Chapter III: Affected Environment

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CHAPTER III: AFFECTED ENVIRONMENT

A. How to Read this Chapter

This chapter contains background information about the resources, resource uses, and programs that exist or occur on the BLM lands managed by the Glennallen Field Office. The chapter is organized by the seven issues presented in Chapters I and II:

1. Travel Management: Includes discussion of off-highway vehicle (OHV) use, trails, roads, and access.
2. Recreation: Includes discussion of general recreation, areas with a concentration of recreational use, and backcountry byways.
3. Natural and Cultural Resources: Includes discussion of air quality, fisheries, soil, water, vegetation, paleontology, cultural resources, visual resources, Sensitive Status Species, Wild and Scenic Rivers, and wildlife. Some of the wildlife discussion related to habitat also applies to vegetation management.
4. Lands and Realty: Includes discussion of land use authorizations, withdrawals, rights of way, disposal areas, Slana, permits, and leases.
5. Vegetation Management: Includes discussion of forestry and fire.
6. Leasable and Locatable Minerals: Includes discussion of geology, minerals management and potential, and renewable energy.
7. Subsistence and Social and Economic Conditions: Includes discussion of social and economic conditions, subsistence, and environmental justice.

In Appendix G, the laws, regulations, and policies are listed to provide an overview of the directives that influence management; they are not meant to be all inclusive.

The order of the issues does not reflect their level of importance. Subsistence is discussed last to consider potential impacts to subsistence that could result from proposed management actions or allowable uses described under the previous six issues.

B. Issue 1: Travel Management

1. Transportation and Facilities

a) Roads

The Alaska Department of Transportation (DOT) maintains most roads located within the Glennallen Field Office boundaries. These roads consist of both gravel and paved surfaces and are integral parts of the statewide transportation system. The State's major road system includes the Denali, Edgerton, Glenn, Richardson, and Parks Highways, and the Tok Cut-off. Other roads in the planning area are secondary roads to access private property or communication sites. Roads that access the Trans-Alaska Pipeline are for maintenance purposes and are maintained by the Alyeska Pipeline Service Company. Roads listed in Table 14 are a description of existing roads within the planning area. These roads do not necessarily cross BLM-managed lands and are not maintained by BLM.

Table 14. Existing Roads within the Planning Area

Type of Road	Miles of Road	Examples of Roads
Paved	590	Richardson Highway, Glenn Highway, Parks Highway, Denali Highway
Major Gravel	289	Lake Louise Road, Denali Highway, Old Edgerton Road, Copper River Highway, Nabesna Road, McCarthy Road
Minor Gravel	425	Coal Mine Road, Valdez Creek Road, TAPS Access Roads

The Glennallen Field Office is responsible for the maintenance of six campground and wayside access roads totaling approximately 7 miles. These gravel access roads require annual maintenance, with larger scale road improvements contracted out when necessary. The Lands and Realty division considers proposals for road construction submitted through right-of-way applications; these applications are rare and are usually associated with access to private lands, particularly in the Slana area. Roads in support of forestry practices are either low-grade and temporary, or forestry activities are conducted in the winter under frozen conditions.

b) Trails

The ease of access from developed highway systems has allowed for the development of a user-created system of OHV trails within the planning area. Current inventories do not accurately represent all trails that are known to exist on the ground. Trail inventories that do exist are focused on Wild and Scenic River corridors and unencumbered BLM lands. These are also the areas where trail maintenance activities have been focused.

Dispersed trails can be found across a large portion of the planning area. Most information on the status of these trails is based on local knowledge, overflight observations, and knowledge of historical routes. It is estimated that 1,300 miles of trails exist in the planning area, approximately 1,002 miles of which have been inventoried through the use of Global Positioning System (GPS) technology. Given the mixed ownership patterns, almost every trail within the planning area crosses multiple jurisdictions. Due to the lack of regulations limiting cross-country travel, increases in technology, and increases in populations users are extending the length of trails, using them to access more remote places every year (BLM 2001).

Inventoried trails are assigned one of five maintenance levels to identify minimum maintenance standards. Past funding has not allowed the Glennallen Field Office to meet the maintenance provisions of the assigned level. The BLM trail maintenance levels are described in detail in the following table. The Glennallen Field Office does not have any trails at maintenance levels 1 or 5.

Table 15. BLM Trail Maintenance Levels

Maintenance Level	Assignment Criteria	Minimum Maintenance Standard
1	These trails are closed to motorized and non-motorized use. This level is the minimum maintenance required to protect adjacent lands and resource values. The objectives may be to remove these trails from the trail system.	Emphasis is given to maintaining drainage and runoff patterns as needed to protect adjacent lands. Brushing and removal of hazards is not performed unless trail drainage is being adversely affected, causing erosion. Closure devices are maintained.
2	Low use trail with little or no contact between parties. Little or no visitor use management. Visitors may encounter obstructions like brush and deadfall.	Trails require condition surveys once every year. Repairs will be done at the beginning of the season to prevent environmental damage and maintain access. Emphasis is given to maintaining drainage and mitigating hazards. The trail may be signed “Not Regularly Maintained.” Major repair may not be done for several years.

Maintenance Level	Assignment Criteria	Minimum Maintenance Standard
3	Moderate use trail with visitor use on a seasonal and/or peak use period with frequent contact between parties. Trail management is conducted with occasional visitor use patrols. Visitors are not likely to encounter obstructions.	The trail shall receive a minimum of one condition survey 1-2 times per season. Major repairs shall be completed annually. Maintenance shall be scheduled 2-3 time per season, if required, to repair the trail for environmental damage and to maintain access. Trail is kept in good condition.
4	High use trail used during specific times of the year with high frequencies of contact between parties. Regularly scheduled visitor use patrol and management.	Scheduled maintenance shall occur frequently during the use season (3-4 times per season). Trail condition and accessibility for persons with disabilities is a major concern. Significant repairs shall be completed within 10 work days.
5	A special high use trail with routine visitor use patrols and management.	Has a scheduled maintenance program. Trail condition and accessibility for person with disabilities is a major concern. Significant repairs shall be completed within 2-3 work days.

Maintenance Level 2 trails in the planning area include the Copper River, Hungry Hollow, and June Lake Trails. These trails only receive sporadic use, and are not high priorities for maintenance. 54-Mile, Dickey Lake, and Fish Creek Trails are examples of Level 3 trails. They receive a high level of use at varying peak seasons (specific hunting seasons or holidays such as the Fourth of July) and are more heavily impacted from visitor use than are Level 2 trails. Level 4 trails include Swede Lake Trail, Coal Mine Road, and the Middle Fork Trail. These trails receive the most consistent use throughout the year, with peaks during hunting season. These routes also comprise the main transportation corridors accessing some of the most sought-after recreational and hunting opportunities in the planning area. The following table illustrates the distribution of maintenance level trails on BLM-managed lands.

Table 16. Inventoried Trails in the Glennallen Field Office

Maintenance Level	Miles of Trail	Percentage of All Trails
2	317	32
3	513	51
4	172	17
Totals	1002	100

c) State-recognized R.S. 2477 Routes

Under Revised Statute 2477, Congress granted a right-of-way for the construction of roads, trails, or highways over unreserved public land. Although the R.S. 2477 provision was repealed in 1976 by the Federal Land Management and Policy Act, a savings clause preserved any existing R.S. 2477 rights-of-way. The State of Alaska recognizes these routes. These routes must be adjudicated or asserted through a process that will occur outside of this planning process. Within the planning area, these routes are based on historical or traditional trails. Because of lack of regular maintenance or use, many of the State-recognized R.S. 2477 routes may no longer exist on the ground. The United States Federal Government does not recognize the validity of the State's claimed R.S. 2477 routes on Federal public land as the State's claims have not been proven valid in a Court of Law. Until proven valid, users of Federal public land are required to follow Federal rules.

d) ANCSA 17(b) Easements

Section 17(b) of the Alaska Native Claims Settlement Act (ANCSA) provided for the reservation to the United States of easements necessary for accessing publicly owned lands across lands conveyed to Native Corporations. Section 17(b) easements may also be reserved for other reasons such as access between communities and for non-public uses such as utility lines and governmental purposes. Some 17(b) easements in the planning area overlap routes claimed by the State of Alaska as potential R.S. 2477 routes.

17(b) easements play a vital role in providing access across Native corporation lands. The BLM reserves 17(b) easements to allow the public to access Federal and State lands for the purposes of recreation, hunting, and other similar public uses on publicly owned lands. There are currently 427 17(b) trail and site easements managed by the Glennallen Field Office.

Currently 17(b) easements that access State lands or BLM-managed public lands are administered by the BLM. Those easements accessing National Park Service or National Forest Service lands are managed by the respective agencies.

The majority of the 17(b) easements managed by the Glennallen Field Office access lands conveyed to the State of Alaska. It is BLM’s position that 17(b) easements accessing lands conveyed to the State should be managed by the State. Management responsibilities may be transferred to the State upon their agreeing to accept management and after consultation with the Native landowner. Management of 17(b) easements may be transferred to another federal agency when the easement access lands managed by them or is reserved for their benefit such as a FAA communications site.

BLM is committed to working with the land owner, state and other federal agencies and the public as coordination between Native corporations, State, and other federal agencies and the public is key to solving issues regarding 17(b) easements.

BLM's legal responsibilities for 17(b) easements are limited to record keeping, identification and reservation, and termination of easements. Easement management (including locating and marking) is discretionary and subject to availability of funds, personnel and approval. BLM is committed to locating, marking and monitoring priority easements and helping educate easements users to understand the rights reserved to the U.S. and the rights of the private land owner.

Map 27 shows the inventoried trails, digitized 17(b) easements, and State-recognized R.S. 2477 routes.

e) Waterways

Alaska's rivers, lakes, and streams provide an important means of transportation and access to public lands. Under the "Equal Footing Doctrine" and the Submerged Lands Act of 1953, which was expressly applied to Alaska in the Alaska Statehood Act of 1958, the State owns the unreserved beds of navigable waters in Alaska. Therefore, lands underlying navigable waters are not federal lands. Instead, they are vested in the State on the date of statehood (1959). As a result, the BLM is required to exclude the beds of all unreserved navigable waters from land conveyances. Navigability determination is a complex and ongoing process. This Resource Management Plan does not make or affect navigability determinations.

f) Airstrips

Most active airstrips or helipads within the planning area are privately owned, operated, and maintained. The Glennallen Field Office currently authorizes one airstrip under lease to Paxson Lodge, Inc. The airstrip is located within T. 22 S., R. 12 E., Fairbanks Meridian, and is 86 acres in size. There are at least two known airstrips in trespass.

Map 27. GPSed Trails, ANCSA 17(b) Easements, and State-recognized R.S. 2477 Routes

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File name: 27_trails.pdf
Map Size: 11x17

g) Boat Ramps

Four developed boat ramps, as described in the following table, are located on unencumbered BLM lands within the planning area. Three of the four are located within developed campgrounds. All ramps are constructed of poured, 8-foot concrete slabs, and can accommodate small powerboats, inflatable rafts, and canoes. Conditions vary based on installation date and incurred damages.

Table 17. Boat Ramp Facilities

Location	Width	Areas Accessed
Sourdough Campground	16 feet (double)	Gulkana River, Gulkana WSR Corridor
Paxson Campground	16 feet (double)	Paxson Lake, Gulkana WSR Corridor
Tangle Lakes Campground	16 feet (double)	Lower Tangle Lakes, Delta WSR Corridor
Delta Wayside	8 feet (single)	Upper Tangle Lakes, Delta WSR Corridor, Middle Fork of the Gulkana WSR

The area by Mile 212 of the Richardson Highway is the take out for the Delta WSR. This unimproved launch/takeout site can be used by powerboats, inflatable rafts, and canoes. The materials are the native material surface comprised of gravel and glacial deposits. This launch area is dynamic because of the changing river patterns and has no improvements other than signage.

h) Communication Sites

The Glennallen Field Office manages, maintains, and utilizes four repeater sites located on Keg, Nadine, Sugarloaf, and Paxson mountains. These sites consist of a repeater antenna that sits at a high point within the district creating a web of channels for radio communication. The repeaters are powered with a combination of solar and batteries; they were last serviced and upgraded in 2002.

2. Off-highway Vehicle (OHV) Management and Trails

OHV use is a major, nationally recognized recreational activity on BLM public lands. Advances in technology, coupled with a rise in popularity and demand, have required the BLM to address possible impacts caused by OHVs on BLM-administered lands. To comply with BLM regulation 43 CFR 8342.1, all BLM lands must be designated in one of the following three categories:

- “Open” – OHVs may travel anywhere; cross-country travel is permitted.

- "Limited" – OHVs are restricted to certain areas or specific trails, with restrictions that can include vehicle weight, type of vehicle, seasonal limitations, or travel restricted to designated trails.
- "Closed" – no OHV activity is allowed.

As stated under "Designation criteria," "all designations shall be based on the protection of the resources of the public lands, the promotion of the safety of all the users of the public lands, and the minimization of conflicts among various uses of the public lands . . ." (43 CFR 8342.1).

The Tangle Lakes Archaeological District (TLAD) was designated as "limited" to OHVs in 1980. This archaeological district is compromised of approximately 196,000 acres of mostly State-selected land containing important cultural and historical resources. During snow-free months (between May 16 and October 15), all OHV usage is limited to four signed trails (approximately 40 miles of trail). All other lands within the TLAD are closed to OHV use during these times. OHV use is unrestricted from October 16 to May 15 when adequate snow cover is present (Federal Register 1980).

The Gulkana and Delta Wild and Scenic River Corridors carry a "limited to existing trails" designation based on management prescribed in the 1983 river management plans for each river (BLM 1983a; 1983b). This limitation limits cross-country travel, but "existing" trails have never been defined. There are 13 trails that cross the designated wild and scenic river corridors; approximately 50 miles of trail are located within the wild and scenic river boundaries.

The remainder of the BLM-managed lands within the planning area are currently undesignated. Use is generally focused at jumping off points from the highway corridors (Richardson, Glenn, Denali, and Tok Cut-off), with the greatest amount of use focused along the Denali Highway and subsistence hunting areas (BLM 2004h). GPS technology, satellite imagery, and aerial photos reveal an expansive network of trails in this area as a direct result of the unregulated use inherent in the "open" designation.

Summer use of OHVs is centered around personal recreation, and usually occurs from early May until September. After September, use shifts from recreation-based to use in support of hunting. The beginning of the subsistence hunting season brings a drastic increase in the use and size of OHVs that utilize BLM-managed lands. In the Glennallen Field Office, OHV use has averaged over 17,000 visitor days over the past five years (BLM, RMIS 2003). OHVs used in the planning area take many forms, from the "standard" 4-wheeler with a Gross Vehicle Weight (GVW) of 750 pounds, to tracked vehicles, snowcats, and weasels with GVWs up to 30,000 pounds. Argos, specialized dozers/skidders, surplus military vehicles, and specialized "monster trucks" or mud boggers are also used.

The current State policy on casual (non-permitted) OHV use on State owned lands is addressed by direction in the Alaska Administrative Code (AAC) at 11 AAC 96.020, "Generally Allowed Uses on State Land" and 11 AAC 96.025, "Conditions for Generally

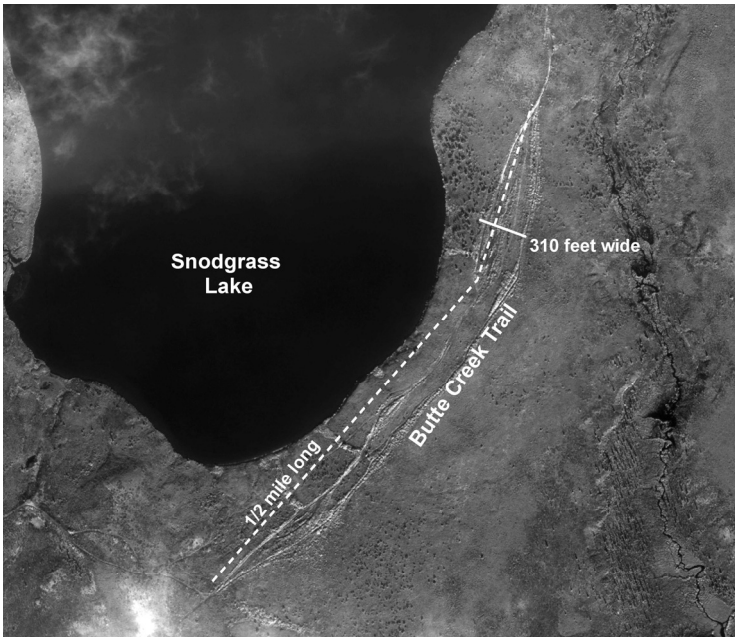
Allowed Uses." Use of highway vehicles with a curb weight up to 10,000 lbs. or recreational-type vehicles (OHVs) with a curb weight of less than 1,500 lbs. is allowed on or off an established road easement if use off the road easement does not cause or contribute to water quality degradation, alteration of drainage systems, significant rutting, ground disturbance, or thermal erosion. To prevent damage to wetlands, stream banks, and other areas with poorly drained soils, prevent erosion and wildlife disturbance or displacement, and provide access to public lands, the Alaska Department of Natural Resources (DNR) may designate certain State lands as "Special Use Lands." This State designation implements regulations on OHV and other uses in order to protect specific resource values (ADNR 2004).

Winter snowmachining within the planning area offers mainly backcountry and hill climbing experiences, with packed trails limited to major travel routes and associated highways. Most winter activity is recreational, though subsistence hunting and trapping activities are also supported by snowmachine. Snowmachine registration through the State has increased from 14,000 registrations in 1996 to over 40,000 registrations in 2002 (State of Alaska DMV 2002). Organized events that center on snowmachining are gaining popularity. This overall increase in use has made quiet winter recreational experiences harder to locate throughout the district. In addition, snowmachines, as are OHVs in the summer, are pushing deeper into the backcountry.

OHV use within the planning area and throughout the State of Alaska has increased substantially in the last few years. Every year vehicle counts at trailheads are increasing, especially during subsistence hunting seasons (BLM 2004a). This increased use has lead to more user conflicts on the trails. It is increasing difficult to find a primitive experience and the search for such an experience drives users farther into the backcountry. Based on public comments received during public scoping for this resource management plan, conflicts between motorized and non-motorized users are also emerging as OHVs expand their range.

Many trails within the planning area are experiencing some level of resource damage (ICRC 2001; ICRC 2002). Motorized opportunities are heavily favored towards highly technical and specialized OHV use in a wet environment, dominated by tundra and muskeg vegetation. Most trails have sections of muddy bogs that become greater obstacles as thermal erosion from vegetation stripping and continued use occurs. This results in users creating detours around the mudholes, creating a braided trail pattern that can range in width from 10 to 100 feet, see Figure 1. These widened trails not only leave a visual scar on the landscape, they also contribute to vegetation and soil damage (Meyer 2002).

Figure 1. Trail Braiding within the Planning Area



With increased use comes the development of new trails. Many miles of unplanned, user-created trails have been pioneered throughout the planning area resulting in trail densities reaching up to an average of 1.6 miles of trail per square mile. Studies done in the Lower 48 have found trail densities ranging from one-half mile in undeveloped areas to 4 miles of trail per square mile in areas heavily impacted by logging roads and population centers (BLM, FS 2001). Along the Denali Highway multiple trailheads and trails eventually tie in together and access the same point creating a crisscrossed network of trails. This spreading out not only affects a larger area of vegetation, soils, and wildlife but also widens the footprint of motorized sound impacts. Table 18 displays the average trail densities found in areas of high, moderate, and low motorized use. Figure 2 shows a spider web of trails found within a Wild and Scenic River Corridor.

