Chapter Three: Affected Environment

Overview

This section describes the existing environment and the current conditions of important resources and values of the South Denali planning area that would be affected by any of the alternatives in this implementation plan. Topics examined include soils, aquatic resources and fish, wetlands, vegetation, wildlife, cultural resources, socioeconomics, and visitor opportunity.

SOILS

Existing soils information for the South Denali planning area (see Figure 2-1) was obtained from existing soils maps for the upper Susitna Valley (State Soil Geographic (STATSGO) Database 1995; Clark and Kautz 1998; Olszewski 1998) and regional soils information from the Soil Survey Geographic Database (SURGO) (2003). This information was supplemented by recent aerial photography (Aeromap 1996) and satellite imagery (IKONOS 1996). Soil map units were field verified within the planning area in 2004. For more information on the 2004 field investigation procedures, please refer to the *Soils Report* (URS 2004b).

The three main areas examined during the 2004 soils survey, and for the purpose of this analysis are located near Peters Hills, Parks Highway (previously referred to as Cari Creek) and the soils surrounding Petersville Road. Distribution of the soil types within the planning areas are presented in the *Soils Report* (URS 2004b).

Planning Area Primary Landforms

All the soils in the geographic area are categorized within two primary landforms or geomorphic units: glacial till plains and mountainous uplands (State Soil Geographic (STATSGO) Database 1995; Clark and Kautz 1998; Olszewski 1998).

Glacial Till Plains

Glacial till plains occur between alluvial terraces along the rivers and the adjacent mountains. The hilly terrain within these plain areas is well-drained and supports mixed forests of white spruce and birch, with an understory of alder and ferns (Clark and Kautz 1998; Olszewski 1998). On the sloping terrain of this landform, the following soils are present:

- Kroto and Strandline silt loam soils (*Andic Haplocryods*)
- Spenard silt loam soils (*Andic Cryaquods*)
- Slikok muck soils: 0 to 5% slopes (*Histic Cryaquepts*)
- Chichanta peat soils:0 to 8% slopes (*Euic Fluvaquentic Borosaprists*)

Mountainous Upland

The second of the two major geomorphic units in the planning area, mountainous uplands, have soils on higher slopes. These soils are well-drained, except when adjacent to stream drainages and depressions. In this case, the tight glacial till prevents downward flow of water (Clark and Kautz 1998; Olszewski 1998). Subalpine areas, which support grasslands and thick alder shrub communities, are composed of the following soils:

- Puntilla silt loam:7 to 20% slopes (*Andic Humicryods*)
- Kliskon silt loam: 12 to 20% slopes (*Andic Cryaquods*)

Typically, Puntilla soils occur on the steeper mountain sideslopes and support communities of Sitka alder, bluejoint reedgrass, ferns, and forbs. Kliskon soils generally occur in poorly drained areas, which are more gently sloping, and support herbaceous meadows of grass and ferns (Clark and Kautz 1998; Olszewski 1998).

Soils in alpine areas at the higher elevations are generally uneven as a result of continual frost heaving and generally consist of the two soil series:

- Chuit silt loam: 3 to 30% slopes (*Andic Humicryods*)
- Nakochna silt loam: 3 to 30% slopes (*Lithic Humicryods*)

These soil series are typically classified as “rubble lands” on the available soils maps (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003). These “rubble land” map units consist of barren areas of loose rock, but also includes sizable patches of Chuit and Nakochna soils, and range in slope from 7 to 45% (Clark and Kautz 1998; Olszewski 1998).

Characteristic of planning area soils that are pertinent to development of project facilities are presented in Table 3-1.

Table 3-1 Soil Characteristics of in the South Denali Implementation Plan Planning Area

Soil Series	Bedrock		Subsidence		Frost action	Erosion		1.1.1 Corrosion Potential	
	Depth (in)	Hardness	Initial (in)	Total (in)	Degree	1.2 Water	Wind	Uncoated Steel	Concrete
Chichantna peat	>60	-	5-10	15-20	High	slight	slight	High	High
Salamatof peat	>60	-	15-30	30-60	High	slight	slight	High	High
Kliskon silt loam	>60	-	-	-	High	severe	severe	High	High
Puntilla silt loam	>60	-	-	-	High	severe	severe	High	High
Slikok muck	>60	-	4-6	10-24	High	Slight to moderate	slight	High	**1.3 High**
Spenard silt loam	>60	-	-	-	High	severe	severe	High	High
Spenard silt loam	>60	-	-	-	High	severe	severe	High	High
Puntilla silt loam	>60	-	-	-	High	severe	severe	High	High
Nancy silt loam	>60	-	-	-	High	severe	severe	High	High
Strandline-Spenard-Kroto complex	>60	-	-	-	-	severe	severe	High	High
Strandline-Kroto complex	>60	-	-	-	-	severe	severe	High	High
Chuit- Nakochna- Rubble Land complex	>60 14-20 >40	- Hard Hard	- - -	- - -	High High -	severe	severe	High High -	High High -
Chuit silt loam	>60	-	-	-	High	severe	severe	High	High
Nakochna silt loams	14-20	Hard	-	-	High	severe	severe	High	High

Planning Area Soils

Peters Hills

The Alternative B Peters Hills access road alignment has been divided into two main portions for descriptive purposes -- an upper and a lower. The lower portion follows a series of low rolling hills and ridges and has a variety of common soil types and complexes. The poorly drained depressions, or gently sloping hills, contain Chichantna peat soils (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003), which support muskeg communities of both ericaceous shrubs and emergent wetlands (Clark and Kautz 1998; Olszewski 1998). Poorly drained ridge tops and hillsides contain Slikok muck soils and Kliskon silt loam (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003). These soil complexes support mostly tall scrub communities of Sitka alder and willow (Clark and Kautz 1998; Olszewski 1998). Some of the lower ridges and the lower slopes at the foot of Peters Hills are mainly Puntilla silt loams (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003) and support low scrub, tall scrub and herbaceous plant communities (Clark and Kautz 1998; Olszewski 1998). The ridge tops along the lower portion of the alignment are well-drained and are mostly Chuit-Nakochna soil complex (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003), which supports both open low scrub and tall scrub thickets (Clark and Kautz 1998; Olszewski 1998).

The upper portions of the proposed access road alignment follow some lower ridges before ascending a steep hillside to the alpine habitats of the proposed visitor facility site. The soils of these upper slopes are mainly mapped as Chuit-Nakochna-rubble land complex (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003), which are generally shallow and well-drained with areas of exposed bedrock or rubble. These shallow soils support alpine communities of low shrub and dwarf shrub/lichen (Clark and Kautz 1998; Olszewski 1998). Some of the swales contain Chichantna peat soils (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003).

The trail system would likely cross all of the common soil types in the regions. The Nature Center at the top of the access road would be within areas classified as Chuit-Nakachna–rubble land complex (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003).

Petersville Road

The Petersville Road Campground is a proposed facility to be placed at a large partially-cleared area uphill and to the northeast of the Forks Roadhouse that is mostly flat and has already been cleared of most of the native vegetation and surface soils. This location falls within the soil map unit of Strandline-Spenard-Kroto complex (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003).

A 4-acre parking area is proposed at the base of the proposed Peters Hills access road near MP 28 of the Petersville Road. This facility is completely within a large muskeg just east of the Petersville Road. Soils in this muskeg are mapped as Chichantna peat soil.

Parks Highway Corridor

The lower portion of the proposed Parks Highway facilities is located on a glacial till plain and ascends to the mountainous uplands at the proposed visitor center on Curry Ridge (State Soil Geographic (STATSGO) Database 1995).
Soils at the proposed MP 121.5 parking area are mapped as Strandline-Spenard-Kroto complex (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003). The soils at this site have been previously disturbed. A soil test pit confirmed the soils are both well-drained and within the expected map section. (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003). The Rabideux Creek Parking Area is in an area of Nancy silt loam soils.

Dominant soil at the proposed parking area and campground near MP 134.6 of the Parks Highway is Strandline Kroto silt loam complex. The large open meadow at this location is primarily Spenard silt loam (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003).

Parks Highway/Curry Ridge

The access road alignment crosses a narrow glacial till plain between the Susitna River and the adjacent mountains to the east. Soils along this alignment are mostly Kroto and Strandline silt loam complexes in the lower elevations, As the alignment gains elevation, soils are generally Puntilla silt loam (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003).

The proposed visitor center near Curry Ridge contains mostly Chuit and Nakochna soils, which are relatively shallow soils that support open low shrub, closed tall shrub communities, and herbaceous meadows at higher elevations (Clark and Kautz 1998; Olszewski 1998). There were also isolated patches of Strandline, Kroto, and Chichantna soils in the general area.

The proposed trail system near the visitor center likely crosses most of the common soil types in the area, including Strandline-Kroto silt loam complexes, Spenard silt loam, and Chuit-Nakochna silt loam complexes (State Soil Geographic (STATSGO) Database 1995; Soil Survey Geographic Database (SURGO) 2003). No soil maps are available for most of the area crossed by the trail system.

WATER QUALITY, AQUATIC RESOURCES AND FISH

Freshwater Streams and Fish

The aquatic resources present in the planning area (see Figure 2-1) include the freshwater streams that support both anadromous and resident fish species. Anadromous fish are species that begin their lives in freshwater habitats, migrate to marine habitats where they mature, and then return to freshwater to spawn. Resident fish remain in streams to spawn and breed, spending their entire life cycle in fresh water. Anadromous waters are protected by the State of Alaska, Department of Natural Resources (ADNR). The ADNR Office of Habitat Management and Permitting (OHMP) requires that permits be obtained for activities (use or construction) potentially affecting anadromous waters. The OHMP is also concerned with protecting fish passage in both anadromous and resident fish streams. The Alaska Department of Fish and Game (ADF&G) continues to receive and process anadromous water body nominations and maintains the fish distribution database (ADF&G 2004b). The Catalog of Waters Important for the Spawning, Rearing or Migration of Anadromous Fishes (ADF&G 1991) and its associated atlas are the media used to accomplish this specification and are adopted as regulation under 11 Alaska Administrative Code (AAC) 195.010. Stream numbers, locations, extent of cataloged habitat, and species utilization of a given stream may change from year to year.

The planning area is located south of Denali National Park and Preserve and includes an extensive portion of the Susitna River drainage that ultimately drains into Cook Inlet. The major rivers flowing through and the planning area originate from glaciers in the Alaska Range and include the Susitna, Chulitna, and Tokositna rivers.

Numerous small to moderately sized lakes and streams originate from non-glacial headwaters of the Alaska Range, many of which are anadromous, and are found within the proposed project corridors along the George Parks Highway and Petersville Road (see Figure 2-1).

George Parks Highway

Two major streams drain the western slopes of Curry Ridge: Troublesome Creek and an unnamed stream and tributaries south of Troublesome Creek. Both of these streams flow into Chulitna River. Troublesome Creek is classified as anadromous. The proposed access road to the Parks Highway visitor center would cross the unnamed stream and a small tributary south of Troublesome Creek.

Petersville Road and Peters Hills

Non-glacial anadromous streams that are crossed by Petersville Road include: a tributary to Rabideux, Ninemile, a tributary to Ninemile, Moose, Gate, Seventeenmile, a tributary to Seventeenmile, Kroto, Twentymile, Kenny, Deep, Peters, and Long creeks. Peters Creek and its major tributaries (including Deep Creek) located in the southwest portion of

the planning area are rated the seventh most important waterway system in the Susitna Basin by the ADF&G (NPS 1997a). In the Peters Hills area, two non-glacial anadromous streams drain the eastern slopes of Peters Hills and flow into the Tokositna River to the north: Bunco Creek and an unnamed tributary to Bunco Creek. Both of these streams are crossed by the proposed Peters Hills access road. The Tokositna flows into the Chulitna River, which flows into the Susitna River. The Susitna River and its tributaries support the largest stocks of Chinook and coho salmon in the Cook Inlet drainage (NPS 1997a).

In their project scoping comments, OHMP specifically stated that the Petersville Road crosses 12 streams that have been cataloged as anadromous for five species of Pacific salmon. The road also crosses at least five tributaries to Peters Creek that support anadromous fish, as well as resident fish species including rainbow trout and Dolly Varden (ADNR 2004; ADF&G 2004b).

An anadromous fish stream survey was performed along the Petersville Road from the Parks Highway (MP 0) to Forks Roadhouse (MP 18) in August 2004. The survey verified the existence of ten cataloged anadromous streams within 150 feet of the existing road centerline (i.e., Rabideux, Ninemile, a tributary to Ninemile, Moose, Gate, Seventeenmile, a tributary to Seventeenmile, Kroto, Twentymile, and Kenny creeks). Other streams within the project corridors were surveyed, and in the Peters Hills area, five juvenile salmonids were observed in the unnamed tributary to Bunco Creek. This stream is cataloged as anadromous for salmon (see Table 3-2). Results of the 2004 study are discussed in detail in the *Water Resources Report* (URS 2004a).

Table 3-2. Cataloged Anadromous Streams of the Planning Area

Stream		**Fish Species (cataloged for)**	
Anadromous Stream #	**Stream Name**	**Scientific Name**	**Common Name**
247-41-10200	Susitna River	*Oncorhynchus tshawytscha, O. kisutch,O. nerka, O. gorbuscha, O. keta*	Chinook, coho, sockeye, pink, and chum salmon
247-41-10200-2381	Chulitna	*O. tshawytscha, O. kisutch,O. nerka, O. gorbuscha, O. keta*	Chinook, coho, sockeye, pink, and chum salmon
247-41-10200-2381-3161	Tokositna	*O. tshawytscha, O. kisutch, O. nerka*	Chinook, coho, and sockeye salmon
247-41-10200-2341	Trapper Creek	*O. kisutch*	Coho salmon
247-41-10200-2291-3049	(tributary to) Rabideaux Creek	*O. kisutch*	Coho salmon
247-41-10200-2081-3100-4136	Unnamed (tributary to Moose Creek)	*O. tshawytscha, O. kisutch*	Chinook and coho salmon

Table 3-2. Cataloged Anadromous Streams of the Planning Area, Continued

Stream		**Fish Species (cataloged for)**	
Anadromous Stream #	**Stream Name**	**Scientific Name**	**Common Name**
247-41-10200-2081-3100-4189	Moose Creek	*O. tshawytscha, O. kisutch*	Chinook and coho salmon
247-41-10200-2081-3100-4167	Gate Creek	*O. kisutch*	Coho salmon
247-41-10200-2081-3194	Seventeen Mile Creek	*O. kisutch*	Coho salmon
247-41-10200-2081-3194-4016	Unnamed (tributary to Seventeen Mile Creek)	*O. kisutch*	Coho salmon
247-41-10200-2081	Kroto Creek/Deshka River	*O. tshawytscha, O. kisutch, O. gorbuscha*	Chinook, coho, and pink salmon
247-41-10200-2081-3181	Twentymile Creek	*O. tshawytscha, O. kisutch*	Chinook and coho salmon
247-41-10200-2053-3150-4060-5026	Kenny Creek	*O. kisutch*	Coho salmon
247-41-10200-2053-3150-4060-5040	Deep Creek	*O. tshawytscha, O. kisutch*	Chinook and coho salmon
247-41-10200-2053-3150-4060	Peters Creek	*O. tshawytscha, O. kisutch, O. gorbuscha*	Chinook, coho, and pink salmon
247-41-10200-2053-3150-4060-5042	Unnamed (tributary to Peters Creek)	*O. tshawytscha, O. kisutch*	Chinook and coho salmon
247-41-10200-2053-3150-4060-5050	Cottonwood Creek (tributary to Peters Creek)	*O. tshawytscha*	Chinook salmon
247-41-10200-2053-3150-4060-5044	Unnamed (tributary to Peters Creek)	*O. kisutch*	Coho salmon
247-41-10200-2381-3161-4085	Bunco Creek	*O. tshawytscha, O. kisutch, O. nerka*	Chinook, coho, and sockeye salmon
247-41-10200-2381-3161-4085-5551-6202	Unnamed (tributary to Bunco Creek)	*O. kisutch*	Coho salmon
247-41-10200-2381-3130	Troublesome Creek	*O. tshawytscha, O. kisutch, O. gorbuscha, O. keta*	Chinook, coho, pink, and chum salmon

Source: ADF&G Fish Distribution Database (http://www.sf.adfg.state.ak.us/SARR/FishDistrib/FDD_ims.cfm).

Most species of anadromous fish depend on freshwater environments for both the spawning and rearing phases of their lives. Adequate spawning habitat is always required, and depending upon the species, adequate rearing habitat is necessary for successful reproduction. Resident fish remain in the streams, lakes, and side slough channels year-round and also require adequate spawning and rearing habitat.

Spawning Habitat

For anadromous fish and resident fish such as rainbow trout, adequate spawning habitat consists of a location in a stream where the female fish is able to dig a nest, or "redd," in the substrate and lay her eggs, after which the male fertilizes them. Components of useable spawning habitat include clean, appropriately sized substrate (gravel), well-oxygenated water, and adequate inter-gravel flow to provide the incubating eggs with oxygen and a means to remove metabolic wastes. If sediment or other material clogs the inter-substrate spaces and the water fails to circulate freely, the incubating eggs can die from hypoxia or be poisoned by toxic concentrations of their own metabolic wastes. Available spawning habitat is usually the key indicator of production potential, especially for those anadromous species that do not rear in freshwater, like pink and chum salmon.

Rearing Habitat

Adequate rearing habitat for both anadromous and resident fish consists of a location in the stream where the young fish can safely feed and grow before migrating to saltwater in the case of anadromous fish, or moving within the stream itself for resident fish.

There are several important characteristics of rearing habitat: a source of food, escape cover from predators, a velocity shelter during high flow events, and a living space for fry as they emerge from the gravel that is protected from larger fingerlings. Good rearing habitat can be found in areas with undercut banks, ponds, pools, lakes, and small side tributary streams. The finite amount of food and living space available in any stream, paired with the fact that rearing species usually establish territories and aggressively defend them, means that rearing habitat is often the key indicator of production potential for resident species, and for those anadromous species that do not immediately migrate to saltwater.

Fish Species Life Histories

Pacific Salmon

Five species of Pacific salmon (Chinook *[Onocorhynchus tshawytscha]*, coho *[O. kisutch]*, sockeye *[O. nerka]*, chum *[O. keta]*, and pink *[O. gorbuschas]*) are found in the planning area. With some important variations, all species have a similar appearance and anadromous life history. Salmon belong to the family Salmonidae and spawn in fresh water and, during the fall, their eggs incubate, hatch, and go through several

developmental stages lasting from several months to several years, depending on species. Chinook, coho, and sockeye salmon spend from one to several years rearing in freshwater before migrating to the ocean, whereas chum and pink salmon leave immediately upon emerging from the spawning gravels. The young salmon feed and grow to maturity in saltwater. They return to fresh water, often migrating tremendous distances to reach their natal streams, where they spawn. Adult salmon do not compete directly with juveniles for the food resources found in freshwater environments. Carcasses left in the streams after spawning fertilize the freshwater environment, ultimately providing food for the developing young. No stocks of Pacific salmon originating from freshwater habitat in Alaska are listed under the Endangered Species Act.

The composition of salmon prey species depends on life stage, availability, and relative abundance of prey, which vary with season and location. Chinook salmon feed on small fish (particularly herring), pelagic amphipods, and crab megalopa, with fish being the largest single contributor to their diet (Healey 1991). Chum salmon diets are composed of amphipod, euphausiid, pteropod, copepod, fish, and squid larvae (Salo 1991). Pink salmon are opportunistic and generalized feeders and are known to feed on epibenthic harpacticoid copepods, pelagic copepods, barnacle nauplii, mysids, eggs of invertebrates and fishes, and fish larvae (Heard 1991). Coho salmon are also opportunistic feeders, with diets consisting of marine invertebrates, chum and pink salmon fry, smelts, sandlance, sticklebacks, squid, and crab larvae (Sandercock 1991). Sockeye are known to feed on euphausiids, amphipods, and small fish (sandlance, herring, pollock, and capelin in the Gulf of Alaska) (Burgner 1991).

A wide variety of predators including birds, marine mammals, and other species of fish feed on migrant salmon smolts. Predators of large salmon include all toothed whales, seals, sea lions, and shark (Sandercock 1991).

