2 Background and Setting

2.1 Regional Setting

The Interior Alaska planning area encompasses approximately 132,200 square miles or 20 percent of the state. If the Interior Alaska planning area were a state, it would rank as the fifth largest state in the Union falling between New Mexico and Montana in size. It contains one State forest, 15 State recreation areas, three national parks/preserves and three national wildlife refuges. Two highway international border crossings as well as 54 percent of Alaska's National Highway System roads are within the study area. The study area includes all of the Fairbanks North Star Borough, and portions of the Matanuska-Susitna (Mat-Su) Borough and Denali Borough; however, 83 percent of the study area is outside an organized borough. The study area is made up of 41% federal land, including Bureau of Land Management, Fish and Wildlife Service, and National Park Service land; and 38% state land, including state-owned and state-selected land[1]. Nearly all the remaining land is Native owned, with less than 1 percent held by private individuals.

Figure 1 shows land ownership distribution for the study area.

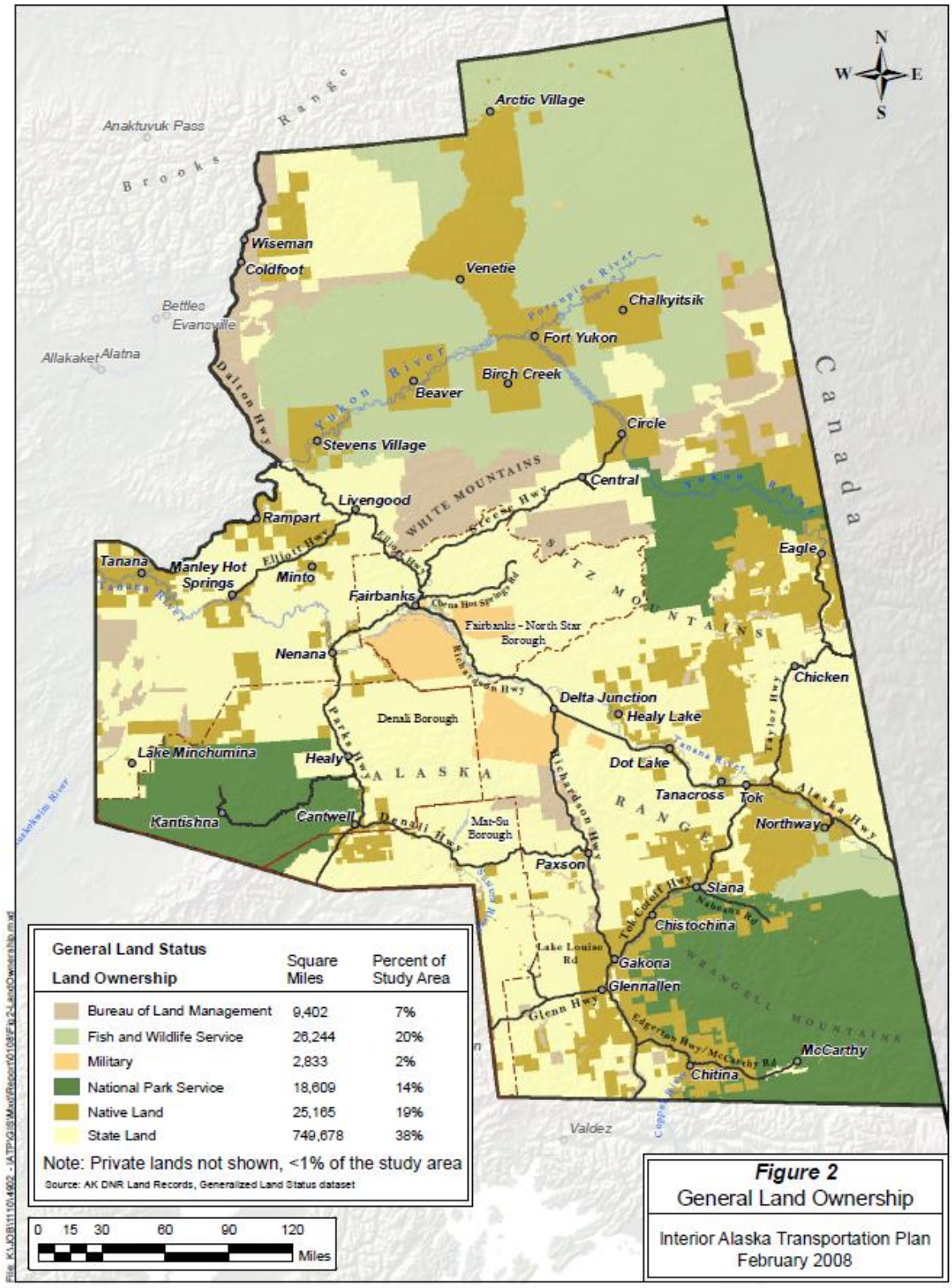
2.2 Communities

There are approximately 50 communities in the study area that range in population from fewer than a dozen to over 31,000 (Fairbanks). All but twelve of the communities in the study area have access to the contiguous highway system. Three of the communities are governed as Home Rule Cities (Fairbanks, Nenana, and North Pole), four are second class cities (Anderson, Eagle, Fort Yukon, and Delta Jct.), and one is a first class city (Tanana).

[1] These numbers are generalized numbers, which reflect combined federal and state land ownership records at the PLSS section level for the State of Alaska. We do not have a land ownership GIS file that has greater detail than the section level.

Source for the land status file used to calculate these numbers: Alaska Department of Natural Resources, Information Resource Management Section, "Alaska General Land Status," 2006.

Figure 1 General Land Ownership



The remaining 43 communities are unincorporated. The unincorporated areas rely on a local Borough or the State for basic governmental services. In addition, many communities have a significant Native population and some have a federally recognized Tribal Government. See Table 2-1 for a summary of community information.