Table 18. Average Trail Densities

Level of Trail Density	Average Miles of Trail/Sqaure Mile
High	1.6
Moderate	.8
Low	.5

Figure 2. Trail Networks within the Planning Area

a) Subsistence Use of OHVs

Section 811 of ANILCA states that the BLM must provide “reasonable access to subsistence resources on public lands.” This allows for the use of OHVs (snowmachines, motorboats, and other forms of surface transportation) on public lands for traditional/subsistence activities, as well as travel to and from villages and homesites, subject to reasonable regulation. Local residents not only depend on these trails for recreational pursuits, they are also an important facet of everyday life. Subsistence activities play a major part in the management of OHV trails, allowing access for the harvest of fish, game, firewood, and numerous other natural bounties.

b) OHVs and Resource Concerns

Each of the Game Management Units (GMU), shown on Map 28, within the Glennallen Field Office boundary have experienced varying levels of increased OHV use and the corresponding wildlife population and habitat degradation problems since the 1960s; however, the scope of OHV use in some areas is of less concern to Alaska Department of Fish and Game (ADF&G) because OHVs are severely limited by steep terrain. Of particular concern for ADF&G managers is Unit 13, which comprises the bulk of the lands managed by the Glennallen Field Office. The unit is large and the State road system provides access to much of the unit from most major population centers of the state. A well developed system of OHV trails across relatively easily-traveled terrain

currently exists and is utilized by large numbers of OHVs for recreation and hunting purposes. There are vast amounts of public land (both State and Federal) in the unit; however, use of OHVs is so intensive and covers such extensive portions of Unit 13 that the current OHV policy on public land does not adequately address the situation (ADF&G 1996).

Snowmachine use in Unit 13A (from Glennallen west to the Talkeetna Mountains, from the Glenn Highway to the West Fork of the Gulkana River to the north) is particularly heavy in the Eureka area. In Unit 13B (Susitna River east to Gakona River, north to Alaska Range and south to the West Fork of the Gulkana River), snowmachine use has increased overall with a significant increase in use around Summit Lake; caribou wintering around the eastern Denali Highway area are particularly prone to snowmachine disturbance from both hunters and recreationists. Unit 13C (Gakona River east to the Mentasta Mountains) is an important moose wintering area and the potential for adverse impacts from snowmobiles is great due to accessibility and relatively easy terrain (ADFG 1996).

The Alaska Board of Game has established four controlled use areas within the planning area to regulate OHV use for hunting and transporting game. These areas are Sourdough, Clearwater Creek, Tonsina, and Delta. These areas are closed to the use of OHVs for hunting (not to recreational OHV use).

Off Highway Vehicles have caused documented impacts to archaeological sites on BLM-managed lands within the planning area. During 1976, the BLM contracted with the Western Interstate Commission for Higher Education to conduct archaeological surveys in and around OHV trails in the Tangle Lakes area. These limited surveys located three archaeological sites along the Landmark Gap North and Glacier Gap trails which were being eroded and damaged by OHV traffic (Zinck and Zinck 1976). These results led to a formal Memorandum of Agreement with the State Historic Preservation Officer and the Advisory Council on Historic Preservation in 1980, which describes a process for opening designated trails in the Tangle Lakes Archaeological District (TLAD).

Specific designations for OHV trails in TLAD were accomplished by Federal Register notices in 1980 and 1984, which opened trails as cultural resource work was competed (Federal Register 1980).

Map 28. State Game Management Units

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File name: 28_gmu.pdf
Map Size: 11x17

C. Issue 2: Recreation

1. General Recreation

Recreation occurs within the planning area throughout the year and at varying levels of use, providing diverse opportunities for all user groups. The recreational resources and activities managed by the Glennallen Field Office include rivers (including 2 components of the National Wild and Scenic River system with 138 dispersed campsites), 4 campgrounds, 2 major waysides, and 24 developed trailheads. The following table provides a more detailed description of amenities offered at recreation sites. The location of the Glennallen Field Office, situated between the state's major population centers and intersected by the State highway system, supports a broad spectrum of dispersed recreation opportunities such as sport fishing, motorized and non-motorized boating, OHV use, snowmachining, camping, hunting, hiking, skiing, sightseeing, driving for pleasure, and wildlife viewing. There are numerous commercial recreation activities (e.g., guides and outfitters, heli-skiing) and competitive recreation activities. Due to the diversity of available opportunities, a recreation user typically participates in multiple activities per visit, such as combining camping and fishing, biking and birdwatching, or hunting and berry picking (BLM 2004g).

Table 19. Recreation Facilities

Facility	Description
Sourdough Campground	Boat launch on Gulkana River, parking, education/interpretation panels, observation pavilion, overflow parking, picnic area, 42 campsites with picnic tables and fire rings, potable drinking water, universally-accessible toilets, boater dump station, universally-accessible trails through campground to parking area.
Paxson Campground	Boat launch on Paxson Lake, parking area, toilet facilities throughout campground, education/interpretation panels, RV dump station, potable drinking water, 20 RV sites, 20 tent sites, 10 walk-in sites, picnic tables and fire rings at all campsites, boardwalk to Paxson Lake.
Tangle Lakes Campground	Boat launch on Lower Tangle Lake accessing the Delta River, parking, education/interpretation panels, 25 campsites, picnic tables and fire rings (sporadic), potable drinking water, universally-accessible toilets.
Brushkana Creek Campground	18 campsites with picnic tables and fire rings, toilets, potable water, day use picnic shelter, education/interpretation panels.
Delta Wayside	Day use area, picnic tables, toilets, boat launch, and education/interpretation panels on Upper Tangle Lakes.
Clearwater Wayside	Day use area, universally-accessible toilets, picnic tables.

Because of the general accessibility and minimal regulatory limitations on public lands, local dependence on these lands has strong ties to utilization of the region's hunting and fishing resources and pursuit of OHV recreation opportunities. In addition to the resident population, regional urban populations depend upon the planning area to

pursue recreational activities. The priorities of the recreation program are public health and safety, resource protection, visitor services, and requests for information and use authorizations (BLM 2004g).

In 1986 a study conducted by the President's Commission on Americans' Outdoors determined that 43 percent of Americans adults identified driving for pleasure as a favorite leisure pursuit. In response, the BLM established a Back Country Byway program in 1989 to complement the National Scenic Byways program and promote pleasure driving as a recreational activity. The program was designed to be highly visible and to foster partnerships with local and State governments and organizations. There are no designated back country byways on lands managed by the Glennallen Field Office.

With tourism as a leading industry in the planning area (Copper Valley Economic Council 2003), demand for recreational opportunities and providers for those opportunities will continue to grow. Demand for additional infrastructure and facilities (including interpretation) and commercial recreation opportunities will be a direct result, increasing the need for active management of the recreation resource. Use numbers over the past five years on the Gulkana and Delta Rivers have risen from 736 and 5,979 visitors, respectively, in 1999, to 1,271 and 7,506 visitors, respectively, in 2004 (BLM 2004b).

An increase in accessibility and a growing trend in visitation and recreation activities in areas that were previously remote and inaccessible has the potential to cause adverse impacts to recreation and other resources unless proactive management decisions and practices are implemented. Without active management, the tendency on BLM-managed lands is for those areas inventoried as Primitive opportunity to trend towards Semi-Primitive Motorized opportunity.

Identified resource damage appears to be linked to ease of access and proximity to harvestable resources like fish and game. Damage is characterized by bare ground, proliferation of dispersed campsites and trails, and increased presence of human waste and trash. Quiet, non-motorized recreation opportunities are becoming increasingly more difficult to locate.

2. Special Recreation Permits

The Glennallen Field Office currently administers special recreation permits for commercial use recreation activities occurring on BLM-managed lands. Approximately 60 special recreation permits were issued in 2003, a slight increase in the number of permits issued in the last 10 years. These permits are mostly for uses within the Delta and Gulkana National Wild and Scenic River areas. Commercial use on the Gulkana River is mainly focused on fishing; use on the Delta River is mainly focused on

wilderness camping and paddling. Other permits are issued for heli-ski operations, hunting guides, and competitive events.

3. Recreation Opportunity Spectrum

In preparation for this land use planning effort, the Glennallen Field Office conducted an inventory of the existing recreation opportunities available across the district using Recreation Opportunity Spectrum classes. The Recreation Opportunity Spectrum (ROS) is a framework for classifying and defining different classes or types of outdoor recreation environments, activities, and experience opportunities, as described in Table 20 (Dilts 2004). The inventory conducted for the Field Office describes the recreational opportunities that currently exist on BLM-managed lands across the landscape. A major trails inventory was conducted the summer of 2005. The results of this inventory had an effect on the ROS classes resulting in the minor modification of class boundaries, particularly along the Denali Highway (Gunn, 2005). The distribution of these classes throughout the planning area is displayed in Map 29.

Table 20. Recreation Opportunity Spectrum Classes

Class (acres / % of planning area)	Description
Primitive 4,782,000 (68%)	Area is characterized by essentially unmodified natural environment of fairly large size. Concentration of users is very low and evidence of other users is minimal. No summer motorized trails exist although seasonal motorized use occurs (snowmachines) at a low density. Sights and sounds of the road system are nonexistent and area is remote. Human-built structures are few and far between or are inconspicuous. Vegetation and soils remain in a natural state.
Semi-Primitive Non-Motorized 346,000 (5%)	Area is characterized by a predominantly unmodified natural environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is more accessible than an area in a primitive class, but is free of motorized trails and roads. Sights and sounds of the road system are more prevalent than in the primitive class, but less prevalent than in the roaded natural or backcountry roaded classes. Vegetation and soils are predominantly natural but some impacts exist.
Semi-Primitive Motorized 1,487,000 (21%)	Area is characterized by a predominantly unmodified natural environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. Area is accessible to specialized OHVs but is generally not accessible to most four-wheel drive vehicles. Sights and sounds of the road system may or may not be dominant. Some portions of the area may be distant from road systems, but all portions are near motorized trails. Vegetation and soils are predominantly natural but localized areas of disturbance may exist.

Class (acres / % of planning area)	Description
Remote Developed Lakeside 17,000 (0.2%)	Area is characterized by a predominantly unmodified natural environment, but concentrated use occurs around areas of high recreational value, such as lakeshores. The surrounding environment is generally in a very natural state and is largely unmodified by humans. Facilities such as docks, cabins, and private homes may exist, but they tend to be concentrated. Access is generally via floatplane, boat, or snowmachine. Natural sights and sounds predominate most of the time, but human sights and sounds are not uncommon, especially during times of heavy use. The area is generally not within sight or sound of a major highway or road. Vegetation and soils are predominately natural, especially outside the developed nodes, but areas of heavy localized modification exist. Concentration of users is variable across seasons, but generally is higher than in the semi-primitive or primitive classes, and lower than the backcountry roaded or roaded natural classes.
Backcountry Roaded 47,000 (0.7%)	Area is characterized by a generally natural environment with moderate evidence of the sights and sounds of humans. Resource modification and utilization practices are evident, but harmonize with the natural environment. Access is generally via four-wheel drive vehicles, and concentration of users is much higher than in the semi-primitive or primitive classes but much lower than in the roaded natural class. In some areas, such as near the Trans-Alaska Pipeline, access may be restricted. Users may be concentrated in areas of high recreational value, such as boat launches, fishing holes, and trailheads. Sights and sounds of the highway system may or may not be evident. Vegetation and soils are predominantly natural but localized areas exist, especially near points of heavy use, where soils and vegetation are modified.
Roaded Natural 136,000 (2%)	Area is characterized by a generally natural environment with moderate evidence of the sights and sounds of humans. Resource modification and utilization practices are evident, but harmonize with the environment. Concentration of users is low to moderate, and rustic facilities may exist for user convenience and safety. The area is accessible to conventional motorized vehicles and roads are maintained on a regular basis. Sights and sounds of the road system are evident and traffic levels may be highly variable. Areas of localized vegetation and soil impacts exist. User concentrations are low to moderate but may be high in popular recreational sites such as waysides, trailheads, and water access points.
Rural 36,000 (0.5%)	Area is characterized by a substantially modified natural environment. Resource modification and utilization practices are obvious. Sights and sounds of humans are readily evident and concentration of users is moderate to high. Some facilities may be designed for use by a large number of people. Areas typically are readily accessible to conventional motorized vehicles and are in areas where homes, businesses, and other structures are common. Traffic levels are fairly constant since these areas are populated. Large areas of extensively modified soil and vegetation exist.
Urban 0 (0%)	Area is characterized by a highly modified environment, although the background may have natural elements. Vegetation is often exotic and manicured. Soils may be protected by surfacing. Sights and sounds of humans predominate. Large numbers of users should be expected. Modern facilities may exist for the convenience and comfort of large numbers of people. The BLM does not manage any lands in this class within the Glennallen District.
Special 93,000 (1%)	Area where existing ROS classes existed prior to this land use plan-related assessment. Areas in this class have their own scale separate from the scale presented in this document. The only area within this class is that covered by the Gulkana river management plan.

(Dilts 2004)

4. Areas of Concentrated Recreation Opportunities

The following areas have been identified because of their concentration of resource values, the significant amounts of recreational activities that occur, or are areas of elevated public concern.

a) Delta WSR Corridor Area

The Delta River is part of the National Wild and Scenic River System. It is has sections classified as “scenic,” “wild,” and “recreational” thus providing a diversity of relational experiences which are road accessible.

The Delta River offers users a unique wilderness float experience: the river is accessible by road and can be traveled in a relatively short amount of time (two to three days). The variety of recreational activities supported by the Delta National Wild and Scenic River makes it truly unique. The Scenic portion of the river includes the Upper and Lower Tangle Lakes and provides for day canoe, kayak, and motorboat trips. The Wild portion of the river affords a float trip for canoe or small raft with a portage around two waterfalls. This stretch of river changes from a clearwater river to a glacial river at Eureka Creek, allowing users to observe the change in landscape as glaciers are introduced. The lower, Recreational portion the Delta River is entirely glacial and contains Class III and IV whitewater in long stretches where Black Rapids Glacier runoff meets the Delta River. It is a rare float for recreational users to take and requires skill in whitewater river-running. Take out points are undeveloped (BLM 1983a).

Over the past five years the Delta River has seen an average of 7,017 visits per year (BLM 2003a). River travelers are the majority of the users, though OHV trails, Top of the World Trail and Rainy Creek Mining Trail, do access the river corridor. While powerboat use is considerably less than on the Gulkana River, it has been increasing due to a change in Federal subsistence hunting regulations that allowed residents of Delta Junction to participate in the Federal subsistence hunt, and feature stories in local publications (Anchorage Daily News 2001).

Other recreational activities that take place within the Delta WSR corridor include fishing, hunting, trapping, berry picking, wildlife viewing, wildlife and scenery photography, hiking, camping, snow machining, and OHV travel. For a description of the other outstandingly remarkable values for which the Delta River was designated, see page 310.

b) Gulkana WSR Corridor Area

The Gulkana National Wild River supports an array of recreational activities. With the establishment of Sourdough and Paxson Campgrounds, the area provides opportunities for car, RV, and tent camping. Both areas also have a boat launch that provides access to the Gulkana WSR corridor. These two campgrounds are the launch and takeout points for most boating and floating activity on the river system.

To get from Paxson to Sourdough on the main stem of the river takes about four days. The trip can be completed with a raft, canoe, or kayak. There is a 2-3 mile reach of Class II and III rapids on the Middle Fork, a 2-3 mile reach of Class II rapids on the West Fork, two reaches of Class II rapids on the Main Stem (3 miles and 8 miles), and a one-quarter mile reach of Class III-IV rapids in the canyon on the main stem. At low water, almost all of these reaches become difficult to run because oars or paddles hit bottom or boats run aground. Visitors are also able to access the river by means of motorboat. The water level determine how far up or down the river motorized boats can go in any given year (BLM 1983b).

During a float or trip on the Gulkana River, visitors have the opportunity for berry picking, wildlife viewing, hunting, fishing, camping, and hiking. The area can also be accessed by OHV on the Middle Fork, Swede Lake, Fish Lake, and Haggard Creek Trails. During the winter months, snowmachines use the area for recreation and accessing trapping lines and subsistence resources.

The Gulkana River considered a prized king salmon fishery. In recent years the river has seen an influx of motorized use due to poor salmon returns on other traditional Alaskan salmon rivers, including the Kenai and Kasilof. The Gulkana also serves as an important recreational fishery for residents of Delta Junction and Fairbanks. Over the past five years the Gulkana has seen an average of 8,410 visits per year (BLM 2003a) with the majority of these visits associated with both king and red salmon fishing seasons.

The Middle Fork and the West Fork of the Gulkana WSR are more remote and offer a fly in or primitive experience. The Middle Fork can also be accessed from the Swede Lake trail with OHV. For a description of the other outstandingly remarkable values for which the Gulkana River was designated, see page 311.

Map 29. Recreation Opportunity Spectrum Classes

File size: 193 KB
File name: 29_ros.pdf
Map size: 11x17

c) Denali Highway Area

The 135-mile Denali Highway was the original travel route from the Richardson Highway to Denali National Park. It connects Paxson Lodge on the Richardson Highway to Cantwell Junction on the Parks Highway. Only 21 miles on the western end of the road and 3 miles on the eastern end are paved; the remaining miles are gravel surface. The highway is maintained by the Alaska DOT from mid-May through mid-October.

According to BLM guidelines, the Denali Highway qualifies as a Type I Back Country Byway with High Scenic Value because it is paved or has an all-weather surface, and adjacent scenery is classified as a Class II Visual Resource Class. This primitive highway provides a glimpse into the way that all of Alaska used to be – remote. The road winds through wide, glacial river valleys and onto mountain passes with vistas of the snow-capped mountains of the Alaska Range, including Mt. McKinley. Visitors have the opportunity to see many kinds of wildlife from moose to porcupine, along with many bird and fish species that occupy the lakes and streams along the highway. Historical and cultural attractions include the Valdez Creek Mining District and the Tangle Lakes Archaeological District.

In addition to providing a scenic driving experience, the Denali Highway also provides access to subsistence resources, remote trail experiences (both motorized and non-motorized), and camping. Two BLM-administered campgrounds and two waysides are located along the highway, and interpretative panels describing the landscape are located at prominent overlooks.

The beauty of the Denali Highway used to be a secret kept by Alaskans. In recent years, however, more and more people have driven, bicycled, or experienced a part or all of what this primitive highway has to offer. This trend of increasing use is expected to continue as the tourism industry grows in Alaska and the Princess Cruise Line continues to utilize the highway as a scenic travel route between Denali National Park and Preserve and Wrangell-St. Elias National Park and Preserve.

d) Tiekel Area

Located between Glennallen and Valdez, this area includes 848,000 acres of BLM-managed lands straddling the Richardson Highway. The transportation and utility corridor is the core of this area and provides a segment of unencumbered BLM lands adjacent to the Richardson Highway. The area is dominated by the Chugach Mountains. The clustered lower peaks of this range cover the area except where bisected by rivers such as the Tiekel and Tonsina. At 7,217 feet, Mount Billy Mitchell is a prominent peak in the area.

The area provides outstanding opportunities for a wide diversity of recreation experiences, from primitive and inaccessible to roaded-natural adjacent to the highway. Several trails take off from the highway and access State, Native, and State-selected lands. These trails provide an excellent opportunity for motorized and non-motorized experiences, loop trails, and extraordinary scenic vistas, all within relatively close distance to the highway. Helicopter-supported skiing and snowboarding are permitted on BLM and State lands within the area. Other Special Recreation Permits are authorized, mostly for outfitter and guiding activities. The BLM currently maintains three trailheads in the area.

e) Delta Range Area

Scenic values in the Delta Range area are high. The recreational segment of the Delta Wild and Scenic River corridor is located in the area, and the Richardson Highway crosses the Alaska Range, providing views of mountains and glaciers. The Trans-Alaska Pipeline also runs north-south through the area roughly paralleling the highway. There are no developed BLM facilities in the area, but numerous dispersed opportunities exist. A pipeline access road at Jarvis Creek provides access to several small lakes stocked by the Alaska Department of Fish and Game. Numerous dispersed campsites have been established in this area and several trails can be accessed from the road. The Delta Range area is popular winter use area for residents of Delta Junction and Fairbanks. Several glaciers in the area (including Canwell, Augustana, and Fels) and a portion of the Alaska Range have been traditionally used by backcountry climbers, skiers, and mountaineers seeking a challenging primitive backcountry experience. McCallum Creek drainage receives greater snowfall than the higher elevations or steeper slopes and is favored by backcountry skiers.

