sound Economic Development Corporation's (NSEDC) "Outside Entity" funds
- Kawerak's Transportation program
- DOT&PF winter trail staking program provides \$650,000 - \$800,000 annually²
- Arctic Slope Community Foundation – funds NSB SAR trail-marking
- TCC – provides funding to villages for trail projects

4.3 RS 2477

Some trails in the region were developed under the Mining Law of 1866 to access mining prospects across public land. The most notable RS 2477 in the region is the Iditarod Trail.

RS 2477 derives from Section 8 of the Mining Law of 1866. This law was later re-designated as Section 2477 of Revised Statutes of 1878 (aka RS 2477). The statute simply provided: "...the right of way for the construction of highways over public lands, not reserved for public uses, is hereby granted."

The Federal Land Policy Management Act (FLPMA) repealed RS 2477 in 1976; however, valid existing rights were protected. RS 2477s were established in Alaska through use or development until most federal land in Alaska was withdrawn in 1969. RS 2477 includes historic routes which exist not only on federal lands, but also on former federal lands which are now held by the State or owned by private parties. The Alaska legislature has recognized over 600 of these rights-of-way in statute (Sullivan, 2013).

² Funds are for trails in both Northern and Central regions

It's important to distinguish the historical meaning of highways from the modern. The word highway was historically used to refer to foot trails, pack trails, sled dog trails, crudely built wagon roads, and other corridors for transportation. The broad wording of the law does not limit the type of right-of-way to which it applies. Alaska Statute 19.45.001(9) defines a highway to include "...a highway (whether included in primary or secondary systems), road, street, trail, walk, bridge, tunnel, drainage structure and other similar or related structure or facility, and right-of-way thereof..." (Alaska Department of Natural Resources, 2013).

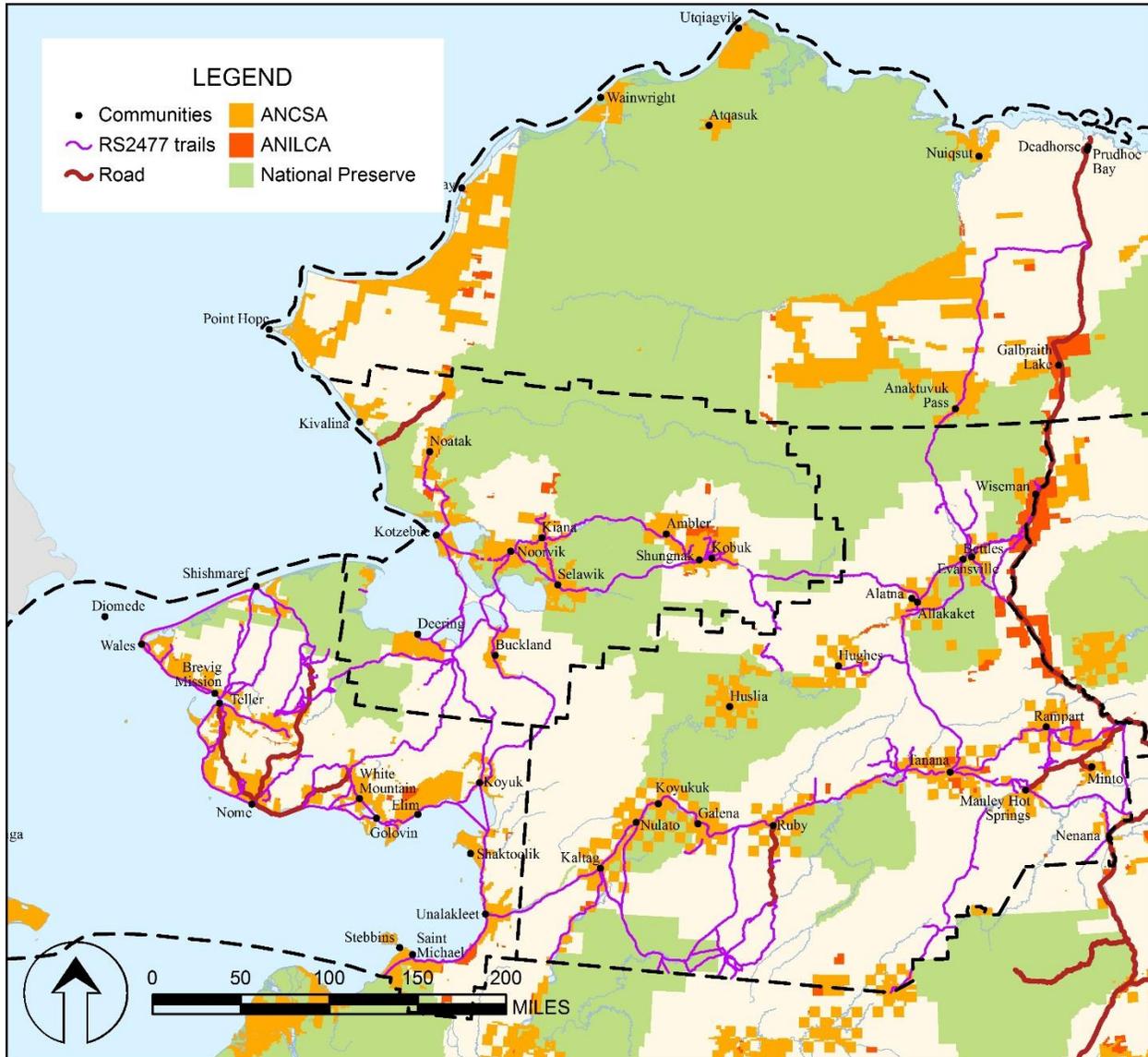


Figure 8 - RS 2477 Routes

There are about 5,513 miles of RS 2477 train rights-of-way in the NWATP project area.

Many RS 2477 trail rights-of-way intersect ANCSA and ANILCA lands, as represented in the following table. About 35% of the length of these trail rights-of-way intersect ANCSA lands, and about 3% intersect ANILCA lands.

Table 6 – RS 2477 Mileages

Land Status	Intersecting RS 2477 Trail Rights-of-Way
ANCSA	1,905 miles
ANILCA	155 miles

5 CASE STUDY

5.1 Kuskokwim River Ice Road

Ice roads created on frozen waterways can be a viable alternative to gravel roads. Ice road construction, and length of time they are viable, is highly dependent on weather conditions. When the weather is favorable, an ice road can provide significant benefits to rural communities as evidenced by the Kuskokwim River ice road.

Multiple tribal governments pooled resources to construct over 250 miles of ice road on the Kuskokwim River in 2017 that connected 11,000 people in 15 communities (DeMarban, 2019). The road provides the region several benefits:

- Provides employment during a time of year when seasonal work is limited
- Allows residents, businesses, and government agencies ability to drive instead of fly, thereby saving costs for plane tickets
- Provides additional access to medical services
- Allows residents of smaller villages to drive to Bethel and stock up on fuel and groceries

DOT&PF doesn't participate in funding the construction or maintenance of the ice road, so coordination and resource pooling between communities is critical. BIA has provided funds for equipment to build and maintain the seasonal road, and FHWA funds have been used to purchase ground penetrating radar to help determine ice thickness.

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