Table 0-1 Planning Area Community Information*

Community	2006 Pop.	% Native Pop.	% Pop. Below Poverty Level	Incorporated Status	Federally Recognized Tribal Govt.	Highway Access
Anderson	279	6.5%	17.55%	2nd Class City	None	Parks Hwy
Arctic Village	147	92.1%	46.28%	Unincorporated	Arctic Village Traditional Council	None
Beaver	64	95.2%	11.11%	Unincorporated	Beaver Village Council	None
Big Delta	738	2.1%	30.3%	Unincorporated	None	Alaska Hwy
Birch Creek	33	100%	37.04%	Unincorporated	Dendu Gwich'in Tribal Council	None
Cantwell	204	27%	2.05%	Unincorporated	Native Village of Cantwell	Parks Hwy
Central	97	9.7%	22.46%	Unincorporated	None	Steese Hwy
Chalkyitsik	79	97.6%	52.63%	Unincorporated	The Chalkyitsik Village Council	None
Chicken	14	0%	0%	Unincorporated	None	Taylor Hwy
Chisana	9	0%	0%	Unincorporated	None	None
Chistochina	104	63.4%	28.57%	Unincorporated	Chistochina Village Council	Tok Cut-Off
Chitina	110	48.8%	12.69%	Unincorporated	Chitina Traditional Indian Village	McCarthy/Edgerton Hwy
Circle	90	85%	42.03%	Unincorporated	Circle Native Community	Steese Hwy
Coldfoot	13	0	0	Unincorporated	None	Dalton Hwy
Copper Center	452	50.6%	18.8%	Unincorporated	Native Village of Kluti-Kaah	Richardson Hwy
Delta Junction	840	5.6%	19.4%	2nd Class City	None	Richardson/Alaska Hwys
Dot Lake	27	5.3%	5.56%	Unincorporated	Native Village of Dot Lake	Alaska Hwy
Eagle	137	7%	16.5%	2nd Class City	Native Village of Eagle	Taylor Hwy
Eielson AFB	4,552	N/A	5.96%	Unincorporated	N/A	Richardson Hwy
Ester	1,841	7.8%	8.06%	Unincorporated	None	Parks Hwy
Fairbanks	31,182	13.3%	10.5%	Home Rule City	None	Rich., Parks, Steese and Elliott Hwys
Fort Yukon	570	88.7%	18.55%	2nd Class City	Native Village of Fort Yukon	None
Fox	377	9.7%	8.74%	Unincorporated	None	Steese Hwy
Gakona	214	17.7%	10.78%	Unincorporated	Native Village of Gakona	Tok Cut-Off

Community	2006 Pop.	% Native Pop.	% Pop. Below Poverty Level	Incorporated Status	Federally Recognized Tribal Govt.	Highway Access
Glennallen	589	12.1%	8.04%	Unincorporated	None	Richardson Hwy
Gulkana	101	73.9%	40.74%	Unincorporated	Gulkana Village Council	Richardson Hwy
Healy	993	5.3%	4.89%	Unincorporated	None	Parks Hwy
Healy Lake	29	73%	9.09%	Unincorporated	Healy Lake Traditional Council	None
Kenny Lake	417	13.4%	25.88%	Unincorporated	None	Edgerton Hwy
Lake Louise	91	10.2%	56.67%	Unincorporated	None	Glenn Hwy
Lake Minchumina	19	12.5%	0%	Unincorporated	None	None
Livengood	28	13.8%	15.38%	Unincorporated	None	Elliott Hwy
Manley Hot Springs	74	23.6%	9.7%	Unincorporated	Manley Village Council	Elliott Hwy
McCarthy	70	0%	15.2%	Unincorporated	None	McCarthy/Edgerton Hwy
Mendeltna	72	7.9%	0%	Unincorporated	None	Glenn Hwy
Mentasta Lake	126	71.1%	35.56%	Unincorporated	Mentasta Lake Village Council	Tok Cut-Off
Minto	202	92.2%	26.42%	Unincorporated	Native Village of Minto	Elliott Hwy
Nelchina	51	9.9%	17.81%	Unincorporated	None	Glenn Hwy
Nenana	549	47.3%	17.83%	Home Rule City	Nenana Native Association	Parks Hwy
North Pole	1,595	7.2%	8.74%	Home Rule City	None	Richardson Hwy
Northway (Jct.& Village)	264	82.1%	21.05%	Unincorporated	Native Village of Northway	Alaska Hwy
Paxson	37	0%	0%	Unincorporated	None	Richardson Hwy
Rampart	16	91%	17.95%	Unincorporated	Rampart Village Council	None
Slana	103	15.3%	23.48%	Unincorporated	None	Tok Cut-Off
Stevens Village	68	95.4%	61.8%	Unincorporated	Stevens Village IRA Council	None
Tanacross	149	90%	33.33%	Unincorporated	Native Village of Tanacross	Alaska Hwy
Tanana	281	81.5%	22.95%	1st Class City	Native Village of Tanana	None
Tazlina	186	30.2%	8.1%	Unincorporated	Native Village of Tazlina	Richardson Hwy
Tetlin	150	97.4%	48.2%	Unincorporated	Native Village of Tetlin	
Tok	1,459	19%	10.5%	Unincorporated	None	Alaska & Richardson Hwy
Tonsina	95	9.8%	6.73%	Unincorporated	None	Richardson Hwy
Two Rivers	627	6.6%	0%	Unincorporated	None	Chena Hot Springs Road
Venetie	184	96.5%	42.79%	Unincorporated	Venetie Village Council	None

**Source: http://www.commerce.state.ak.us/*

This plan will consider Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (EO 12898), dated February 11, 1994. This Executive Order requires Federal agencies to achieve environmental justice by identifying and addressing disproportionately high and adverse human health and environmental effects, including the interrelated social and economic effects of their programs, policies, and activities on minority populations and low-income populations in the United States. These requirements are to be carried out to the greatest extent practicable, consistent with applicable statutes and the National Performance Review. Individual characteristics of Environmental Justice are to be addressed during the project recommendation phase or on a project by project basis. The Department is also committed to Tribal consultation with federally recognized tribes during the planning, design and construction process.