The annual Arctic Man Ski and Sno-Go Classic is held in the southern end of the area. This competitive snowmachine/ski race draws up to 10,000 spectators, and has led to increases in the amount of dispersed snowmachine use in the area. The event takes place on both State and BLM lands.

5. Recreation Area Designations

a) Special Recreation Management Area (SRMA)

A Special Recreation Management Area (SRMA) designation intensifies management of areas where outdoor recreation is a high priority. It helps direct recreation program priorities toward areas with high resource values, elevated public concern, or significant amounts of recreational activity. Areas with a SRMA designation can be expected to see investments in recreation facilities and visitor services aimed at reducing resource

damage and mitigating user conflicts (BLM 1990). Implementation-level plans are completed for each SRMA to fully describe management actions and objectives (BLM 2005b).

There are currently no designated SRMAs within the planning area.

b) Extensive Recreation Management Area (ERMA)

An Extensive Recreation Management Areas (ERMA) is an area that emphasizes the traditional dispersed recreation use of Public lands (BLM 1990). ERMAs have an undeveloped character that allows visitors to escape crowds, reply on their own skills and equipment for recreation pursuits, and freedom from stricter regulations (BLM 1990). All lands that are not within a designated SRMA revert to the ERMA category. BLM actions in ERMAs is limited to custodial actions and therefore do not require an implementation-level plan (BLM 2005b).

All land within the planning area, with the exception of the Delta and Gulkana Wild and Scenic River Corridors, is currently managed as ERMAs although not formally designated as such.

D. Issue 3: Natural and Cultural Resources

1. Soils

The Soil Resources Program is responsible for the protection, restoration, and enhancement of soils on BLM-administered lands. Inventory and monitoring are the typical means used to assess the condition of the resource.

The soils resource may be affected by natural forces such as wind and water erosion and by unnatural causes such as road building, mining, or OHV use. A primary function of the Soil Resources Program is to evaluate proposed actions on Federal lands according to the National Environmental Policy Act. For all authorized activities in the area, stipulations mitigate potential sources of soil degradation, to the extent possible.

Soil supports vegetation important to wildlife, stream bank stabilization, and commercial resources such as timber. Subsistence, commercial, sport, and recreational uses of lands and resources are all related directly or indirectly to the use of soil. Permitted activities, such as timber harvest or mining, include stipulations that minimize surface disturbing impacts.

The major programs that can lead to soil degradation (e.g., compaction and erosion) are mineral development, recreation, OHV use, forest management, and fire.

OHV use for hunting and recreational activities is continuing to grow, and concerns about potential watershed degradation will increase under current management. All of the planning area with the exception of the Tangle Lakes Archeological District and the Delta and Gulkana Wild and Scenic River Corridors are open to unrestricted use of OHVs.

OHVs can indiscriminately cross alpine areas, wetlands, steep slopes, and areas underlain by permafrost. Continual crossings expose the soil by compacting and removing vegetation, thereby increasing the availability of material to erosion (Meyer 2002). Trail condition surveys conducted on most of the major trails on lands managed by the Glennallen Field Office indicate trails are in critical need of management, with many areas showing high potential for watershed degradation (ICRC 2001, ICRC 2002).

a) Soils Inventory

Soils in the planning area have been surveyed on a very broad scale through the Exploratory Survey of Alaska completed in 1979. This survey is best used for general land use planning. Map units are very large and lacking in detail. The State of Alaska has been divided into 15 major land resource areas; of these 15, 5 make up most of the land within the planning area: Southcentral Alaska Mountains, Southeastern Alaska, Copper River Plateau, Alaska Range, and the Interior Alaska Lowlands. These areas are dominated by broad basin rolling to hilly moraines and glacial lacustrine sediment interspersed with many lakes, and mountains capped by large icefields, and many glaciers with moraines, outwash plains, and other glacial features.

Intensive soil surveys have been done on limited areas, most notably on the Gulkana Wild and Scenic River, in Copper River area, and along the Trans-Alaska Pipeline corridor. The completion of a survey of the Delta WSR Corridor is expected in March 2005. A brief summary of the major soil associations in the planning area is listed in Table 21, and is displayed in Map 30 (USDA 1979).

Table 21. Major Soil Associations

Soil Association	Description
RM 1 (AK218) Rough Mountainous Land	This soil association is made up of steep rocky slopes, icefields, and glaciers. Some slopes in the mountains support sparse shrubby vegetation, but most are barren. These areas are unsuitable for agriculture, forestry, or building construction.
IQ 1 (AK063) Histic Pergelic Cryaquepts (clayey)	This association occupies the site of a large glacial lake that existed during the last ice age. Most soils in this association are formed of clayey nonacid glaciolacustrine sediments and are underlain with shallow permafrost. These soils are interspersed by areas of gravelly morainal deposits and ancient beaches made up of silty sandy deposits. Vegetation is composed primarily of black spruce forest, interspaced with large areas of brushy tundra and scattered areas of sedges, mosses, and low shrubs. The climate and soil conditions preclude most crops and commercial timber production. These soils also impose severe limitations for roads and buildings due to unstable conditions caused by permafrost.
IQ2 (AK064) Histic Pergelic Cryaquepts (loamy)	This association occupies extensive tracts of nearly level to rolling ground moraines, outwash plains, and long mountain foot slopes. The soils are poorly drained with a shallow permafrost table, and are formed from loamy colluvium or loess, and scattered gravel glacial deposits over gravelly and stony glacial drift. Vegetation is mostly made up of black spruce forests and tundra dominated by sedges, mosses, and low shrubs. These soils are not suitable for common agriculture crops or commercial forestry. Due to extensive permafrost, these areas are subject to severe limitations for development.

Soil Association	Description
IU3 (AK201) Pergelic Cryumbrepts (very gravelly)	These areas are made up largely of hilly alpine plateaus, rocky peaks, sharp ridges, steep mountain valleys, and foot slopes. The dominant soils are formed in very stony and gravelly colluvial material over bedrock. While soils are below freezing in temperature, the texture is so course that little ice rich permafrost is present. Vegetation is predominantly low shrubs, mosses, lichens, grasses, and forbs. Soils of this association are not suitable for cultivation or forestry, and, due to rugged terrain, have severe limitations for construction purposes.
IR11 (AK178) Typic Cryochrepts (very gravelly)	These soils are formed in thick deposits of very gravelly till and colluvium. The soils are well drained without permafrost and are covered with stands of white spruce and aspen in many locations. Portions of these soils are suitable for forest development.
SO10 (AK247) Humic Cryorthods (very gravelly)	The dominant soils formed in very gravelly drift or colluvium capped with a mantle of silty loess or a mixture of loess and ash. The soils are well drained and acidic. Vegetation is dominated by white spruce and aspen in the valleys and subalpine species on the slopes. These soils are not suitable for cultivation, and upland slopes are not generally suitable for construction projects. The soils do allow for forest development.
SO15 (AK259) Pergelic Cryorthods – Histic Pergelic Cryaquepts (very gravelly)	These soils are formed on rolling gravel glacial drift commonly capped with a thin mantle of silty loess or volcanic ash. These associations are a mixture of well and poorly drained soils that contain some ice rich permafrost. Vegetation is tundra with scattered groups of black spruce and aspen. The association is not suited for agriculture or forestry.
SO16 (AK263) Pergelic Cryorthods (very gravelly), Histic Pergelic Cryaquepts	These soils occupy the choppy morainal hills and broad valleys of the Copper River Plateau. The dominant soils formed in glacial till of loamy colluvial sediments. This association is composed of a mixture of gravelly well drained and loamy poorly drained soils. Permafrost is present throughout the association, although clear ice is not commonly found in the well drained portions. Vegetation is comprised of dwarf birch, willows, sedges, mosses, and low shrubs. In general these soils are not potentially suitable for cultivation or commercial forestry and contain severe limitations for development.
SO17 (AK264) Pergelic Cryorthods	This association occupies alpine areas adjoining steep mountains in the Alaska Range. High sharp ridges and peaks of bare rock or rubble, steep mountainsides, and deep glacial valleys dominate the landscape. The soils are mostly well drained and shallow. They are frozen but contain little clear ice. These soils are not suitable for agriculture or commercial forestry and have severe limitations for engineering uses.

Map 30. Major Soil Associations

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Map size: 11x17

2. Water Quality

The planning area contains many hydrologic features that contribute to the area's diverse water resources. Glaciers and their sediment-ladened runoff, clearwater streams, wetland areas, lakes, and intricate major river watersheds combine to support wildlife, plants, and a multitude of human activities. Subsistence, commercial, sport, and recreational uses are all related in some way to water use. Generally, it is believed that the surface water is of good quality (Sondergaard 2003d). There are no water bodies listed as impaired on the State's list of impaired water bodies (303d list) on BLM managed lands in the East RMP planning area.

Two waterbodies within the Field Office boundaries are being monitored for instream flow: the Delta and Gulkana Rivers. These rivers are included in the National Wild and Scenic Rivers System and are afforded special management by the BLM. Flow regimes on these two rivers are being documented in order to quantify the amount of water necessary to support the values for which these areas were designated. It is BLM's policy to apply for a State Certificate of Reservation from the Alaska Department of Natural Resources to protect and maintain these instream flows. Applications were filed to reserve water on the Gulkana in 1996 and flow data is continually collected to support the filings and provide additional information regarding management of the river. It is expected that filing for a reservation of instream flow on the Delta will occur in 2006.

There is minimal water quality information available on other waterbodies in the area. Most preliminary water quality samples were gathered in conjunction with fisheries studies. For all authorized activities in the area, enforcement of State water quality standards is a required stipulation to the authorization. In addition, the State's Nonpoint Source Pollution Program has been outlined in Alaska's Nonpoint Source Pollution Strategy. This strategy identifies potential sources of pollution in Alaska and suggests measures to manage those sources of pollution. The development of this strategy was required by EPA in order for Alaska to receive continued grant funding under Clean Water Act Section 319.

Water resources will continue to have a significant role in the social and cultural aspects of rural Alaskans. The resource is used extensively for subsistence and personal use. Within the planning area, major programs that can generate point or non-point water quality problems are mineral development, recreation, forest development, and fire.

a) Mineral Development

All placer and hardrock mining activities currently taking place within the planning area are operating under 43 CFR 3809 regulations which require compliance with all

pertinent Federal and State laws pertaining to water quality. There are no active coal or oil and gas leases within the planning area.

b) Recreation

The primary types of regulated recreational activities on lands managed by the Glennallen Field Office are guided hunting, guided sport fishing, guided float trips, and use of BLM campgrounds and waysides. All of these activities have the potential to impact water resources; however, none of these recreational activities has been determined to be causing a problem with water quality to date.

Recreation within the planning area covers a wide range of activities including OHV use, camping, raft and canoe float trips, and sightseeing. The recreation staff has observed, and must deal with, OHV use that has caused bank erosion and sedimentation at stream crossings and riparian areas, causing diminished water quality (BLM 2004i).

c) Fire Management

Fire management in the planning area is currently being conducted under the cooperative Alaska Interagency Fire Management Plan (Alaska Interagency Fire Management Council 1984). In addition, the fire and fuels management direction in the BLM-Alaska Land Use Plan Amendment for Wildland Fire and Fuels Management (2005) and the BLM-Alaska Fire Management Plan (2005) are applicable to BLM-managed lands statewide. Although a large portion of the area generally lacks the fuels required to carry watershed damaging wildfires, some potential does exist in areas of dense spruce forests. Depending on its intensity, fire can exert measurable effects on basic soil resources, leading to increased sensitivity of the landscape to eroding forces and to reduced land stability. This is manifested primarily as increased overland water flow and greater sedimentation of rivers and streams.

While wildland fires have little effect on watershed values, major erosion frequently results from the use of mechanized fire equipment on ice-rich, fine-grained, permafrost soil. Complete removal of all of the vegetation and organic material during fireline construction causes much deeper permafrost melting than occurs in adjacent burned areas. Runoff channels and deep gulleys frequently form, and siltation can result (Sondergaard 2003d).

d) Forest Products

The number of acres disturbed by forest product harvesting within the planning area are minimal; however, due to the location of marketable timber resources, the possibility for

impacts from commercial timber development to high quality streams is ever present. To date, the impacts from commercial operations have been minimized by the liberal application of operating stipulations. The stipulation with the biggest positive impact to the area's water resources has been the requirement that all activities associated with commercial timber harvest that require the use of heavy equipment must be done when the ground is frozen and covered with snow. This stipulation will continue to be implemented on all future commercial forest product sales unless site conditions are conducive to dry, warm weather harvest. Non-commercial timber product usage, while of a larger magnitude in the planning area, is causing no known problems. Non-commercial harvesting is limited to personal use for firewood or house logs and is widely dispersed throughout the planning area. This type of harvesting is also conducted under a set of stipulations designed to prevent unnecessary environmental damage.

3. Air Quality

Air quality throughout the planning area is pristine or nearly so, except during periods in the summer when wildfires may increase the airborne particulates. On rare occasions and for short periods of time (such as during the 2004 fire season), wildland fires result in air quality standards being exceeded. Wildland fire occurrence and impacts from those fires vary widely from year to year. State air quality regulations distinguish between impacts associated with wildland fire and those of prescribed fires. Wildland fire emissions are not regulated under current EPA or State policy. There are no large industries which add significantly to the particulates in the air; however, Pump Stations 10 and 12 and heating and power generation stations in local communities may cause local increases in particulates during periods of still air. These increases have not presented any significant problems at any locations on lands managed by the Glennallen Field Office (Sondergaard 2003a).

At present, the only activities in the planning area that could be envisioned as contributing to the diminishing of air quality would be facilities associated with the Trans-Alaska Pipeline (such as the pump stations), gravel highways, wildland fires, prescribed burns, mining operations, and major construction projects such as highway realignment. The State of Alaska Department of Environmental Conservation monitors these activities for air quality violations and enforces dust control programs, a major source of air quality reductions around construction projects. With the exception of the pipeline facilities and one mining operation, all of these activities are seasonal in nature and usually short in duration; only fire is known to cause any significant decrease in the quality of the air resources in the planning area (Sondergaard 2003a).

The lack of major human impacts to air quality across a total area of 33 million acres has precluded the need for a BLM air quality monitoring program. Conclusions described above are based on specialist observations rather than specific monitoring data.

a) Smoke Management

The Alaska Department of Environmental Conservation (ADEC) is responsible for declaring air episodes and issuing air quality advisories, as appropriate, during periods of poor air quality or inadequate dispersion conditions. ADEC is a member of the Alaska Wildland Fire Coordinating Group. During periods of wildland fire activity, the Multi-Agency Coordinating Group (MAC), a sub-group of the Alaska Wildland Fire Coordinating Group, addresses air quality and smoke management issues. As ADEC develops its State Implementation Plan for regional haze, changes may be necessary to address additional fire tracking and emission management needs based upon policies and guidelines developed by the Western Regional Air Partnership. Under State law all

agencies, corporations, and individuals that burn 40 or more acres of land require written approval from ADEC prior to burning. The Enhanced Smoke Management Plan being developed by ADEC will outline the process and items that must be addressed by land management agencies to help ensure that prescribed fire activities minimize smoke and air quality problems. The Enhanced Smoke Management Plan will also address elements required by the EPA's Interim Air Quality Policy on Wildland and Prescribed Fire (EPA 1998).

4. Vegetation (Including Sensitive Status Plant Species)

This section describes the occurrence and current condition of vegetation within the planning area. For information regarding the management of vegetation, fire and forestry practices, see section (III)(F) *Issue 5: Vegetation Management*.

Within the Glennallen Field Office boundaries lie extremely complex geology, varied climate and periodic disturbances of the habitats. Diverse floras range from the coastal shorelines of Prince William Sound to wetlands of the temperate rain forest to the tundra of South-central Alaska, as well as the ice-clad peaks of the Alaska and Chugach ranges. Most of the plant species in the planning area are widely distributed and common. However, some of the taxa are of limited distribution and numbers, several of which might be locally or globally rare.

a) Alaska Earth Cover Classification

Vegetation on most BLM lands within the Glennallen Field Office have been mapped on a broad scale using satellite imagery. This mapping is best served for general land use planning and as a guide to areas for a specific purpose. More intensive vegetation mapping has been done on limited areas, most notably on the Gulkana Wild and Scenic River through the Soil/Vegetation Survey. The Delta River Soil/Vegetation Survey will be completed in March 2005. Since the Earth Cover Classification covers most of the BLM lands addressed in this plan, those classifications will be used to define the vegetation within the planning area boundaries. A brief summary of the land cover classifications scheme for the Glennallen Field Office follows:

The classification scheme consists of 10 major categories and 27 subcategories. The following describes the 10 major categories as portrayed on Map 31.

1.0: Forest; Needleleaf and Deciduous Trees. The needleleaf species generally found are white spruce (*Picea glauca*) and black spruce (*Picea mariana*). White spruce tends to occur on warmer sites with better drainage, while black spruce dominates poorly drained sites, and thus is more common in the interior of Alaska where permafrost occurs. The needleleaf classes include both white and black spruce. Mature stands of black spruce with an understory component of lichen provide critical winter range for caribou.

The deciduous tree species generally found are paper birch (*Betula papyfera*), aspen (*Populus tremuloides*), and cottonwood (*Populus balsamifera* and *Populus trichocarpa*). Black cottonwoods (*trichocarpa*) are generally found only in river valleys and on alluvial flats. Under some conditions, willow and alder form a significant part of the tree canopy. Deciduous stands are found in major river valleys, on alluvial flats, surrounding lakes,

Map 31. Alaska Earthcover Classifications

File size: 295 KB
File name: 31_earthcvr.pdf
Map size: 11x17

or, most commonly, on the steep slopes of small hills. Mixed deciduous/coniferous stands are present in the same areas as extensive, deciduous and mixed deciduous/coniferous stands and are generally limited in size. The only exception to this rule is near major rivers where relatively extensive stands of pure deciduous trees occur on floodplains and in ancient oxbows.

Sub-categories within this category are: Closed Needleleaf (1.1), Open Needleleaf (1.2), Open Needleleaf Lichen (1.21), Woodland Needleleaf (1.3), Woodland Needleleaf Lichen (1.31), Closed Deciduous (1.4), Closed Birch (1.41), Closed Aspen (1.42), Closed Poplar (1.43), Open Deciduous (1.5), Open Birch (1.51), Open Aspen (1.52), Open Cottonwood (1.53), Closed Mixed Needleleaf/Deciduous (1.6), and Open Mixed Needleleaf/Deciduous (1.7).

2.0: Shrub. The tall and low shrub classes are dominated by willow species (*Salix* spp.), dwarf birch (*Betula nana* and *Betula glandulosa*) and Vaccinium species, with alder (*Alnus* spp.) being somewhat less common. However, the proportions of willow to birch and the relative heights of the shrub species vary widely, which can create difficulties in determining whether a site is made up of tall or low shrub. As a result, the height of the shrub species making up the largest proportion of the site dictates whether the site is called a low or tall shrub. The shrub heights will only be averaged within a genus, as in the case of a site with both tall and low willow shrubs. Dwarf shrub is usually composed of dwarf ericaceous shrubs and Dryas species, but often includes a variety of forbs and graminoids. The species composition of this class varies widely from site to site and may include rare plant species. It is nearly always found on hill tops or mountain plateaus, and may include some rock.

Sub-categories within the Shrub category are Tall Shrub (2.1), Willow/Alder Low Shrub (2.21), Other Low Shrub/Tussock Tundra (2.22), Other Low Shrub/Lichen (2.23), Other Low Shrub (2.24), Dwarf Shrub/Lichen (2.31) and Other Dwarf Shrub (2.31).

3.0: Herbaceous. The classes in this category include bryoids, forbs, and graminoids. Bryoids and forbs are present as a component of most of the other classes but rarely appear in pure stands. Graminoids such as Carex spp., Eriphorum spp., or Bluejoint Grass can dominate a community.