Rainbow Trout

Rainbow trout are one of Alaska's most sought-after sport fish. Rainbow trout occur as both freshwater resident and anadromous forms, the anadromous form referred to steelhead trout. Rainbow trout, like salmon, belong to the family Salmonidae. Spawning for resident rainbow trout usually occurs between late April and early July in shallow gravel riffles or small clearwater streams (ADF&G 2004a). The fry rear along the stream margins or protected lakeshore for two or three years, feeding on plant material, crustaceans, and aquatic insects and their larvae. The juveniles then move into the deep pools of lakes and larger streams where their diet changes to other fish, salmon carcasses, eggs, and sometimes small mammals. Resident rainbows that either live in or migrate to large lakes with sockeye salmon runs generally grow faster and larger than fish that remain year-round in streams (ADF&G 2004a). Rainbow trout occur throughout clear-water tributaries of the Susitana River drainage and stocked lakes. The glacially fed mainstem rivers in the planning area provide wintering habitat for these fish (ADF&G 1978).

Dolly Varden

Like rainbow trout, Dolly Varden are one of Alaska's most important and sought-after sport fish. Dolly Varden are also known as char, a fish belonging to the family Salmonidae. Anadromous and freshwater resident forms of Dolly Varden exist with lakes and rivers. Little is known of the habits of Alaskan resident Dolly Varden. Spawning usually occurs during late September or October. Many of the spawning fish die soon after, but those that survive either return to the sea, remain in streams, or migrate to lakes. In lakes, Dolly Varden feed heavily on freshwater snails, aquatic insects, and also consume drifting salmon eggs (ADF&G 2004c). Dolly Varden are widely distributed in the Susitna River and its tributaries and likely occur in all but the smallest streams in the planning area (ADF&G 1978, ADF&G 2004c).

Other Resident Fish Species

Other resident fish in the planning area include game fish such as northern pike (*Esox lucius linnaeus*), Arctic grayling (*Thymallus arcticus*), lake trout (*Salvelinus namaycush*), and round whitefish (*Prosopium cylindraceum*), and nongame fish including lampreys (*Petromyzontidae* sp.), longnose sucker (*Catostomus catostomus*), and slimy sculpin (*Cottus cognatus*) (NPS 1997a).

Pike overwinter in relatively deep lakes and rivers. During spring they move to areas in the lake where flooded marshes occur or to upstream or downstream locations in rivers to spawn in marsh areas, generally returning to the same area annually. The young fish move out of the marshes and into the mainstream or lake soon after hatching. Pike are carnivorous; their diet consists mainly of other fishes such as whitefish, small pikes, salmon, trout, and suckers. They also prey on invertebrates. Pike are indigenous to areas north and west of the Alaska Range, and a small native population occurs in Southeast Alaska near Yakutat. However, in many lakes and streams of Alaska pike have been illegally introduced, subsequently upsetting the species balance, due to the pike's carnivorous nature. Pike were introduced illegally into the Susitna River drainage in the 1950s (Morrow 1980).

Arctic grayling overwinter in lakes or lower reaches of medium-sized rivers such as the Sustina. In the spring they migrate annually upstream to more shallow spawning areas. They have no apparent preferences for spawning substrate, but seem to use sandy gravel in stream tributaries most often (Morrow 1980). Grayling have an unusual tolerance for low dissolved oxygen levels, which allows them to survive long winters in areas where many other salmonids would die (ADF&G 2004a). Their diet consists mainly of insects, especially aquatic forms. Arctic grayling is the most common resident species in Denali National Park waters, which is also likely true for the planning area (NPS 1997a).

Whitefish are the most abundant group of fish north of the Alaska Range, with the round whitefish inhabiting almost every type of river and freshwater habitat in the planning area. These fish are a major food item for many predatory fish (ADF&G 2004a). Round whitefish move annually to shallow gravel areas of streams in the late fall to spawn,

and/or overwinter. The diet of round whitefish consists mainly of the immature stages of insects, such as Diptera and Trichoptera (Morrow 1980).

Lake trout spawn annually during the fall in shallow, rocky areas of lakes, tending to return to their natal spawning grounds. After spawning, the fish disperse throughout the waterway, and during summer can be found in deeper water of lakes to keep cool. The young fish move to deeper waters within a month of hatching. The lake trout diet includes zooplankton, insects, snails, amphibians, and mice (Morrow 1980).

Like salmon, Pacific lampreys are anadromous, spending the main portion of their lives at sea and returning to freshwater to spawn in the spring. Preferred spawning habitat consists of fine gravel substrate in the upper reaches of streams. The newly hatched larvae mature in the sand bottom of the stream for several years, until they reach adulthood and migrate to sea. The adult lampreys are parasitic in the marine environment, attaching themselves to salmon and trout with their oral disk, and feeding on the other fish's body fluids for nutrition (Morrow 1980). Little information is known about the life history of arctic lampreys; however, there are freshwater and anadromous forms (Morrow 1980). Spawning and rearing times coincide with those of the Pacific lamprey, with the adults either migrating to sea or to lakes or larger rivers (Morrow 1980).

Longnose suckers spawn in the spring, moving from their overwintering areas in lakes into streams or from their overwintering areas in deep pools into shallow gravely substrate streams. Some fry move downstream soon after hatching, while others remain in the streams all summer. Longnose suckers are bottom feeders, sucking up insect larvae, other invertebrates, algae, and occasionally fish eggs (Morrow 1980).

Slimy sculpins are common at depth in lakes and along the bottom in swift-current streams with rocky bottoms. Spawning occurs in the spring, and the nest site is usually under a rock or other object, in shallow water. Slimy sculpins do not migrate much throughout a watershed, and are more or less sedentary. Diets of the sculpin consist mainly of insects, especially Diptera and Trichoptera, but can include larval trout (Morrow 1980).

Surface Water

The South Denali Implementation Plan planning area is influenced by the rugged Alaska Range, including Denali, North America's highest peak. Several large glaciers Eldridge, Ruth, Tokositna, Kahiltna, and Yentna, reside in the central portion of the Alaska Range. These glaciers feed many rivers including the Susitna, Chulitna and the Tokositna rivers, all of which are within the Cook Inlet watershed. These braided rivers are composed of glacial runoff, carrying heavy loads of silt (ADNR 1980).

Major rivers transport a heavy silt load during the early spring months (Olszewski 1998). Alluvial fans and terraces are found adjacent to streams and rivers in the planning area. The alluvial fans are formed from sediments deposited by the streams. Sediments are derived from the glacial outwash from the mountain ranges, originating from the volcanic-ash influenced loess deposited in the major river bottoms (Olszewski 1998). Typical of glacial runoff streams, they have distinct day-to-day differences and occasional floods.

The majority of rivers and streams within the planning area, with the exception of the Tokositna River, flow from north to south. Many smaller headwater streams in the area are clear and originate from small watersheds in moraines and lowlands that are not glaciated. Peak discharge as a result of snowmelt typically occurs during spring and early summer. The magnitude, duration and frequency of flooding in the planning area is not well documented. Flooding from snowmelt usually occurs during spring while summer and early fall flooding results from rainstorms or glacial melt.

There are three lakes near the proposed nature center in the Peters Hills, two lakes close to the campground near the Forks Roadhouse along the Petersville Road, four lakes near the aptly named Four Lakes Trail, three lakes near or along the Long Point Loop Trail, and one large lake (Home Lake) near the proposed public use cabin, all in the Peters Hills area. In addition, the proposed access road would cross two streams, the campground is adjacent to Peters Creek, and the turnout near Kroto Creek would be improved. The proposed hiking trails also abut or cross small streams and drainages in several locations. Many of these drainages are likely to be intermittent and seasonal (URS 2004a).

Surface water bodies in the vicinity of the Parks Highway developments include a small lake near the proposed parking area/ campground at MP 134.6, several small lakes and one large lake (Lake 1787) near the 5-Mile Easy Loop Trail, one lake adjacent to the 4-Mile Hiking Trail, two lakes near the 3- Mile Curry Ridge Trail, and four lakes in the vicinity of Curry Lookout. However, there are no streams or lakes in the immediate vicinity of the proposed visitor center. The proposed access road would cross two streams, and additional development is proposed near Troublesome Creek. Many of the additional drainages are near the proposed hiking trails and are likely to be intermittent and seasonal (URS 2004a). The parking areas proposed at MP 105 and MP 121.5 of the Parks Highway are adjacent to Rabideux Creek and the Chulitna River, respectively.

Groundwater

Little information exists on groundwater presence at the alternative locations. During a 1980 site investigation, a surficial geology examination declared that the Tokositna River valley probably contains large quantities of groundwater. The Tokositna River valley has better ground water potential than the saddle and benches on ridges of hills and between mountain peaks, because the recharge area is larger. Groundwater storage is recharged in the spring and summer by rainfall and snowmelt.

Water Quality

Water quality in the planning area is primarily impacted by three factors: source, geology and mining impacts. Recreation use and human waste can affect water quality as well. Nearly all surface water in the South Denali region is potable after it has been treated for *Giardi lamdlia* cysts (treatments include boiling or filters) (NPS 2004b). In 2002, a U.S. Geological Survey (USGS) report entitled *Water Quality of Camp Creek, Costello Creek, and Other Selected Streams on the South Side of Denali National Park and Preserve, Alaska,* (USGS 2002) documents water resources data for streams and water bodies similar to those in the South Denali region. In general, the results of the USGS investigation show good water quality in the planning area representative of natural conditions, with the exception of some impacts to streambed sediments from mining activities. An NPS study in 1995 analyzed the Chulitna and Yentna rivers, obtaining data from five EPA national databases, and declared them to be of good quality, with some impacts from human activities. Potential sources of contaminants include several mining claims and glacial streams carrying high sediment loads (NPS 1996). The NPS surveyed 19 streams including Long Creek, Bear Creek, Wildhorse Creek, and Alder Creek which are near the planning area; water quality reflected natural conditions (Edwards and Tranel 1998).

The stream samples taken in 2004 indicate low conductivity and total dissolved solids (Duluth Streams.org 2005). The field investigations conducted in 2004 for this South Denali Implementation Plan EIS indicate that water quality at both Peters Hills and Parks Highway is good and is representative of background or ‘natural’ conditions found in undisturbed locations in the area (URS 2004a).

WETLANDS

Placement of fill in waters of the U.S. is regulated by the Clean Water Act, which is aimed at maintaining and restoring the health of the nation’s waters. Section 404 of this act authorizes the U.S. Army Corps of Engineers (USACE) to grant permits for the discharge of dredged or fill material into waters of the U.S., which includes lakes, ponds, mudflats, streams, and wetlands (USACE Waterways Experiment Station 1987). Under the CWA:

> "*Wetlands means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas*" (33 U.S.C. 323.2(c)).

The U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) maps of the planning area were used to make an initial determination of the presence of wetlands in the alternative sites. An on-site field investigation was conducted to ground-verify the NWI wetland maps. Delineation of wetlands that were not recorded in the field was primarily based on NWI maps and aerial photograph interpretation.

In-field wetland determinations were made according to the U.S. Army Corps of Engineers (USACE) 1987 Wetlands Delineation Manual (USACE Waterways Experiment Station 1987). Refer to the *Wetlands Report* (URS 2004d) for further details on the 2004 field investigation.

The three main areas in the planning area (see Figure 2-1) examined during the 2004 wetlands survey and for the purpose of this analysis are located near Peters Hills, the Parks Highway (previously referred to as Cari Creek in the (URS 2004d)), and the wetlands surrounding the Petersville Road.

All the wetlands and other waters of the U.S. described in the planning area are described according to the Cowardin Classification system (Cowardin, Carter et al. 1979). Palustrine wetlands are nontidal wetlands with vegetation dominated by trees, shrubs, persistent emergents, or emergent mosses or lichens, or waters that lack such vegetation and are less than 20 acres, have less than 0.5 percent salinity and have less than 6.6 feet of water at low water (Cowardin, Carter et al. 1979). Lacustrine and riverine systems are technically not wetlands, but are under the jurisdiction of the USACE as waters of the U.S.

Palustrine Emergent (PEM) Wetlands

There are approximately 19,200 acres of palustrine emergent wetlands within the planning area, mostly associated with groundwater seeps or muskeg and bog communities, some of which are extensive (NWI 1979; NWI 1980a; NWI 1980b; NWI 1980c). Emergent wetlands that are components of wetlands complexes of unconsolidated bottom/open water, aquatic bed, scrub-shrub wetlands and these complexes make up an additional several thousands of acres. Emergent wetlands vegetation is dominated by a variety of species, including several sedges (*Carex* spp.), cottongrass (*Eriophorum* spp.), horsetail (*Equisetum* spp.), buckbean (*Menyanthes trifoliata*), showy yellow pond-lily (*Nuphar polysepalum*), marsh cinquefoil (*Comarum palustre*) and in bog environments, sphagnum moss (*Sphagnum* spp.). Swamp gentian (*Gentiana douglasiana*), marsh feltwort (*Lomatogonium rotatum*), and violet species

(*Viola* spp.) are commonly found forbs. These communities typically have a low shrub component of bog birch (*Betula nana*), cloudberry (*Rubus chamaemorus*), bog blueberry (*Vaccinium uliginosum*), and Labrador tea (*Ledum palustre spp. decumbens*). Several extensive emergent wetlands and wetland complexes occur in the planning area.

Functions and Values

One of the more important wetland functions of palustrine emergent wetlands is providing wildlife habitat and regional ecological diversity. Wildlife habitat value in these wetlands varies, depending upon the type of vegetation and habitat structure available. Larger areas provide some habitat for waterfowl and shorebirds during the summer. Breeding and staging trumpeter swans (*Cygnus buccinator*) may be found in these wetlands, along with large flocks of migrating sandhill cranes (*Grus canadensis*), Canada geese (*Branta candensis*), greater white-fronted geese (*Anser albifrons*), and tundra swans (*Cygnus columbianus*) (NPS 2003a). All species would be expected to utilize these wetlands to some degree for feeding and resting during migration. Moose likely utilize some of these wetlands as foraging habitat (especially those dominated by willow species) (NPS 2003a).

Regional ecological diversity of palustrine emergent wetlands within the planning area is generally moderate to high and is often based on the presence of deciduous scrub-shrub communities, which tend to increase vegetative diversity and provide important nesting sites to songbirds (Kessel 1998). Two Alaska Natural Heritage Program (ANHP) sensitive plant species were identified in several wetlands along the Petersville Road area during the 2004 wetlands survey: silvery sedge (*Carex lapponica (canescens)*) and rannoch-rush (*Scheuzeria palustris*) (ANHP 2004; Roland 2004). The presence of these species are indicative of high regional ecological diversity (Adamus Resources Assessment Inc. 1987).

Social value of these wetlands is generally low but varies by location. The areas along the Petersville Road and the lower elevations of Peters Hills are used extensively by recreational off-road vehicles (ORV) including three-/four-wheelers and snowmachines due to the open nature of the terrain. Other human uses include recreational hunting, hiking and general nature appreciation.

Palustrine Scrub-Shrub Wetlands (PSS)

Scrub-shrub wetlands consist of approximately 14,800 acres within the planning area, with an additional several thousands of acres of scrub-shrub wetland complexes (NWI 1979; NWI 1980a; NWI 1980b; NWI 1980c). Scrub-shrub wetlands are dominated by shrubs and/or trees that are less than 20 feet tall. Sub-classes describe the type of scrub-shrub (e.g., needle-leaved, broad-leaf, dead) (Cowardin, Carter et al. 1979). In the planning area, scrub-shrub wetlands are dominated by either broadleaf deciduous shrubs or needle-leaved evergreens dwarf trees. Common species include black spruce (*Picea mariana*), Labrador tea, leatherleaf (*Chaemadaphne calyculata*), diamond-leaf willow

(*Salix planifolia*), Barratt willow (*Salix barrattiana*), sweet gale (*Myrica gale*), and bog birch. Bog laurel (*Kalmia polifolia*), bog cranberry (*Vaccinium oxycoccus*), and crowberry (*Empetrum nigrum*) are also common in many scrub-shrub communities. The herbaceous layer is generally dominated by horsetail, sedges, and bluejoint reedgrass (*Calamagrostis canadensis*). Several acres of scrub-shrub wetlands and wetland complexes occur in the planning area.

Functions and Value

Some of the key wetland functions of scrub-shrub wetlands include riparian support, regional ecological diversity, and wildlife habitat for disturbance-sensitive species. Scrub-shrub wetlands can provide riparian support when in proximity to streams by stabilizing banks and reducing sediments and toxicants in the water (Adamus Resources Assessment Inc. 1987). The regional ecological diversity for scrub-shrub areas is moderate to high, based mostly on vegetative diversity. However, these wetlands are most valuable due to their wildlife habitat support functions Deciduous scrub-shrub wetlands, especially those dominated by willow species, provide important foraging habitat for moose.

Moose, Kroto, and Peters Creeks are identified as critical moose habitat for winter survival. Other important riparian scrub-shrub wetlands and areas with extensive scrub-shrub bogs include the lower elevations of Peters and Dutch Hills and the southern end of Curry Ridge, and upper Troublesome and Twentymile creeks.

Songbirds also may use scrub-shrub bogs for nesting and rearing young during the summer months and support some resident birds during the winter (Kessel 1998). Olive-sided flycatchers, a species of concern, prefer nesting in black spruce bogs (NPS 2003a). Therefore, scrub-shrub wetlands within these regions would be rated very high for disturbance-sensitive wildlife habitat functions.

Social values include use of these areas for recreational hunting and general nature appreciation.

Palustrine Forested (PFO) Wetlands

The planning area includes approximately 4,600 acres of forested wetland, with an additional few thousand acres of forested wetland complexes (NWI 1979; NWI 1980a; NWI 1980b; NWI 1980c). Forested wetlands are dominated by trees taller than 20 feet (Cowardin, Carter et al. 1979). Forested wetlands consist mostly of black spruce. The shrub layer is typically dominated by leatherleaf, crowberry, Labrador tea, bog birch, bog laurel, and bog cranberry. The herbaceous layer is dominated by sedges, horsetail, starflower (*Trientalis eruopaea*), and Labrador lousewort (*Pedicularis labradorica*). There are only a few small areas of forested wetlands within the planning area, all of which occur along Petersville Road.

Functions and Values

Regional ecological diversity of forested wetlands is generally low, largely based on the lack of diversity in structural habitat (Adamus Resources Assessment Inc. 1987). Forested wetlands that consist of willow shrub layer may be important for moose foraging habitat and may provide some relief to moose during the winter months due to the thermal cover and shallower snow depths (NPS 2003a). Black spruce forested wetlands are very widespread in southcentral Alaska.

Palustrine Aquatic Beds (PAB)/Open Water (POW)/Unconsolidated Bottom (PUB) Wetlands

There are approximately 215 acres of palustrine aquatic beds and ponds in the planning area, and several hundred additional acres of aquatic bed complexes (e.g., PEM/PAB, PSS/PAB, etc.) (NWI 1979; NWI 1980a; NWI 1980b; NWI 1980c). Palustrine aquatic bed wetlands are dominated by plants that grow on or below the surface of the water. Plants are either attached to the substrate or float freely in the water above the bottom or on the surface. This community develops in relatively permanent waters or areas of frequent flooding (Cowardin, Carter et al. 1979). Dominant vegetation commonly consists of floating-leaf pondweed (*Potamogeton natans*), burreed (*Sparganium* spp.), showy yellow pond lily and buck-bean. Palustrine unconsolidated bottom habitats may or may not contain vegetation that grows on or below the surface of the water for most of the growing season (Cowardin, Carter et al. 1979). Open water habitats are permanently flooded wetlands.

Functions and Value

Many of the functions of these sites are dependent on location. Open water wetlands may serve as important fish habitat depending on the depth and duration of inundation and access to the area (Adamus Resources Assessment Inc. 1987). Fish species are supported by ponds with suitable habitat. Breeding and staging trumpeter swans have been located in the Tokositna drainage, and recent studies have observed large flocks of staging swans in the Chulitna River area, especially between the Tokositna drainage and the West Fork of the Chulitna River (NPS 2003a). Trumpeter swans preferred habitat is undisturbed emergent wetlands or aquatic beds for feeding (Rosenberg and Rothe 1994) and riparian forests, lakes, and ponds for nesting (NPS 1997a).

Tule greater white-fronted geese (*Anser anser albifrons*), an “at risk” species according to the International Waterfowl Research Bureau, have been observed nesting in low densities within the Yetna and Tokositna drainages (NPS 2003a). Aquatic beds also provide important foraging habitat for migrating waterfowl, including sandhill cranes, Canada geese, greater white-fronted geese, and tundra swans (NPS 2003a).