2.3 History and Culture

The following paragraphs contain facts about the robust history of the area to help explain the diverse cultures and people living in the Interior.

Until the latter part of the 19th Century, the area was sparsely populated by Native Alaskan groups, largely Athabascan. These groups traditionally had a nomadic way of life, centered upon subsistence hunting, fishing and gathering. The following description is from *Athabascans of Interior Alaska, Appendix A: A Brief Description of Alaskan Athabascan Culture.*[2]

> Movement from place to place was an essential part of the lives of most Alaskan Athabascans. The local band was generally the social unit which stayed together in the travels for food.
>
> The following excerpt from Olson's Master's Thesis describes the yearly movements of one group, the Minto Lower Tanana:
>
> There was a regular pattern to the hunting and fishing migrations which demanded that the people be on the move almost continually throughout the year. They had to travel in small bands. Late in the fall, men who controlled the moose or caribou fence would gather their friends and relatives and set out for the small encampment near the fence.

[2] http://ankn.uaf.edu/curriculum/Athabascan/Athabascans/appendix_a.html

This is where the log houses were located. They would remain in this camp until mid-December or January. If there was to be a potlatch, they would travel to a central point where they would meet others for the celebration. If any were going down the Kuskokwim, they would start in January and return about three months later. Later on in January, they would be back out in small bands searching for caribou or moose, and trapping smaller animals and birds until late in the spring. In the warm weather, they would move to the lakes before break-up to trap beaver and muskrats. As summer approached they moved to their fish camps on the small rivers where they fished and hunted water fowl until the fall.

Changes to this lifestyle began in 1741 when Vitus Bering, a Danish navigator serving the Russian navy, established a Russian presence in Alaska. Although Russian influence in the Interior was minor, the strongholds established by the Russians during their 126-year occupancy had a ripple effect. Additionally, the English influenced the Interior when their Hudson Bay Company established a trading post at Fort Yukon in 1847. Bigger lifestyle changes came after the United States took possession of Alaska in 1867.

Between 1867 and 1886, American influence in Alaska was largely concentrated in Southeast, Alaska. The biggest influences at the time were from the Alaska Commercial Company and their canneries. Then, in 1886, gold was discovered in the Interior at Forty Mile River, followed by a discovery at Birch Creek. The find at Birch Creek established Circle City as a supply center, and by 1893, Circle had a substantial population, a number of saloons, a school, a hospital and a church. There were other gold discoveries in the Interior as well, such as Pedro Dome near Fairbanks, which spurred development.

http://www.alaskahighwayarchives

Early Alaska road builders

This influx of Euro-American people into the Interior after 1886 changed the Native lifestyle significantly. Missionaries came to the area with their respective religions and built churches and schools.

The 1896 Klondike discovery resulted in the United States increasing military presence in Alaska. Army Posts were established at Eagle, Valdez, Nome, Haines and at the junction of the Yukon and Tanana Rivers. The gold discoveries led to more military trail and road building as well as establishment of a telegraph line into the interior of the Territory. Numerous roadhouses and trading posts were also built.

In 1899, the military began seeking the best route from Valdez into the Copper River Valley. By 1901, the Trans-Alaska Military Road extended from Valdez to Eagle. A spur trail was built from Gulkana to Fairbanks in 1902/03. Between 1901 and 1904 the U.S. Army Signal Corps constructed the Washington/Alaska Military Cable and Telegraph System (WAMCATS) between Valdez and Eagle.

The Board of Road Commissioners for Alaska was established by President Theodore Roosevelt under the War Department, Division of the Army in 1905. The Board began upgrading a trail between Circle and Birch Creek in 1906. The Richardson Trail had regular stage service by 1907.

Congress gave some thoughts to farming in Alaska and extended the Homestead Act to the Territory during these early years. Both agriculture and homesteading would become important to the Interior.

http://www.alaskarails.org

President Warren G. Harding prepares to drive the Golden Spike signifying completion of the Alaska Railroad.

The Copper River and Northwestern Railroad was completed by the Alaska Syndicate to carry copper ore from the mines at Kennicott through Chitina to the Port of Cordova in 1911. Construction of the Alaska Railroad was begun in 1915 and completed in 1923. The route connected Fairbanks and Nenana to tidewater at Seward.

President Harding celebrated this connection by setting the golden spike in Nenana.

The Board of Commissioners for Alaska was officially renamed the Alaska Road Commission in 1926. Between 1905 and the early 1930s, the Board of Road Commissioners of Alaska/Alaska Road Commission continued to build new routes and improve existing roads in the study area. In 1933, the Alaska Road Commission was transferred to the Department of the Interior from the War Department.

During the 1920s, the Alaska Road Commission became involved in aviation and began to build airfields. By 1936, there were 74 airfields in Alaska, several of them in the study area. These included, but were not limited to, Fort Yukon, Circle, Eagle, Fairbanks and Nenana. During World War Two (WWII) American planes were flown from the continental United States via Alaska to Siberia, as authorized by the Lend-Lease Act of 1941, an act to promote the defense of the United States. Many of the routes they flew lay over remote and roadless wilderness where pilots made their way in stages from the safety of one hastily built airfield to the next. Alaska was the exchange location. United States Army Air Corps pilots from the 7th Ferrying Squadron flew planes from their points of manufacture in the US states to Great Falls, then across Canada to Ladd Field near Fairbanks, Alaska, now Fort Wainwright. From there, pilots of the USSR Air Force flew the planes over western Alaska and across Siberia to the warfronts.

WWII and the associated construction boom in Alaska made other significant impacts statewide including the construction of the Alaska Highway, a 1,522-mile-long road from Dawson Creek, British Columbia, to Fairbanks, Alaska through rugged, unmapped wilderness. Northway Junction and Tok were established as road camps during development of the Alaska Highway in the 1940s.