Sub-categories within the herbaceous category include Lichen (3.11), Moss (3.12), Wet Graminoid (3.21), Tussock Tundra (3.31), Tussock Tundra/Lichen (3.311), Mesic/Dry Graminoid (3.34), and Mesic/Dry Forb (3.35).

4.0: Aquatic Vegetation. The aquatic vegetation is divided into Aquatic Bed (4.1) and Emergent (4.2) classes. The aquatic bed class is dominated by plants with leaves that float on the water surface, generally pond lilies (*Nuphar polysepalum*). The Emergent Vegetation class is composed of species that are partially submerged in the water and may include freshwater herbs such as horsetails (*Equisetum* spp.), marestail (*Hippuris* spp.), and buckbean.

5.0: Water. Two subclasses, Clear Water (5.1) and Turbid Water (5.2).

6.0: Barren. This class includes sparsely vegetated sites, such as abandoned gravel pits or riparian gravel bars, along with non-vegetated sites, such as barren mountaintops or glacial till. Subclasses include Sparse Vegetation (6.1), Rock/Gravel (6.2), and Non-vegetated Soil (6.3).

7.0: Urban. This class was not found in the study area.

8.0: Agricultural. This class was not found in the study area.

9.0: Cloud/Shadow. At least 50 percent of the cover is cloud or shadow.

10.0: Other. Sites that do not fall into any other category are assigned to Other.

b) Upland and Riparian Vegetation

Throughout the planning area, fire as well as insects and disease are the most common natural disturbances that effect vegetation. Prior to the mid-1950s, periodic wildland fires were common, sometimes burning hundreds of thousands of acres. Fire suppression in combination with frequent interspersed wetlands and riparian areas has decreased the frequency and magnitude of wildland fire occurrence.

In general, within the Forest needleleaf cover types, lack of fire has lead to a late-seral expression dominated by mature black or white spruce. As the forest canopy develops and the understory species disappear, a site becomes progressively less productive. Relatively few animal species find the requirements necessary for their survival in the mature spruce forest that will eventually develop in the absence of fire. However, because lichen cover increases in these more mature stages of black spruce stands, these areas are valuable for lichen foraging animals such as caribou. Within the shrub types, lack of periodic fire can lead to lack of resprouting, over-mature shrubs, and dying crowns.

Lack of periodic fire and an increase in average temperatures in the area has contributed to the infestation of spruce bark beetle (*Dendroctonus rufipennis)* in white spruce stands. Over the past 10 years, the infestation has resulted in 80-90 percent mortality in many white spruce stands. Because of the occurrence of white spruce, the infestation is particularly prevalent in the Tiekel planning sub-region. Recent mapping shows 144,000 acres of affected white spruce stands. Poor access into areas of infestation has prevented salvage, fuels reduction, or prescribed fire activities.

Human-caused disturbances to vegetation are relatively rare within the planning area. Most permitted activities are of a temporary nature and require some mitigation to minimize disturbance to vegetation. OHV users impact vegetation by removing obstructing vegetation to create trails; continuous use of trails leads to removal of

ground cover vegetation and exposure of bare ground. This type of activity in soils underlain by permafrost will lead to thermal erosion, mud, and bog-holes. Mud-holes tend to create trail braiding, where users find higher or dryer ground, thus widening the trail and associated impacts to vegetation, see Figure 1 on page 194. Some OHV trails in the planning area are at least 200 yards wide in braided areas. At current trail densities, these impacts to vegetation are relatively insignificant. With an estimated 900 miles of trail on BLM-managed lands in the planning area, at an average width of 15 feet, there are 1,636 acres of vegetation disturbance tied to OHV trails. Some impacts, however, can be significant locally (such as vegetation removal on a trail resulting in sedimentation into a stream).

With rare exception, riparian/wetland vegetation within the planning condition is in good condition. Riparian condition surveys done along the Gulkana River found riparian vegetation to have:

- Diverse age-class distribution and composition,
- Species present that indicated maintenance of riparian/wetland soil moisture characteristics;
- Deep-rooted riparian species;
- Vigorous riparian vegetation;
- Adequate vegetative cover to protect streambanks and dissipate energy during high flows;
- Plant communities with an adequate source of coarse and/or large woody material. (Sondergaard and Guyer 2002)

The rare inclusions that did not exhibit these characteristics were attributed to recreational activities (dispersed camping) and OHV trails accessing the river.

c) Noxious Weeds and Invasive Plants

Alaska has a known total of 1,373 native and introduced plants. It is unknown at this time how many species of noxious or invasive plants occur in the planning area because of a lack of surveys.

Noxious and invasive species are expected to be more prevalent in urbanized areas where vehicles transport seeds from outside of Alaska. There have been minimal formal weed surveys in the planning area. Weed control efforts have been primarily concentrated on increasing public awareness and prevention.

The Strategic Planning Committee for Noxious and Invasive Plant Management (CNIPM) has initiated efforts for a statewide Memorandum of Understanding between the BLM and other agencies to create an Invasive Plants Management Plan. The Committee held an Alaska Interagency Noxious and Invasive Plant Workshop in 2001. In December of 2001 the CNIPM came out with the *Strategic Plan for Noxious and*

Invasive Plants Management in Alaska (CNIPM 2001). A statewide list of noxious and invasive plant species is in the process of being developed.

Public concern about the harmful effects of uncontrolled weeds continues to increase. Unacceptable levels of weeds could adversely affect crop and forage production, wilderness, wildlife habitat, visual quality, recreation opportunities, and land value. Noxious and invasive weeds may be more prevalent near settled areas, but their populations are suspected to be increasing in remote areas as well. OHV use (especially summer and fall use), electronic sites, right-of-way development, guided hiking and climbing, helicopter landings in the summer, trail construction, non-motorized recreational activities, and utility systems or other development activities could result in increased infestations of noxious or invasive plant species (CNIPM 2001).

The goal is to keep noxious weed populations low enough to prevent unacceptable spread, damage, or annoyance, and to encourage desirable vegetation to permanently replace the weeds. If the alterations in the quality or quantity of the original habitat are severe enough, plant and animal populations may be substantially altered, resulting in displacement or even elimination of species. Changes in quality can be more subtle, yet the effects can be just as real and disruptive.

d) Sensitive Status Plant Species

(1) Threatened and Endangered Plant Species

At this time there are no threatened or endangered plant species know to occur on BLM-administered lands in the planning area. There is only one listed species in Alaska, the Aleutian shield fern, and it only occurs in the Aleutian chain on Adak Island.

(2) Sensitive Status Plant Species

Conserving rare species and unique natural plant communities is a necessary step toward maintaining species diversity in the planning area. The BLM's national and state goals and objectives for rare and sensitive plant species are to consider the overall welfare of these species when undertaking actions on public lands, and to not contribute to the need to list the species under the provisions of the Endangered Species Act. There are 31 rare/sensitive species on the Alaska Botanical Threatened and Endangered and Sensitive Status Species list as shown in Table 22. Since little to no specific baseline plant inventory data exists for the planning area, extrapolations of rare plant occurrences based on adjacent Wrangell-St. Elias National Park and Preserve plant inventories have been used to assess which rare plant species may inhabit the East Alaska planning area (NPS 1986).

Table 22. Sensitive Status Plant Species Possibly Occurring within the Glennallen Field Office

Common Name	Scientific Name	Possibly Occurs in Planning Area
Aleutian wormwood	*Artemesia aleutica*	No
Purple wormwood	*Artemesia globularia* var. *lutea*	No
Yellow-ball wormwood	*Artemesia senjavinensis*	No
Alaskan glacier buttercup	*Beckwithia glacialis* spp. *alaskana*	No
Triangle-lobe moonwort	*Botrychium ascendens*	Yes
Ogilvie Mountains springbeauty	*Claytonia ogilviensis*	No
Sessile-leaved scurvy grass	*Cochlearia sessilifolia*	Yes
Shacklette's catseye	*Cryptantha shackletteana*	Yes
Bering dwarf primrose	*Douglasia beringensis*	No
Aleutian whitlow-grass	*Draba aleutica*	No
Tundra whitlow-grass	*Draba kananaskis*	Yes
Murray's whitlow-grass	*Draba murrayi*	No
Ogilvie Mountains whitlow-grass	*Draba ogilviensis*	No
Muir's fleabane	*Erigeron muirii*	No
Yukon wild buckwheat	*Eriogonum flavum* var. *aquilinum*	No
Narrow-leaved prairie rocket	*Erysimum asperum* var. *angustatum*	No
Calder's bladderpod	*Lesquerella caldera*	No
Calder's licorice-root	*Ligusticum caldera*	No
Drummond's bluebell	*Mertensia drummondii*	No
Arctic locoweed	*Oxytropis arctica* var. *barnedyana*	No
Kobuk locoweed	*Oxytropis kobukensis*	No
Alaska bluegrass	*Poa hartzii* ssp. *alaskana*	No
Yukon podistera	*Podistera yukonensis*	No
Hairy lousewort	*Pedicularis hirsuta*	No
Aleutian saxifrage	*Saxifraga aleutica*	No
Mountain avens	*Senecio moresbiensis*	No
Pear-shaped candytuft	*Smelowskia pyriformis*	No
Stipulated cinquefoil	*Potentilla stipularis*	No
Nodding semaphoregrass	*Pleuropogon sabinei*	No
Pygmy aster	*Aster pygmaeus*	No
Willow	*Salix reticulate* spp. *glabellicarpa*	No

Table 23. Plant Species with Potential Future Listing as Sensitive Status Plant Species by BLM-Alaska*

Common Name	Scientific Name	Possibly Occurs in Planning Area
Cody's rockcress	*Arabis codyi*	Yes
Tunux's moonwort	*Botrychium tunux*	Yes
Yaaxudakeit's moonwort	*Botrychium yaaxudakeit*	Yes
Narrow-leaf grape fern	*Botrychium lineare*	Yes
Mountain moonwort	*Botrychium montanum*	Yes
Alaska moonwort	*Botrychium alaskense*	Yes

* As identified by the Alaska Natural Heritage Program (2004), rare plant species not currently on BLM's Sensitive Status Species list. *B. tunux* is being considered for possible inclusion to the Candidate list by U.S. Fish and Wildlife Service.

Most of the rare plants that could occur in the planning area are typically found in hard to access habitats such as solifluction slopes, seeps, heaths, snowbeds, recently deglaciated areas, rocky outcrops, cliffs, and scree slopes in subalpine and alpine areas. Therefore we would expect that few human demands exist for these environments and consequently would not jeopardize theses particular rare plant species.

OHV use (especially summer and fall use), use authorizations, mining, right-of-way development, guided hiking and climbing, helicopter landings in the summer, trail construction, non-motorized recreational activities, utility systems or other development activities could subject rare/sensitive plant populations to additional impacts and cause localized decreases in some populations where they may occur, especially if near human settlements.

Habitat degradation and destruction is the most serious threat to rare and sensitive species. Rare communities are particularly vulnerable to destruction and degradation because either there are so few of them or their total acreage is very limited. These communities are threatened by hydrologic changes, water pollution, and development. Maintaining rare plants and their habitats enhance the diversity of living resources. The identification of habitat needs for these rare and endangered species and communities has not been pursued for the planning area, due to budgetary constraints, limiting management's ability to foster improved conditions for the perpetuation of these resources. Any management action must be reviewed for occurrences of rare and sensitive species, and special areas needing extra protection must be identified and set aside.

(a) Sessile-leaved Scurvy Grass

Cochlearia sessilfolia is known regionally from collections at Valdez, Seward, Kodiak, and Kenai Fjords. It should be considered as a possible occurrence within the planning area in intertidal zone areas (Rogers 2004b).

The typical habitat of sessile-leaved scurvy grass is gravel bars in the intertidal zone, where submersion at high tide would occur (Murray and Lipkin 1987). C. sessilifolia is very close morphologically to Cochlearia officinalis, but differs because C. sessilfolia is an annual plant, lacking a distinct basal rosette and having larger fruits and a different seed morphology (Rogers 2005a).

(b) Shacklette's Catseye

Cryptantha shackletteana has been documented regionally along Totschunda Creek within the Mentasta Mountains in Wrangell-St. Elias National Park and Preserve in proximity to BLM-managed lands (Cook and Roland 2002). As described by Cook and Roland,

> "This Alaska endemic plant is known from only three localities worldwide, is rare in Alaska (G1Q S1) and is a United States Fish and Wildlife Species of Concern. We have previously reported this notable find (Roland and Cook 1998). This species is closely related to *C. spiculifera* (Piper) Payson which is common throughout the Great Basin states (Higgins 1969, Cronquist et al. 1984). A specimen from Chuktoka, assigned to *C. spiculifera* by Tolmachev and Yurtsev (1980), has been examined and determined to be neither *C. shackletteana* or *C. spiculifera*. The collections from the Mentasta Mountains are 280 km south of the collections at Eagle and Calico Bluffs on the Yukon River" (2002).

Given the aforementioned documented locations on adjacent National Park Service-managed land, Shacklette's catseye may possibly be found on very steep, xeric, south-facing scree and rubble slopes above Tetlin River within the Mentasta Mountains on BLM-managed lands (Rogers 2004b).

In general, Shacklette's catseye habitat in east Alaska is characterized as dry gravels on open, calcareous slopes.

(c) Triangle-lobe Moonwort

This moonwort (Botrychium ascendens) has been documented regionally on Gold Hill in the Nutzotin Mountains within Wrangell-St. Elias National Park and Preserve south-facing scree slope adjacent to BLM-managed lands. As described by Cook and Roland,

> "This North American species with a cordilleran distribution was known from two localities in Alaska and one in the Yukon Territory (Cody 1994). It is rare in

> Alaska (G3 And S1) and Cody (1994) suggested that it be added to the list of rare species for the Yukon Territory (2002)."

In general, triangle-lobe moonwort habitat in east Alaska is characterized by open mountain slopes and steep screes, ranging in elevation from 4,500-5,300 feet.

(d) Tundra Whitlow-grass

Also known as longstalk whitlow-grass, tundra whitlow-grass (Draba kananaskis). Regional locations have been documented in the Chugach Mountains within Wrangell-St. Elias National Park and Preserve in proximity to BLM-managed lands (Cook and Roland 2002). As described by Cook and Roland, "[t]his North American cordilleran mustard was known only from the vicinity of Hope on the Kenai Peninsula."

Emphasis on possible tundra whitlow-grass occurrences are focused where an alpine limestone environment is found in close proximity to adjacent Wrangell-St. Elias National Park and Preserve lands (Rogers 2004b).

In general, tundra whitlow-grass habitat in east Alaska is characterized as alpine communities, rocky alpine slopes, rocky ledges, bare shale, and limestone slopes with large blocky talus.

(3) Plants of Concern

(a) Alaska Moonwort

Although not officially listed as a BLM-Sensitive Status Species plant, Alaska moonwort (Botrychium alaskense) warrants special concern due to its rarity. The species has been documented immediately adjacent to Glennallen Field Office lands within Wrangell-St. Elias National Park and Preserve on the Cheshnina Plateau (Rogers 2004b).

In general, Botrychium alaskense habitat in east Alaska is characteristic of recently disturbed areas, revegetating sandbars, new oxbow lakes, infrequently mowed fields or lawns, ditches, and edges of roads.

(b) Cody's Rockcress

Although not officially listed as a BLM-Sensitive Status Species plant, Cody's rockcress (Arabis codyi) warrants special concern due to its rarity. The species is known from Iron Creek in the Chitina River area and only a few sites in the Yukon (Rogers 2004b). National Park Service botanists have documented this rare species in the Chugach Mountains on west-facing unstable limestone scree slopes (Cook and Roland 2002).

Arabis codyi habitat is characterized by unstable alpine slopes.

(c) Mountain Moonwort

Although not officially listed as a BLM-Sensitive Status Species plant, mountain moonwort (Botrychium montanum) warrants special concern due to its rarity. This moonwort has been documented within Wrangell-St. Elias National Park and Preserve (Rogers 2004b).

Botrychium montanum habitat is characterized by alpine forb herbaceous scree slopes, wet fens, and cedar forests.

(d) Narrow-leaf Grape Fern

Although not officially listed as a BLM-Sensitive Status Species plant yet, narrow-leaf grape (Botrychium lineare) warrants special concern due to its rarity. The species is known from the Chisana airstrip within Wrangell-St. Elias National Park and Preserve and is considered likely to occur on adjacent BLM lands of similar environmental composition (Rogers 2004b).

Open silty areas, disturbed roadsides, and meadows usually of high elevation in mountainous country are typical habitats of Botrychium lineare.

(e) Tunux's Moonwort and Yaaxudakeit's Moonwort

Although not officially listed as a BLM-Sensitive Status Species plants, Tunux's moonwort (Botrychium tunux) and Yaaxudakeit's moonwort (B. yaaxudakeit) warrant special concern due to their rarity. Both are known from the Yakutat Forelands and are considered very likely to occur on beaches to the west on BLM lands. In addition, B. tunux has been documented within the White River Valley of Alaska and along the Chisana River. B. yaaxudakeit has been documented within the White River Valley of Alaska (Rogers 2004b).

Characteristic habitat for Botrychium tunux is within alpine forb herbaceous scree slopes and in open sand dunes and upper beaches along the coast. The typical habitat of Botrychium yaaxudakeit is silty slopes.

5. Wildlife (including Sensitive Status Wildlife Species)

The overall objective of wildlife habitat management on public lands is the conservation and rehabilitation of fish, wildlife, and plant resources consistent with multiple use management principles. On Glennallen Field Office lands, however, management is typically limited to conservation efforts rather than rehabilitation because few if any district resources are impacted enough to justify rehabilitation work. In collaboration with the State of Alaska's identified wildlife population management objectives, the Glennallen Field Office emphasizes wildlife habitat improvement to support wildlife populations compatible with what ecosystems can sustain naturally.

The use of wildlife resources within the planning area by humans is either consumptive (hunting and trapping) or non-consumptive (viewing and photography). With the exception of Federal subsistence areas, consumptive uses of the wildlife resource are regulated by the Alaska Board of Game through season setting and harvest level regulations. Unique to Alaska, however, is the Federal subsistence mandate that ensures subsistence uses of natural resources, including wildlife, receive the highest priority use above sport or commercial uses. The Federal Subsistence Board manages the fish and wildlife harvest on Federal Reserved waters for fish and Federal lands for wildlife through harvest regulations. The State may comment on these regulations and close coordination of State and Federal regulations is sought by both entities.

Given the physiographical extent of the Glennallen Field Office, ranging from glaciated, mountainous terrain to broad, sedimentary interior valleys and lowland coastlines, habitats are quite varied and support a diversity of wildlife species. Wildlife resources in Alaska are constrained due to climatic conditions that are extreme in interior regions but more moderate in the coastal environments. Table 24 shows the habitat types that occupy the planning area.

Table 24. General Habitat Types within the Glennallen Field Office

Habitat Type	Acres	Percent of District
Ice/snow/rock	1,755,600	5
Water	1,393,700	4
Tundra	6,591,200	17
Shrub	12,012,000	31
Spruce/poplar	16,747,500	43
Total	38,500,000	100

The Alaska Department of Fish & Game's annual *Species Management Report* is the authoritative source of current wildlife populations' status throughout the state. This report is relied upon heavily to present information per species and associated habitat by Game Management Unit (GMU) within the BLM's Glennallen Field Office boundaries.

The units and subunits that encompass the Glennallen Field Office are Unit 5B, Unit 6A, Unit 6D, a portion of Unit 11, a portion of Unit 12, all subunits within Unit 13, Unit 14B, Unit 20A, and Unit 20D. Map 28 on page 197 displays the location of each unit within the Glennallen Field Office.

The following information is provided as an overview of existing wildlife populations and associated habitat within the Glennallen Field Office. However, because wildlife populations and their associated habitats do not recognize political boundaries, this information also applies more broadly to other adjacent public lands.

A wide variety of wildlife species (mammals, birds, and amphibians) are found in Southcentral Alaska. Complete species lists can be found in *Appendix D.* Only those species of wildlife considered important as a subsistence resource, economically important to Southcentral Alaska, or otherwise a high profile species, will be covered in this chapter.

a) Big Game Species

All maps displaying the habitat of big game species are at the end of the *Big Game Species* section beginning on page 239 of this chapter.