Palustrine Unconsolidated Shore (PUS)

Approximately 300 acres of unconsolidated shore/scrub-shrub complexes have been delineated (NWI 1979; NWI 1980a; NWI 1980b; NWI 1980c). Palustrine unconsolidated shores are characterized by substrates that have less than 30 percent coverage of plant species other than pioneer species. These wetlands are also periodically flooded and would include examples such as gravel bars and flats (Cowardin, Carter et al. 1979). Only one acre of palustrine unconsolidated shore has been identified.

Functions and Values

Functions served by these wetland complexes would be the same as those served by scrub-shrub wetlands. In addition, these wetlands could provide nesting habitat for some bird species that tend to nest near water and are found in the planning area (NPS 2003a).

Lacustrine System

Approximately 3,500 acres of lakes are found in the planning area (NWI 1979; NWI 1980a; NWI 1980b; NWI 1980c). The lacustrine system (lakes) includes open water habitats greater than 6.6 feet deep and 20 acres in size (Cowardin, Carter et al. 1979). In the planning area, the lacustrine system includes Scotty Lake, Swan Lake, Jake Lake, Twentyfive Mile Lake, and Kroto Lake.

Functions and Values

Important functions of these habitats include support of resident fish species and potentially one or more species of salmon, assuming the habitat is connected to adjacent river systems. Several migrating waterfowl species likely utilize this habitat type for nesting, feeding or staging for migration. Swan Lake has been identified as prime trumpeter swan nesting habitat (NPS 1997a). Lakes also provide important feeding habitat for the arctic tern and long-tailed jaegers (NPS 2003a).

Riverine System

Over 21,000 acres of riverine waters have been identified in the planning area (NWI 1979; NWI 1980a; NWI 1980b; NWI 1980c). The riverine system includes all habitat contained within a channel, except where ocean-derived salts exceed 0.5 percent, or wetlands dominated by trees, shrubs, persistent emergents, or emergent mosses or lichens (Cowardin, Carter et al. 1979). An extensive system of tributaries run throughout the planning area, bordered by the Susitna and Chulitna River drainages in the east, the Kahiltna River drainage to the west and Tokositna River drainage to the north.

Functions and Values

Many of these streams and rivers provide fish habitat function and support the both resident and anadromous fish species. The riverine system also provides several wildlife species foraging and/or nesting habitat along riverbanks. Harlequin ducks (*Histrionicus histrionica*), a species of concern, are likely found within the planning area, although population studies have not been conducted. These waterfowl prefer fast-moving, clear streams and rivers (NPS 2003a). Osprey and bald eagles feed near in riverine water in the planning area (NPS 2003a).

Table 3-3 summarizes the baseline wetlands acreage, which is defined as the wetlands that remain in the planning area as of March 2005. These baseline acreage numbers will serve as a comparison for the direct and indirect impacts of the proposed project.

Table 3-3: Baseline Wetlands within the Planning Area (Acres)

Cowardin Class[1]	**Baseline**[2]
Lacustrine System (Lakes)	
Lacustrine	3,384
Palustrine System	
Palustrine Aquatic Beds and Complexes	209
Palustrine Emergent Wetlands and Complexes	102,233
Palustrine Forested Wetlands and Complexes	8,297
Palustrine Moss-Lichen Wetlands and Complexes	3
Palustrine Scrub-Shrub Wetlands and Complexes	34,384
Palustrine Unconsolidated Bottom Wetlands and Complexes	2,048
Palustrine Unconsolidated Shore Wetlands and Complexes	294
Riverine System	
Lower Perennial Riverine	1,113
Upper Perennial Riverine	19,947
Total Lacustrine	**3,394**
Total Palustrine	**147,469**
Total Riverine	**21,062**
Total Wetlands and Other Waters of the U.S.	**171,925**

Notes: [1] Classified by NWI maps (NWI 1979; NWI 1980a; NWI 1980b; NWI 1980c) and described according to the *Classification of wetlands and deepwater habitats of the United States* (Cowardin, Carter et al. 1979).
[2] The baseline waters of the U.S. refers to the wetlands environment as it is known as of March 2005.

VEGETATION

Existing vegetation mapping was reviewed for background information on the planning area (see Figure 2-1). Data reviewed included available vegetation survey (geographic information system [GIS]) data, aerial photography, and prior technical studies conducted in Denali National Park. The review of background information was conducted prior to a 2004 field investigation, the results of which were intended to assist NPS in selecting

locations for the visitor facilities in the South Denali planning area. Refer to the *Vegetation Report* (URS 2004b) for further details on the 2004 field investigation.

The three main areas examined during the 2004 field investigation and for the purpose of this analysis are located near Peters Hills, the Parks Highway (previously referred to as Cari Creek in the Vegetation Report (URS 2004b)), and the wetlands surrounding the Petersville Road.

The vegetation of the planning area is a mosaic of taiga (boreal forest) and tundra ecosystems influenced by the interaction of climate, topography, substrate, and site history. These determining factors vary considerably across the landscape creating a diversity of plant communities and vegetation types that vary across all spatial scales (NPS 2003a). Eight vegetation communities have been described and mapped within the planning area (Shasby and Carneggie 1986; USGS 1987; Fitzpatrick-Lins, Doughty et al. 1989). Viereck *et al*. (1992) delineates the various vegetation communities in the planning area. These include forest, scrub (shrub) and herbaceous units.

Forest Units

Broadleaf Forest

Broadleaf forest communities have over 75 percent coverage of broadleaf tree species (Viereck, Dyrness et al. 1992). These communities are found on well-drained soils and are generally dominated by paper birch (*Betula papyrifera*), or balsam poplar (*Populus balsamifera*) along riparian corridors. Over 200,000 acres of broadleaf forests have been identified in the planning area (USGS 1987). Trembling aspen (*Populus tremuloides*) can also form extensive stands. Commonly occurring shrubs include Sitka alder (*Alnus viridis* ssp. *sinuata*), devilsclub (*Oplopanax horridus*), Canadian bunchberry (*Cornus canadensis*), currants (*Ribes* spp.), blueberry (*Vaccinium* spp.), and highbush cranberry (*Viburnum edule*). Monkshood (*Acontinum delphiniifolium*), claspleaf twistedstalk (*Streptopus amplexifolius*), false toadflax (*Geocaulon lividum*), fireweed (*Epilobium angustifolium*), cow-parsnip (*Heracleum lanatum*), bluejoint reedgrass (*Calamagrostis canadensis*), horsetail (*Equisetum* sp.), ladyfern (*Athyrium filix-femina*), and western oak fern (*Gymnocarpium dryopteris*) are common species in the herbaceous layer.

Needleleaf Forest

Needleleaf forest communities have over 75 percent coverage of needleleaf tree species (Viereck, Dyrness et al. 1992). Needleleaf forests in the planning area dominated by white spruce (*Picea glauca*) are generally found on well-drained soils, while needleleaf forests formed on poorly drained soils are often dominated by black spruce (*Picea mariana*). Over 32,000 acres of needleleaf forest have been identified in the planning area (USGS 1987). The shrub and herbaceous layers of white spruce forests are dominated by species similar to those described for broadleaf forests.

The shrub layer of black spruce communities includes black spruce, bog birch (*Betula nana*), leatherleaf (*Chamaedaphne calyculata*), bog laurel (*Kalmia polifolia*), black crowberry (*Empetrum nigrum*), marsh Labrador tea (*Ledum palustre* ssp. *decumbens*), cloudberry (*Rubus chamaemorus*), bog cranberry (*Vaccinium oxycoccus*), bog blueberry (*V. uliginosum*), and lingonberry (*V. vitis-idaea*). Various wetland grasses (*Deschampsia* spp., *Calamagrostis* ssp.) and sedges (*Carex* spp. and *Eriophorum* spp.) are found in the herbaceous layer, with occasional patches of sundews (*Drosera rotundifolia* and *D. anglica*) and other forbs.

Mixed Forest

Mixed forests in the planning area are found on well-drained soils and are dominated by paper birch (*Betula papyrifera*) and white spruce in the tree stratum. Broadleaf or needleleaf species contribute 25 to 75 percent of the tree cover in these communities (Viereck, Dyrness et al. 1992). Over 47,000 acres of mixed forest have been identified in the planning area (USGS 1987). The shrub and herbaceous layers are dominated by species similar to those described for broadleaf forests.

Scrub Units

Tall scrub

The tall scrub communities within the planning area are generally dominated by Sitka and/or mountain alder (*Alnus viridis* ssp. *sinuata* and *A. crispa*). To be considered a tall scrub community, the dominant shrubs must be greater than or equal to 1.5 m (5 ft) in height (Viereck, Dyrness et al. 1992). These communities tend to be located on moderately to well-drained soils; however, communities dominated by feltleaf willow (*Salix alaxensis*), Barclay willow (*S. barclayi*), Barratt's willow (*S. barrattiana*), or diamondleaf willow (*S. planifolia*) can be more poorly drained and are often located within riparian areas. Common herbs include tall Jacob's-ladder (*Polemonium acutiflorum*), larkspur monkshood, American false-hellebore (*Veratrum viride var. eschscholtzii*), arctic starflower (*Trientalis europaea*), western oak fern, horsetail, and bluejoint reedgrass.

Black spruce can also form tall scrub communities in low-lying, poorly drained soils. The shrub and herbaceous layers of these communities are dominated by the same species as the black spruce needleleaf forest communities.

Low scrub

The low scrub communities within the planning area tend to be dominated by diamondleaf willow and Barratt willow. These communities are common along drainages and often form dense thickets. Commonly found herbaceous species within these communities include Canada burnet (*Sanguisorba canadensis*), roseroot stonecrop

(*Sedum rosea* ssp. *intergrifolium*), northern geranium (*Geranium erianthum*), arctic sweet coltsfoot (*Petasites frigidus*), fireleaf leptarrhena (*Leptarrhena pyrolifolia*), bluejoint reedgrass, horsetail, ladyfern and western oak fern.

Black spruce can also form low scrub communities in low-lying, poorly drained soils. The shrub and herbaceous layers of these communities are dominated by the same species as the black spruce needleleaf forest communities (see above). Shrubs in the low scrub communities must be between between 20 centimeters (cm) (8 inches [in]) and 1.5 m (5 ft) in height (Viereck, Dyrness et al. 1992).

Tall and low scrub units were combined when delineated by USGS (1987); thus these communities together comprise over 160,000 acres in the planning area.

Dwarf Scrub

The dwarf scrub communities occur in the higher elevations of the planning area. Many of the communities are dominated by ericaceous species, including alpine bearberry (*Arctostaphylos alpina*), diapensia (*Diapensia lapponica*), Lapland cassiope (*Cassiope tetragona*) and blueberry (*Vaccinium* sp.). Dwarf willow communities are formed of arctic willow (*Salix arctica*), least willow (*S. rotundifolia*), skeleton leaf willow (*S. phlebophylla*), and netted willow (*S. reticulata*). *Dryas* tundra is also commonly found within the planning area and is dominated by mountain avens (*D. octopetala*) and entire-leaf avens (*D. integrifolia*). Sedges (*Carex* sp.) commonly form the herbaceous layer of the *Dryas* tundra community. These plant species are less than 20 cm (8 in.) in height, forming a mat covering over shallow bedrock (Viereck, Dyrness et al. 1992). Reindeer lichen (*Cladina* sp.) is also common in these communities. Dwarf scrub and related communities (which includes communities dominated by lichen), comprise over 10,000 acres in the planning area (USGS 1987).

Herbaceous Units

Mesic (dry) herbaceous

Mesic herbaceous vegetation communities form meadows dominated by either forbs or grasses, located on moderately to well-drained soils. The dominant graminoid herb is generally bluejoint reedgrass; however, hairgrass (*Deschampsia* sp.), fescue (*Festuca* sp.) and sedges (*Carex* sp.) are also prevalent. Forbs including American false-hellebore, fireweed, oak fern and horsetail are also interspersed within the meadow. The mesic graminoid herbaceous communities generally form a complex with open tall scrub communities dominated by Sitka and mountain alder.

Dry forb communities found on riverbanks and floodplains in the planning area are often dominated by river beauty (*Epilobium latifolium*), yellow avens (*Dryas drummondii*), and yarrow (*Achillea borealis*). Alpine herbaceous communities on talus slopes are generally

sparsely vegetated with saxifrages (*Saxifraga* sp.), pincushion plant (*Diapensia lapponica*), boreal sagebrush (*Artemisia arctica*), and roseroot stonecrop.

Moist and wet herbaceous

Wet herbaceous vegetation communities are also called emergent wetlands, and are generally dominated by sedges (*Care*x sp.) and cottongrasses (*Eriophorum* sp.). These sedge meadows are poorly drained, often with areas of shallow standing water. Several different sedge species can dominant a meadow; common species in the planning area include, fewflower sedge (*Carex pauciflora*), water sedge (*C. aquatilis*), boreal bog sedge (*C. magellanica*), round sedge (*C. rotundata*), and manyflower sedge (*C. pluriflora*). Tall cottongrass (*Eriophorum angustifolium),* slender cottongrass (*E. gracile*), and northland cottonsedge (*E. brachyantherum*) were the common cottongrass species. The dominant forb species within the planning area include marsh horsetail (*Equisetum palustre*), swamp horsetail (*E. fluvatile*), smooth violet (*Viola glabella*), purple marshlocks (*Comarum palustre*) Kamchatka fritillary (*Fritillaria camschatcensis*), swamp gentian (*Gentiana douglasiana*), and marsh feltwort (*Lomatogonium rotatum*).
Mesic (dry) and moist/wet herbaceous units were combined when delineated by USGS (1987); thus these communities together comprise over 29,000 acres in the planning area.

Vegetation Species of Concern

Pear-fruited smelowskia *(Smelowski pyriformis)* is an Alaskan alpine endemic and a species of concern under the Endangered Species Act (ESA), and is suspected in the planning area (NPS 1997a). Its preferred habitat is steep, sparsely vegetated, unstable alpine screes between 2,000 and 5,500 feet elevation. It is commonly found with McConnell's poppy (*Papaver mcconnellii*), purple saxifrage (*Saxifraga oppositifolia*), river beauty, Griscom's arnica (*Arnica griscomii* spp. *frigida*), monkshood, and arctic stitchwort (*Minuartia arctica*) (Lipkin and Murray 1997).

Pink dandelion (*Taraxacum carneocoloratum*) is also a species of concern under the ESA and has been found in the general region of the Alaska Range. This species is typically found on alpine slopes and coarse, well-drained substrates (NPS 1997a).

Table 3-4 shows the plants that have been identified as species of concern by The Nature Conservancy and National Heritage Network and are given a state (subnational) status ranking. These species are known or suspected to occur within the planning area.

Table 3-4 Plant Species of Concern in the Planning Area

Species	**1.3.1 Common Name**	**1.3.2 State Rank**
Agrostis thurberiana	Thurber bentgrass	S2
Carex lapponica (canescens)	Silvery sedge	S2
Cicuta bulbifera	Bulblet water-hemlock	S1
Cryptogramma stelleri	Slender cliff brake	S2S3
Eriophorum viridi-carinatum	Green-keeled cottongrass	S2
Glyceria striata	Fowl mannagrass	S2S3
Malaxis paludosa	Bog adder's-mouth	S2S3
Potamogeton obtusifolius	Blunt-leaved pondweed	S1
Scheuzeria palustris	Rannoch-rush	S3
Thlaspi articum	Arctic pennycress	S3

Notes: S1: Critically imperiled
S2: Imperiled
S3: Rare or uncommon
Sources: (NPS 1997a; ANHP 2004; Roland 2004)

Silvery sedge (*Carex lapponica (canescens)*) and rannoch-rush (*Scheuzeria palustris*) were both located along the Petersville Road during the 2004 wetlands survey. Silvery sedge is given an "S2" rating, meaning that there is an imminent threat to the population persistence within the state, but it is globally secure, though quite rare in parts of its range. Rannoch-rush is rated as an "S3", similar to arctic penny (Roland 2004).

Table 3-5 summarizes the baseline vegetation acreage, which is defined as the terrestrial vegetation that remains in the planning area as of March 2005. These baseline acreage numbers will serve as a comparison for the direct and indirect impacts of the proposed project.

Table 3-5: Baseline Terrestrial Vegetation within the Planning Area (Acres)

Alaska Vegetation Classification[1]	**Baseline[2]**
Terrestrial Vegetation	
Closed Broadleaf Forest	193,357
Closed Needleleaf Forest	30,655
Closed Mixed Forest	44,156
Tall and Low Scrub	154,571
Dwarf Scrub and Related Communities[3]	9,994
Dry or Moist Herbaceous	27,989
Sparsely Vegetated	3,281
Total Vegetation	**464,003**
Other	
Non-Vegetated	14,203
Clear and/or Deep Water	2,977
Turbid and/or Shallow Water	4,127
Ice, Snow, and Clouds[4]	103
Shadow[5]	NA

Notes: [1] As described by Fitzpatrick-Lins and others (1989), adapted from Viereck and others (1992).
[2] The baseline vegetation environment refers to the vegetation environment as it is known as of March 2005.
[3] This class may also consist of communities dominated by lichens (Fitzpatrick-Lins, Doughty et al. 1989).
[4] This class may consist of bright reflective surfaces and various amounts and types of cloud cover (Fitzpatrick-Lins, Doughty et al. 1989).
[5] This class represents those areas obscured from remote sensors by mountainous terrain; vegetation may or may not occur in these areas (Fitzpatrick-Lins, Doughty et al. 1989).

WILDLIFE

The following section summarizes the relevant natural history and population status information for selected species in the planning area and is intended to provide a baseline of information relevant to the analysis of impacts in Chapter 4. Figure 2-1 (located in the color map section at the end of Chapter Two) shows wildlife habitat in the planning area for certain species.

Mammals

The area surrounding the South Denali planning area provides habitat for a variety of mammals. Large game species include moose, caribou, brown bear, and black bear (Table 3-6). Species hunted and trapped primarily for their fur include wolf, red fox, lynx, and beaver. There are also a large number of small mammals that have important ecological roles in the local environment, including snowshoe hare, arctic ground squirrel, red squirrel, porcupine, voles, shrews, and lemmings. (ADF&G 2004a).

Brown and Black Bears

Both brown and black bears inhabit the South Denali area. Black bears usually prefer forested habitat while brown bears prefer the more open terrain of high-elevation shrub and tundra communities (Herrero 1972). However, in interior mountain populations, brown bears often utilize all major plant communities at some time during the year (Martinka and Kendall 1985). Both bear species are opportunistic feeders and the availability of various food sources at different times of the year determines much of their seasonal movement patterns. Upon emerging from their dens in mid-spring, bears typically seek foods high in protein and fat. Moose calves and winter-killed moose are likely the most important food sources during this period although they also forage heavily on roots, sedges, early herbaceous plants, and over-wintered berries (Stelmock 1981). From late June through early August, spawning concentrations of anadromous fish attract bears to the smaller streams in the lowlands. During late summer and fall, blueberries and other berries ripen and provide another important food source.

Brown bear denning in the planning area is generally initiated in late October or November and lasts until about April. Brown bears usually den at the higher elevations of the foothills but are also known to den in lower elevation timber (Faerber 1995; NPS 1995c). Although denning may occur on slopes facing any direction, moderately steep slopes that have well-drained soil with a southern aspect appear to be preferred (Miller 1987).