Although there was homesteading in the interior as early as 1902, the post-WWII homesteading activity was substantial. Several communities in the study area were established as a result of the homesteading activity. North Pole was homesteaded in the 1940s. Homesteading in the 1950s included Rex (north of Nenana) and Big Delta. Kenny Lake was homesteaded in the 1960s and Slana was homesteaded in the 1980s.

Local schools impacted the nomadic way of life for the local indigenous populations. The first public school in the study area was constructed in the 1950s by the BIA. Prior to that time, the various church sponsored schools were the centers of education.

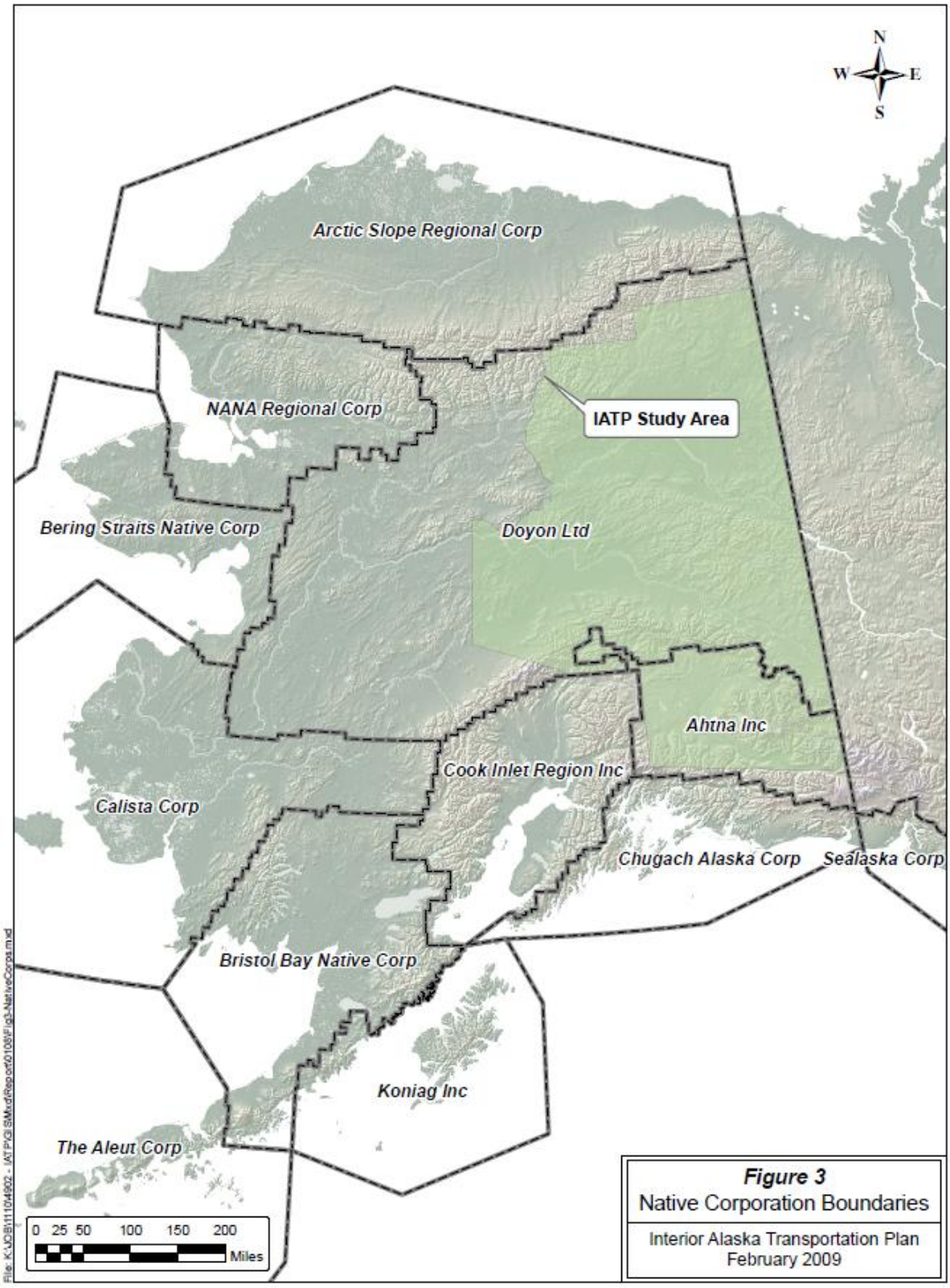
In 1956, the Alaska Road Commission was transferred to the Bureau of Public Roads when Congress placed Alaska under a modified section of the Federal-Aid Highway Act. Alaska became the 49th State in 1959 and a department of highways was formed to manage road construction and maintenance. Over a period of 20 years (1953-1973), several highways were constructed or improved which greatly enhanced transportation in the Interior.

In 1969, oil was discovered at Prudhoe Bay on Alaska's North Slope. The nation was in the throes of an energy crisis and pushed for an 800-mile-long pipeline. Alyeska built a 360-mile road from the Yukon River to Prudhoe Bay to supply the oil facilities on the North Slope. Today, the Dalton Highway is a 415 mile road from Livengood to Prudhoe Bay. It was built at a cost of $125 million. It continues to be used primarily by truckers and pipeline support vehicles as well as tourists interested in driving to the Arctic Circle and beyond.

Congress passed Alaska Native Claims Settlement Act in 1971. This legislation granted Alaska Natives title to 44 million acres of land, and set up 13 Native regional corporations and more than 200 village corporations, capitalizing them with $962.5 million. The cash payments were provided to compensate Natives for lands they had used for centuries but had lost in the settlement. The settlement ended all previously established Native reservations and reserves, barring one (Metlakatla in Southeast Alaska). The establishment of regional and village corporations greatly increased the Native footprint in the economy of the State and in political influence. A map of Regional Corporation boundaries is shown in Figure 2.