(1) Bear

Grizzly bears (*Ursus arctos*) and black bears (*Ursus americanus*) are widely distributed on lands managed by the Glennallen Field Office and huntable populations are found within each Game Management Unit (GMU) within the Field Office boundaries. See Map 32 on page 239 for the current distribution of bears within the Glennallen Field Office. Biological pressures dictate what areas of their home range are preferred at different times of the year. For example, grizzlies are only active for half of the year, denning within their home ranges for the period of October to April (or longer in the case of females with cubs), thus occupying a very well-defined and restricted habitat during this period. However, during the remaining six months in which they forage, grizzlies occupy all available habitat within their home range and consume whatever they may find (BLM 1989b).

Grizzly bears occur throughout Alaska except on remote isolated islands surrounded by saltwater environments. As stated in the Wildlife Notebook Series published by ADF&G,

> "Formerly, taxonomists listed brown and grizzly bears as separate species. Technically, brown and grizzly bears are classified as the same species . . the term "brown bear" is commonly used to refer to the members of this species found in coastal areas where salmon is the primary food source. Brown bears found inland and in northern habitats are often called "grizzlies" . . . inland bears are usually smaller than coastal bears, probably

> because they do not have a readily available supply of protein-rich food, such as salmon, in their diet" (ADF&G 1994).

Grizzly populations vary depending on the productivity of the environment, but because they range over large scale areas with no affinity to a particular habitat, they should be considered creatures of landscapes rather than of a specific habitat type.

Field Office-wide, the current condition of grizzly and black bear habitat is considered moderate to good. Localized threats to the continued quality of bear habitat include extensive logging of old growth forests along the Southcentral coastline, human development/encroachment, and wildland fire suppression that prevents establishment of early seral vegetative communities across the landscape.

(2) Bison

Thousands of years ago, bison (*Bison bison*) were the most common large terrestrial mammal in Alaska; however the Alaskan bison of a millennia ago has gone extinct. The bison found in interior Alaska now are an introduced species that originated in 1928 from transplants from Montana to the Delta Junction area. Since that time, natural emigration and further transplants have resulted in an additional bison herd on BLM-managed lands in the Copper River area. Other herds have also been established in Alaska, such as the Farewell herd and the Chitina River herd. Map 33 on page 241 illustrates the current distribution of bison on lands managed by the Glennallen Field Office.

An assessment of the current condition of bison habitat has not been conducted, but ADF&G indicates there is evidence of heavy use and reduced forage production in those areas preferred by bison (such as swamps, sedge openings, grassy bluffs, and river bars) (Tobey 2002).

The Copper River bison herd in Unit 11 is occasionally found on BLM-managed lands west of the Copper River in the Kenny Lake area; these lands are selected for eventual conveyance to either the State of Alaska or the Ahtna Native Corporation. The Copper River bison herd size has fluctuated considerably since the 1950s, with a low of 64 animals in 1995 and a high of 119 in 1970. In 2001, ADF&G's bison count resulted in 108 animals total. ADF&G's management objective for this herd is a minimum of 60 animals. A complete habitat condition assessment of the Copper River bison range has not been conducted, but generally they are known to inhabit black spruce forests, frequent swamps, sedge openings, grass bluffs, and river bars. Field observations by ADF&G biologists at preferred feeding locations indicates heavy use of the sites and reduced forage production as a result of overgrazing (ADF&G 2002a).

The Delta River bison herd in Unit 20D is frequently found on BLM-managed lands in the Black Rapids and Donnelly Dome area of the Delta River during calving season. A portion of these lands used by the Delta bison herd during calving have been selected by the State of Alaska for conveyance; however, the core Delta River riparian

zone/corridor will be managed indefinitely by the BLM. Recent annual herd counts before the scheduled fall hunting season indicate this herd is stable (434 animals in 1999; 453 animals in 2000; and 471 animals in 2001) and benefits from an active ADF&G bison range management program. ADF&G's management objective for this herd is to maintain approximately 360 animals at the pre-calving count (ADF&G 2002a). No specific information is provided on this herd's diet when on unmanipulated public lands range, but it is assumed their grazing and browsing preferences would be the same as those of the Copper River bison herd. ADF&G actively manages this herd to maintain and/or increase their time spent on public lands rather than on privately-owned agricultural lands where conflicts are known to occur regularly with farming and livestock interests.

(3) Caribou

Caribou (*Rangifer tarandus*) live in the arctic tundra, mountain tundra, and northern forests of North America, Russia, and Scandinavia. Worldwide there are approximately 5 million caribou, with about 950,000 of those found in Alaska.

Annual caribou movements are affected by a myriad of physiological and environmental factors. After insect numbers have declined in August, the caribou scatter across the countryside and feed heavily on willow leaves, forbs, sedges, and mushrooms to gain weight in preparation for the upcoming stresses and physical demands of mating season and cold weather. By mid to late September, both the rutting season and fall migration have begun and the caribou diet switches to lichens, dried sedges, and shrubs. To find adequate supplies of available food, caribou herds generally migrate long distances (up to 400 miles) between summer and winter ranges. However, they tend to calve in the same general area each year (ADF&G 2001b). No matter where they are located in Alaska, caribou are an important subsistence species. See Map 34 on page 243 for the current distribution of caribou within the Glennallen Field Office.

The current condition of caribou habitat, specifically the Nelchina herd range, within the Glennallen Field Office area is one of declining quality. Analysis of ADF&G-established range exclosures since 1955 indicates that lichen biomass and production has been exceeded by the number of caribou. An assessment of caribou body condition and herd productivity during the 1990s also concluded that the Nelchina animals were in poorer body condition and more nutritionally-stressed than other interior herds due to overstocking of their range for a number of years (Tobey 2001).

The Mentasta and Chisana caribou herds occupy lands within the northern half of Wrangell-St. Elias National Park and Preserve (and beyond) inside GMU 11. Though no work has been done to determine if overlap of ranges occurs between these two small herds, personal observations indicate that they are physically separate (the Chisana herd's range extends west only as far as the Nabesna River and Glacier) and genetically distinct herds. A portion of Glennallen Field Office lands are within the extreme northern end of GMU 11 (15, 997 acres); however BLM lands in this area are not now, nor were they historically, occupied by either the Mentasta or the Chisana

caribou herds. Neither of these herds is considered a huntable population due to recent drastic declines in their population numbers within the past two decades; the Mentasta herd had numbered approximately 3,500 during the mid- to late- 1980s, but a recent population count (2003) found only 273 animals remain. Among other factors leading to these declines is predation by bears and wolves on newborn calves (Rogers, 2003).

Unit 13's Nelchina caribou herd is the most abundant large mammal in the interior region of Southcentral Alaska. Calving occurs in the eastern Talkeetna Mountains. Historic winter range is the Tangle Lakes area; however, the majority of the Nelchina caribou herd now winters outside of Unit 13 in Units 12 and 20 (Joly et al. 2002). Population numbers are quite variable from year to year due to hunting pressure, changes in habitat quality and weather patterns, carrying capacity relationships, and influence of predators. Currently, the Nelchina caribou herd numbers approximately 37,000 and is considered in recovery from a recent low of 29,600 animals in 2000 (Tobey 2005). ADF&G has set a population objective of 35,000 to 40,000 for this herd (Tobey 2001). Habitat assessment for Unit 13 indicates that due to lack of wildland fires, summer range conditions currently limit the productivity of the Nelchina herd (ADF&G 2001b).

The Macomb caribou herd is a small herd of woodland caribou whose traditional range extends from the Robertson River westward to the Richardson Highway, along the northern side of the eastern Alaska Range within Unit 20D. Until 1972, the Macomb herd had been relatively unknown; population estimates at that time put the herd at 350-400 animals. Harvest by hunters had exceeded calf recruitment annually until harvest was severely restricted or eliminated from the 1970s through the 1990s; predation by bears and wolves were also key factors in poor calf survival and led to a localized wolf control effort during the winter of 1980-1981. ADF&G now manages for a fall population objective of 600-800 animals. The most recent census in 2000 resulted in approximately 650 Macomb herd caribou (Dubois 2001). A documented portion of the Macomb caribou herd's summer/fall range is within the Glennallen Field Office's land management jurisdiction and is considered sensitive habitat for this struggling herd (Dubois 2001).

Due to the high profile of caribou, especially the Nelchina herd, movement patterns across the landscape and areas of critical concern (such as calving) are well-documented. However, because of their less than 100 percent predictable annual movements, opportunities to collect more data regarding habitat preferences should be pursued.

(4) Dall Sheep and Mountain Goat

Within the planning area, Dall sheep (*Ovis dalli dalli*) are generally distributed over approximately 6.9 million acres during some time of the year. There are several distinct populations in the district that are associated with the mountain ranges in which they reside: Alaska Range, Talkeetna Mountains, Mentasta Mountains, and Chugach

Range. See Map 35 on page 245 for the current distribution of Dall sheep within the planning area.

Mountain goats (*Oreamnos americanus*) are the single North American representative of widespread worldwide goat-like animals. The range of Alaskan mountain goats extends from the southeastern panhandle north and west through coastal mountains as far as Cook Inlet. Southcentral Alaska mountain goats are found primarily in the Chugach and Wrangell Mountains, but also into the Talkeetna Mountains. Mountain goats in this area are apparently at the extreme extent of their range within the planning area, as none are found north of the Talkeetna, Chugach, or Wrangell Mountains. The majority of mountain goats in the planning area are found in the Chugach Mountains and particularly in coastal environments (BLM 1989b). See Map 36 on page 247 for the current distribution of mountain goats within the planning area.

The current condition of Dall sheep habitat (quantity and quality) in the various mountain ranges within the Glennallen Field Office boundaries is generally good to excellent (BLM 1989b).

Within the Glennallen Field Office boundaries, the current condition of mountain goat habitat is largely unknown but assumed to be good, taking into consideration that ADF&G believes mountain goats to be at the extreme northern end of their suitable range in Southcentral Alaska. However, high reproductive rates suggest that the goat populations are still below the carrying capacity of their habitat (BLM 1989b).

Specific information on seasonal distribution of mountain goats (particularly in winter) is lacking from the literature, but the data need is gaining in importance as high-impact recreational activities (i.e., heli-skiing operations) are established and expanding within the Chugach Mountains. Although both sheep and mountain goat habitats were heretofore inherently protected from the majority of adverse human influences associated with development and recreation, recent advances in recreational pursuits (i.e., heli-skiing, cat-skiing, and snowmobiling) now threaten the sanctity of these high elevation habitats (Macarthur et al. 1982; Cote et al. 1996; Goldstein et al. 2004).

(5) Moose

Moose (*Alces alces*) are the largest member of the deer family, and are considered an important subsistence species. They are widely distributed throughout the planning area generally below 4,000 feet elevation, but are not found in areas of extreme habitat such as glaciers, deep lakes, and marine environments. Moose are most abundant in recently burned areas that contain willow and birch shrubs, timberline plateaus, and along the major rivers of Southcentral and interior Alaska. In general, however, their distribution is determined by requirements for food and cover, and by seasonal snow depths. See Map 37 on page 249 for the current distribution of moose within the planning area.

The current condition of moose habitat within the planning area is poor to good, depending on location. While moose habitats in general are unaffected by human activities, those populations associated with human activities often suffer. Human activity during the majority of the year does not usually affect moose populations; however, those moose that inhabit areas where mechanized travel exists are frequently subject to vehicular collisions, poaching, and harassment.

An even more critical habitat need for moose is the return of fire on a large scale in order to provide an increased amount and diversity of early seral vegetative types across the landscape. Since 1980, several attempts to implement prescribed burns have been made with minimal success. In 2004, a year when wildland fire burned a record number of acres statewide, the BLM and the State of Alaska were able to cooperatively conduct a prescribed burn in the Alphabet Hills area that successfully burned 40,000 acres in a mosaic burn pattern.

The ADF&G indicates that moose numbers for the entire Unit 13 are currently trending downward due to severe winter conditions and increased predation on calves. The State management objective for moose in all of Unit 13 is 20,000-25,000 animals. Moose habitat assessment of Unit 13 by ADF&G indicates that there is much room for improvement overall if wildland fires were not actively suppressed or if mechanical treatment to encourage sprouting of deciduous shrub species were implemented (ADF&G 2002b).

Map 32. Black and Grizzly Bear Habitat

File size: 187 KB
File name: 32_bear.pdf
Map size: 11x17

Map 33. Bison Habitat

File size: 178 KB
File name: 33_bison.pdf
Map size: 11x17

Map 34. Caribou Habitat

File size: 186 KB
File name: 34_caribou.pdf
Map size: 11x17

Map 35. Dall Sheep Habitat

File size: 185 KB
File name: 35_dsheep.pdf
Map size: 11x17

Map 36. Mountain Goat Habitat

File size: 182 KB
File name: 36_goat.pdf
Map size: 11x17

Map 37. Moose Habitat

File size: 193 KB
File name: 37_moose.pdf
Map size: 11x17

b) Furbearers

Furbearers include those species of mammals that are routinely sought after by licensed trappers who place commercial value on the animals' pelts. Furbearers include Canada lynx, wolf, wolverine, coyote, red fox, pine marten, weasel (ermine), river otter, beaver, mink, muskrat, marmot, and squirrel, all of which are widely distributed throughout the planning area. Definitive species population and distribution information is not available, and consequently wildlife biologists rely upon annual trapper harvest reports and opinions and field observations by department personnel conducting track surveys to gauge furbearer status and trend information. The price paid for animal pelts is the greatest determining factor in trapper harvest effort, and subsequently, in the number of pelts sealed per species per year by ADF&G.

Of the furbearer species noted above, all but marmot and squirrel are routinely targeted for trapping in the planning area. Because of their economic value, Canada lynx, wolf, and wolverine are discussed in more detail in this document. River otter, beaver, pine marten, coyote, red fox, muskrat, and mink are briefly discussed because limited harvest information is available which provides some insight into their status and trend in the planning area.

In general, the condition of furbearer species habitat within the boundaries of the Glennallen Field Office is moderate to good. The terrestrial secondary consumer species of furbearers (wolf, coyote, red fox, wolverine, lynx, pine marten, and weasel) would indirectly benefit from the return of wildland fire to the landscape by the direct benefits of habitat improvement afforded their prey species under a more natural fire regime. Aquatic-based furbearer (river otter, mink, beaver, and muskrat) habitat is excellent across the district due to the large quantity of aquatic environments present and the associated wetland vegetation available.

(1) Beaver

The beaver (*Castor canadensis*) is the largest rodent found in North America and is found widely distributed throughout Alaska's forested regions. Water environments having greater than 2-3 feet of depth are necessary to sustain a beaver during the entire year. A continuous supply of nearby woody material and other vegetation is also necessary to sustain a beaver colony; once these food resources have been depleted, the beaver colony migrates to a new area and reestablishes itself in an area of food and water resource abundance (ADF&G 1994). Beavers are widely distributed within the planning area.

(2) Coyote

The Copper River Valley, the Matanuska-Susitna Valleys, and the Kenai Peninsula are host to the largest populations of coyote (*Canis latrans*) in Alaska. Coyotes are

relatively new to the state, having immigrated here shortly after the turn of the twentieth century. Because the coyote will consume carrion, snowshoe hares, mice, voles, marmots, ground squirrels, muskrats, fish, insects, birds, and even Dall sheep where possible, the coyote is considered an opportunistic forager (ADF&G 1994).

(3) Gray Wolf

The wolf (*Canis lupus*) occurs throughout mainland Alaska. Presently wolves are common over much of the state with densities ranging from about one wolf per 25 square miles in some of the southern and interior portions of the state, to one wolf per 150 square miles or less in the coastal portions of western and northern Alaska. In general, wolves are found throughout the planning area wherever adequate numbers of prey species are found. Wolves are carnivorous, and in most of mainland Alaska, moose and/or caribou are their primary food. During summer, small mammals including voles, lemmings, ground squirrels, snowshoe hares, beaver, and occasionally birds and fish supplement their diet (ADF&G 1994).

As in other areas of Alaska, management of the wolf population in Southcentral Alaska's Unit 13 has varied due to political mandates and State policy. Currently ADF&G's management objective for this unit is to achieve and maintain a post-hunting and trapping season of 135-165 animals distributed proportionally among each of the five subunits. The spring 2002 wolf population estimate was 230 wolves (5.4 wolves per square kilometer). ADF&G recommends substantial reductions in wolf numbers in Unit 13 to avoid severe declines in ungulate populations, particularly moose (Tobey 2002).

(4) Mink

Mink (*Mustela vison*) are found throughout Alaska except Kodiak Island, the Aleutian Islands, the offshore islands of the Bering Sea, and most of the Arctic Slope. Mink are aggressive carnivores and will consume virtually everything that they can capture of manageable size including insects, fish, birds, bird eggs, and small mammals. Suitable mink habitat consists of streams, ponds, beaches, or marshes (ADF&G 1994).

(5) Pine Marten

Pine marten (*Martes americana*) are found from southeastern Alaska, northward and westward in the state to where the last of the trees disappear and unsuitable arctic tundra habitat begins. In Alaska, the majority of pine marten are found in the stunted black spruce forests and bogs of the interior. Home ranges of marten vary in size due to changes in food availability and density levels. Unlike pine marten in the lower 48 states, squirrels are not a primary food source for Alaskan marten. Alaska's pine martens are opportunistic feeders and will readily consume carrion where available. Red-backed voles, meadow voles, and mice compose the majority of their diet; to a lesser extent, they are dependent upon berries, especially blueberries, for food. Of

even less importance to the pine marten diet are small birds, eggs, and vegetation (ADF&G 1994).

(6) Red Fox

Alaska's red fox (*Vulpes vulpes*) ranges widely throughout the state except for some southeast islands, the western Aleutians, and Prince William Sound. Red foxes prefer broken country, extensive lowland marshes, hills, and draws-type habitat. The red fox lives in both forested and tundra environments, but is most abundant in non-tundra settings. The red fox has an omnivorous diet composed of small mammals, birds, eggs, insects, vegetation, and carrion, but voles are its preference (ADF&G 1994).

(7) River Otter

The river otter (*Lutra canadensis*) ranges over most of North America to the north of Mexico. In Alaska, the river otter is widely distributed except for the Aleutian Islands, offshore islands in the Bering Sea, and an area adjacent to the arctic coast east of Point Lay. River otters will hunt both on land and in water, and are inextricably tied to riparian zone habitat throughout their lives. Their diet consists of snails, mussels, clams, insects, frogs, a variety of fish, and occasionally birds, mammals, and vegetable matter (ADF&G 1994). River otters are widely distributed within the planning area.

(8) Wolverine

Wolverines (*Gulo gulo*) are distributed in small numbers across their remaining range (chiefly Alaska) and require large expanses of wilderness. Like bears, wolverines are opportunistic feeders and will consume whatever is available, including carrion and small prey animals (e.g., snowshoe hares, ptarmigan, grouse, ground squirrels). Rarely and given the right circumstances, they are capable of killing young moose (calves or yearlings), caribou, mountain goats, and Dall sheep. Unlike bear diets though, wolverines consume very little vegetation and only when other preferred food sources have become scarce (ADF&G 1994). Wolverines, being capable of subsisting on a varied diet of carrion and prey, are generally found throughout the planning area, but fare best at mid- to high-elevations.

c) Raptors

There are 18 species of raptor known to inhabit lands within the planning area at least seasonally: bald eagles, golden eagles, osprey, gyrfalcon, northern harrier, American kestrel, merlin, red-tailed hawk, sharp-shinned hawk, Swainson's hawk, northern goshawk, rough-legged hawk, great horned owl, great gray owl, snowy owl, northern hawk owl, short-eared owl, and boreal owl. Only the bald eagle will be discussed in detail, as most information specific to the Glennallen Field Office pertains to this species.