Table 3-6. Mammal species that regularly occur within the planning area of the South Denali Implementation Plan and their management status under the Alaska Department of Fish and Game

Mammal Species	Large Game	Furbearer	Other
Moose (*Alces alces*)	X		
Caribou (*Rangifer tarandus*)	X		
Dall sheep (*Ovis dalli*)	X		
Brown bear (*Ursus arctos*)	X		
Black bear (*Ursus americanus*)	X		
Wolf (*Canis lupus*)		X	
Red fox (*Vulpes vulpes*)		X	
Lynx (*Lynx canadensis*)		X	
Beaver (*Castor canadensis*)		X	
Wolverine (*Gulo gulo*)		X	
River otter (*Lontra canadensis*)		X	
Mink (*Mustela vison*)		X	
Marten (*Martes americana*)		X	
Short-tailed weasel (*Mustela erminea*)		X	
Least weasel (*Mustela nivalis*)		X	
Snowshoe hare ***(****Lepus americanus****)***			X
Arctic ground squirrel (*Spermophilus parryii*)			X
Voles, shrews, and lemmings			X
Red squirrel (*Tamiasciurus hudsonicus*)			X
Northern flying squirrel (*Glaucomys sabrinus*)			X
Porcupine (*Erethizon dorsatum*)			X
Muskrat (*Ondatra zibethicus*)			X
Marmot (*Marmota caligata*)			X
Collared pika (*Ochotona collaris*)			X
Coyote (*Canis latrans*)			X
Little brown bat (*Myotis lucifugus*)			X

Estimates of brown bear densities in different parts of GMSU 13E (east side of planning area) ranged from approximately 7 to 23 bears per 1000 km^2 in the 1980s (not including dependent cubs) (Tobey 2003b). Preliminary results from a 2000-2003 survey of brown bears in GMSU 13E indicate an estimated density of 16 to 26 bears per 1000 km^2 (ADF&G 2005). Within the 1,162 square miles of GMSU 16A in the planning area (excluding lakes, glaciers, large rivers, and areas above 5,000 feet), brown bear densities have been estimated to range from 11 to 23 bears per 1000 km^2 (ADF&G 1993a; ADF&G 1996). Preliminary results from the 2000-2003 survey indicated similar estimates of density in the northern sections of GMSU 16A, 16B, and 14B. Population trend data is not available in either GMSU 13E or GMSU 16A but ADF&G wildlife managers feel that the brown bear population was growing during the 1990s in spite of increased hunting pressure (Tobey 2003b; Del Frate 2003).

Brown bear hunting regulations for GMU 13 and GMU 16 were liberalized in the 1990s, and again in 2005, to reduce the brown bear population in response to an Alaska State Legislature mandate for intensive management of ungulate populations for human use. As of July 1, 2005, the brown bear bag limit is one per year instead of one per 4 years. A total of 62 brown bears were taken from GMSU 13E in the 2001-2002 season, the highest harvest on record, indicative of the substantial rise in hunting mortality since 1995 (Tobey 2003b). An average of 4 bears per year is also reported to be killed in defense of life and property (DLP) in GMU 13. This figure is considered an underestimate of DLP mortality since some shootings are likely unreported. In GMSU 16A, hunting mortality averaged 12 bears per year from 1999-2001 with an estimated DLP mortality of 2 bears per year (Del Frate 2003). Hunting mortality is known to be concentrated in areas that are easy and inexpensive to access (Miller 1990; ADF&G 1993b). Many brown bears are taken opportunistically during hunts for moose and caribou (Tobey 2003b).

Black bears are present in relatively large numbers in the lowland forests of the Chulitna, Ruth, and Tokositna Rivers. During spring 2000 bear surveys, ADFG staff noted high spring concentrations of black bears on south facing slopes of the Tokositna River (NPS 2004b). Preliminary results from 2000-2001 surveys in GMSU 16A estimate a density of 112 black bears per 1000 km^2 (McDonough 2002a).

Black bears are hunted throughout the South Denali area and there is no closed season for hunting. Black bear limits were increased to three per year effective July 1, 2005. In GMSU 13E, 37 black bears were taken in the 2000-2001 season (Tobey 2002b). In GMSU 16A, an average of 54 black bears were taken per year from 1999-2001 (McDonough 2002a). This is the highest harvest rate on record.

Caribou

Caribou from the Denali and Nelchina herds occasionally move through the planning area during their seasonal migrations between alpine and forested habitats (ADNR 1980; ADF&G 1996). During the summer, caribou tend to be concentrated in alpine tundra areas (Boertje 1985). In late summer, when temperatures cool and insect harassment decreases, caribou disperse to lower elevation habitats such as those in the planning area.

The Nelchina herd has fluctuated dramatically since the late 1940s. The herd increased from the mid-1970s until 1995 when it peaked at 50,000 animals. The herd has since decreased and is now estimated to number about 34,000 caribou (Tobey 2003a). Caribou are a popular game animal and are generally hunted on the south side in the late summer and early fall under a variety of permit and open hunt regulations.

Moose

Moose inhabit all the major habitat types in the South Denali area except alpine tundra. Calves are born in late May through June, generally in lower elevation habitats. Moose

then tend to move into higher elevation forests and shrub habitats. Fall rutting and post-rutting concentrations occur in subalpine habitats, including the Peters and Dutch Hills (ADFG 1985a), with moose moving down from these areas in winter as snow depths increase (ADF&G 1992). Riparian willow stands provide a large part of winter forage, and upland coniferous forests provide thermal cover and shallower snow depths (ADNR 1991).

The upper Tokositna River valley was identified by the state as important winter range in the *Denali State Park Master Plan* (ADNR 1989). An area on the south side of the Tokosha Range has a particularly high concentration of moose and is known as "Moose Meadows" to pilots who lead scenic flights out of Talkeetna (NPS 1995d). High numbers of moose also wintered in the Little Peters Hills and Petersville area where the riparian zones of Moose, Kroto, and Peters Creeks provide critical winter habitat (ADNR 1991).

The moose population in the South Denali area has fluctuated substantially since the early 1900s with population declines during periods of high mortality from severe winters, natural predation, and heavy human harvest. Mild winters with moderate snow depth help the population to increase (Tobey 2002a). Moose hunting is very popular and hunting regulations have changed substantially over the years to account for changes in the moose population as well as increasing numbers of hunters and improved access (Tobey 2002a). Moose hunting is currently only allowed in August and September and is focused along the roads and larger stream areas. In GMSU 16A, the moose population fluctuated between an estimated 2400 to 3600 moose from 1990-2002 (McDonough 2002b). In the last 3-year period, an average of 154 bulls have been taken by hunters each year, an estimated 36 more are taken illegally every year, and 17 moose are killed by vehicle collisions (McDonough 2002b). Population and mortality estimates for GMSU 13E are not available but the most recent density estimate (2001) was 0.9 moose per square mile (Tobey 2002a).

Wolves

Wolves occur throughout the planning area in a variety of habitats that support their prey, which include primarily moose, with lesser numbers of caribou and sheep, plus small mammals such as hares and beaver. Wolf populations are primarily dependent on the abundance and vulnerability of moose and caribou. During periods of low winter snowfall, prey species tend to be in good physical condition and are difficult for wolves to capture. Under these conditions, wolf numbers tend to be low because of poor reproduction and high dispersal and mortality of older wolves (Adams and Mech 1995; Mech, Adams et al. 1998). When winters are severe, prey become more vulnerable and wolf populations can quickly increase by higher pup production, high survival rates, and reduced dispersal of young adults. Winter observations made since 1992 indicate that there are a minimum of four wolf packs, and possibly five, that have some portion of their range within the planning area (ADF&G 1996).

Small mammals

The South Denali area also supports a large suite of smaller mammals, including carnivores (coyote, red fox, lynx, river otter, wolverine, marten, ermine, least weasel, and mink), rodents (hoary marmot, arctic ground squirrel, red squirrel, northern flying squirrel, beaver, voles, brown lemming, and porcupine), two lagomorphs (snowshoe hare and collared pika), insectivores (shrews), and at least one species of bat (little brown bat). These species inhabit a variety of habitats and form integral links in the food web. Many of the rodents are prey sources for larger omnivores and carnivores.

Red fox are common in the Denali area but coyotes are uncommon. Lynx occur at relatively low densities and depend heavily on snowshoe hare as a prey source. River otter and wolverine also occur at relatively low densities. Marten, ermine, least weasel, and mink occur in suitable habitat but little is documented about their abundance. Hoary marmots are usually found in loosely formed colonies in subalpine and alpine areas, often in close proximity to talus slopes and boulder fields. Flying squirrels and red squirrels are common in spruce dominated forests. Arctic ground squirrels are common and conspicuous in open-country habitats. Populations of voles, shrews, and lemmings occur in a diversity of habitats and exhibit tremendous fluctuations but are rarely seen because of their small size and secretive habits.

Birds

There are many species of birds that are listed on various conservation lists that occur within the South Denali area (Table 3-7). Most of these species are migrants and spend only the summer breeding season in the area. Many of these species, especially those associated with river and lake habitats, are not likely to occur on a regular basis within the construction limits of the alternatives, which are primarily in upland habitats, but could be affected by increased human activity in the surrounding area. Only the ptarmigan are hunted in the area. With the exception of trumpeter swans, there is little information on actual density and distribution of these species. The following accounts briefly describe the relative abundance and habitat preferences of the listed species (Terres J.K 1980; Armstrong 1995; USGS Patuxent Wildlife Research Center 2005; NPS 2005a). Current information on the population status and conservation concerns for these species can be found in the conservation list references and on the Internet (NatureServe 2005).

Waterfowl and Waterbirds

Red-throated loons nest near small, marshy lakes and are uncommon in the area. Trumpeter swans are common nesters in the wetlands of the major river valleys, as documented in aerial surveys conducted by the USFWS every 5 years (USFWS 2000). The Tule goose is a subspecies of greater the white-fronted goose that nests primarily in the lower Susitna Valley, but also in small numbers along the western shore of Upper Cook Inlet from the Susitna River south to Redoubt Bay. The primary nesting grounds extend between the Yenta River drainage and the Susitna River, north to include the

Kahiltna Valley and lower Tokositna River drainage adjacent to Denali National Park. This area is used by the entire population during migrations in May and August. The Upper Kahiltna Valley has been a primary molting site for more than 1000 Tule geese in midsummer. American widgeons, mallards, northern shoveler, northern pintail, and green-winged teal are common breeding dabbler ducks. Harlequin ducks are common nesters along forested, swift-flowing streams. Long-tailed ducks, ring-necked ducks and surf scoters are both uncommon nesters near streams and lakes in both tundra and taiga habitats.

Shorebirds

American golden-plovers and surfbirds nest on alpine tundra and are considered uncommon. Wandering tattlers are uncommon nesters on streamside gravel banks. Whimbrels are uncommon and nest in lower elevation tundra habitats. Other local shorebirds include greater and lesser yellowlegs, solitary sandpipers and spotted sandpipers.

Raptors

Gyrfalcons are uncommon cliff nesters and birds of open habitat. American peregrine falcons are also cliff nesters and are considered rare in the area.

Owls

Short-eared owls are uncommon nesters in open tundra habitats. Great gray owls nest in forested areas but are considered rare. Boreal owls are uncommon in the area and are forest nesters. Northern hawk owls are also uncommon forest residents of this region.

Ptarmigan and Grouse

Rock ptarmigan and white-tailed ptarmigan are resident birds of rocky mountain ridges and shrub habitats, with rock ptarmigan being more common. Sharp-tailed grouse are uncommon to rare in forests with many open areas. Spruce grouse occur in lower elevation coniferous forest habitats.

Songbirds

Black-backed woodpeckers are rare forest nesters. Olive-sided flycatchers are uncommon nesters in spruce forest habitat. Hammond's flycatchers are locally common birds of deciduous forests, both in riparian and upland habitats. Northern shrikes are uncommon residents that are found in a variety of forested habitats with adjacent open areas. American dippers are uncommon residents that are closely associated with fast flowing streams.

Gray-cheeked thrush and varied thrush are common in forest and shrub habitats, sometimes feeding in open areas. Arctic warblers are common nesters in willow shrub habitats. Bohemian waxwings are common residents that nest in spruce forests with muskegs. Townsend's warblers are uncommon in spruce and mixed forests. Blackpoll warblers are uncommon in wet spruce forest habitats. Golden-crowned sparrows are uncommon in sub-alpine shrub thickets. Smith's longspurs are rare and nest in lowland tundra. Rusty blackbirds rarely nest near marshy lakes and ponds in the area. White-winged crossbills are an irruptive species that may be common in spruce forests some years and absent in other years.

Table 3-7. Bird species that regularly occur within the planning area of the South Denali Implementation Plan and are listed on statewide conservation lists.

Bird Species	Species likely to occur in the construction limits of the alternatives	Birds of Conservation Concern[1] (USFWS)	Priority Species for Conservation[2] (Boreal Partners in Flight)	Species of Special Concern[3] (ADF&G)	BLM Sensitive Species[4]	Alaska Watchlist[5] (Audubon)
Red-throated loon (*Gavia stellata*)					X	X
Trumpeter swan (*Cygnus buccinator*)					X	
Tule white-fronted goose (*Anser albifrons elgasi*)					X	X
Harlequin duck (*Histrionicus histrionicus*)	X				X	
Long-tailed duck (*Clangula hyemalis*)					X	X
Surf scoter (*Melanitta perspicillata*)					X	
Gyrfalcon (*Falco rusticolus*)			X			
American peregrine falcon (*Falco peregrinus anatum*)		X				X
Rock ptarmigan (*Lagopus mutus*)	X					X
White-tailed ptarmigan (*Lagopus leucurus*)	X		X			

Table 3-7. Bird species that regularly occur within the planning area of the South Denali Implementation Plan and are listed on statewide conservation lists, continued.

Bird Species	Species likely to occur in the construction limits of the alternatives	Birds of Conservation Concern[1] (USFWS)	Priority Species for Conservation[2] (Boreal Partners in Flight)	Species of Special Concern[3] (ADF&G)	BLM Sensitive Species[4]	Alaska Watchlist[5] (Audubon)
Sharp-tailed grouse (*Tympanuchus phasianellus*)			X			
American golden-plover (*Pluvialis dominica*)		X				
Wandering tattler (*Heteroscelus incanus*)						X
Whimbrel (*Numenius phaeopus*)	X	X				
Surfbird (*Aphriza virgata*)		X				X
Short-eared Owl (*Asio flammeus*)		X				
Great gray owl (*Strix nebulosa*)	X		X			
Boreal Owl (*Aegolius funereus*)	X		X			
Black-backed woodpecker (*Picoides arcticus*)			X			
Olive-sided Flycatcher (*Contopus cooperi*)	X		X	X	X	X

Table 3-7. Bird species that regularly occur within the planning area of the South Denali Implementation Plan and are listed on statewide conservation lists, continued.

Bird Species	Species likely to occur in the construction limits of the alternatives	Birds of Conservation Concern[1] (USFWS)	Priority Species for Conservation[2] (Boreal Partners in Flight)	Species of Special Concern[3] (ADF&G)	BLM Sensitive Species[4]	Alaska Watchlist[5] (Audubon)
Hammond's Flycatcher (*Empidonax hammondii*)	X		X			
Northern Shrike (*Lanius excubitor*)	X		X			
American dipper (*Cinclus mexicanus*)			X			
Gray-cheeked Thrush (*Catharus minimus*)	X		X	X	X	X
Varied Thrush (*Ixoreus naevius*)	X		X			
Arctic warbler (*Phylloscopus borealis*)	X	X				
Bohemian waxwing (*Bombycilla garrulus*)			X			
Townsend's Warbler (*Dendroica townsendi*)	X		X	X	X	X
Blackpoll Warbler (*Dendroica striata*)	X		X	X	X	X
Golden-crowned Sparrow (*Zonotrichia atricapilla*)	X		X			

Table 3-7. Bird species that regularly occur within the planning area of the South Denali Implementation Plan and are listed on statewide conservation lists, continued.

Bird Species	Species likely to occur in the construction limits of the alternatives	Birds of Conservation Concern[1] (USFWS)	Priority Species for Conservation[2] (Boreal Partners in Flight)	Species of Special Concern[3] (ADF&G)	BLM Sensitive Species[4]	Alaska Watchlist[5] (Audubon)
Smith's longspur (*Calcarius pictus*)			X			X
Rusty blackbird (*Euphagus carolinus*)			X			
White-winged crossbill (*Loxia leucoptera*)	X		X			

CULTURAL RESOURCES

Ethnohistory

The Susitna River basin and hills along the southern flank of the Alaska Range were traditionally occupied by the Dena'ina Athabaskan. Three major cultural subdivisions, or 'societies', were discernable within the Cook Inlet region. Differences between the Interior, Susitna, and Kenai societies were reflected in distinctive subsistence practices and cultural expressions (Townsend 1981). People of the Susitna society spoke a dialect of the Dena'ina language known as the Upper Inlet (Kari 2003). This dialectical subdivision was spoken throughout much of Upper Cook Inlet from the Yentna River to Nickolai Creek near Tyonek (Townsend 1981).

The Dena'ina seasonal round correlated to periods of fish, animal, and plant productivity. Fishing occurred in the summer and early fall during anadromous fish migrations. During the winter and spring other particular fish species were caught under the ice. Although subsistence activities involved a basic opportunistic strategy, the fall-winter seasons were particularly important for caribou, mountain sheep, and bird hunting. Other activities along the seasonal round included fall berry picking, winter snaring of ground squirrels, hares, and squirrels, and moose hunting (Townsend 1981). The Dashq'e Ht'ana band of Kroto Creek traveled up the Tokositna and Chulitna Rivers in the fall for moose, caribou, and ground squirrel hunting. After the hunt the parties would load their caribou or moose hide boats and float down the river to their winter villages (Kari 2003). In 1913 geologist Stephen Capps (1913) reported that native peoples along the Susitna River regularly entered the Yentna country during the fall and winter for hunting and trapping.

Elder Shem Pete of Susitna Station recalled stories of hunters using Chelatna Lake (Ht'u Bena) for caribou hunting. Caribou were driven into the lake and speared (Kari and Fall 2003). Shem Pete's brother-in-law Susitna Pete mined gold during the early years of the twentieth century along Cache Creek and maintained a camp in the region (Kari and Fall 2003). A trail along the Kahiltna River to Cache Creek was used to traverse the country. This trail was later used by miners during the first decades of the twentieth century to access their Cache Creek claims (Kari and Fall 2003). The Peters Hills area (K'enuqak'itnetan) and namesake creek (K'enuqak'itnetan Betnu) were thought to resemble a mythological animal. Shem Pete wrote, "as you walk around it [Peters Hills], it looks like a big animal lying there" (Kari and Fall 2003).

The typical Dena'ina seasonal round included a primary winter village of one or more semi-subterranean houses. Typically each multi-family house contained several kin groups of the same clan (Kari and Fall 2003). Skin or birchbark tent-like structures were used at other locations throughout the remainder of the year. During the historic period Dena'ina houses were replaced with log house designs. Large Dena'ina winter villages in the Susitna Valley were located at Susitna Station (Tsat'ukegh), Hewitt Lake (Tiq'atl'ena), and the mouth of Kroto Creek (Dashq'e) (Kari and Fall 2003).

History

The first recorded Euroamerican to enter the Susitna River basin was Petr Malakhov of the Russian American Company. In 1844 Malakhov ascended the Susitna to a point near Devils Canyon (Kari and Fall 2003; Brooks 1911). Few if any non-natives entered the Susitna and Chulitna basins until gold miners prospected the region during the latter part of the nineteenth century. In 1887 prospectors explored the Yentna River and by 1895 other groups traversed the Chulitna. One of these early parties led by William A. Dickey ascended the Susitna in 1896 and made note of other non-native groups returning from the Talkeetna and Chulitna Rivers (Sherwood 1992). Dickey designated the name 'McKinley' to the mountain known as 'Delaykah' or 'Dghelay Ka'a' to local Dena'ina people (Kari and Fall 2003). The mountain's namesake was Republican presidential nominee William McKinley (Sherwood 1992). During the Turnagain Arm Gold Rush of 1895-1896 miners began to prospect Upper Cook Inlet and the Susitna valley in earnest. The 1897 gold strike in the Willow Creek drainage of the Talkeetna Mountains brought hundreds more prospectors to the Susitna River basin (Barry 1997; Buzzell 2004).

Early geologic reconnaissance of the Susitna Valley was undertaken in 1898 by geologists Josiah E. Spur and George H. Eldridge. Spur ascended the Susitna and Yentna Rivers to the mouth of the Skwentna (Capps 1911). Eldridge followed the Susitna River to the Tanana Valley (Capps 1913). The following year four parties under the direction of U.S. Army Captain Edwin F. Glenn converged on the Susitna River valley to reconnoiter potential routes from Cook Inlet to the Tanana (Sherwood 1992). One detachment under Joseph Herron ascended the Kichatna River and mapped a route to the Kuskokwim, Tanana, and Yukon Rivers. Although the other three parties of the Glenn expedition failed to reach their destinations, they did make important notes of the region (Sherwood 1992).