Congress passed the Alaska National Interest Lands Conservation Act (ANILCA) in 1980, establishing more than 100 million acres of Federal land in Alaska as new or expanded conservation system units. These units take the form of national parks like Wrangell St. Elias National Park and Preserve and Yukon Charlie Rivers National Park and Preserve and wildlife refuges like Tetlin National Wildlife Refuge and Yukon-Flats National Wildlife Refuge. Several Interior communities now find themselves inside or near these parks and preserves. Some communities involved include Beaver, Cantwell, Chitina, Circle, Eagle, Fort Yukon, Healy and McCarthy.

Figure 2 Regional Corporation Boundary Map



The discovery of oil, mineral development, and expansion into the Interior led to communities that are diverse in economy, lifestyle and population. There are communities that are traditionally native—primarily Athabascan—and other communities where non-native populations are predominate. Surface transportation access plays a part in this diversity. More traditional communities tend to be those with no direct highway access, but there are exceptions. All the communities in the study area exhibit a blend of lifestyles as a result of the many and varied influences and activities over the history of the Interior.

2.4 Economy

Fairbanks is the primary economic hub for the Interior and the transportation hub for North Slope development. A substantial amount of goods are delivered to Fairbanks for redistribution in the outlying communities. The Glennallen area, however, relies on goods from Anchorage delivered via the Glenn Highway.

Many individuals outside urban areas rely on subsistence for a portion of their personal economy, supplementing their income with fishing, hunting, trapping, or gardening.

Several factors contribute to a regional economy in the study area including a limited commercial salmon fishery, a lumber industry, agricultural products, large and small scale mining, the military, the construction industry, transportation and tourism (including culture tours and guiding for hunting and fishing). Additional details about the economy are found in subsequent chapters.

2.5 Environmental Overview

This section provides a brief overview of the study area, with an emphasis on factors that impact the transportation network and are important in the evaluation of the SAFETEA-LU planning factors.

2.5.1 Climate

Interior Alaska experiences a continental climate characterized by wide daily and annual temperature ranges, low humidity and relatively light and irregular precipitation. Lower elevations, such as the Yukon Flats and the Tanana Valley, experience extreme cold in the winter as well as high summertime temperatures.

Overall, maximum and minimum annual mean temperatures do not vary significantly throughout the study area. As expected, increased precipitation, snowfall, and snow depth are recorded in mountain ranges and passes.

Table 0-2 provides a general summary of climate conditions.

Table 0-2 Regional Climate Information

Averages*	Copper Basin Region	Denali Region	Fairbanks Region
Average Annual Mean Maximum Temperature	30 F	37 F	37 F
Average Annual Mean Minimum Temperature	16 F	16 F	17F
Average Annual Precipitation (in.)	15	17	11
Average Annual Snowfall (in.)	56	130	67
Average Annual Snow Depth (in.)	7	11	8

**Approximate averages based on weather stations located within the study area.*
Data taken from the Western Region Climate Center, http://www.wrcc.dri.edu.

Temperature inversions, frequent in winter, generally occur under clear skies, when winds are light, and surface temperatures are extremely low. However, locations only a few hundred feet above the surface can be significantly warmer.[3]

Interior Alaska generally does not normally experience severe high winds. However, wind velocities from 50 to 100 miles per hour have been recorded in communities near mountain passes. Healy and Delta Junction are examples of these communities. These severe wind conditions often occur in the winter months and, when combined with intense cold, they create a safety hazard to the traveling public.

Ice fog occurs in Interior Alaska during extended periods of extreme cold. Generally this requires temperatures at or below −30 F, causing water droplets to freeze into extremely tiny crystals of ice in midair. Dense ice fog is most often seen in and near Fairbanks where it is created by the freezing of water vapor present in automobile exhaust and combustion products

[3] Data taken from *Alaska Climatology*, http://climate.gi.alaska.edu/climate/index.html, accessed on June 21, 2007.

from heating and power generation. Visibility may be limited by the ice fog and cause hazards to both vehicular and pedestrian traffic.

In summer, throughout the study area, occasional wind gusts cause dust and fine particulates to hamper visibility. Glacial silt from streambeds, deltas, and other sources are often the main cause.

www.dec.state.ak.us

Ice fog in Fairbanks

2.5.2 Geography/Topography

The topography and geography within the study area varies from wide valleys to flat tundra, vast wetlands, wild rivers, rolling foothills, deep moraines, active volcanoes, dissected uplands, lowland basins, and mountain passes. Generally, highway construction follows natural contours and topography. Topographical constraints often determine the configuration and direction of transportation routes throughout the study area.

The existing road system within the study area traverses five mountain passes and four summits ranging from 2,000 to 4,086 feet. The passes in the Interior include Broad Pass at milepost (MP) 201.3 on the Parks Highway, Isabel Pass at MP 197.5 on the Richardson Highway, Mentasta Pass at MP 45.6 on the Tok Cut-Off, Tahneta Pass at MP 122 of the Glenn Highway, and Snowshoe Pass at MP 28 of the Elliott Highway, as shown on **Error! Reference source not found.**. The summits include Clearly Summit at MP 20.7 on the Steese Highway, Twelvemile Summit at MP 85.5 on the Steese Highway, Eagle Summit at MP 107.5 on the Steese Highway, and Maclaren Summit at MP 36.9 on the Denali Highway.

Other significant topographic features in the study area include the Yukon Tanana Uplands, Tanana Flats and the Alaska Range which contains the highest mountain in North America, 20,320-foot tall Mount McKinley.

The Yukon-Tanana-Kuskokwim plateaus area of the Interior is considered one of the major physiographic regions of the North American Subarctic. In contrast to the Canadian Shield and

ASCG photo

Approaching Stevens Village by air

Cordilleran areas of the Subarctic, this region was not glaciated during the later stages of the Pleistocene.