(1) Bald Eagle

Bald eagles (*Haliaeetus leucocephalus*) are Alaska's largest resident bird of prey and are more abundant here than anywhere else in the United States. Eagles are often found along Alaska's coast, offshore islands, and interior lakes and rivers. Most bald eagles winter in southern Alaska, but some migrate even further south to warmer climes. Fish are the main diet of the bald eagle. Interior populations of bald eagles, such as the Gulkana River population, prey heavily on spawning salmon. When fish are in short supply, Alaska's interior bald eagles will consume waterfowl, small mammals, and carrion (ADF&G 1994).

Bald eagles are widely distributed throughout the planning area seasonally where suitable habitat and food resources can be found. See Map 38 on page 255 for the current seasonal distribution of bald eagles within the area. Nesting habitat is typically white spruce, cottonwood, or large aspen. Most nest sites are within 100 feet of water (either a lake, stream, or river) (BLM 1989b).

Bald eagle nesting surveys have been conducted in the Gulkana River watershed and portions of the Delta River watershed for over 20 years. Through these surveys, the BLM has determined that nearly 100 nesting territories exist within the Gulkana River drainage; actual nest occupancy rates vary from year to year depending on various climatic conditions and biological situations (BLM 2004l).

The planning area hosts bald eagles in other areas during breeding and nesting season, such as the lower Copper River and Tiekel River; however, very little is known of these seasonal populations.

d) Waterfowl and Other Water Birds

Within the planning area, there are large populations of waterfowl and other water birds (including ducks, geese, swans, loons, grebes, cormorants, and the great blue heron) that utilize the extensive wetlands available. Detailed information is provided only for those birds identified as sensitive species by BLM-Alaska and are known or suspected of occupying habitat within the Glennallen Field Office. This information is located in section *Sensitive Status Wildlife Species* section on page 258.

The current condition of waterfowl and other wading bird habitat is excellent across the district due to the enormous quantity of aquatic environments and associated wetland vegetation available which are primarily unimpacted by humans.

Map 38. Bald Eagle Breeding and Nesting Habitat

File size: 180 KB
File name: 38_eagle.pdf
Map size: 11x17

e) Migratory Birds (Passerines)

The birds that return each spring to Alaska are quite varied and number up to 131 species of breeding birds. Little is known about the population trends of Alaskan landbirds, but Alaskan habitats are still relatively pristine and unaltered, and no large-scale threat to their summer habitat has warranted long-term studies to date. Given that Alaska's summers are of short duration and generally warm and mild, the success of breeding birds depends greatly on their ability to locate suitable nesting habitat in a timely fashion, endure infrequent adverse weather conditions, evade predators, and avoid disruption of their normal routine. Suitable nesting habitat is especially critical to the success of breeding birds, as there they are able to meet the specific needs of rearing young (providing food, water, and shelter) while expending as little energy as possible in the process.

Because of the variety of habitats preferred by the varying species of birds that migrate to Alaska each year, migratory birds are known to occupy every available space of natural habitat within the planning area including wetlands, forests, scrub, and tundra.

Detailed information is provided only for those species of passerines that have been identified by BLM-Alaska as being sensitive species and are known or suspected of occupying habitat within the Glennallen Field Office. This information is located in section *Sensitive Status Wildlife Species* section on page 258.

f) Upland Game Birds

(1) Ptarmigan

Ptarmigan are close relatives of forest and prairie grouse, but live in alplands and arctic tundras throughout the Northern Hemisphere. The ptarmigan group is divided into three species and all are residents of Alaska. Willow ptarmigan (Lagopus lagopus) occupy nearly all of Alaska's high ,treeless country, rock ptarmigan (Lagopus mutus) occupy all major treeless areas except the flat tundras of western and northern coasts of Alaska, and white-tailed ptarmigan (Lagopus leucurus) occupy rugged upland habitat from the Alaska Range and central Yukon southward. All three species therefore can be found within the planning area.

In general, ptarmigan begin nesting as soon as snow has melted within their range and will typically lay six to ten eggs which hatch in late June to early July. Young are precoccial.

Ptarmigan routinely form and disband into large flocks often during the fall, with their movements becoming more predictable as cold weather sets in. The extent of these fall

movements is variable, but migrations of 100 to 150 miles one way would represent a maximum migration distance for ptarmigan. Ptarmigan move about erratically in winter (November to March) in search of available food. However, by spring (April and early May) large flocks of ptarmigan (up to several thousand) are known to move en masse back towards their breeding grounds.

The diet of all three species consists of plan materials (buds, twigs, and catkins of willow, alder, and birch) during the months of winter and early spring. Their diet during the remaining snow-free months of the year consists of a bland of insects, dried berries, new leaves, and flowers.

Ptarmigan are known for wide fluctuations in their abundance over relatively short periods of time (within a few years). The cause behind these rapid changes in population remains a mystery (ADF&G, Wildlife Notebook Series, 1989).

g) Amphibians

(1) Western Toad

The western toad (*Bufo boreas*) is the only toad species found in Alaska; however, its range is limited to southeast Alaska as far north as Prince William Sound. Considering this, the western toad may potentially inhabit suitable lands in the vicinity of Bering Glacier.

(2) Wood Frog

There are two species of frogs that occupy habitat within the State of Alaska, but only one species occupies land within the planning area: the wood frog (*Rana sylvatica*). The wood frog is capable of inhabiting diverse habitats (grasslands, forest, muskeg, and tundra) and is commonly found a considerable distance from fresh water.

h) Sensitive Status Wildlife Species

As of spring 2005, there are no wildlife species that occupy habitat on Glennallen Field Office lands or are found in adjacent marine waters that are Federally-listed as threatened, endangered, or candidates for listing. Informal, Endangered Species Act of 1973, as amended, Section 7(a)(2) consultations with both the U.S. Fish and Wildlife Service and the National Marine Fisheries Service were conducted as part of the development of this resource management plan. This informal consultation with both agencies resulted in determinations of no threatened or endangered species occurring within the vicinity of the Glennallen Field Office, and no critical habitat for any of these species found in the vicinity of Field Office lands.

BLM-Alaska does give special consideration to certain species that are considered sensitive as defined by one or more of the following criteria:

1. their situation is under status review by the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service, or
2. their numbers are declining so rapidly that Federal listing may become necessary, or
3. they exist in typically small and widely dispersed populations, or
4. they inhabit ecological refugia or other specialized or unique habitats (BLM Manual 6840 Revision 1-19-2001) (BLM 1988a).

The BLM-Alaska Sensitive Status Species list was last updated in April 2004. The majority of species on this list have been considered based on either criteria three or four. The Alaska Natural Heritage Program provided the basis for the potential occurrence of these species on BLM administered lands.

The BLM's objective regarding sensitive species is to ensure that actions authorized on BLM-administered lands do not contribute to the need to list the species under the Endangered Species Act.

Table 25 lists the BLM-Alaska bird and mammal sensitive species. Twenty-five species of birds are considered sensitive species in Alaska; of those, 12 species are suspected of or known to occupy habitat within the Glennallen Field Office boundaries, based on birding checklists compiled by local natural resource management agencies (Alaska Natural History Association 1993, BLM 1989a, FWS n.d.). Two species of mammals are considered sensitive species in Alaska; both of these species are known occupants of habitat within or immediately adjacent to the Glennallen Field Office.

Table 25. BLM-Alaska Sensitive Status Wildlife Species List

Common Name	Scientific Name	Known or Suspected Occupant on BLM-managed Lands
Canada lynx	*Lynx canadensis*	X
Harbor seal	*Phoca vitulina*	X
Trumpeter swan	*Cygnus buccinator*	X
Dusky Canada goose	*Branta canadensis occidentalis*	X
Tule white-fronted goose	*Anser albifrons gambelli*	X
Harlequin duck	*Histrionicus histrionicus*	X
Red-throated loon	*Gavia stellata*	X
Buff-breasted sandpiper	*Tryngites subruficollis*	X
Red knot	*Calidris canutus*	X
Blackpoll warbler	*Dendroica striata*	X
Gray-cheeked thrush	*Catharus minimus*	X
Olive-sided flycatcher	*Contopus borealis*	X
Townsend's warbler	*Dendroica townsendi*	X
American peregrine falcon	*Falco peregrinus anatum*	X
Arctic peregrine falcon	*Falco peregrinus tundrius*	
Bristle-thighed curlew	*Numenius tahitiensis*	
Kittlitz's murrelet	*Brachyramphus brevirostris*	

Common Name	Scientific Name	Known or Suspected Occupant on BLM-managed Lands
King eider	*Somateria spectabilis*	
Old squaw	*Clangula hyemalis*	
Black scoter	*Melanitta nigra*	
Black guillemot	*Cepphus grille*	
Dovekie	*Alle alle*	
Black brant	*Branta bernicla*	
Black-tailed godwit	*Limosa limosa*	
Surf scoter	*Melanitta perspicillata*	
McKay's bunting	*Plectrophenax hyperboreus*	
Marbled godwit	*Limosa fedoa*	

(1) Blackpoll Warbler

Blackpoll warblers (*Dendroica striata*) winter outside of the North American continent, primarily in the northwestern portion of South America. Blackpoll warblers depart from their wintering grounds as late as the end of April and arrive on their Alaska breeding grounds in late May.

Blackpoll warblers prefer riparian shrub thickets and/or early successional forests of spruce in Alaska for their breeding habitat.

In general, blackpoll warblers seem to be more plentiful in Alaska than in any other region of the United States. Research indicates that Alaska is likely one of the major breeding areas for this species. Research indicates that blackpoll warblers would likely benefit from land management and forestry practices that increase the availability of early successional habitats, including logging and fire. These warblers are likely to be adversely affected by fire suppression, which tends to increase the amount of older forest habitats (Pogson et al. 1997).

(2) Buff-breasted Sandpiper

The buff-breasted sandpiper (*Tryngites subruficollis*), although uncommon, is one of several species of sandpipers that regularly migrate to and breed in Alaska each year. It is considered a sensitive species because of human disturbance effects to productivity, overhunting, pesticides and contaminants used in agriculture, and winter habitat degradation (Lanctot and Laredo 1994). Although official documentation does not exist to tie the buff-breasted sandpiper to Glennallen Field Office (GFO) lands, we suspect it may occupy suitable habitat somewhere within GFO boundaries based on suitable habitat availability. This small, diminutive shorebird prefers dry ground on tundra ridges during breeding season and the drier areas of tidal flats and other areas during migration (Armstrong 1995). Within Alaska, the Copper River Delta near Cordova and the Fox River flats near Homer are especially important to the buff-breasted sandpiper (as well as to millions of other birds) as highly productive seasonal staging areas. The buff-breasted sandpiper winters as far south as the southern tip of South America.

(3) Canada Lynx

Canada lynx (*Lynx canadensis*) are the only indigenous wild cat of Alaska. Once found throughout northern North America, lynx are now Federally listed as a threatened species in the northern Rocky Mountains of the lower 48 states due to overharvesting and the cat's inability to successfully compete with more opportunistic predators, such as coyotes and bobcats. As a result of their listing in the lower 48, the BLM considers the Canada lynx a sensitive species in Alaska. However, in Alaska, Canada lynx are still considered a legal furbearer and are actively sought by trappers. Lynx are found throughout the planning area where suitable forested habitat and snowshoe hare populations exist.

Canada lynx populations are inextricably dependent upon the availability of their primary prey, the snowshoe hare, and to a lesser extent by the availability of other small game populations. Lynx inhabit Alaska's forested regions including spruce and hardwood forests from sea level to subalpine zones, but they fare especially well in areas that have recently experienced wildfires. In the resulting mosaic habitat type of old black spruce forest and young resprouting vegetation, the prey species that lynx favor are more easily found foraging on the new, succulent growth (ADF&G 1994).

(4) Dusky Canada Goose

The dusky Canada goose (*Branta canadensis occidentalis*) is the darkest-colored Canada goose in Alaska. The Alaska population of dusky geese has always been small, with the shortest migration of all Canada geese in Alaska. They nest only in the coastal region of southeast Alaska on the Copper River Delta near Cordova southward to the Bering Glacier forelands. Most birds overwinter in the rich grassy fields of Oregon's Willamette Valley and along the Columbia River near Portland, but a few stay farther north in coastal areas of Washington and British Columbia. See Map 39 for the current seasonal distribution of dusky Canada goose within the planning area.

The great Alaska earthquake of 1964 produced an uplift and drying of dusky Canada goose nesting grounds that initially helped the geese to increase in number to over 25,500 by 1979. However, long-term habitat changes favoring predators (such as brown bears and coyotes) have reduced dusky goose production, and the population has hovered between 10,000 and 18,000 since the 1980s (ADF&G 1994). Since the 1964 earthquake, in which profound hydrologic changes dramatically affected availability of dusky Canada goose habitat along Alaska's southeast coastline, the dusky goose population has continued to decline steadily despite managerial efforts to improve their status (USGS 2000).

The dusky Canada goose is considered a BLM sensitive species and a Species of Concern by the Alaska Natural Heritage Program. The dusky goose is a regulated game species under Alaska Fish & Game regulations; however, in Unit 6 (which includes the Bering Glacier forelands), the open hunting season for waterfowl species is

Map 39. Dusky Canada Goose Habitat

File size: 95 KB
File name: 39_dgeese.pdf
Map size: 8.5x11

from September 28 to December 16, which allows for most dusky Canada geese to migrate out of the area before hunting season commences (Alaska Natural Heritage Program 2003).

(5) Gray-cheeked Thrush

Gray-cheeked thrushes (*Catharus minimus*) winter on the South American continent from northeastern Colombia to easternmost Panama. These thrushes arrive on their Alaskan breeding grounds by late May after having migrated north over 4,000 miles during the preceding month. Most have left Alaska by the end of August, although some stragglers remain until early September.

Research has shown that gray-cheeked thrushes avoid deciduous forests of all types when establishing their breeding territories in Alaska, and instead prefer habitat types where shrub is the main component or where open woodlands and dwarf forests are present (Pogson et al. 1997). Gray-cheeked thrushes are relatively abundant in Alaska when compared to other areas of the United States and Canada. However, no trend has been detected in an analysis of data from 24 breeding bird survey routes in Alaska. Research suggests that disturbance of riparian habitat might reduce numbers of this already rare species (Pogson et al. 1997).

(6) Harbor Seal

The harbor seal (*Phoca vitulina richardsi*) is a marine mammal species commonly found in both the north Atlantic and Pacific oceans. In Alaska, the harbor seal is found along the coast from British Columbia north to Kuskokwim Bay, and westward throughout the Aleutian Islands. See Map 40 on page 264 for the distribution of harbor seals within the planning area. Most commonly, harbor seals inhabit coastal waters, but occasional observations of seals up to 50 miles offshore have been made. Harbor seals do not make long annual migrations as other marine mammals do, but will make lengthy local movements of up to 120-150 miles.

Potential harbor seal terrestrial haul-out habitat exists along the western half of Vitus Lake on lands managed by the Glennallen Field Office, though no seals have been documented using this area. The shorelines in this area are mostly vegetated with tall alder and willow thickets and would not provide suitable haul-out sites with good visibility for early detection of predators.

Accurate harbor seal population numbers are difficult to determine because seals are only visible when hauled out; simultaneously, an unknown number of seals can be underwater and go completely undetected by survey biologists. Best estimates for harbor seal populations in Alaska range between 200,000 and 300,000 animals. The Marine Mammal Protection Act restricts harbor seal harvest to Alaska Natives only; annual harvest is about 2,500 to 4,000 animals. The number of harbor seals has

Map 40. Harbor Seal Habitat

File size: 196 KB
File name: 40_seal.pdf
Map size: 8.5x11

declined in several areas of the Gulf of Alaska and Prince William Sound since the mid 1970s; the reasons behind the decline have not been determined (ADF&G 1994). Harbor seals are known to haul out on Vitus Lake icebergs in the foreground of Bering Glacier. A two-year research study of Vitus Lake harbor seal behavioral ecology was begun in 2002. To date, research indicates that harbor seals using Vitus Lake as a haul-out site account for roughly 1 percent of the region's total harbor seal population. Seal numbers peak in Vitus Lake during the month of September coinciding with a local salmon run. Seals are apparently present throughout the year here, but in significantly lower numbers outside of the salmon run timeframe (Burns and Savarese 2003).

(7) Harlequin Duck

Harlequin ducks (*Histrionicus histrionicus*) are among the least studied ducks in North America, mainly due to their affinity for wild and remote terrain and their relatively short migrations between wintering and summering grounds. On coastal wintering grounds, harlequin ducks prefer choppy waters off rocky points and reefs. Preferred harlequin breeding habitat is typically an inland forested area with vigorous mountain streams.

Like all ducks, harlequins are renowned for their aerial maneuverability and are often observed skimming across the surface of twisting mountain streams and rivers while feeding either on surface invertebrates or diving underwater to retrieve their meal. They are also noted for their ability to navigate through the strong currents of rushing mountain streams. With the coming of fall in September, the female leads her young on their first migratory flight to wintering grounds along the coast.

Because of their range and habitat preferences for more remote and harsh environments, harlequin duck populations and their preferred habitat in Alaska have been relatively unaffected by human disturbances and encroaching developments (ADF&G 1994). Harlequin ducks have been observed on the Gulkana River during breeding season.

Harlequin ducks are considered a sensitive species because of early century overhunting, contaminants and toxins, fishing net entanglement, and habitat degradation (Robertson and Goudie 1999).

(8) Olive-sided Flycatcher

Olive-sided flycatchers (*Contopus borealis*) winter primarily in northern South America, and generally migrate north towards summer breeding grounds beginning the last week of March; conversely, they migrate south from their summer breeding grounds beginning late August or early September. In Alaska, they are gone from their summer range by mid to late September.

Generally flycatchers occur at low densities throughout Alaska on their breeding range. Based on breeding habitat studies, it is the opinion of BLM biologists that flycatchers prefer black spruce coniferous forests, mixed coniferous forests (both black and white

spruce), and mixed deciduous forests (aspen and birch) where temperatures tend to be cooler, and in the vicinity of water (Bent 1942).

Research on the relationship between this species and their habitat is conflicting and requires further study.

The olive-sided flycatcher is a known or probable breeder in central Alaska and is considered uncommon across this range, preferring coniferous forests for its nesting habitat.

(9) Peregrine Falcon

In general, peregrine falcon breeding range is characterized by habitats having a cliff component and large open expanses of airspace and landscape for foraging. Typically though, peregrine falcon density in any given area is limited by availability of suitable nest site locations and further by territorial spacing of pairs, which is itself a consequence of prey availability (White et al 2002). The American peregrine falcon (*falco peregrinus anatum*) is found from the crest of the Brooks Range south throughout mainland Alaska, and so would be expected to occupy suitable breeding habitat within the boundaries of the Glennallen Field Office but no documentation exists of any actual occupancy to date (Rogers 2005b).

The American peregine falcon was de-listed in 1999. Consequently, it is a considered Sensitive Status Species by BLM as a constraint of the Endangered Species Act amendment (section 49 (g)(11)) requirement which specifies that de-listed species will be monitored for a minimum of 5 years post-delisting in cooperation with State agencies in order to maintain the non-threatened status of these species.

(10) Red Knot

The red knot (*Calidris canutus*) is a member of the sandpiper family (*Scolopacidae*). It is considered uncommon to rare in different parts of Alaska, and is consequently considered a sensitive species by BLM-Alaska. Although official documentation of habitat occupancy by the red knot has not been made, BLM-GFO suspects that it may inhabit seasonal breeding grounds within the Glennallen Field Office based on the availability of its preferred habitat. The red knot prefers gravelly ridges in alpine tundra during breeding season. Like other shorebirds migrating to and from Alaska, staging areas at the Copper River Delta and the Bering River are extremely important to the red knot.

(11) Red-throated Loon

Adult red-throated loons (*Gavia stellata*) migrate to their northern breeding grounds by late May to reestablish nesting territories with their life-long mates. Adult loons struggle to successfully raise young, as the eggs and chicks are easily preyed upon by gulls, jaegers, foxes, and other predators. Like other nesting birds, the adult loons are

susceptible to human-caused disturbances and will temporarily halt the incubation process, sometimes allowing the eggs to chill and die. It has been observed that on busy recreational lakes, loon chicks will sometimes drown in the wake of motorized watercraft (ADF&G 1994). Loons will congregate on large inland lakes before migration to coastal wintering areas.