In 1902 USGS geologists Alfred Brooks and L.M. Prindle explored the Alaska Range along the Kichatna River, a tributary of the Yentna River (Capps 1911). By 1904 engineers of the Alaska Central Railway Company began surveys of the Chulitna and Susitna valleys in their search for a potential railroad route to Fairbanks (Brooks 1911). Detailed historical descriptions of the uplands near Tokositna and Ruth Glaciers were recorded during the mountaineering expeditions of F.A. Cook in 1906 and Belmore Brown and Herschel Parker in 1911 (Tuck 1934).

Gold was first reported in the hills and tributaries of the Kahiltna River in 1905. Initial discoveries on Nugget Creek and along Peters Creek were made by Doc Herning and group of prospectors based out of Home Lake on the Tokositna River (Capps 1913; Marsh 2000). The Peters Hills were named for early claim owner Henry Peters (Hanson 1999:12). Gold on Cache Creek was discovered in 1906 and the region was designated the Yentna Mining District (Capps 1913). The district included placers in the Peters Hills, Dutch Hills, and the Twin and Mills Creek basin near Chelatna Lake (Paige and Knopf 1906). By the 1920s the Mills, Twin, and Clearwater Creek placers were incorporated within the Fairview Mining District (Wimmler 1925; Paige and Knopf 1906).

Initial production was reported from small gulches above the tree line where placer ground was shallow (Paige and Knopf 1906). Some of the creeks in the Peters and Cache Creek drainages were exceptionally rich with coarse gold. It was reported that "an ounce to the shovel was generally obtained" from these early claims (Paige and Knopf 1906). Miners quickly expanded their operations from the streambeds to newly discovered high bench placers adjacent to the creeks. Nearly 100 men were employed in several dozen large placer operations during the year 1911 (Capps 1913).

Early mining operations employed shovel-in and hydraulic sluicing technology (Capps 1913). These processes involved groundsluicing or hydraulicking off low-paying overburden and shoveling-in lower gravels at or near bedrock into strings of sluice boxes (Capps 1913:54). Water control systems were required and miles of ditches were constructed along Cache and Peters Creek by 1911 (Capps 1913). Some miners diverted creeks and small rivers using wing dams and shoveled-in the exposed creek gravels (Capps 1913).

Miners in the Yentna District faced short summer seasons, high transportation costs, unpredictable water resources, and timber shortages. Most profitable claims were located above the treeline and required a large quantity of wood for sluice boxes, cabins, fuel, and other mining applications (Capps 1913). Given the high costs of overland freighting to the district, a local sawmill was constructed near Thunder Creek to provide milled lumber (Capps 1913). Even with the sawmill in operation miners were still required to haul lumber distances in excess of seven miles to their claims (Capps 1913). Lignite coal found at some locations was used to supplement limited fuel supplies (Capps 1911, 1913).

Prior to World War I most transportation to the district followed a route from either Tyonek or Knik to the settlement of Susitna Station at the mouth of the Yentna River. Susitna Station, or 'Tsat'ukeght', was a primary Dena'ina village in Upper Cook Inlet and quickly grew as a major supply station on the trail to the gold fields (Kari and Fall 2003). From this point most freight and passengers continued up the Yentna on gasoline-powered launches to the small settlement of McDougall at the confluence of Lake Creek (Paige and Knopf 1906; Capps 1913). From McDougall travelers followed a trail that paralleled Lake Creek, crossed the Kahiltna River, and continued to Cache Creek and Peters Creek (Capps 1913). The trail terminated at Home Lake on the Tokositna River. At this location some miners would build boats late in the season and raft down the Tokositna to their winter homes (Hanson 1999).

By 1909 portions of the trail north of McDougall were upgraded to a wagon road by the Cache Creek Mining Company (Marsh 1999b). Most supplies were carried to the mining camps during the winter due to the marshy ground, tortuous river crossings, and hoards of insects found along the trail in summer (Capps 1913:21). Overland access to the western part of the mining district followed a trail from Youngstown on the upper Yentna River (Paige and Knopf 1906:118).

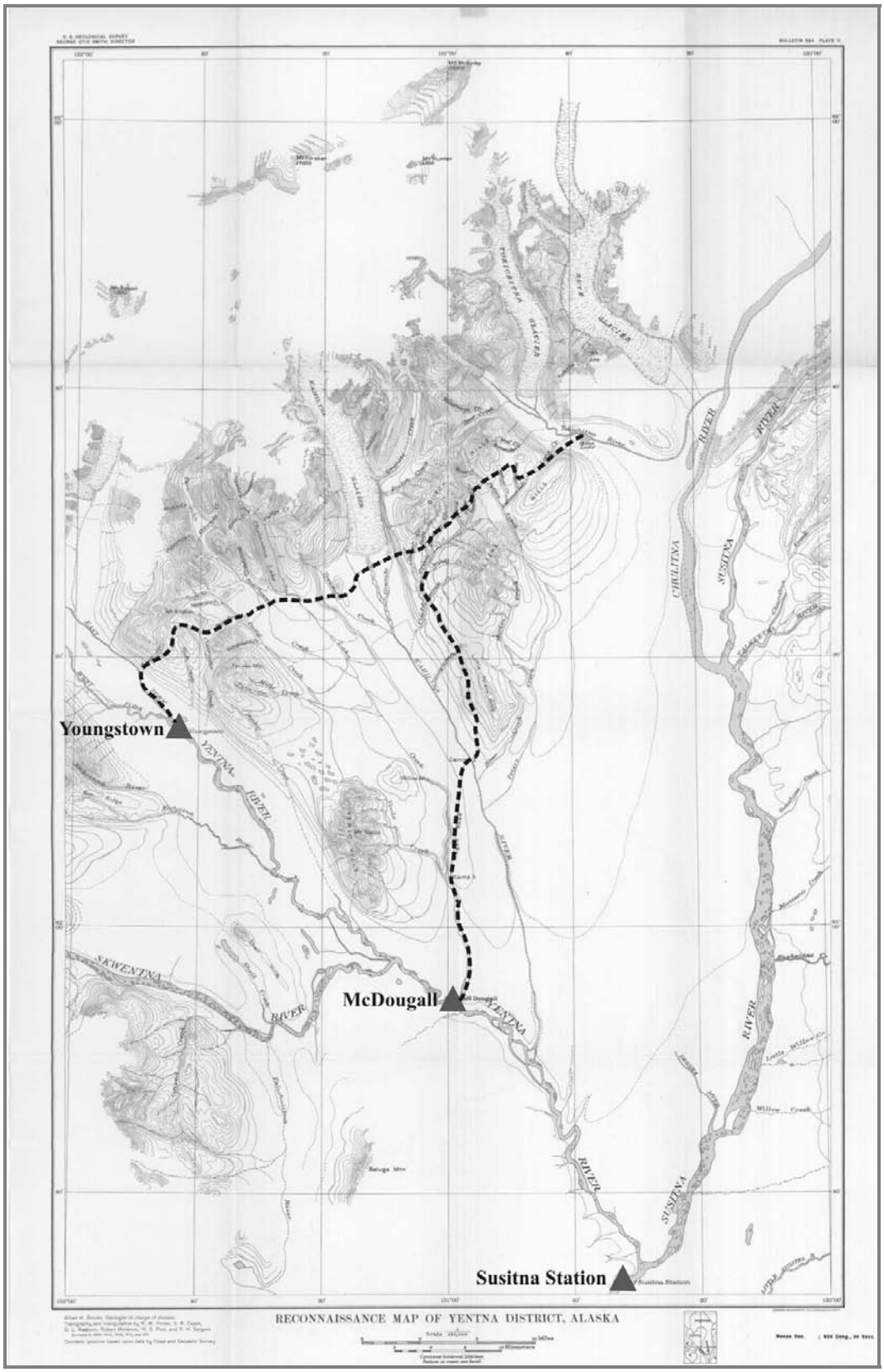


Figure 3-1. Reconnaissance Map of the Yentna District, 1911 (Capps 1911).

Construction of an alternate supply route to the Yentna District began in 1918 after the Alaska Railroad was completed to Talkeetna (Marsh 1999b). By 1922 fifteen miles of wagon road and thirty miles of rough trail were constructed by the Alaska Road Commission (ARC) along Route 51, the Talkeetna-Cache Creek Road (ARC 1922; Wimmler 1923). With the new route completed, Talkeetna became the primary supply and entry point for miners of the Yentna and Fairview Districts (Tuck 1934). Many miners of the region wintered in Talkeetna, which by 1930 boasted a population of 89 (Tuck 1934). The former supply settlement of McDougall and the McDougall-Cache Creek Trail were largely abandoned by 1926 (Bacon and Cole 1983).

In 1929 the Talkeetna-Cache Creek wagon road was extended to Peters Creek at MP 23 (Wimmler 1929). Near this location, referred to as 'the Forks', freight was transferred from wagons to horses and the trail diverged. The Forks Roadhouse was built at this locality in the late 1920s (ADOT&PF 2001). Route 51B followed the course of Peters Creek and was known as the Peters Creek Trail. Route 51A, the Cache Creek Trail, extended 16 miles to the mining operations on Cache Creek (ARC 1929; Wimmler 1929). Route 51A followed the valley of Black Creek and is also known as the 'Black Creek Summit Trail' (Bacon and Cole 1982). A bridge spanning Peters Creek on the Cache Creek Trail was constructed in 1938. Several ARC construction camps and shelter cabins were established along the route, including one substantial site at Susitna River crossing at the 'Landing' (Marsh 1999a).

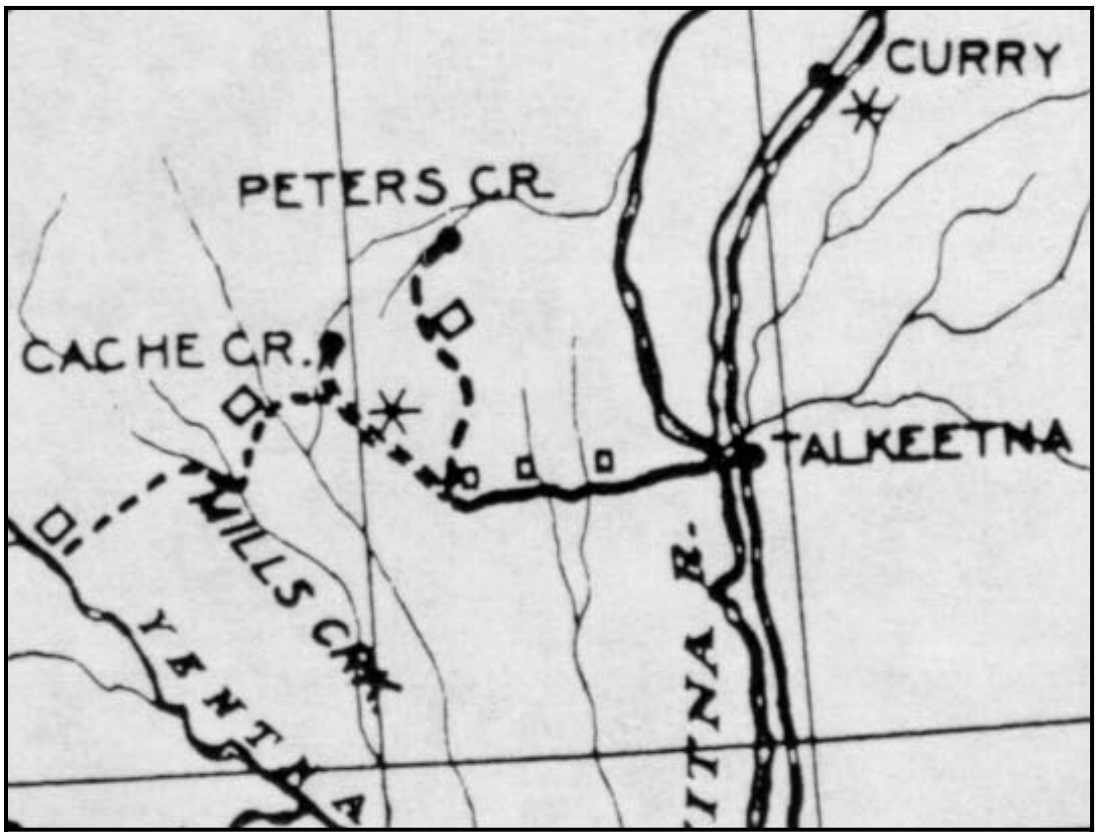


Figure 3-2. Map of cabins and trails in the Yentna Region (ARC 1931).

The largest gold producer in the Yentna Mining District during this period was the dredge of the Cache Creek Dredging Company. The dredge began operations in 1917 after being freighted over the McDougall Trail by horse team and reassembled on Cache Creek. The complex dredging outfit required miles of ditches, penstock and flume, and was for a time driven by hydroelectric power (Wimmler 1923; Marsh 1999a). The dredge closed in 1926. Other placer operations during the period employed hydraulicking, groundsluicing, and shoveling-in (Wimmler 1923,1925).

Settlements at Curry, Sherman, Gold Creek, and Canyon were established along the railroad route in the 1920s for the maintenance of the line (Tuck 1934). At the town of Curry a hotel was built to accommodate the burgeoning tourism industry surrounding Mt. McKinley Park. Amenities at the hotel included a golf course, swimming pool, and hiking trail to Curry Lookout (Antonson and Hanable 1985). In 1930 Curry had a population of almost 100 people, including miners, maintenance personnel, and trappers (Tuck 1934).

By the late 1930s most miners of the Yentna District employed draglines, washing plants, bulldozers, and hydraulic technology (Roehm 1937; Capps 1940). These large-scale operations required large crews, consolidated claims, and increased investment capital. In contrast were a few individuals or partnerships that continued to mine using small-scale methods, including sniping and groundsluicing (Roehm 1937). In 1937 J.C. Roehm reported that the Talkeetna-Cache Creek Road was passable by truck to within six miles of the Petersville mining camp (Roehm 1937). Rehabilitation of the route was completed two years later and trucks could for the first time drive to Petersville in dry weather (Roehm 1939).

During World War II all major placer mines in the Yentna District were shut down by the Federal Government under War Production Board Limitation Order L-208. The order closed non-essential mines throughout Alaska to save capital and labor resources for the war effort. The government rescinded the order in 1945 but many mines in Alaska failed to reopen due to stagnant gold prices and increased labor costs (L'Ecuyer 1997; Buzzell 2004). In 1951 only six operations and seven men were mining in the Dutch and Peters Hills. Just prior to the war one-hundred miners were employed in the district (Roehm 1937; Saunders 1951).

Homesteaders began to settle along the Cache Creek Road during the 1950s. The earliest recorded settler on the Petersville road was Clarence "Shorty" Bradley and his wife Florence. Their 160-acre homestead was initially purchased in about 1939 and was located across the river from Talkeetna at Trapper Creek. Trapper Creek was named for the cabin of Oliver and Noah Rabideux who trapped in the vicinity during the 1920s (Marsh 1999a). Significant growth in Trapper Creek occurred in 1959 when a large group of pioneers from the Michigan area homesteaded the area. These new arrivals were known as the "Michigan Fifty-Niners" (Marsh 1999c). In 1971 the George Parks Highway between Anchorage and Fairbanks was completed and invigorated settlement in Talkeetna and Trapper Creek (Marsh 1999a). Recent State of Alaska land disposal

programs have opened the area to further development. A few small-scale placer mines operate today within the creeks and benches of the former Yentna Mining District.

Previous Investigations

The principle ethnohistoric work for the Dena'ina of Upper Cook Inlet and the Susitna River basin is *Shem Pete's Alaska* (Kari and Fall 1987, 2003). Indicated by Shem Pete and other Dena'ina elders are traditional place names and site locations, many of which are not reported to the Alaska Heritage Resources Survey (AHRS). Common resource types described in the work include campsites, villages, transportation routes, and mythological locations tied to Dena'ina oral history.

Specific cultural locations reported in the Peters and Dutch Hills included a trail (K'enuqak 'itnetant) from Home Lake to the Yentna River, and the camp of Susitna Pete along Cache Creek (Delggematnu) (Kari and Fall 2003). Areas for bear hunting were found within the Chulitna River corridor at Curry Ridge (K'esugi Ken) and Troublesome Creek (Nelnikda Ey'unt). Shem Pete reported the remains of a steambath and possible campsite along the east bank of Troublesome Creek (Kari and Fall 2003). K'esugi Ridge, which translates to "The Ancient One", was also frequented by the Dena'ina of the Kroto Creek area for caribou hunting (Kari and Fall 2003).

The first recorded cultural resource reconnaissance of the Susitna River Valley was conducted by William Irving in 1953. Identified within the proposed site of the Devil's Canyon Dam were eleven archaeological sites representing historic and prehistoric occupations (Irving 1957). In 1971 Frederick Hadleigh West conducted a reconnaissance of the George Parks Highway between the Chulitna River crossing and Hurricane Gulch (West 1971). Historic cabins and a collapsed log cache site (TAL-119) were identified at Byers Lake within a private homestead (West 1971:4). No prehistoric sites were identified along the Chulitna River survey area.

During the 1970s historic building remains at Curry Lookout (TAL-001) were reported to the AHRS. TAL-001 is situated on the top of a conspicuous 2,500-foot hill overlooking Troublesome Creek. A frame building was built at the site in 1923 and became a destination for patrons of the Curry Hotel on the Susitna River. Tourists from the hotel would hike or ride horses to the overlook for views of the Alaska Range and Mount McKinley (AHRS card).

The first large-scale archaeological survey of the region was undertaken in conjunction with the proposed Susitna Hydroelectric Project (Dixon et. al. 1985b). Over 250 archaeological sites were inventoried near the Susitna Canyon. Sites ranged from early Holocene Paleoarctic assemblages to historic Euroamerican tradition components (Dixon 1985a). Investigators also discovered a series of volcanic ash (tephra) horizons useful for dating archaeological and stratigraphic units in the region. The survey area included the Susitna River Canyon and a 0.5-mile wide transmission line corridor along the Susitna and Chulitna Valleys between the towns of Willow and Healy.

An archaeological reconnaissance of the Susitna River basin was conducted for the U.S. Department of Agriculture in 1981 (Bacon and Cole 1982). Using ethnographic, historical, and field investigations, researchers located a number of sites along the middle and lower Susitna River valley. A helicopter survey of the Dutch and Peters Hills identified the Petersville Road (TAL-117), the abandoned Cache Creek Trail between the Forks and Cache Creek (TAL-118), the Forks Roadhouse (TAL-116), and several possible Alaska Road Commission (ARC) shelter cabins (Bacon and Cole 1982). The survey also visited the historic settlements of McDougall and Youngtown south of the Yenlo Hills. Portions of the abandoned McDougall-Cache Creek Trail were reported by a local bush pilot. A map illustrating the exact location of these sites was not prepared. Prehistoric sites were not encountered during a pedestrian survey of a 40-mile long track along the east bank of the Susitna River (Bacon and Cole 1983).

Cultural resources were inventoried on lands along the Tokositna, and Coffee Rivers by the National Park Service in 1988 and 1989 (Lynch 1996). Identified was a cluster of modern (late 20th century) cabins near Pirate Lake. No historic or prehistoric properties were located within the survey area near the Dutch and Peters Hills (Lynch 1996).

Between 1989 and 1992 archaeological investigations were conducted at Tiq'atl'ena Bena (Hewitt Lake) near the confluence of the Yentna and Skwentna Rivers. Excavations at (TYO-049) identified artifacts, house depressions and cultural components spanning at least 3,600 years of occupation (Dixon 2003). Ground slate artifacts and associated radiocarbon dates from the site indicate association with the Ocean Bay II or Kachemak cultures of the Alaska Peninsula and the Kenai Peninsula (Dixon 2003).

Archaeologist Fran Seager-Boss conducted a survey of Matanuska-Susitna Borough (MSB) lands near Talkeetna during 1995. Identified were two cache pit clusters near Birch Creek, and an historic site, lodge, and cabins along the east side of the Susitna River between Sunshine and Talkeetna (Seager-Boss 1996).

The mining town of Petersville (TAL-071) and an associated landing strip (TAL-070) were reported to the AHRS by archaeologist Donna Redding. In 2001 the Peters Creek Bridge (TAL-080) was determined eligible for inclusion in the National Register of Historic Places. The historic steel truss bridge over Peters Creek was built in 1938 and used to access placer mines in the area (ADOT&PF 2001).