Railroads preceded highways in some parts of the study area. The highway and rail corridors do not always coincide because trains cannot navigate steep grades or sharp curves. The Alaska Railroad avoided steep grades and tried to follow gradual slopes and level ridges wherever possible. However, both the highway and railroad systems meander through several mountain passes and across river valleys.

The highway corridors within the study area also act as major visual flight corridors for small aircraft transiting to and from the United States and Canada and throughout the study area. Many of the airport facilities are found along highways, such as the Glenn, the Richardson, and the Alaska Highways. These airports and associated communities offer pilots and passengers excellent road accessibility. The physical characteristics of the highways, land, mountain passes, water bodies, extensive valleys, and flats also provide visual landmarks to pilots. These terrain features not only provide visual confirmation of a pilot's location, but also signal upcoming changes in weather conditions. Air travel is the primary means of intrastate transportation to remote camps and communities.

2.5.3 Soils

Much of the Interior of Alaska contains poorly drained soils, but well-drained soils such as Cryothents are also found. The Tanana Soil—designated as the "State Soil", along with waterlogged soils (Inceptisols) and bog soils (Histosols) characterize many of the soil types within the study area. The Tanana soil consists of shallow, moderately permeable soils formed in materials weathered from limestone and contains permafrost within 50 inches of the surface. The soil does not drain well naturally, but will warm up and drain well if it is cultivated. This makes the Tanana Soil good for agriculture.

Inceptisols soils are characterized by poor drainage and waterlogging over sands, silts, and gravels. Histosols are poorly drained and occur on young landscapes where there are wetlands. They contain at least 20-30 percent organic matter by weight and are more than 16 inches thick. Often, soils on north facing slopes are shallow and poorly developed, with continuous permafrost.[4]

2.5.4 Permafrost

Much of the study area contains permafrost, which is often less than 100 feet thick. The active layer on top of the permafrost may be several feet in depth. Permafrost is generally absent on the sun-warmed southern slopes of hills and along the inner sides of riverbeds. Permafrost is discontinuous in the major river valleys. It is predicted that the permafrost in the Interior of Alaska will begin to thaw over immense areas as early as 2015, with major thawing most likely to occur by 2040. Minor increases in temperature will bring sinking buildings, roller-coaster roads, and boreal forest changing into wetlands.

http://www.tfhrc.gov/trnsptr/rttaug96/images/arctic.jpg

Rolling roadbed due to permafrost

As the climate continues to warm, repair and maintenance costs may increase. The Institute of Social and Economic Research (ISER) at the University of Alaska Anchorage (UAA) has estimated the future costs for Alaska public infrastructure at risk from climate change. These costs show that damage from climate change could add $3.6 to $6.1 billion (10 to 20 percent) to future costs for public infrastructure from now to 2030 and $5.6 to $7.6 billion (10 to 12 percent) from now to 2080. It is anticipated that in the next 25 years, the warming climate will necessitate costly repairs and replacement of infrastructure. Most expensive will be the costs for roads,

[4] http://www.alaskool.org/resources/regional/yukon_reg_profile/permafrost.htm

runways, and water and sewer systems which are particularly vulnerable to thawing permafrost, flooding, and coastal erosion.[5]

Continued thawing of the permafrost dries the vegetation and tundra. The dry vegetation will act as fuel for wildfires and will likely cause more wildfires to start. Once a fire destroys the vegetation, there is no cover to insulate the permafrost. After fires, the permafrost is not recovering in many areas. As a result, in just a few years the existing ecosystem within the study area may change to an entirely different system.

2.5.5 Fire

Wildfires are a frequently recurring hazard in the study area. In June 2006, fire surrounded the Parks Highway near Nenana, endangering structures, motorists, travelers, homes, property, and communities. The Taylor Complex fire in 2004 burned five miles northeast of Tok near the Taylor Highway and the Alaska Highway. In May 2003, a wildfire sparked 80 miles south of Fairbanks. Fire also quickly spread across Fort Greely and the Richardson Highway in June 1999.

Photo by SPC Kerensa Hardy, Ft. Greely Public Affairs.

Fire south of Ft. Greelv. June 13. 1999

Knowledge and management of transportation systems and community facilities are essential to minimize fire losses and maximize fire protection. The transportation system can not only effectively mobilize resources, equipment, and personnel to these sites, but also provide safe evacuation routes for displaced residents. In the past, limited ground mapping severely hindered the State's ability to manage wildfires and natural and man-made hazards. Emergency personnel lacked the information to quickly locate and access areas in danger. High-resolution QuickBird satellite imagery from DigitalGlobe has mapped key areas, which are electronically shared with State agencies. This imagery provides infrastructure mapping of roads

[5] Institute of Social and Economic Research, University of Alaska Anchorage, "Estimating Future Costs for Alaska Public Infrastructure At Risk from Climate Change" June 2007.

and access trails, an inventory of airstrips and airstrip approach information, shows fuels hazards, identifies defensible space, and is used for maps of sewer, water, power, and structural locations and sources.

2.5.6 Seismic Activity

Seismic faults are common in the study area and include the Denali-Totschunda Fault, the Kaltag Fault, the Kobuk Fault, the Susitna Glacier Thrust Fault, and the Tintina Fault.

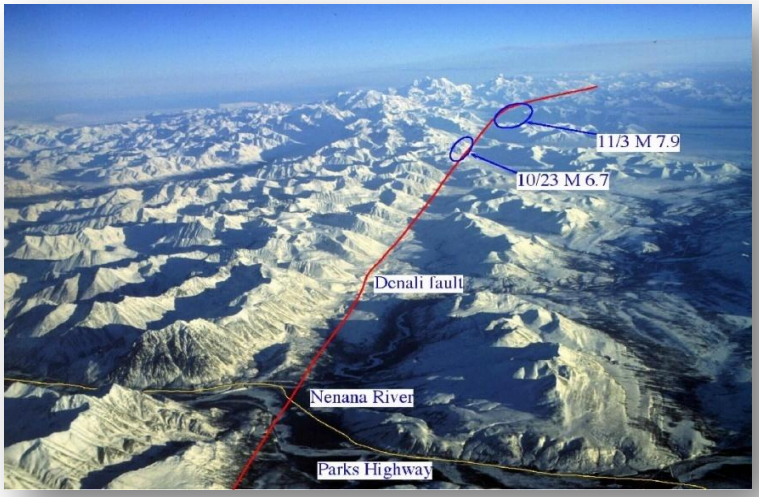


Photo and interpretation by Wesley K. Wallace, Geophysical Institute, University of Alaska Fairbanks.