The red-throated loon is considered a BLM sensitive species because of hunting pressure, oil spills associated with fossil fuel development, fishing net entanglements, and habitat degradation (Barr et al. 2000). Although official documentation does not exist, biologists have observed this species in the vicinity of the Bering Glacier and suspect that it may occupy seasonal breeding habitat there.

(12) Trumpeter Swan

The trumpeter swan (*Cygnus buccinator*) is a BLM sensitive species due to its Federal listing as endangered within the lower 48 states. However, because of the remote nature of their preferred habitat in Alaska, trumpeter swans have been relatively unaffected by human development in the state in stark contrast to the species' plight in the lower 48 states. A 1990 census found trumpeter swans to number over 13,000 statewide (FWS 1991).

Alaska's trumpeter swans generally winter near coastal waters from Cordova south to the Columbia River in Washington State. Trumpeters summer in Alaska's forested wetlands of the interior and along the coastal plain from Cook Inlet south to the Chilkat Valley (FWS 1996b). See Map 41 on page 269 for the current seasonal distribution of trumpeter swans within the planning area.

In the post-breeding period, when cygnets are able to fly, trumpeter swans congregate at staging areas in preparation for flying southward. These staging areas are usually large shallow lakes and represent important trumpeter swan habitat.

Trumpeter swan patterns of seasonal use in and around Vitus Lake, and more broadly in the Bering Glacier forelands, has remained mostly consistent during the past two U.S. Fish and Wildlife Service's swan censuses in 1995 and 2000 (FWS 1996; FWS 2000). Trumpeter swans utilize suitable nesting habitat along the southern shoreline of Vitus Lake and in outlying glacially-carved ponds and wetlands. In the immediate area of eastern Vitus Lake, three pairs of trumpeter swans and one single adult swan with a brood were observed during the 2000 census. The west-southwest corner of Vitus Lake was host to five pairs of adults and three flocks of swans during the same time period (FWS 2000).

The Gulkana River watershed is an area of seasonally concentrated trumpeter swan occupancy and use due to the abundance of thousands of remote, small, shallow freshwater ponds and lakes with a plentiful supply of aquatic vegetation for foraging swans to eat. A 1995 U.S. Fish and Wildlife Service trumpeter swan survey of the Gulkana Unit determined that 5,316 square miles of potential summer habitat are

available for nesting swans. During the census portion of this effort, 3,577 adult swans were observed (0.67 swans per square mile) (white adult swans may or may not have been accompanied by gray young-of-the-year swans). From these data, researchers made a "speculative assessment" that by the year 2050, 5,191 adult swans (0.98 swans per square mile) would potentially occupy the available habitat within the Gulkana Unit (FWS 1996).

Large numbers of trumpeter swans are also found during breeding and nesting season occupying suitable habitat in the Susitna River Valley (FWS 2000). Trumpeter swan habitat in the planning area and across the state is well-documented on a recurring basis due to the continuous efforts of the U.S. Fish and Wildlife Service. However, the effects of motorized vehicles on breeding, nesting, and cygnet-rearing swans are not well understood, and managers would benefit greatly by having this impact clearly defined.

(13) Townsend's Warbler

Townsend's warblers (*Dendroica townsendi*) winter in two distinct and separate areas. The Pacific coast wintering population is found from northwestern Washington south to southern California. The second wintering population of Townsend's warblers is found in the highlands of northern Mexico and Central America to Costa Rica. Spring migration lands this species on central Alaskan breeding grounds by mid-May. Townsend's warblers depart for their wintering grounds from interior Alaska by late August.

Alaskan Townsend's warblers were found to exhibit distinct habitat preferences during the breeding season for mixed forested habitat types where mature white spruce is the dominant species (pure deciduous mix, pure conifer mix, and deciduous/coniferous mix). The breeding success of Townsend's Warber has been positively correlated to the size (a proxy for age) of the white spruce (Matsuoka, 1996). Researchers recognize that additional information is necessary to determine the specific habitat requirements of this species within Alaska (Pogson et al. 1997). Townsend's warblers are considered a sensitive species because of winter habitat degradation (Wright et al. 1998).

(14) Tule White-fronted Goose

The tule white-fronted goose (*Anser albifrons gambelli*), a larger and darker subspecies of the three subspecies of white-fronted geese in Alaska, numbers only about 7,000 birds. This goose winters with Pacific birds in central California. Its Alaska breeding range has not yet been fully determined, but the west side of Cook Inlet is a known nesting area. White-fronted geese nesting in Alaska are part of the Mid-continent Population that breed throughout the western and central arctic of Canada. This population of over 300,000 birds migrates through the central United States and winters in Texas and Mexico (ADF&G 1994).

Map 41. Trumpeter Swan Nesting Sites

File size: 186 KB
File name: 41_swan.pdf
Map size: 11x17

Tule white-fronted geese are considered a BLM sensitive species and are known to occupy seasonal habitat in the Bering Glacier area. Recently, a USDA Forest Service survey crew documented the entire known Alaskan population of Tule white-fronted geese (from the Cook Inlet area) staging for fall migration along the western edge of Vitus Lake in the foreground of Bering Glacier. Until this discovery was made, researchers had no information on the migration route of this species once they had left their summer breeding grounds at Cook Inlet and headed south (Rogers 2003c). Further documentation of tule white-fronted goose staging habitat in the Bering Glacier area is needed to enable managers to provide adequate protection for this sensitive species.

(15) Collaboration with Other Agencies and Non-Governmental Organizations

It is the inherent responsibility of Federal agencies to cooperatively gather information regarding species of concern (threatened, endangered, or sensitive) in order to better manage, conserve, and aid in the prevention of their further decline. To that end, the following research and monitoring efforts have been or are currently being carried out within the purview of the Glennallen Field Office.

Research Efforts:

- A 2-year cooperative research study with the University of Alaska regarding Vitus Lake harbor seal ecology was begun in 2002. Among other findings, this research indicates that harbor seals using Vitus Lake (in the foreground of the Bering Glacier) as a haul-out site account for roughly 1 percent of the Gulf of Alaska region's total harbor seal population.
- In cooperation with the U.S. Geological Survey and Ducks Unlimited, the BLM has been studying the reduced capacity for dusky Canada goose production and a gradual long-term decline in this population in the Bering Glacier area following the 1964 earthquake in the Copper River Delta. Understanding the factors limiting goose productivity is of increasing importance as this population continues to decline and managers exhaust their options for reducing the harvest of this species in the lower 48.

Monitoring Efforts:

- In conjunction with the U.S. Geological Survey's Patuxent Wildlife Research Center, the Canadian Wildlife Service's National Wildlife Research Centre, the U.S. Fish and Wildlife Service's Boreal Partners in Flight, and numerous local volunteer birding enthusiasts, continue annual breeding bird surveys along 12 official Breeding Bird Survey (BBS) routes within the Glennallen Field Office boundaries are conducted to monitor the status and trends of North American bird populations. BBS routes were designed to provide a continent-wide perspective of population change over time among passerines and other birds.
- The Glennallen Field Office contains approximately 2,569 square miles of prime trumpeter swan breeding habitat that supports 32 percent of the total trumpeter

swan population in Alaska. The U.S. Fish and Wildlife Service's Migratory Bird Division conducts a statewide census of trumpeter swans every five years to track population trends and evaluate their breeding habitat. Among other benefits of this recurring census is the ability of resource managers to track population trends and detect any significant changes over time.

Other research and monitoring efforts are either underway or completed for other sensitive species listed above that may or are strongly suspected of occurring within lands managed by the Glennallen Field Office, including the tule white-fronted goose, the red-throated loon, the grey-cheeked thrush, the harlequin duck, and the olive-sided flycatcher. These particular research projects are not occurring within the Glennallen Field Office proper, but the resulting information will be extremely beneficial to management of these species.

6. Fish (Including Sensitive Status Fish Species)

The fisheries resources on the Glennallen Field Office offer a wide variety of species and opportunities. Anadromous species occurring within the planning area include all five species of pacific salmon (Chinook, coho, chum, pink, and sockeye) and steelhead trout. Map 42 on page 275 displays the location of the anadromous stream and rivers within the planning area. Resident fish species found within planning area waters include kokanee salmon, stocked and land locked sockeye, lake trout, rainbow trout, cutthroat trout, Dolly Varden, Arctic grayling, burbot, round whitefish, lake whitefish, pygmy whitefish, longnose sucker, slimy sculpin, and Pacific lamprey. The fisheries habitats in the planning area range from tiny clearwater streams to large, glacial-fed rivers, and from high alpine, clear lakes to large, glacial lakes. Fish habitats vary considerably with each species displaying different requirements. General habitat requirements for the different resident fishes are identified in the Alaska Habitat Management Guide (ADF&G 1986) and in Scott and Crossman (1973).

There are two broad categories of streams and lakes within the planning area: glacial and clear. Because of conditions found within glacial streams, they are typically much less productive in terms of biomass production and numbers of fish than are clear lakes. There are approximately 23,000 miles of streams, more than 102,000 lakes between 2-38,000 acres, and more than 211,000 lakes less than 2 acres within the planning area. Total estimated number of lakes of all sizes is 313,000, with a total lake acreage of 2.35 million acres (6.1 percent of all Glennallen Field Office lands). This acreage includes all marsh areas associated with lakes. Total estimated lake perimeter distance is 98,572 miles (Ritter and Koeln 1989).

Major rivers within this region include the Copper River and its major tributaries (the Gulkana, Gakona, Chistochina, Slana, Tiekel, Tonsina, Klutina, and Tazlina Rivers); the Bering River; the Tok and Little Tok Rivers; the Susitna River and its major tributaries (the Maclaren, Tyone, and Oshetna Rivers); the Nenana River; the Matanuska River; and the Delta River. Major lakes include the glacial Tazlina, Klutina, and Tonsina Lakes, and clearwater Susitna, Tyone, Louise, Crosswind, Ewan, Fish, Paxson, Summit, Mankomen, Mentasta, Suslota, Bering, Tangle, Upper Tangle, and Fielding Lakes. Altogether, these fishery resources support large commercial, recreational, and subsistence fisheries.

In the Bering Glacier area, the Seal, Tsiu, Kaliakh, Kulthieth, and Duktoth Rivers are all anadromous rivers that support strong runs of coho salmon.

The Copper River fisheries is a major economic contributor. According to Cordova District Fishermen United, the fishery averages about $22 million a year directly to fishermen, and another $18 million to cannery workers, tendermen, and shore side support. Estimates of value for the commercial sport guide industry, sport and

subsistence is placed at about $5 million, making the fishery a $45 million a year economic driver.

The Copper River supports extensive commercial, recreational, and subsistence fisheries for sockeye salmon. While the largest harvest occurs in the lower portions of the river, most sockeye spawning and rearing areas are located within the Copper River Basin. The upper east fork of the Gulkana River between Paxson and Summit Lakes is one of several areas that contribute significantly to total sockeye production in the Copper River. Between 1962 and 1972, the spawning population in the affected area declined from about 60,000 to 25,000 (Roberson, unpublished data), with habitat erosion (due to reconstruction of the Richardson highway) the primary cause of the decline. This and the abundance of warm water springs in the area led ADF&G to consideration and construction of a hatchery to supplement wild salmon runs in the Copper River.

Sockeye eggs are obtained from spawning salmon in adjacent spring areas and incubated in the hatchery. Salmon fry released from the Gulkana I hatchery site move downstream to rear to smolt in Paxson Lake. As hatchery releases approached the rearing capacity of Paxson Lake, Summit Lake was added as a fry release site. The first Summit Lake release was in 1980 with an initial release of 1.3 million fry. An additional release site, Crosswind Lake, was tested in 1985 and added as a regular release site in 1988 with a release of 2.5 million fry. The Gulkana I hatchery site has been supplemented by the Gulkana II site, downstream and adjacent to the Gulkana River just upstream from Paxson Lake. This site is on BLM land and BLM has issued a lease to Prince William Sound Aquaculture Corporation, which runs the hatchery under contract with the State of Alaska.

The goal of the Gulkana facility is to provide an annual average return of 300,000 adult sockeye salmon without jeopardizing delta and upriver wild stock escapements. Wild stock returns range from 500,000 to 4 million fish. In the time period from 1977 to 1999 the most frequent wild return was 1.7 million fish and the average return was 1.6 million fish. The desired average hatchery production (300,000) is 15 percent of an estimated total return of 2 million (Prince William Sound Aquaculture Corporation 2000).

As the Gulkana Hatchery program expanded there was growing concern about the department's ability to achieve wild stock escapement goals. The Gulkana Hatchery Policy Paper was produced by a group of ADF&G biologists in 1990 when the expected hatchery return was estimated to be between 250,000 and 300,000 adults. The report recommended projects that would enable the department to better achieve wild stock escapement goals for both the upriver and delta components of the Copper River sockeye return. These projects focused on escapement enumeration, AWL sampling, stock identification and data analysis. Some of these recommendations have been implemented. However, excellent survivals, both fresh water and marine, have increased the size of the adult hatchery return above the 250,000 to 300,000 adults expected at that time. These large hatchery returns continue to complicate harvest

Map 42. Anadromous Rivers and Streams

File size: 193 KB
File name: 42_anad.pdf
Map size: 11x17

management of the Copper River District even though wild sockeye returns have also had excellent survivals.

BLM's role in fisheries management is as a habitat manager. ADF&G is directly responsible for population management, including the operation and monitoring of the hatchery facility and its' effects on the wild salmon stocks of the Copper River. BLM's involvement is through the lease for the Gulkana II site.

a) Monitoring Projects

The BLM is responding to a growing concern voiced by subsistence users, commercial outfitters, and ADF&G about the potential for overharvest and depletion of Chinook and sockeye salmon fish stocks in the Gulkana River and its tributaries through a cooperative fish counting project on the Gulkana River. A long-term goal of this project is to establish a biological escapement goal for the Gulkana River. A biological escapement goal is the minimum number of spawning fish needed to sustain the run while at the same time meeting the harvest demands of different user groups. This information would provide a vital management tool to ensure the sustainable harvest of wild stocks.

Current management regulations for allowable harvest of Chinook and red salmon, coupled with imprecise in-season data of run strength, threatens the sustainability of the Gulkana River fisheries and forces ADF&G to manage conservatively (i.e., maintain a lower level of harvest). It is therefore essential that a more effective means of assessing spawning escapement be implemented as increasing demands are placed upon these fish stocks by the various fisheries. With increased precision of escapement data, ADF&G could more actively manage where necessary and accommodate increased fishing effort at current or increased harvest levels.

b) Factors Affecting Fish Populations and Habitats

The major fish species within the planning area are managed by ADF&G while their habitats on public lands are managed by the BLM. Activities such as fire, minerals development, and recreation are the major activities that the BLM manages that can affect fish and their habitat directly and indirectly. Alaska Statute 41.14.870 requires ADF&G to list waters that are important for spawning, rearing, or migration of anadromous fish. It also requires anyone wanting to use, divert, obstruct, pollute, change flow, construct in, or operate a vehicle in those waterbodies to obtain written approval from ADF&G prior to beginning construction.

Fish populations and habitat conditions in the planning area are good for both anadromous and resident species. Although Chinook and sockeye salmon stocks for

the Copper River are considered fully allocated, current levels of exploitation for both anadromous and resident fish are considered sustainable.

Currently, habitat quality is not a limiting factor in anadromous fish populations in the planning area. Fish habitats are subjected to relatively consistent environmental conditions, meaning that habitats change very little in a static system. Most limitations are imposed by human demand or pressure on the populations. However, in the past, extremes of environmental conditions have impacted all stocks of anadromous fish.

Severe winters which have little snow and extreme cold can dramatically reduce survival of eggs in spawning beds, as the insulating blanket provided by snow cover is important protection from the severe cold which occurs each year (ADF&G 1986). Conversely, too much lingering deep snow cover on the ice lakes will retard the opening of lakes and phytoplankton production sufficiently to affect growth and survival juvenile salmon. Extreme flow and temperature fluctuations also can account for significant mortalities. Other than humans, predators do not usually pose significant threats to any anadromous stocks, with perhaps the exception of the low population steelhead in the Gulkana River. Birds such as gulls and terns do exert a fairly high toll on fry at the time they emerge from the gravel and begin their downstream migration to rearing areas, but this is usually confined to short time periods. High, sudden flows in spawning streams have been known to scour out spawning areas, and silt associated with high flows will affect eggs in reds.

Limiting factors on resident fish and their habitats are similar to those for anadromous fish. However, as resident fish distribution is far more extensive than that for anadromous fish, and their life histories are measurably different, more factors will undoubtedly affect them. For example, in addition to those factors affecting anadromous fish, parasites often produce severe inroads on resident populations. Resident fish are not granted the opportunity to reside in marine environments during major portions of their lives; they must spend their winters in what can only be described as a hostile environment. Low temperatures and oxygen levels and the metabolic problems associated with them undoubtedly exert considerable influence over almost all populations which winter over in the freshwater lakes and streams of the planning area.

c) Subsistence Fisheries

Within the planning area there is a large local dependence on the fisheries resources for subsistence purposes, primarily the Copper River salmon species. Subsistence fishers in the upper Copper River for the last five years have harvested almost 209,000 salmon annually, 95 percent of which have been sockeye. At this time, all of the subsistence salmon fishing occurs on lands within the planning area that are managed by stewards other than the BLM (primarily the National Park Service and ADF&G). However, the waters contained on public lands provide a tremendous service in that they are the spawning and rearing areas for these fish stocks. It is also conceivable that at some time in the future there may be some pressure to harvest these resources on BLM-

managed lands. Other than the Copper River salmon, there is no known subsistence dependence for salmon within the planning area.

There is a long history of subsistence fishing in the upper Copper River. The first State subsistence law was passed in 1978, giving subsistence use of salmon the highest priority in allocation. In order to comply with ANILCA, the State modified the regulations in 1982 such that only "rural" residents qualified for subsistence priority. This in turn led to the creation of a personal use fishery that allowed dipnetting of salmon. In 1989 the State Supreme Court in the *McDowell Decision* determined that all State residents qualified for subsistence (*McDowell v. State of Alaska* 1989). The implementation of this decision resulted in having two subdistricts in the Upper Copper River District: the Glennallen Subdistrict and the Chitina Subdistrict.

The Glennallen Subdistrict was classified as a subsistence fishery open to all Alaska residents, and the Chitina Subdistrict was classified as a personal use fishery also open to all Alaska residents. Under State regulations, a user could fish one subdistrict or the other, but not both. In 1999 the State Board of Fisheries reclassified the Chitina personal use fishery as a subsistence fishery. In 2003 the State Board of Fisheries reversed that decision, and the Chitina Subdistrict is once again classified as a personal use fishery. Also in 1999, the Federal government assumed management of the subsistence fisheries on Federal waters only, which includes a significant portion of the Copper River. The Federal regulations mirrored the State regulations for the first two years, therefore no Federal permits were issued. However, beginning in 2002, Federal regulations were different than the State regulations, and rural users had a choice of a State or Federal permit.

At present there is a personal use fishery, a State subsistence fishery, and a Federal subsistence fishery for upper Copper River salmon. The personal use fishery and the State subsistence fishery are open to any state residence, while the Federal subsistence fishery is limited to rural residents with a customary and traditional use determination. The harvest goals authorized by the State Board of Fisheries and set by ADF&G are as follows: 60,000-75,000 for the Glennallen Subdistrict, and 100,000-150,000 for the Chitina Subdistrict. The number of fish actually harvested is listed in the Table 26.