During the late 1990s the Office of History and Archaeology and National Park Service surveyed several locations in the Peters Hills region of Denali State Park (Hanson 1999). Proposed development within Denali State Park included a visitor center, cabins, hiking trails, and campground. The survey documented three historic mining sites; (TAL-072, TAL-073, TAL-074). A complex of ditches, tailings, and artifacts was found at the head of Poorman Creek (TAL-072). Two sites located along Ramsdyke Creek (TAL-073, TAL-074) included ditch features, possible hydraulic pipe, a tent or cabin site, and various historic artifacts. The survey also identified isolated prospect pits, shovels, tinware, and mining equipment scattered throughout the planning area.

In 1998 archaeologist Joan Dale of the Office of History and Archaeology reported a number of lithic flakes from the surface of a ridge locality in the uplands near Byers Lake (Dale 2005). The site (TAL-114) is located within an area previously investigated by Frederick Hadleigh West (1971).

Matanuska-Susitna Borough (MSB) lands near Trapper Creek and Talkeetna were investigated again in 2004 by Fran Seager-Boss. Sites identified near the Petersville Road corridor included historic sites (TAL-094,TAL-108); prehistoric archaeological sites (TAL-092,TAL-095); and cache pits and possible house depressions (TAL-089-092; TAL-102). Recovered from the Trapper Creek Overlook Site (TAL-092) and Screaming Hawk Site (TAL-095) are chipped stone and obsidian artifacts that may be several thousand years old (Seager-Boss 2004). In 2004 staff of the Alaska Division of Parks and Outdoor Recreation reported a mining ditch feature (TAL-115) within the uplands overlooking Peters Creek.

Historic documents and other sources indicate additional cultural resources along the Petersville Road. Three shelter cabins are plotted on a 1931 map of the Talkeetna-Cache Creek Road (Route 51) prepared by the Alaska Road Commission (Figure 3-2). The location of only one of these, the Forks Roadhouse (TAL-116), is known to resource managers. Several other cabins are indicated along the Petersville Road on the 1954 (B-2) and the 1958 (B-8) Talkeetna USGS quadrangles. Resources associated with the early settlement of Trapper Creek are reportedly located along the first few miles of the Petersville Road (Marsh 1999a).

Table 3-8. Cultural Resources reported to the Alaska Heritage Survey (AHRS) in the proximity of the Petersville Road corridor.

AHRS Number	Resources Name(s)	Resource Type
TAL-070	Petersville Airstrip	airstrip
TAL-071	Petersville	Mining camp
TAL-072	Poorman Creek Mining Site	Mining complex
TAL-073	Ramsdyke Creek Mining Site	Mining habitation site
TAL-074	Ramsdyke Creek Habitation Site	Mining ditch and habitation site
TAL-076	Rabideux cabin	Trapping cabin
TAL-080	Peters Creek Bridge	bridge
TAL-089	Post Hole Site	site
TAL-090	Spirit Tree Site	Cache pits and depression site
TAL-091	Confluence Point	Cache pit site
TAL-092	Trapper Creek Overlook	Prehistoric site
TAL-094	ARC Construction Camp	ARC historic site
TAL-102	Powerline Cache Pits	Cache pits
TAL-108	Robson Cow Camp Site	Historic cattle yard
TAL-115	Mining ditch	Mining ditch
TAL-116	Forks Roadhouse	Roadhouse
TAL-117	Petersville Road; (ARC Route 51-Talkeetna-Cache Creek Wagon Road)	Road
TAL-118	Cache Creek Trail; (ARC Route 51A- Black Creek Summit Trail)	Trail

Table 3-9. Cultural Resources reported to the Alaska Heritage Survey (AHRS) in the proximity of the Parks Highway development site.

AHRS Number	Resource Name(s)	Resource Type
TAL-001	Curry Lookout	Historic building
TAL-114	TAL-114-Flakes	Prehistoric locality
TAL-119	Byers Lake Cabins	Homesteading cabins

SOCIOECONOMICS

Matanuska-Susitna Borough

The land within the planning area is in the Matanuska-Susitna Borough. There are 26 communities in the borough, although only three are incorporated: the cities of Wasilla, Palmer, and Houston, which are all south of the planning area. Trapper Creek, Petersville (defined in the U.S. Census and this document to include Peters Creek), Talkeetna and the "Y" are all unincorporated and are the communities principally affected in regard to the alternatives considered in the environmental impact statement. They are officially represented by advisory community councils established by the Matanuska-Susitna Borough.

The South Denali region supports a remarkable diversity of economic activity. Tourism, retail, mining, labor export, and services make up a large portion of the economic mix. In many of the communities, non-market activities such as gardening and subsistence hunting, fishing, and gathering make up a significant portion of the economic activity, along with activities that do not fit well within standard economic reporting systems, such as trapping and the manufacture and sale of arts and crafts. This is particularly true for communities such as Talkeetna, Trapper Creek, Y area, and Petersville.

Economy and Employment

Historically, mining and agriculture were the economic activities that brought people to the Matanuska-Susitna Borough. In fact, the borough is still the state's biggest agriculture producer. However, in the context of a rapidly growing population, agriculture has become relatively unimportant, amounting to only $9 million in production in 1998 (Fried 2000). Now, the rapid population increase in the Matanuska-Susitna Borough is directly linked to the export of labor, particularly to Anchorage. In 1990, the census estimated that 28% of borough residents could be working in Anchorage; in 1998, a new report estimated that the number had climbed to 38% even as the overall population increased. In addition, an estimated 10% of borough residents commute long distances to work in the oil industry on the North Slope, in the fishing industry in Bristol Bay, or in construction around the state. The comparative affordability of housing is one of the primary factors attracting residents to the Matanuska-Susitna Valley (Fried 2000).

Because labor is the borough's major export, it is not surprising that services and retail dominate employment within the boundaries of the borough itself. Expansion in these sectors over the last decade means that more income is retained in the borough instead of leaking out to Anchorage and elsewhere. Construction and the finance-insurance-real estate sectors have also prospered from residential and commercial construction.

The tourism industry is also strong in the Matanuska-Susitna Borough, although its character is different from the rest of the state. The visitor industry in Matanuska-Susitna Borough caters in large part to Alaskans and others who have recreational property in the borough. According to the 2000 census, 19.2% of the housing in the borough is recreational or seasonal, and hundreds of new cabins are added each year. The owners of these recreational properties buy services and pay property taxes.

While Denali-bound visitors spend some money for food and gas on the way through the borough, only the northern communities of Trapper Creek and Talkeetna are tied directly to the park economically. For several decades, Talkeetna has been the gateway to Denali National Park and Preserve for mountaineers who fly from the town airstrip into the Alaska Range to climb Mount McKinley or adventure on other peaks or glaciers. Although this type of visitor traffic has had considerable effect on Talkeetna's character, the number of people entering the park this way has always been relatively minor. However, other visitors come to the town to enjoy the mountain views, take flightseeing trips over the park, listen to stories of mountaineers and bush pilots, and experience life in a small Alaska town. In 1992, the Talkeetna Visitor Impact Assessment estimated that 40,000 visitors came to Talkeetna over the course of a year. For 2001, Christopher Beck & Associates estimated 110,000 visitors came to Talkeetna (Talkeetna Community Tourism Plan – Issues and Needs Workbook, March 2002).

The opening of two large new lodges serving the package tour industry has driven much of the tourism growth in Talkeetna and nearby South Denali communities. The Mount McKinley Princess Lodge opened 20 miles north of Trapper Creek in 1997. Cook Inlet Region, Inc. opened its Talkeetna Alaskan Lodge in 1998 and within a year began working on plans to double its size. Proximity to and views of Mount McKinley, accessibility from road and rail, a diversity of attractions, and available land have made this area a magnet for the rapidly expanding package tourism industry (Talkeetna Community Tourism Plan – Issues and Needs Workbook, March 2002). These two lodges became two of the largest private sector tourism-related employers in the borough upon opening. Alaska Economic Trends January 2003 shows the McKinley Princess as #21 and Talkeetna Lodge as #27, in the top 50 employers for 2001 in the Mat-Su Borough.

It is important to note that not all tourism in the northern Matanuska-Susitna Borough is Denali-related. Sportfishing, hunting, snowmobiling, and other non-park tourism have been important, at least as long as park-related visitation has been, and still make up a substantial part of tourism activity.

Economic Characteristics

The Matanuska-Susitna Borough has a very similar median household income and per capita income to the state; but in the northern communities that are more strongly tied to the national park, the income is substantially lower than the rest of the borough and state. The percentage of the workforce that is unemployed is significantly higher across most of

the Denali-area communities than the state as a whole, perhaps because of the seasonality of work. The poverty rate of families is slightly higher than the state average through most of the communities; although Trapper Creek has a high poverty rate of 27.6% (see Table 3-10: Selected Economic Characteristics).

Table 3-10: Selected Economic Characteristics, 2000

Geographical Area	Median Household Income	Per Capita Income	Unemployment (%)	Families below poverty level (%)
State of Alaska	$51,571	$22,600	9.0	6.7
Matanuska-Susitna Borough	51,221	21,105	10.3	7.8
Petersville CDP	43,750	43,000	50.0	0.0
Talkeetna CDP	38,289	23,695	14.4	7.2
Trapper Creek CDP	27,031	18,247	8.1	27.6
Municipality of Anchorage	55,546	25,287	6.8	5.1
Fairbanks-North Star Borough	49,076	21,553	9.1	5.5

Source: U.S. Census of Population and Housing, U.S. Bureau of the Census 2000

Population

The Matanuska-Susitna Borough and the communities of Talkeetna and Trapper Creek show vigorous growth, particularly when compared to the more moderate growth of the large cities of Anchorage and Fairbanks. The Matanuska-Susitna Borough is known as the fastest growing area in the state (Fried 2000) and its population more than doubled during the 1980s. The population continued to grow rapidly during the 1990s, increasing from 39,683 in 1990 to 59,322 in 2000 according to the U.S. Census, a 50% increase. In contrast, the state of Alaska population increased by 14% during the same time period. Population density for Matanuska-Susitna Borough is low at 1.6 persons per square mile.

Economy

The Matanuska-Susitna Borough is historically an agriculture and mining region; however, neither dominate the economy today. Today the Mat-Su economy derives its vitality from a number of different quarters. Probably its most prominent source of economic stimulus is its role as residence of choice for many people who work somewhere else. U.S. Census 2000 commuter data show that 35 percent of the Valley's labor force works outside the borough. The Valley's visitor industry also continues to broaden and expand. A growing number of businesses in the Mat-Su provide services to the rest of the state, such as Job Corps, the GCI call center, Matanuska Valley Regional

Hospital, Sunshine Health Clinic, and others. As the Mat-Su Borough's population rises to higher levels, more of the services needed by the local populace are generated locally. Combined, these several forces have elevated the Mat-Su Borough to the most dynamic economy in the state.

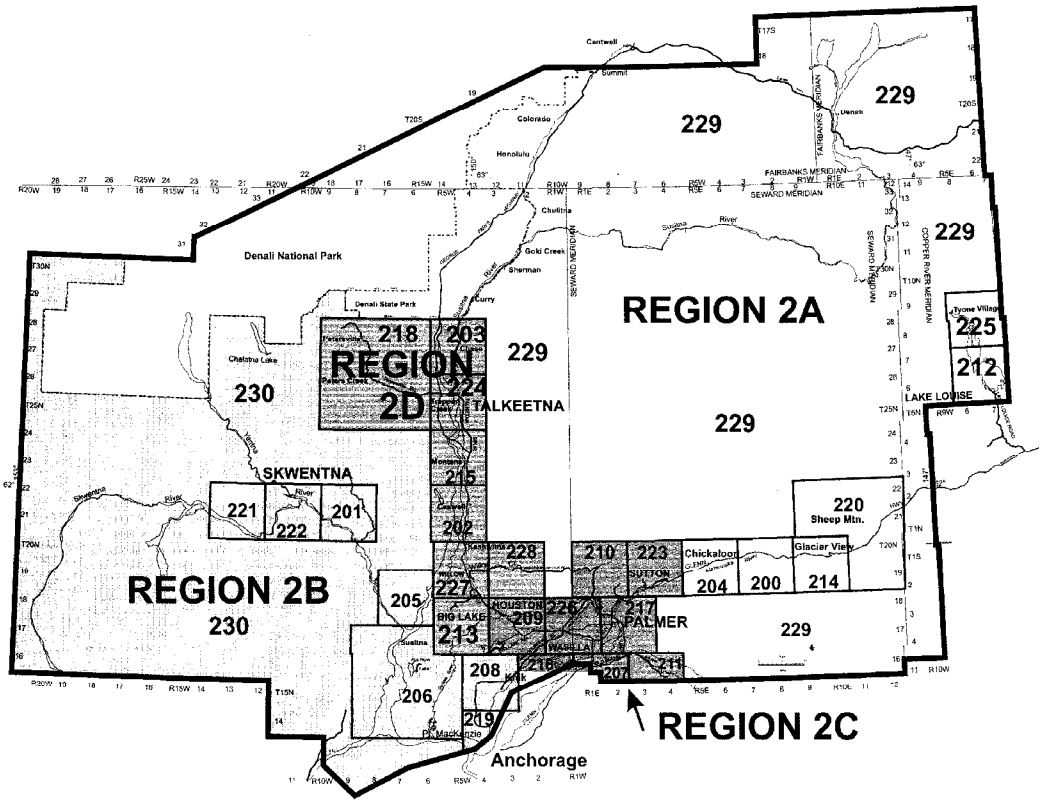
Total employment has been growing steadily during recent years. Employment growth between 1990-2001 was 80% (Fried 2003). Much employment is concentrated in trade, services, and government. Also notable are construction, transportation, and public utilities industries. Growth in the visitor industry has contributed to recent job gains in these sectors.

Unemployment rates in the Matanuska-Susitna Borough have typically greatly exceeded statewide levels; however, they have recently come down. In October 2002, unemployment rates in the Mat-Su Borough fell to 7.3%, compared to 12.1% in 1993 (Fried 2003).

Housing and Real Estate

This section describes the housing market data from the Alaska Multiple Listing Service and the Matanuska-Susitna Valley Board of Realtors in portions of four Alaska Multiple Listing Service (MLS) regions within the Matanuska-Susitna Borough (MSB). These regions include the area around Chase (Area 203), the area containing Petersville, Moose Creek, and Peters Creek, (Area 218), the area containing Talkeetna (Area 224), and the area containing the former townsite of Curry (a portion of Area 229). The areas contain the communities most likely to be affected by the South Denali Implementation Plan Alternatives. Figure 3-3 shows the MLS map of the region. The areas on this map are based on MSB tax parcel maps.

Figure 3-3 Matanuska-Susitna Borough MLS Regions



Source: (Alaska Multiple Listing Service 2005)

Areas in Aggregate

Data were only available in aggregate blocks for the selected region. The listing services were able to provide data for Petersville, Peters Creek, Moose Creek, and Curry (Areas 218 and a portion of 229) as one block and Talkeetna, Montana Creek (part of Y Census Designated Place), and Chase as another block.

The market for both homes and unimproved lots is much larger in the second block than in the first block. With the exception of Chase, which is located off the highway system and is only served by air and flag stop on the Alaska Railroad, Talkeetna and Montana Creek represent the largest communities in the planning area. Between 1996 and 2001, more than three times as many homes sold in the Talkeetna/Montana Creek/Chase area as compared to the Petersville/Peters Creek/Moose Creek/Curry area. In addition, homes tended to sell for nearly one-third more in the first set of communities than in the second (see Table 3-11).

Table 3-11 Residential Sales by Aggregate Communities, 1996-2001

	Talkeetna/Montana Creek/ Chase			Petersville/ Peters Creek/Moose Creek/Curry		
Year	Number of Units	Total Value	Average Price	Number of Units	Total Value	Average Price
2001	20	$2,089,304	$104,465	5	$303,000	$60,600
2000	20	$1,615,500	$80,775	8	$536,200	$67,025
1999	17	$1,829,500	$107,618	3	$213,000	$71,000
1998	8	$719,500	$89,938	5	$333,000	$66,600
1997	10	$560,600	$56,060	2	$177,500	$88,750
1996	9	$643,400	$71,489	2	$113,500	$56,750
Total	84	$7,457,804	$88,783	25	$1,676,200	$67,048

Source: (Alaska Multiple Listing Service 2005)

Table 3-12 shows the sales of unimproved lots in the aggregated communities from 1996 through 2001. As with the sale of residential properties, sales in the first group are triple the number of sales in the second group. Lots near the communities of Talkeetna and Montana Creek have carried an average value nearly double that of the more remote communities. In both aggregate groups the number of lots sold between 1996 and 2001 is greater than the number of homes sold by a nearly 2-to-1 margin.

Table 3-12. Unimproved Lot Sales by Aggregate Communities, 1996-2001

	Talkeetna/Montana Creek/ Chase			Petersville/ Peter's Creek/Moose Creek/Curry		
Year	Number of Lots	Total Value	Average Price	Number of Lots	Total Value	Average Price
2001	42	$1,027,645	$24,468	16	$239,100	$14,944
2000	34	$772,050	$22,707	23	$332,000	$15,091
1999	35	$811,911	$23,197	9	$110,000	$12,222
1998	30	$907,033	$30,234	8	$68,500	$8,563
1997	42	$844,599	$20,110	3	$20,950	$6,983
1996	20	$320,000	$16,000	6	$71,700	$11,950
Total	203	$4,683,238	$23,070	65	$842,250	$12,957

Source: (Alaska Multiple Listing Service 2005)

U.S. Census data show high levels of vacant housing stock in the Petersville and Trapper Creek Census Designated Places (CDPs). The Chase and Y CDPs also have high levels of vacant housing stock (see Table 3-13). The Y CDP includes both Montana Creek and Sunshine.

Table 3-13. Vacancy Rates by Census Data Place

Community	Units	Total Vacant	Percent Vacant
Talkeetna CDP	528	170	32.2%
Chase CDP	90	69	76.7%
Y CDP	818	496	60.6%
Petersville CDP	189	172	91.0%
Trapper Creek CDP	361	179	49.6%

Source: (U.S. Census Bureau 2000)

However, this result is primarily due to the fact that the U.S. Census is conducted in April and many of the properties in the planning area are summer cabins that are not readily accessible or occupied until June. Thus, while much of stock is vacant for the majority of the year, it is used by the owners as vacation properties during the summer. Individuals looking for housing in the planning area would have to purchase property, construct a residence, or commute from a large community with available stock. Because other communities in the planning area lack a sufficient amount of available housing stock, the larger communities of Talkeetna and Montana Creek house employees working in the tourist industry associated with the southern portion of the Denali National Park area who cannot find housing closer to their seasonal employment opportunities. Vacancy rates in the summer in these communities are very low (Stinson 2005).

Land Use

Figure 2-14 (in the color map section at the end of Chapter Two) shows ownership of lands in the planning area.

Denali State Park

Denali State Park (325,460 acres) is about 140 miles north of Anchorage along the George Parks Highway, adjacent to Denali National Park and Preserve. A variety of visitor facilities are available, including four campgrounds with a total of 114 campsites, picnic areas, a boat launch on Byers Lake, and several scenic pullouts along the highway. About 48 trail miles (some maintained) provide hiking routes.

There are about 1,000 acres of private land within the Denali State Park boundaries. These include private inholdings and native allotments. There are no active mining claims in the state park. Most of the private land is near the southern park boundary and concentrated along the Parks Highway.

The *1989 Denali State Park Master Plan* designates the western portion of Denali State Park as Natural and Natural With Special Management Considerations. Natural zones are established to provide for moderate-to-low impact and dispersed forms of recreation and to act as buffers between recreational development and wilderness. Activities in this zone include, but are not limited to, hang gliding, bicycling, backpacking, fishing, hunting, cross country skiing, camping, sledding, tobogganing, berry picking, and rock climbing. Private motorized off-road vehicle use is generally prohibited within this zone. A small section in the Tokositna area is designated for Recreational Development. The recreational development zone is established to meet the more intensive recreational needs of the public with convenient and well-defined access. Snowmobiles may be allowed throughout all areas during periods of adequate snowcover.

The area between the Parks Highway and the proposed development at the Parks Highway site is also classified for Recreation Development, with areas to the east classified as Natural and Natural With Special Management Considerations. Most of Curry Ridge is classified as Wilderness.

For a complete description of general zoning classifications in Denali State Park, refer to pages 57-61 of the *1989 Denali State Park Master Plan* and to the 2005 *Draft Denali State Park Master Plan Amendment.*

In addition, the Matanuska-Susitna Borough has special land use regulations within the boundaries of the Denali State Park. Regulations consist of specific permitted, conditional and prohibited uses, as well as building height limits of no more that 35 feet, minimum lot area of five acres, sign regulations, and increased setback and vegetative buffer requirements from the Parks Highway.