This high-altitude view shows the epicenter of the November 2002 earthquake, located approximately 42 miles east of the Parks Highway.

The largest inland earthquake in North America in almost 150 years struck Alaska on November 3, 2002. This magnitude 7.9 earthquake, one of the largest ever recorded on U.S. soil, occurred on the Denali-Totschunda fault system, which is one of the longest strike-slip fault systems in the world. This event caused significant damage to the transportation systems in Interior Alaska. Multiple landslides and rock avalanches occurred in the Alaska Range with the largest slide on the Black Rapids Glacier near the Richardson Highway. While the earthquake caused few injuries and no deaths, it did create numerous landslides and damaged roads and bridges at a cost of at least $35 million.

The inspections by DOT&PF revealed that the earthquake damaged four of the State's major highways and six bridges. Two of the highways, the Parks and the Alaska Highway sustained limited damage while the Richardson Highway and the Tok Cut-Off were impassable for many miles. More than 20 miles of the Richardson Highway roadbed was damaged by the quake. The earthquake shifted the road sideways by eight feet at the fault line, caused rock slides along extended sections, and left cracks up to five feet wide across both lanes and as deep as eight feet.

Photo source: DOT&PF

Earthquake damage to Tok Cutoff Highway, 2002

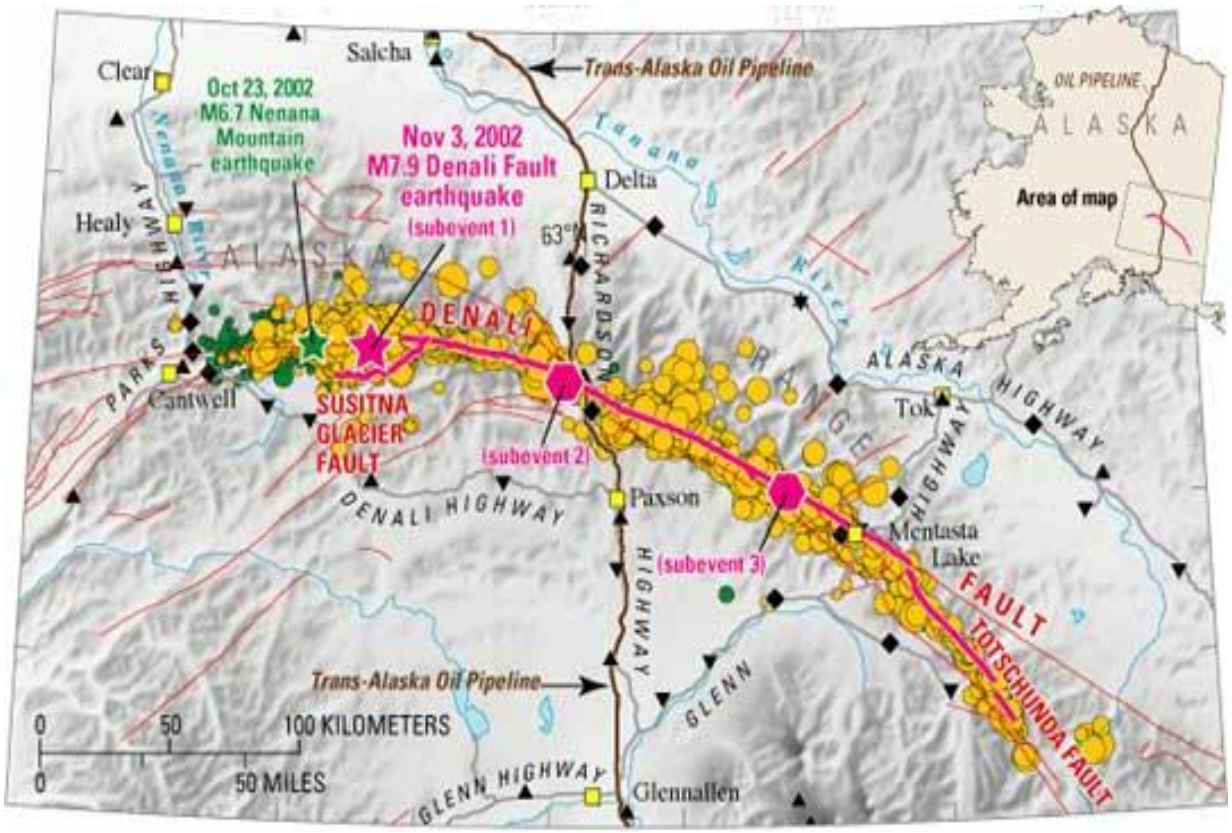
Severe damage was found along the Tok Cutoff Highway and extended for more than 50 miles. The road dropped six feet in some sections and extensive pavement sections collapsed. Large cracks, ranging from inches to several feet wide and up to 12 feet deep, shattered the paved surface for miles. There was a lateral shift of 22 feet at the fault.

The rural communities of Mentasta, Northway, Tetlin, and Slana were without road access. Emergency vehicles could not reach these residents. Mentasta Lake Road and Northway Road were also impassable and the Northway Airport suffered severe damage.

Six bridges within the study area sustained damage. Pressure of liquefied soil moved the bridge abutment walls about ten inches. The Tanana River Bridge, located approximately 11 miles south of Tok shifted off its steel supports by nearly four inches. This span weighed more than 1.1 million pounds.

Repairs and reconstruction on the Tok Cutoff was particularly difficult, as the area continued to experience strong aftershocks in the month following the initial quake. The aftershocks prevented the soils from stabilizing.[6]

[6] Information regarding the earthquake damage and repairs was obtained from an article by Shannon McCarthy, *Responding to an Earthquake*, Public Roads, Vol. 67, No. 3, Nov/Dec 2003, USDOT & FHWA.



Map courtesy of the Alaska Earthquake Information Center, UAF Geophysical Center.

Aftershock sequence from the Nenana Mountain and Denali Mountain events.

The Denali Fault event was preceded by the magnitude 6.7 Nenana Mountain event on October 23, 2002. The Nenana Mountain and Denali Fault earthquakes both generated a vigorous aftershock sequence of over 35,000 aftershocks through the end of 2004.

2.5.7 Drainages/Floodplains

Major drainages of the Yukon, Porcupine, and Tanana Rivers, and associated lakes, tributaries, and valleys, together with the Alaska, Brooks, and Wrangell-St. Elias Mountain Ranges also provide regional development boundaries throughout the area. There are alluvial river floodplains such as the Yukon River and Yukon Flats, Tanana River, Minto Flats, Kantishna River, Porcupine River and others. Four major rivers, the Yukon, Tanana, Koyukuk, and upper Kuskokwim, provide the area's outstanding hydrologic features. All four rivers form wide valleys, with extensively braided channels; in some areas, the valleys contain hundreds of small lakes, wetlands, and marshes. Elevations are generally less than 2,000 feet.

2.5.8 Hazard Management

The Alaska DOT&PF manages natural and manmade disasters under two emergency plans. One is the Alaska Emergency Operations Plan, which outlines the actions that the State, local communities and the private sector should take in the event of a disaster. The other is the State's Emergency Highway Traffic Regulation, updated in 1998, which outlines procedures for coordinating major military deployments with civilian traffic management in the event of a national emergency. There are also a growing number of Hazard Mitigation Plans being developed for individual communities.

1.1.9 Biological Resources

2.5.9.1 Terrestrial Wildlife

The Interior Region offers good habitat for a number of mammals commonly used for subsistence and sport hunting. Mammals found within the study area include moose, caribou, grizzly and black bear, dall sheep, wolves, and furbearers. Furbearers include marten, mink, red fox, muskrat, ermine, coyote, red squirrel, hare, beaver, lynx, otter, and wolverine.

Photo: Dave Sanches

Caribou on the Richardson Highway

Of particular concern to vehicular traffic are the migratory caribou herds. There are six major caribou herds in and adjacent to the Interior Region: Chisana, Delta, Fortymile, Macomb, Nelchina, and Porcupine. These herds often migrate across major portions of the Alaska Highway, the Dalton Highway, the Denali Highway, the Parks Highway, the Steese Highway, the Richardson Highway and the Tok Cut-off, causing vehicular accidents.

Moose-vehicle collisions occur even more frequently along highways throughout the region, particularly along the Richardson Highway and Chena Hot Springs Road, where collision rates are among the state's highest.[7]

2.5.9.2 Aquatic Wildlife

Several species of fish exist in the Interior Region waterways. Resident and anadromous fish are found in all of the major rivers. Dolly Varden/Arctic Char; and Trout were listed for some drainages and not for others. A review of the Fish Distribution Database at the Alaska Department of Fish and Game (ADF&G), Sport Fish Division, reveals these species continue to be available in these rivers today. Many lakes and streams within the study area also contain several fish species including whitefish, northern pike, arctic grayling and lake trout.

2.5.9.3 Avian Wildlife

Numerous bird species can be found in the study area. They include migratory birds such as swans, geese, ducks, cranes, raptors, passerines as well as resident bird populations; ravens, black cap chickadees, common red poles, grouse, grey jays, and ptarmigan.

http://tea.armadaproject.org/_birch1.jpg

Birch Trees in the fall

According to ADF&G, a Species of Special Concern: "is any species or subspecies of fish or wildlife or population of mammal or bird native to Alaska that has entered a long-term decline in abundance or is vulnerable to a significant decline due to low numbers, restricted distribution, dependence on limited habitat resources, or sensitivity to environmental disturbance."

Interior Region species of special concern include the American Peregrine, Arctic Peregrine, Northern Goshawk, and Olive-sided Flycatcher.

[7] DOT&PF, *Moose-Vehicle Accidents on Alaska's Rural Highways*, 1995.

2.5.9.4 Vegetation

Vegetation within the study area is highly varied due to changes in topography and soil type. Vegetation types include willow, alder, birch, aspen, spruce (white and black), larch, poplar, blueberry and cranberry bushes, lichen and mosses to name a few. Many of the tree species meet requirements for harvest.

2.5.10 Cultural Resources

Well-documented cultural resource sites appear throughout the study area. Some sites date back about 11,000 years, which has been defined as the American Paleoarctic tradition dating to 8,000 to 10,000 years ago. About 6,000 years ago, a new group of people became the first pan-Arctic culture, spreading south as far as the Alaska Peninsula and east as far as Greenland and Hudson's Bay. In historic times this area was primarily the home of Athabascan peoples. The Athabascans have been defined as a group of mostly forest dwelling, hunting and gathering Indians, organized into bands, speaking a group of fairly closely related languages. The Athabascan people can be traced back 4,000 years.[8]

2.5.11 Environmental and Other Impacts

Any development associated with this planning effort requires detailed and in-depth analysis for the environment and for socio-economic impacts. Projects such as roads or pipelines that may impact wildlife habitats will require substantial study. These resources are of local and State importance and emphasis would need to be placed on how the development can be managed to allow continued health and vitality of these resource populations.

[8] Smithsonian Institute, "The Handbook of North American Indians, Book 6, Subarctic" 1981.