Petersville Road Corridor

The 1970 MSB Comprehensive Plan and the Matanuska-Susitna Borough's 1998 Petersville Road Corridor Management Plan are incorporated by reference into this plan. Information about land use along Petersville Road is located on pages 3-5 of the Petersville Road plan. Traffic projections for Petersville Road are located in Appendix E of this document

A sizable portion of land area at Petersville (section 28) is owned by the Matanuska-Susitna Borough. Most of the land in the adjacent corridor between Petersville and Peters Creek to the south is owned by the State of Alaska. There are mining claims in the area immediately south and a small claim to the west of Petersville. A number of parcels west of Petersville are privately owned. Along the road at Peters Creek there are a few privately-owned parcels and a tract owned by the Matanuska-Susitna Borough, but most of the land area is owned by the State of Alaska. Heading east between Peters Creek and Kroto Creek there are several subdivisions on opposite sides of the Petersville Road, some extending 2–3 miles into remote areas. There is also a small privately-owned parcel at Kroto Creek. Most of the adjacent area, however, is owned by the State of Alaska. Between Kroto Creek and Gate Creek there are numerous privately-owned parcels and one large subdivision on the north side of the Petersville Road, as well as extensive state-owned lands in the corridor. Just beyond Gate Creek there are several large privately-owned land parcels on the north side of the Petersville Road and several tracts of land owned by the University of Alaska located on both sides of the road.

Proceeding farther east beyond Gate Creek, there are major land holdings on both sides of the road owned by the Matanuska-Susitna Borough, as well as several privately-owned parcels and subdivisions located near Scotty Lake, and surrounding areas owned by the State of Alaska. The built-up area at Trapper Creek adjacent to the Petersville Road is largely in private ownership. Large areas on the periphery of the Trapper Creek community are owned by the Matanuska-Susitna Borough.

The Matanuska-Susitna Borough estimated acreages for each ownership category in the Petersville Road corridor (See Table 3-14: Land Ownership along Petersville Road). The acreages have been calculated to include landholdings within 100 feet on either side of the right-of-way, and thus reflect only landholdings immediately adjacent to the road.

Table 3-14: Land Ownership along Petersville Road according to the 1998 Petersville Road Corridor Management Plan

Land Owner	**Acres**
State of Alaska	33,665.5
Matanuska-Susitna Borough	4,270.7
Matanuska-Susitna Borough selected	1,058.1
Private	3,487
Other (lake)	512.8

State law designated an area of public land near the Petersville Road (approximately a two-mile long corridor along Peters Creek) for recreational mining and other general public recreation. The area is open for recreational gold panning, mineral prospecting, or mining using light portable field equipment. The area is closed to the staking of new mining claims.

There is currently relatively little mining activity in the Petersville area. Perhaps a half dozen miners are working three to four small mining operations in a given year. Most of these operations are active between mid-May and mid-October. The miners stay in the area most of the time; supplies are routinely brought in by airplane. Most of the miners have built cabins or located trailers at the claim sites. The mining operations are dispersed with distances of 2-3 miles separating them.

The Matanuska-Susitna Borough has implemented a form of performance zoning that mostly refers to lot line and right-of-way setbacks for structures and conditional use permits for certain intensive uses throughout the Borough. The Borough also has a subdivision ordinance that regulates the subdividing of land. Additional land use zoning is undertaken by special land use districts, such as the special land use district regulations within Denali State Park. The special land use districts consist of more detailed zoning regulations that address specific communities and areas. In addition, there is a memorandum of understanding between the borough and the state concerning increased setbacks and vegetative buffering on public parcels along the Petersville Road and the Parks Highway.

The borough instituted a junk car removal program that could be used to maintain scenic values on the road corridor. However, due to limited enforcement staff, enforcement of junk and trash complaints is conducted on a complaint basis only, and "neighborhood character" is a factor in determining whether a junk and trash violation exists. Existing zoning ordinances require a conditional use permit to operate a commercial junkyard.

George Parks Highway

Land ownership along the George Parks Highway is divided among federal, state of Alaska, University of Alaska, Matanuska-Susitna Borough, Native corporations, and private interests. The following information on the status of ownership is based on maps and other information assembled by the Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation, Matanuska-Susitna Borough, and Cook Inlet Region, Inc. Beginning from the south, land ownership between Caswell and the Talkeetna spur road junction is mixed, though most of the land is private. Several large parcels within a mile of the highway are under Matanuska-Susitna Borough, State of Alaska, University of Alaska, or Native corporation ownership. Between the junction and the highway bridge crossing the Susitna River, land ownership remains mixed; however, major portions are owned by Matanuska-Susitna Borough and the State of Alaska. Between the bridge and the Trapper Creek area, land ownership is held exclusively by Matanuska-Susitna Borough and the State of Alaska. The area surrounding the Trapper

Creek intersection with George Parks Highway consists of Matanuska-Susitna Borough and private ownership. The area north of Trapper Creek to the southern boundary of Denali State Park is in Matanuska-Susitna Borough, State of Alaska, and federal ownership. Most of the state park is owned by the state; however, there are a variety of large and small privately held properties within the state park boundary. The area north of Denali State Park to Broad Pass is in federal and State of Alaska ownership.

General State Land

Much of the south side planning area is undeveloped land used for dispersed recreational and subsistence activities, with mining occurring towards the end of the Petersville Road. A few areas and scattered sites are used for residential activities, and there are small commercial areas and sites.

The State of Alaska Division of Natural Resources publication, "Generally Allowed Uses on State Land" Fact Sheet (which can be viewed at http://www.dnr.state.ak.us/mlw/factsht/gen_allow_use.pdf) applies to general state lands in the planning area, but not to lands included in Denali State Park.

Public Services

The Matanuska-Susitna Borough is a second-class borough, incorporated in 1964. It has a seven-member assembly and a directly-elected mayor. The school board, platting board and planning commission also have seven members each. The Matanuska-Susitna Borough exercises areawide, non-areawide, and service area powers to provide for the various public facilities and services. Areawide and non-areawide functions are financed from taxes levied on taxable properties in the borough. Areawide functions that the borough must perform include education, assessment and taxation, and planning. The borough has also elected to provide parks and recreation, ambulance service, ports and harbors, and historic preservation functions on an areawide basis. Special service areas have been established to provide ambulance, fire, road, flood, water and sewer, and erosion control services.

The borough imposes a property tax, a special 5% hotel/motel tax, and a tobacco products tax, but does not impose the optional general sales tax.

Petersville Area

This 200-square-mile area is located along the Petersville Road, beginning at about 14 miles from the intersection with the George Parks Highway. Kroto Creek forms its eastern boundary and it includes Petersville and Peters Creek. There is no community center per se, but residents are dispersed throughout the area. Gold discoveries were made in the upper tributaries of Peters Creek in the early 1900s leading to the development of a freighting trail that extended westerly to Peters Creek and led to the establishment of Petersville. Numerous mining operations were active in the area until

being forced to shut down during W.W. II. Though resurgence occurred in the late 1940s, nearly all mining activity ceased by the mid-1960s due to increased operating costs and the fixed gold price. With the price rising in the 1970s, many of the previously idle properties again were brought into production. Today mining is not a significant employer in the Petersville area.

Population

The population for the Petersville area was listed as 84 in the 1990 census, living in 37 households. The 2000 census counted 27 people (Mat-Su Borough 2003).

Economy

Tourism is becoming an increasingly important component of economic activity in the Petersville area. Recreational activities, such as hunting, dog mushing, snowmachining, and cross-country skiing, are stimulating development of small retailing and service businesses. According to the 2000 U.S. census, the Petersville area had employment of 6 workers. There were 6 unemployed workers indicated. Median household income amounted to $43,750.

Housing

The 2000 census reported 189 housing units, of which 17 were occupied year-round. It is likely that most vacant units are for seasonal, recreational, or occasional use. The geographic boundaries for this area are quite large, including considerable sparsely-populated lands. Also, the census planning area for housing exceeded that for the Matanuska-Susitna Borough's community area boundaries, increasing the housing counts.

Public Services

The Petersville area is represented by an advisory community council. The Petersville Road is maintained by the state. Except for ambulance and rescue service, there are no other public services provided locally.

Trapper Creek Community

Trapper Creek lies about 115 miles north of Anchorage near the intersection of the George Parks Highway and the Petersville Road. There is no clearly recognizable townsite; however, most businesses and residences are near the intersection or close to the Parks Highway off the Petersville Road. Kroto Creek serves as a western community boundary and is also a common boundary with the Petersville/Peters Creek community to the northwest. Recreational activities, including hunting, snowmachining, and dog mushing, are the mainstay of the Trapper Creek visitor industry.

The Trapper Creek community began to take shape in the late 1950s with the arrival of early homesteaders anxious to take advantage of agricultural land available. Though the majority of these homesteaders left soon after they arrived, a few remained to farm and raise families. In the late 1960s the George Parks Highway was built and stimulated migration to the area. With more people came expanded services and a sense of community.

Population

The 2000 census population for the Trapper Creek community was estimated at 423 persons in 182 households.

A large number of property owners have permanent addresses elsewhere. In the summer of 2003 the Matanuska-Susitna Borough generated a list of property owners and registered voters in the Trapper Creek Community Council area, which totaled 1383 addresses. Of those, only 369 contained mailing addresses in Talkeetna, Trapper Creek or Willow. There were 463 with Anchorage or Eagle River address, 141 with addresses in Palmer or Wasilla, and the balance were elsewhere around the state and out of state.

Economy

Today Trapper Creek has a limited economic base, with the majority of business categorized as retail and service. Many jobs are related to tourism (restaurants, gasoline stations, lodges, markets, etc.) or local and state government functions associated with schools, highways, and the post office. Seasonal work is available in construction, commercial fishing, and mining.

According to *Matanuska-Susitna Borough Community Profiles*, prepared by Matanuska-Susitna Resource Conservation and Development, Inc. in January 1995, Trapper Creek had a 1990 civilian labor force of 109 workers of which 76 were employed and 33 unemployed for an unemployment rate of 30.3%, roughly triple the rate for the Matanuska-Susitna Borough. The 2000 U.S. Census reports a labor force of 136, of which 125 were employed. In 2000, median household income for Trapper Creek residents, another measure of economic health, was $27,031, compared to $51,221 for the borough.

Housing

The 2000 census reported 334 housing units, of which 183 were occupied. Many vacant units are second homes or vacation cabins.

Public Services

The Trapper Creek Community Council is a five-member elected advisory council recognized by the Matanuska-Susitna Borough as the representative body for the community in deliberations with the borough. The area represented by the council includes the built-up area near the highway exchange and the area served by the Petersville Road extending to Kroto Creek. Only limited public services are provided in Trapper Creek.

Trapper Creek does not have an established fire service area. The closest fire station is about 15 miles to the south at the Sunshine Community Health Center Building on the George Parks Highway, which is one of two stations operated by the Talkeetna Fire Service Area. The other station is located at Talkeetna. A fire station also exists in Willow. A volunteer fire department did exist at Trapper Creek, but was disbanded several years ago. Information suggests that there have been several cabin/home fires at Trapper Creek during recent years.

Emergency medical and rescue services are provided by the Matanuska-Susitna Borough on an areawide basis with volunteer staffing. A single ambulance is located at Trapper Creek. Ambulances are also stationed at Willow, Talkeetna, and Valdez Creek.

Accident data provided by Department of Transportation and Public Facilities for the Petersville Road covering a 20-month period (January 1994 through August 1995) indicate a total of 21 accidents of which 12 occurred on the paved portion of the road between MP 0 –and MP 2.7, three occurred between MP 2.7 –and MP 5.0, and five occurred between MP 5.0 and MP 18.6 (up to the Forks Roadhouse). None of the accidents were fatal, but 10 involved injuries. Two-thirds of the accidents took place during winter (October - April). Accident data for Petersville Road covering January 2000 through December 2002 indicate a total of seven accidents occurring between MP 1.5 and MP 14.0. Six of the seven accidents occurred during winter and none were fatal.

There were five collisions at the intersection of the Parks Highway and Petersville Road in the 1998-2002 time period. In the estimation of the DOT&PF's regional traffic staff, only one would have benefited from a left turn lane.

Accident data covering a 20-month period (January 1994 through August 1995) for George Parks Highway from MP 63.3 near Willow to 167.7 near the northern boundary of Denali State Park were also reviewed. Total accidents for the period amounted to 442, of which 146 involved injuries (including 17 fatalities). Sixty percent of the accidents occurred during winter. For the approximately 68-mile distance between the Talkeetna turnoff and the northern boundary of Denali State Park (which logically would be served

by Trapper Creek EMS facilities) total accidents amounted to 272, of which slightly more than half occurred during winter months. Seventy-two of the accidents involved injuries, including 7 fatalities. As indicated by the data, more than half of accidents occurred on the roughly 36-mile stretch south of Talkeetna Junction. From January 2000 through December 2002 there were 344 accidents along the George Parks Highway from MP 63.3 near Willow to 167.7 near the northern boundary of Denali State Park. These accidents resulted in a total of 14 fatalities.

Police services are provided by the Alaska State Troopers. A state trooper station, staffed by 7 individuals (4 of whom are troopers), is located at MP 0.3 of the Talkeetna Spur Road. It is anticipated that the Alaska State Troopers would be able to keep pace with local needs within the context of statewide priorities.

The Trapper Creek Elementary School (K-6), which is operated by the Matanuska-Susitna Borough School District, is located just off the Petersville Road, 2 miles west of the highway interchange. Primary and secondary education services are provided on a borough-wide basis. The Matanuska-Susitna School District provides teachers and other operational resources to schools within the borough. The FY 1995-96 budget for the Trapper Creek Elementary School amounted to $495,194. The school had 14 certified and 6.75 classified full-time equivalent (FTE) employees. District-level operational funding amounted to $90.3 million, of which $64.0 million or about 70% represented state distributions. Another $4.8 million or 8% came from federal sources.

School construction is normally financed through the issuance of general obligation bonded debt. Total school construction bonds outstanding as of June 30, 1996, amounted to $15.9 million. Debt reimbursement is available from the state on pre-approved school projects subject to the limitations of the State Legislature. After 1994 the maximum debt service reimbursement provided (on a current year basis) by the State is 70% of the total. For FY 1996 the borough was eligible for about $13 million in school debt reimbursement.

Trapper Creek Elementary School experienced rapid enrollment growth in the early 1990s, rising from 30 students in 1990 to 59 students in 1995. Secondary school services (grades 7-12) are provided for students from the Trapper Creek area as well as from the Talkeetna area, and areas north of Willow to the Susitna River by the Susitna Valley Junior-Senior High School. The school is located on the George Parks Highway at MP 98.4, just south of the Talkeetna Spur road. The school also experienced rapid enrollment growth during the early 1990s, increasing from 119 students in 1990 to 178 students in 1995. Continued enrollment expansion at both schools could result in the need for additional facilities and operational resources. As noted, revenue allocations are made at the district level. There is no local area tax levy to support public education.

Trapper Creek has an established road service area with responsibility for 39.5 miles of roadway. The FY1996 levy amounted to 2.88 mils generating $39,380 in estimated revenues. State revenue-sharing funds added $31,465 for a total of $70,845 estimated revenues. Estimated expenditures for the road service area amounted to $54,711 for

contractual costs and $16,134 for administration, representing a cost of $1,795 per mile. The Petersville Road is a state road and maintained accordingly.

There is also a solid waste transfer site located in Trapper Creek that also serves Denali State Park.

Y Community

Y is the developed area between Willow and Talkeetna, on the George Parks Highway. Y includes Montana Creek and Sunshine and encompasses 333.4 sq. miles of land and 3.1 sq. miles of water.

Ahtna-speaking Athabascans lived in the Talkeetna Mountains and had a village opposite the mouth of Sunshine Creek called "Tsuk Qayeh," meaning "Old Village." Dena'ina-speaking Athabascans lived along the Deshka River and the middle Susitna River in the winter, below present-day Talkeetna. A Dena'ina village was located on the North Fork of the Kashwitna River, with a trail to Chickaloon. Montana Creek became a small Dena'ina village in about 1915 during railroad construction. Through 1927, the railroad brought employment and settlement to the area. Montana, at railroad MP 209.3, was one of the first construction camps. In 1918, a spur was constructed to a coal mine in the area. Sunshine Depot at railroad MP 215.3 was established in 1918, but was moved to higher ground in 1936. Construction of the George Parks Highway and State land disposals led to settlement of the area.

Population

The population for the Y area was listed as 956 in the 2000 census, living in 412 households.

Economy

Many residents are self-employed in a variety of small businesses, including lodging, guiding and charter services. Some residents are employed in the Palmer/Wasilla area. Tourism is becoming an increasingly important component of economic activity in the Y area. Recreational activities, such as hunting, dog mushing, snowmachining, and cross-country skiing, are stimulating development of small retailing and service businesses. According to the 2000 U.S. census, the Y area had employment of 253 workers. There were 81 unemployed workers indicated. Median household income amounted to $31,848.

Housing

The 2000 census reported 810 housing units. Only half of the homes in this area are occupied. One hundred thirty-six units lacked plumbing and kitchen facilities.

Public Services

The Y Community Council advocates for area residents' concerns. Public services include ambulance service, a solid waste transfer site, fire station, senior center, and high school.

Talkeetna Community

The small unincorporated town of Talkeetna is located about 15 miles off the George Parks Highway and about 114 miles north of Anchorage. The town lies at the end of the Talkeetna Sspur road near the confluence of the Talkeetna, Chulitna, and Susitna Rivers. Talkeetna is a station stop on the Alaska Railroad at about MP 227. There is a general aviation airport. Talkeetna is the traditional departure point for Mount McKinley mountaineering expeditions.

The town originated as a supply station for miners and mining camps in the area. Later construction of the Alaska Railroad established the town as a transportation center for the upper Susitna River valley, a function that was augmented in 1941 when the Talkeetna airport was built by the Civil Aeronautics Authority, the predecessor of the Federal Aviation Administration. In 1965 the Talkeetna spur road was constructed, which linked the town to the George Parks Highway and allowed motor vehicle traffic into town.

Like the rest of the borough, the Talkeetna area is mostly undeveloped land with limited uses. There are residential and commercial activities concentrated in the townsite, with scattered residential sites along the roads elsewhere in the Talkeetna planning area.

The Talkeetna Community Council adopted their *Comprehensive Land Use Plan* in January, 1998. The plan provides detailed information on a broad range of topics, including background information on social and economic environment, natural and physical environment, and existing land ownership and management; and provides discussions of issues and recommendations for a land use plan; a transportation plan; a public facilities and services plan; and implementation. The Talkeetna comprehensive plan, when adopted by the Matanuska-Susitna Borough Assembly, updated and superseded the existing Talkeetna plan component of the Matanuska-Susitna Borough comprehensive plan that was adopted in 1970. At the direction of the borough assembly, community comprehensive plans are incorporated by reference upon adoption, and become a chapter of the 1970 plan.

In September 2002, the Talkeetna Community Council and Chamber of Commerce facilitated the production of a Talkeetna Community/Tourism Plan. As a result of the planning effort and community's desire to mitigate side effects of rapid tourism growth, a chapter of the document was dedicated to implementing special land use district regulations in the downtown area and along the Spur Road. In 2003, the Talkeetna Special Land Use District was adopted by the Matanuska-Susitna Borough Assembly at a public hearing held in the Talkeetna Elementary School gym. Over 200 community

members participated, supported the process, and contributed to the development of the regulations, which helped implement some of the main goals of the 1998 Talkeetna Comprehensive Plan.

Population

The Talkeetna population has fluctuated over the years, based on availability of work locally. However, from 1980 to 1990 the population in the townsite core area actually declined by 14 residents (dropping from 264 persons to 250 persons). During the same period, population growth in the outlying area was quite rapid, rising from 376 persons to 557 persons for an annual average rate of growth of 4.0%.

The 1990 census population of the Talkeetna planning area, estimated at 557 persons in 224 households (including one-person households), includes surrounding community residents of about a 24-square-mile area. The corresponding figure for the townsite area, as noted, was 250 residents. Residents in the area, outside the townsite, use Talkeetna as a source for supplies, for a mail stop, for schools, and as a social gathering place. In 1994, according to the *Talkeetna Comprehensive Plan,* January, 1998, the Talkeetna area population had grown to 651 persons, with the townsite area population growing to 287 persons, reversing the downward trend from the previous decade. The 2000 census counted 772 persons living in Talkeetna.

A 1991 community survey indicated that 57% of those interviewed had lived in the Talkeetna area for more than 10 years and another 21% had lived there for 6–10 years. This suggests a stable social environment.

Housing

In 1990 there were 168 housing units in the Talkeetna townsite and 344 units in the entire planning area. Sixty-seven percent of the units in the townsite were occupied and 32.1% vacant. Of the 1990 total in the townsite, 25 units, or about half of all vacant units, were for seasonal, recreational, or occasional use. The percentages of occupied and vacant units were about the same for the planning area. The 1990 median value of owner-occupied housing in the townsite was $66,300, which is lower than the borough average of $71,500. The 1990 vacancy rate for renter-occupied housing in the townsite was 18.8%. Median contract rent in 1990 was $283 per month, which is also lower than the borough average of $430 per month.

Although there are few vacant parcels of land within the Talkeetna townsite, according to the *Talkeetna Visitor Center Impact Assessment* (Transport/Pacific Associates et. al. 1992), there is a large surplus of available building sites in the immediate area. These vacant sites could accommodate significant population growth.

Economy

Talkeetna's major industries include the transportation industry, the trade and service industries, the communication industry, and government. According to a 1989 Matanuska-Susitna Borough employment survey and the 1990 U.S. Census, there were about 220 employed persons in the Talkeetna community, of which 144 (65%) worked within the area and 76 (35%) commuted out-of-area to work. Of workers living and employed in the area, 44% work in trade and services, about 23% work in transportation, about 26% work in professional and related services (including government), and about 7% work in communications and other public utilities. According to the borough survey, nearly two-thirds of resident workers (employed in retail trade, services, and transportation) are employed in tourism-related industries. The 2000 U.S. Census reports 541 people in the labor force, 463 of whom are employed.

Many Talkeetna residents work in numerous and diverse trades. In addition, many local businesses are multi-faceted, which makes them difficult to classify. Further, many of Talkeetna's residents depend on a wide range of economic activities, some non-monetary, to enable them to live independently. Some residents rely on locally caught fish and game, locally grown garden produce, arts and crafts sales, or seasonal employment to supplement their incomes. According to the 2000 census, median household income for Talkeetna residents was $38,289, compared to $51,221 for the borough.

Tourism is Talkeetna's main industry. The air transportation industry out of Talkeetna serves three main user groups: flightseers; mountain climbers; and hunters/recreation hikers. Sportfishing, boating, hunting, hiking, and winter sports, such as cross-country skiing, dog mushing, and snowmachining, are all popular in the area.

A survey completed in April 1992 identified the following major established businesses: 4 flight services, 5 riverboat/rafting/guiding services, 8 hotel/motel/bed and breakfast establishments, 5 restaurants, and 11 retailers. Virtually all of these businesses had some relationship to tourism and many depended exclusively on it. Since 1992 the number of flight services has increased to 6. According to information provided by the local chamber of commerce, the number of beds, particularly from bed and breakfast establishments, has increased by a third since the survey was conducted.

About 40,000 persons visited Talkeetna in 1990, based on *Talkeetna Visitor Center Impact Assessment* (Transport/Pacific Associates et al. 1992). The report provides projections of visitation (to the then-proposed Talkeetna NPS visitor center) between 1994 and 2003. The 1994 projection was for 49,000 visitors. Interviews with local residents and community representatives in Talkeetna suggested that tourism-related visitation has been growing fairly rapidly during recent years by as much as 10% per annum, although one business source indicated that visitation was down slightly in 1995. Accordingly, flight operations (most related to Denali National Park and Preserve flightseeing) have been growing at about 10% per year.

Public Services

Talkeetna has an active community council with five elected members. The council is involved in overseeing municipal activities and represents the community's interests before the Matanuska-Susitna Borough Assembly and other governmental agencies. Four service areas in the Talkeetna planning area perform water and sewer, fire protection, road maintenance, and water erosion and flood control functions. The service area functions are funded by special property taxes levied within the respective service areas. Education is an areawide function provided by Matanuska-Susitna Borough. The Alaska State Troopers provide police protection. The Alaska Department of Transportation and Public Facilities manages the Talkeetna airport.

Road maintenance is provided from a service area property tax levy. Talkeetna's road network is extensive and poorly constructed, which creates high maintenance and upgrade costs. The Greater Talkeetna Road Service Area maintains 73.9 miles of roads. The Alaska Department of Transportation and Public Facilities maintains the Talkeetna Spur Road, Comsat Road, and Christiansen Lake Road, for a total of about 20 miles.

Fire protection and emergency medical services are provided by the borough through the Talkeetna Fire Service Area. The fire service area encompasses about 40 square miles, extending from the west townsite to the Parks Highway. Emergency medical services are provided by the borough on an areawide basis. The fire department is volunteer. Including emergency medical services and rescue services, there are 18–20 volunteers. There are two fire stations — one is on the Talkeetna Spur Road, north of the Talkeetna Elementary School; the other is on the George Parks Highway near MP 99. Fire-fighting and emergency medical service equipment includes three engines, two tankers, one jeep, one trailer, and two ambulances. The Talkeetna Fire Service Area is supported by a volunteer response team.

Talkeetna's public library is located on Talkeetna Spur road, ½ mile from the village center. The library function is an areawide service provided by the borough. The library is staffed by a librarian, on-call personnel, and volunteers. The library is open 40 hours per week.

The Talkeetna Historical Society Museum is owned and operated by the Talkeetna Historical Society, a nonprofit organization. The museum receives numerous visitors from packaged tours offered by Anchorage-based companies.

Parks and recreation are provided as an areawide responsibility of the borough, although Talkeetna residents contribute volunteer time and effort to improve facilities. Local resident participation in recreation-related activities is high. Established park facilities located in the planning area include Village Park, River Park, Talkeetna River boat launch and campground, X-Y Lakes Park, and Christiansen Lake Park.

There are about 20 miles of cross-country ski and hiking trails constructed by Talkeetna Chamber of Commerce and maintained by local skiing groups.

Health and cemetery services are provided by a private physician and Talkeetna Cemetery Association, a volunteer organization. Sunshine Community Health Center provides service to all the communities in the area. It has one doctor and four PAs, plus mental health services.

The Talkeetna Elementary School is located on a 5-acre site on the Talkeetna Spur Road, about ¼ mile south of the village center. The school was renovated in 1999. Enrollment in the early 1990s shows an increase from 89 students in 1990 to 119 students in 1995. Current enrollment is 113 students.

Quality of Life

People frequently justify the location of their home due to the perceived quality of life the area provides. However, the quality of life variable is often difficult to define, as it is inherently intangible and subjective. The factors that define the quality of life may vary for different locations, age groups, or other demographic variables. Quality of life can be described as the personal satisfaction (or dissatisfaction) with the non-economic attributes of the area in which one lives (including environmental, cultural, or intellectual conditions) (Howe, McMahon et al. 1997; Webnox Corp. 2005).

To define the existing condition of the quality of life in the planning area, several sources of information were analyzed. Public scoping comments were reviewed, as well as other planning documents related to the planning area, and documents from recent community meetings in Talkeetna, Trapper Creek, Petersville, and the Y Community (Reed Hansen and Associates 1995; Matanuska-Susitna Borough Planning Department 1999; Trapper Creek Steering Committee 2003; Y Community Council Board 2003). Eight quality of life indicators were identified for the planning area: rural character, pace of life, community image, self-sufficient lifestyle, community cohesiveness, economic characteristics, government interaction, and recreation opportunities. Each of these indicators is described below, defining the affected environment for each of the indicators.

Rural Character

Residents of Talkeetna, Trapper Creek, Petersville, and Y Community have chosen to live in these communities because of the remoteness and peaceful character of the area. There are low human population levels in the area. Large tracts of undeveloped land surround these communities; the natural environment dominates the landscape. Forests, streams, wildlife, and viewsheds are highly valued by locals. The wild character of the area, or the feeling of Alaska as the "last frontier," is something that residents identify with and strive to maintain. The legacy value of the area, or the ability for future generations to enjoy the area essentially unchanged from its present condition, is important to local residents.

Pace of Life

During most of the year, the pace of life within the planning area is slow and tranquil. Residents typically value the low numbers of cars in the planning area and freedom from traffic congestion for the majority of the year. The summer months bring vast increases in the numbers of cars and people to the area, which in turn greatly affects the pace of life for local residents. For residents living along the Petersville Road, there is a marked increase in traffic and congestion on weekends during the winter months from snowmachiners.

Community Image

An identifiable community image is another important quality of life indicator. Several of the communities in the area have a rich history; maintaining the historic identity of the area is important to residents. An identifiable community center (or business district) contributes to the community image. Maintaining their existing community images is important to local residents, including the perception of clean and safe communities.

Self-Sufficient Lifestyle

Residents of the communities in the planning area do not have all of the modern conveniences of living in a large city. The independence and resourcefulness that is associated with this type of lifestyle is something the residents value, and keeps them living in these communities. Residents pride themselves on being creative and being able to survive with the resources at hand. The ability to provide for oneself or one's family by subsisting on the land is vital to most local residents' quality of life.

Community Cohesiveness

Even though the communities in the planning area have relatively small populations, and the houses are fairly spread out from one another, there is still a strong sense of community. Neighbors know one another and are willing to lend a helping hand to one another in times of need. This familiarity and cooperation with neighbors is important to local residents and distinguishes the small rural communities from larger urban communities.

Economic Characteristics

As in most parts of Alaska, the summer months are extremely busy in the South Denali area due to the influx of tourists. This creates a potentially unstable economic base for the communities – if tourism is strong, then the employment opportunities and business profits are also strong. However, during a slow tourism year, or during the winter months, jobs and profits are not as plentiful. Because tourism has such mixed impacts on these communities, having more stable and diverse industrial and service sectors is becoming increasingly important.

The cost of living in the planning area is also a defining element of quality of life. While undeveloped land may be more available and less costly than in urban areas, goods and services are typically less available and more costly. Currently, most of the communities in the area have an inadequate tax base to support the level of services needed such as Emergency Medical Services (EMS), fire, and medical to cover current and anticipated future populations. Community facilities (such as libraries, recreation centers, theaters, or medical centers) are also limited in the area.

Government Interaction

Government control has historically been an issue for people living outside of major cities in Alaska; this is also true for the communities in the planning area. While local control is highly valued, most communities in the planning area are not incorporated and do not have a form of local government. Regulations or requirements imposed from a statewide or national level are typically not viewed favorably. There is a high desire in local communities to prevent spin-off developments or unwanted growth, but there are not local government entities in place to plan or regulate these initiatives. Finding the right level of government regulation for communities like these is important, yet difficult, to achieve.

Recreation Opportunities

The rural communities in the planning area are surrounded by an expansive natural landscape, which supplies many different types of recreational opportunities for local residents. The area also provides habitat to a diversity of wildlife species that are valued for their aesthetic qualities as well as hunting and subsistence uses. Developing and identifying adequate trailheads, as well as designated trail systems and wilderness access, are extremely important to these communities.

VISITOR OPPORTUNITIES

Visitors and local residents participate in many of the same recreational activities in the South Denali area. There is currently a broad range of recreational opportunities available, though concerns about the quality of the experience were expressed during scoping. Comments received during scoping describe the current situation as unmanaged and note problems with safety, trespass, vandalism, noise, and litter along the Petersville Road corridor and in the Tokosha area. Scoping comments suggest that freedom of movement, natural sounds, visual quality, and solitude are valued components of the recreational experience.

Airplane and Helicopter Use

Alaska Division of Parks and Outdoor Recreation aircraft regulations for Denali State Park prohibit fixed-wing landings east of the George Parks Highway, except on Blaire and Ermine Lakes. Practice landings are prohibited throughout the park, and helicopter landings are allowed only by commercial use permit at the discretion of the Director of State Parks.

As a means of experiencing Denali National Park and Preserve, scenic air tours (flightseeing) are second in popularity only to the shuttle bus tours along the park road. Approximately 36 aviation companies based along the Parks Highway corridor from Anchorage to Fairbanks advertise air tours in portions of the park and preserve. Air tours can be either by helicopter or airplane, although helicopters are not permitted to land. They occur throughout the park, but the majority of flights are concentrated on the south side of the Alaska Range, centered on Mount McKinley. The majority of the tours follow a flight path along the Kahiltna, Tokositna, and Ruth Glaciers, possibly circling Mount McKinley or Mount Foraker, depending on flight duration (Jones and Stokes 2000).

Era Aviation has a commercial use permit from Alaska State Parks to operate helicopter flightseeing from a park inholding near the Mount McKinley Princess hotel over Denali State Park and into the national park. They reported that in the summer of 2003 they conducted 371 flights carrying 1,924 revenued passengers. They had to cancel 543 reservations due to poor flightseeing weather. The reservations for this activity were down 25% from 2002.

It should also be noted that the Air Force's Susitna Military Operating Area lies partly over the planning area. When flying over the national park, the "floor" is set at 10,000 feet MSL or 5,000 feet AGL, whichever is higher. Overflights can occur between 7am and 10pm (Rolf 2000). The military conducts an average of 3 flights per day (primarily by F-15s) in the Susitna MOA and an average of 8-12 flights per day by the following types of aircraft: OA-10A, F-16C, F-15E in the MTR 1900 (U.S. Department of Defense 1995). While these flights are generally not sightseeing flights, the presence of military aircraft could affect the visitor experience on the ground.

Birding

Opportunities for birding exist along the Petersville Road corridor and on public lands adjacent to and throughout Denali State Park.

Boating – Motorized

Motorboats are used on the Tokositna River for access to private property and surrounding lands. Commercial operators offer river boating within Denali State Park and on the Chulitna and Susitna River systems.

Boating – Nonmotorized

Private rafting trips are somewhat common on the Tokositna River during the summer. A couple of commercial rafting guides have permits to use the state park, though their activity level is very low. River rafting and boating, including guided trips, occur on many of the south side rivers and streams, including the Chulitna River, Tokositna River, Lake Creek, Kroto Creek, and Moose Creek. Data on river use for the Deshka River system suggests a total of about 12,600 person visits per year (NPS 1997).

Cycling

Bicycle use occurs primarily on mining routes throughout the Peters and Dutch Hills and on the Petersville Road. Mountain biking in this area has increased in popularity over the last decade. There are no designated bike trails within Denali State Park.

Hiking and Camping

Registration for overnight use on the south side of Denali National Park was voluntary in 1999 and 2000 and was heavily recommended in 2001. Three hundred twenty-eight backcountry users registered in 1999; 426 registered in 2000; and 684 registered in 2001. Hiking into the national park from the Peters Hills, although possible, is extremely limited and difficult because of the thick vegetation and rugged terrain.

Hiking and camping are common in the Peters Hills and along Curry Ridge, as hiking along the ridges is relatively easy. Hiking on Kesugi Ridge is very popular and use has been increasing steadily (Heikes 2005). Increased use is attributed to exposure in outdoor/travel magazines and the construction of the trail and trailhead at Ermine Hill. Backcountry camping is allowed in the state park, but open fires are permitted only on gravel bars or in fireplaces the state provides. Inside the planning area there are no locations where open fires are legal.

Horses and Other Pack Animals

Horses and pack animals are not allowed in Denali State Park, with the exception of llamas, which are considered “pets.”

Hunting and Fishing

The Alaska Board of Game regulates hunting and establishes harvest levels and season lengths. Hunting regulations are published annually. The Board of Game meets regularly and changes state hunting regulations as necessary, based on comments and proposals from the public and local fish and game advisory committees.

The following animals are subject to hunting on lands in the planning area. Most of these species are harvested for subsistence and personal use.

- moose (Alces alces)
- Dall sheep (Ovis dalli)
- black bear (Ursus americanus)
- grizzly bear (Ursus arctos)
- wolf
- wolverine
- spruce grouse (Dendragapus canadensis)
- ruffed grouse (Bonasa umbellus)
- willow ptarmigan (Lagopus lagopus)
- rock ptarmigan (Lagopus mutus)
- white-tailed ptarmigan (Lagopus leucurus)
- snowshoe hare (Lepus americanus)
- fur animals, including coyote, red fox, lynx, and squirrel

Hunting is allowed within Denali State Park, though the discharge of firearms is prohibited within ¼-mile of the Parks Highway and ½-mile of developed facilities such as campgrounds, trailheads and Public Use Cabins.

The state of Alaska is divided into 26 game management units (GMUs). Hunting and trapping regulations, harvest reporting requirements, and game management practices are designed specifically to each GMU. Game management units are further divided into subunits and uniform coding units (UCUs) that represent major drainages. The boundaries of UCUs rarely conform to political land designations. Locations of harvests according to UCU are entered into a database that is maintained by the state. Because UCUs do not follow political land designations, it is difficult to determine whether harvests occurred within the boundaries of the preserve. Denali State Park is located in both GMU 13E and 16A. The planning area is almost entirely within GMU 13E and 16A.

There are three Commercial Use Permits issued by Alaska State Parks for hunting guides within Denali State Park. All three guides primarily hunt bears in the spring.

Off-road vehicle (ORV) Use

ORV use occurs along the Petersville Road corridor and throughout the Peters Hills. ORVs are prohibited in the state park, except by special permit. In the Tokositna area, the Division of Parks and Recreation provides permits to the people who have the (four) mining claims at the headwaters of Long Creek.

Alaska Travel Adventures conducts commercial jeep tours along the Petersville Road to Peters Creek. Typically, ten jeeps travel the road twice a day. In 2003, about 2000 passengers participated in the tours (Windred 2003).

Sport Fishing

Fishing is popular in the South Denali region. The numerous surface waters provide habitat for the migration, spawning, and rearing of a variety of fish species, such as salmon, rainbow trout, Arctic grayling, northern pike, burbot, and whitefish.

Skiing and Snowshoeing

Skiing and snowshoeing occur at relatively low levels throughout the planning area. Conflicts between skiers and snowmachine users occur and are increasing. Many skiers and snowshoers have been displaced due to these conflicts.

Skijoring and Mushing

Skijoring and mushing occurs primarily in Denali State Park and on other public lands north and south of the Peterville Road, with little mushing in the national park. In the Tokositna area, mushers often use snowmachine trails. Public comment suggests that conflicts between mushers and other trail users have occurred and are increasing, and that some mushers have been displaced due to these conflicts.

Snowmachine Use

There is extensive access to the South Denali region in winter by snowmachine, primarily by Alaska residents from Anchorage and to a lesser degree from Fairbanks and by other year-round residents along the George Parks Highway. Riders often park on the shoulder of Petersville Road during the snowmachine season. Many users begin riding near the plowed end of the Petersville Road (at Kroto Creek). Users often park on the shoulder of the Petersville Road during the snowmobile season, causing unsafe conditions and hampering snow removal. Most use occurs on state lands north of the trailhead and in the Dutch Hills and Peters Hills, although some use extends into the national park north of the Dutch Hills. Snowmachines are allowed throughout Denali State Park once snow depths are sufficient to protect underlying vegetation.

The number of “jumping-off” points along the plowed roads to the south and east of Denali National Park, and the speed at which snowmobile users can travel, make accurate estimates of users difficult. During March and April of 1999, the NPS estimated that there were between 1,500 and 2,000 snowmobile users along the Parks Highway, primarily in the region from Cantwell to the West Fork of the Chulitna River and the Tokositna River area (NPS 2000).

On one weekend day in December, an estimated 350 vehicles pulling snowmobile trailers (each trailer capable of carrying two snowmobiles) were counted on the Petersville Road (NPS 1997). Snowmobile tracks have been spotted on aerial surveys throughout the south side, including Cache and Peters Creeks, up the Tokositna River drainage to the base of

the Tokositna and Kanikula Glaciers, up to 4,000 feet elevation in the Dutch Hills, along Dutch and Bear Creeks, and all along and out from the Petersville Road.

Most riders drive out the Petersville Road but find poor conditions so they leave the road to find alternative routes. Alaska State Parks began contracting for the grooming of the unplowed portion of Petersville Road in March 2004, from the Kroto Creek Trailhead to the historic mining camp of Petersville. Comments received during scoping indicate that there are problems with trespass and riders getting lost because trails and routes are not marked. This is changing as the Matanuska-Susitna Borough implements Matanuska-Susitna Borough Trails Plan, and as local snowmachine organizations receive funding to groom and maintain trails.