Table 26 . Subsistence and Personal Use Fisheries Permits Issued and Harvested

	Subdistrict			
	Glennallen		Chitina	
	Permits Issued	Fish Harvested	Permits Issued	Fish Harvested
State Permits				
1998-2002 average	1,145	72,307	8,730	121,286
Federal Permits				
2002	200	20,000	143	> 1,000

The subsistence harvest has stabilized at around 200,000 Copper River salmon annually. Demand on subsistence resources is likely to remain stable or increase slightly within the next 5 to 10 years due to an increase in urban users. Commercial fishers in Prince William Sound and on the Copper River Flats take by far the greatest proportion of all salmon stocks taken in the planning area, followed by Copper River subsistence fishers and sport fishers. At present, salmon resources are fully allocated; in years when there is a biological concern, ADF&G would likely regulate the harvest through a series of emergency closures to ensure that escapement goals are met. Escapement is the portion of an anadromous fish population that escapes the commercial, subsistence, and recreational fisheries and reaches the spawning grounds.

Within the Copper River basin, very few subsistence permits are issued for freshwater species. ADF&G issues permits for 1-2 individuals per year for whitefish in the area (Rogers, 2005). Other taking of freshwater fish in the area for subsistence purposes is probably done through sport fishing permits. According to a recent publication by Simeone and Kari, whitefish and grayling traditionally made up the bulk of the freshwater fish harvest in the area. For the Ahtna people, Lake Louise and Ewan Lake were renowned for freshwater harvest. Post-1950's, after Ahtna families had settled into permanent communities along the highway, reliance and harvest of freshwater fish declined. Today, whitefish, rainbow trout, grayling, and burbot are the most frequently harvested freshwater fish, but in smaller amounts (Simeone and Kari, 2004).

Subsistence harvest in the Bering Glacier area is an important activity to Yakutat, Cape Yakataga, and Cordova residents. One of the most important subsistence activities of area residents is salmon fishing. Subsistence set netting has been done at the Duktoth, Kaliakh, Tsiu/Tsivat, Seal, Tashalich, and Kiklukh Rivers. Some residents also harvest eulachon during their run in February and March.

d) Sport Fishing

Resident fish in the planning area are some of the most heavily used in Alaska. This fact is influenced significantly by the relatively easy access to the population centers of the state. The waters in the planning area support the largest grayling, whitefish, burbot, and lake trout fisheries in the state (Walker et al. 2003). These "largest " fisheries generally do not consist of a single waterbody, but of all the waterbodies within the planning area.

Future demand on freshwater fish resources is anticipated to increase due to increases in population and the tourism industry. While there is currently a large population base of these fishes, on a single waterbody basis they are highly susceptible to the demand-associated stresses. As the primary manager of freshwater fish on public lands, ADF&G is quick to respond to demand-associated stresses, particularly overfishing, with regulatory changes that reverse these trends. Bag limits, seasons, and size limits are adjusted downward as increasing demand forces these populations into stress

situations. These regulatory changes stabilize the populations, and usually, as a side effect, regulate demand.

While all species are managed by ADF&G, only those species highly sought by fishers are actively monitored. These species include grayling, burbot, lake trout, and rainbow trout. Overall demand for these resources is stable after experiencing an increase in the early 1990s. Studies in the early 1990s by ADF&G indicated populations were reflecting smaller and fewer fish of younger age classes – classic signs of over harvesting. As a result, recent management changes have been implemented to attempt to turn these trends around.

e) Sensitive Status Fish Species

There are no threatened or endangered fish species in the planning area. Only one sensitive fish species, the Gulkana steelhead (Oncorhynchus mykiss), is found within the planning area. The steelhead trout is a migrating form of the rainbow trout. Unlike anadromous salmon species, steelhead do not typically die after they spawn. They often return to the sea after they spawn and return in subsequent years. Steelhead and rainbow trout are located in the mainstem Gulkana River and in the Middle Fork. Crucial spawning areas have been identified in the Middle Fork (Brink 1995; Stark 1999). The adult steelhead enter the Gulkana River in the early fall, overwinter in the mainstem, and spawn in the early spring.

Concerns related to the population of steelhead trout are maintaining the integrity of the spawning areas, the ability to maintain a sustainable population, maintenance of adequate corridors for young fish migration to the mainstem Gulkana, and adequate food base. It is suspected that a large portion of the young steelhead food base is composed of drifting salmon eggs and aquatic insect drift initiated by spawning salmon. The BLM is currently involved in cooperative population monitoring projects with ADF&G. In addition, ADF&G regulates steelhead fishing on the Gulkana through catch-and-release and bait restrictions.

7. Cultural Resources

The BLM is responsible for the management, inventory, documentation, and interpretation of the archaeological, historical, and paleontological resources within the district. The Cultural Program works in support of other programs as well to ensure that the Glennallen Field Office's projects, permits, and programs comply with a variety of legal mandates surrounding cultural resources.

Cultural resources within the planning area cover a large span of time from the end of the Pleistocene, around 10,000 years before present, to the Cold War era of the 1950s and later. Archaeological and historic remains within the Glennallen Field Office's boundaries include some of the State's oldest and densest prehistoric activity areas, camps, and villages; early 1898 gold rush camps and trails; one of the earliest highways and roadhouse systems in the country; and Cold War-era Ballistic Missile Early Warning System (BMEWS).

Only a small fraction of information regarding the number, distribution, and nature of these resources is known. The vast majority of heritage resources in the District have not been identified due to a number of interrelated factors, chief among them the cost and difficulty of accessing remote parts of the field office to conduct systematic archaeological or paleontological work. Other factors include the cryptic nature of the area's resources, which is abetted by dense vegetation and thick sedimentary deposits. Therefore, few systematic, area-wide archaeological surveys have been attempted within the district outside of work conducted for the Trans-Alaska Pipeline System, highway construction or realignment, and other large construction projects. The majority of this archaeological work has been what is termed "salvage archaeology," which has involved hurried excavations and research centering on sites at risk from construction projects.

The Glennallen Field Office must deal with the actual and potential damage inflicted on cultural resources from both the lawful recreational users of public lands and the criminal misconduct of vandals and looters. The first group, which largely incorporates OHV users, impacts several sites within the Field Office though ignorance of cultural resources. Basic solutions for these problems are public education, designation of appropriate uses for each trail, and a program of inventory along existing and designated trails. This inventory is required to provide a baseline for the management actions that will be taken by BLM and their compliance with the National Historic Preservation Act of 1966, as amended.

The following information is organized by planning regions delineated for purposes of both this cultural resources discussion and the paleontological resources discussion. Map 43 on page 283 illustrates the boundaries of these regions.

Map 43. EARMP Planning Regions

File size: 177 KB
File name: 43_planreg.pdf
Map size: 11x17

a) Bering Glacier-Icy Bay Region

(1) Prehistory and History

The planning area falls within the territory ascribed to the regional group of Eyaks often referred to as the Yakatags (de Laguna 1990), the Guth-le-uk-qwan or the Qwolth-yet-kwan. The Yakatags inhabited the coast line from about Cape Suckling south to Cape Yakataga (de Laguna 1990). The Eyak had several permanent villages along the shoreline of the Gulf of Alaska, including villages at the mouths of the Okalee, and Yakataga Rivers, as well as at Guyot Bay (de Laguna 1990). This group of Eyak was heavily influenced by the Tlingit since about 1850, when Eyak lore suggests increased trade with the Tlingit (de Laguna 1990). Excavations at Yakutat's Old Town indicate that the Eyak may have inhabited the coast for as long as 250 to 400 years B.P. (de Laguna et al. 1964).

The Eyak lived in sedentary villages, using a variety of boats to access resources along the coast (de Laguna 1990). Houses were rectangular and constructed with gabled roofs and vertical planks; houses or often portions of communities were surrounded by palisades for protection (de Laguna 1990). The Eyak yearly subsistence cycle began in February with the trapping of various fish beneath the ice and seal harpooning above the ice (de Laguna 1990). Various roots and other plant foods were gathered until spring and summer, when the Eyak shifted their focus to salmon, various waterfowl, and large and small land mammals, as well as a variety of berries and roots (de Laguna 1990). During the fall they gathered late berries, dried clams, and hunted fur-bearing mammals. Winter activities included hunting bears and ptarmigan as well as fishing for halibut, yet the majority of the winter activities took place in the villages and homes as indoor chores from December through February (de Laguna 1990).

Early Eyak contact with Europeans was volatile and marked by a number of conflicts. The Eyaks' first direct contact with Europeans began in 1792 when a group of Eyaks attacked Aleksandr Baranov's party in Prince William Sound (Baranov 1979). Later, Russians took a number of Eyak hostage from a village near the Kaliakh River in 1894 (Purtov and Kulikalov 1979). The Russians then established a fort and agricultural colony at Yakatat in 1796, from which the Russians hunted fur-bearing mammals with Aleut and Eskimo hunters (de Laguna 1990). The local Eyak wiped out and destroyed this fort in 1805, which the Russians never reestablished (de Laguna 1990). Later Russian attempts to explore the Copper River resulted in the employed Eyak killing their Russian masters (de Laguna 1990). Prior to contact with other Europeans, half the Eyak population along the coast was wiped out in the small pox epidemic of 1837-38 (de Laguna 1990).

American contact with the Eyak began during Abercrombie's 1884 expedition up the Copper River, where he used Eyak guides until reaching the first Ahtna village

(Abercrombie 1900). The Eyak were largely isolated until the 1880s when they were visited by a variety of Euro-American miners, missionaries, and traders (de Laguna 1990). The majority of the remaining Eyak in the early 1900s concentrated at Yakatat, where some were employed in the cannery from 1910 to about 1920 (de Laguna 1990). The remaining Eyak outside of Yakatat were forced to leave their homes around 1907 to 1910 due to increased mineral development in the area and the depletion of coastal herring and salmon resources (de Laguna 1990). Fewer than 20 people in Old Town, Cordova were the only remaining Eyak speakers along the coast by the 1920s (de Laguna 1990).

Human activity in the planning area was limited until the mid to late 1940s when the Federal Aviation Administration (FAA) constructed an airstrip and weather station just west of the old Eyak village at Cape Yakataga. The FAA constructed a road in the late 1940s to late 1950s from the airstrip to a VHF transceiver approximately 2.5 miles to the east. The bridge currently standing over the South Channel of the Yakataga River was built around 1957 to access this transceiver (Jackson 2001; FAA 1958).

Subsequently, the U.S. Air Force constructed a tropospheric communications station on Cape Yakataga in the late 1950s, which became operational as part of the White Alice Communications System's "A" route in 1960 (U.S. Army Corps of Engineers 1998). Portions of the FAA-held lands, including the bridge, were transferred to the U.S. Air Force in 1967 (Haskins 1986; Jackson 2001). The lands surrounding the road and the bridge were later transferred to the Chugach Natives, Inc. in 1984. However, an easement was retained by the U.S. Air Force for the airstrip, road, and all improvements. This road, bridge, and easement were relinquished by the Air Force through the Army Corps of Engineers, Department of the Army, in 1986 to the BLM.

(2) Current Status

This portion of the Glennallen Field Office requires very little time annually for cultural resource management. Several mining claims in the area require Section 106 review of their mining plans each year in compliance with the National Historic Preservation Act. However, none of these claims has been monitored by the Glennallen cultural staff, and potential impacts to cultural resources are presumed to be minimal. It has been recommended in Section 106 reviews of these claims, starting in Fiscal Year 2000, that the Glennallen archaeologist examine and monitor these claims for compliance. Weather conditions and the general remoteness of the area has precluded examinations up to this date.

b) Chistochina-Slana Region

(1) Prehistory and History

The areas surrounding the Chistochina–Slana region contain cultural resources that are both prehistoric and historic in nature. The Copper River drainage, in its entirety, was accessible for human habitation as early as 9,500 years B.P. when retreating glaciers and a draining pro-glacial lake may have exposed the basin (Ferrians et al. 1983; Buzzell and McMahann 1995). However, few prehistoric sites have been located and none of these has been extensively excavated within this region.

The area was occupied by the Ahtna, an Athapaskan language group, at the time of contact (de Laguna and McClellan 1981). Specifically, the Sanford River-Chistochina band occupied the Chistochina and Sanford River drainages, while the Mentasta band occupied the Slana River and north of the Suslota River as well as the area around Mentasta Lake (de Laguna and McClellan 1981). The most western portion of the planning area fell within the territories ascribed to the Gulkana-Gakona band along the Gakona River (de Laguna and McClellan 1981).

The first Euro-American exploration of the area occurred in June of 1885 when a small party of explorers under Lieutenant Henry Allen followed the Copper River north to the Slana River (Sherwood 1995:113). The party camped at Lake Suslota where they stocked up on spawning salmon before proceeding north through the pass to Tetling's on the Tetlin River in the Tanana Valley (Sherwood 1995).

The 1898 Valdez to Eagle trail as well as the winter Valdez to Fairbanks route along the Gakona River passed through the region. Prospectors pursuing gold in the Yukon in 1898 ventured along the northwestern bank of the Copper River, to continue north of the Alaska Range though Mentasta Pass (Powell 1997). Later prospectors followed the military trail, established in 1899, along the same route (Powell 1997). A branch of the trail toward Fairbanks became the dominant route for gold seekers when gold was discovered in the Tanana Valley in 1902 (Philips 1984). During the same year that gold was discovered in the Tanana Valley, the U.S. Army completed the Valdez to Eagle portion of the Washington Alaska Military Cable and Telegraph System (Quirk 1974). While the original Valdez to Fairbanks route had followed the Gakona River northward, the newly-formed Alaska Road Commission, the Board of Road Commissioners for Alaska, realigned the route with a new parallel segment of road along the Gulkana River (Bleakley 1996).

(2) Current Status

The native village of Chistochina and the Cheesh'na tribe have expressed their concerns about the current condition of a 17(b) easement and the historic, native Chistochina trail. The village has even produced a film entitled "I Am A Trail," which addresses the historic importance area natives have placed on the trail as well as

current uses and the trail's overall poor condition. A preliminary investigation indicates that the trail may qualify under National Register criteria for a place of religious and cultural importance under Section 101 (d) of the National Historic Preservation Act. This would require additional management responsibilities on behalf of the BLM to mitigate adverse effects on this resource. It is recommended that the BLM perform a National Register Eligibility Determination or that BLM agrees in accord with the Alaska State Historic Preservation Officer to treat the trail as eligible to the National Register. The result would be a programmatic agreement covering only the portion of trail that the BLM administers, while inclusion of the State of Alaska in the agreement would encourage communication and cooperation between the Village and the State.

c) Denali Region

(1) Prehistory and History

The Denali region contains cultural resources that are both prehistoric and historic in nature, but the best archaeological information from the area is from the Nenana River drainage. The Upper Nenana was accessible for human habitation at several times during the late Pleistocene; however, the earliest that the Upper Nenana drainage could retain evidence of human occupation is after the McKinley Park III stage around 11,800 years B.P. (Bowers and Mason 1992). Previous glacial episodes have remodeled the landscape within the drainage dramatically, leaving little possibility for in situ evidence for earlier human use of the area.

Several cultural traditions are represented in the Nenana drainage spanning from the Pleistocene to the late Holocene. The earliest evidence of human occupation of the drainage is from the Dry Creek Site located near Healy. Dry Creek is a terminal Pleistocene site, whose earliest component has been dated to about 11,120 years B.P. and is ascribed to the Nenana complex on the basis of its representative tool types (Hoffecker et al. 1996). The Denali Complex, dating around 10,690 years B.P., is also represented at Dry Creek (Hoffecker et al. 1996), as well as at the Carlo Creek Site. The Carlo Creek Site contains evidence of both a Denali Complex occupation, dated around 9,500 to 8,500 years B.P., and a technologically unidentifiable occupation, dated around 6,700 years B.P. (Bowers and Mason 1992). The drainage also contains sites of the late Athapaskan period, around 500 to 300 years B.P., in the vicinity of the Nenana River Gorge (Bowers and Mason 1992).

There is also good evidence that the nearby Susitna River drainage to the east was occupied as early as the middle of the Holocene. The Ratekin Site has been interpreted as a caribou kill and butchering site (Skarland and Keim 1958) with a Northern Archaic aged assemblage as its oldest component.

Historically, the Western Ahtna and Tanaina primarily used the Upper Nenana drainage, while the Lower Tanana used the lower Nenana drainage. Both the Ahtna and Tanaina

speak closely-related Athapaskan languages and share close cultural affinities between the Western Ahtna and Upper Cook Inlet Tanaina (de Laguna and McClellan 1981).

Both peoples used the area seasonally and had no known permanent camps until the twentieth century. The Tanaina had an established village at Stephan Lake southeast of the project area as well as a camp at Chulitna Creek to the south. However, the closest Ahtna camp was at Tyone Lake (de Laguna and McClellan 1981). The Tanaina used the region around the project area as part of their seasonal ground in late summer when they traveled to the mountains to hunt caribou and mountain sheep, which usually involved moving their families long distances from summer fish camps to temporary mountain camps (Townsend 1981). Families accompanying these mountain hunters usually snared ground squirrels while the men hunted larger game (Townsend 1981). The Western Ahtna were more dependent than other Ahtna groups on large game due to a lack of access to salmon streams (de Laguna and McClellan 1981). They relied on the area for hunting caribou and mountain sheep into the twentieth century.

The earliest recorded Euro-American exploration of the area occurred in 1898, when G.H. Eldridge and Robert Muldrow of the U.S. Geological Survey as well as Sergeant William Yanert of the U.S. Army, followed the Susitna and Chulitna Rivers north to the Yanert Fork immediately north of the project area. Gold was discovered on Valdez Creek in 1903, which resulted in a rush of gold seekers to the region as well as the development of a small mining community (Dessauer and Harvey 1980). This mining community, which was composed of both Euro-American and native miners, flourished until the 1920s, with corporate mining shutting down during World War II (Dessauer and Harvey 1980).

During construction of the Alaska Railroad, a small railroad construction community of Ahtna and Euro-Americans grew up at nearby Cantwell around 1916 (de Laguna and McClellan 1981, Dessauer and Harvey 1980). When the railroad was completed from Seward to Cantwell through the Chulitna and Nenana River valleys in 1919, it provided a railhead for supplying miners in Valdez Creek as well as the new community at Cantwell (Dessauer and Harvey 1980). Much of the Valdez Creek mining community was abandoned in the 1940s due to a decline in gold profits. Mining in this region has continued until the present. Unfortunately, much of the historic community was bulldozed in the late 1970s (Dessauer and Harvey 1980).

(2) Current Status

The BLM currently administers a number of commercial mining claims in the Valdez Creek drainage; however, little additional impact is expected from these small family-operated claims. These claims see few additional acres of impact per year in an area that has been impacted by mining since the early 1900s. Previous impacts have removed many of the historic structures and features associated with the early mining site in the area, leaving only the Denali Post Office in its original location and close to its original condition. Likewise, although the John Babel rock cabin has remained in its

original location, it is in poor condition and is in continual danger of collapsing or being removed by nearby mining activity since it is only 100 feet from active mining.

There are, however, additional historic remains within the Valdez Creek drainage, including a native miner's cabin and the remains of a reconstructed miner's cabin. The major threat to all these aforementioned resources are not related to mining but to vandalism, unauthorized reconstruction, and neglect. Several of the original structures associated with the Denali townsite and Valdez Creek mines have been bulldozed or burned by various individuals who feared the creation of a historic district, which they perceived would have limited the ability to mine in the area. Also two structures have been moved or reconstructed over the years. The native cabin was reconstructed by workers at Cambior Mining in the mid 1990s, and has continued to be reconstructed and modified by trespass users, including area hunters, since. The second miner's cabin was moved by Cambior, also in the mid-1990s, from its original location near the location of the central Denali townsite. It has since seen some reuse and reconstruction; generally the condition of this cabin is poor. Beyond the standing structures there are also numerous historic features including water ditches, freight sleds, and collapsed structures that require additional relocation, mapping, and documentation.

An additional impact to the area's historic resources is the illegal removal of artifacts from the native miners' townsite. This is the result of a lack of management presence in the area, as well as a lack of law enforcement presence.

d) Gulkana-Delta Region

(1) Prehistory and History

The Gulkana-Delta region encompasses some of the densest and best investigated clusters of archaeological sites within the Glennallen Field Office's management area. The region includes the Tangle Lakes Archaeological District, as well as some of the least investigated prehistoric remains for the entire region, namely within the Gulkana and Delta River corridors. North of the Copper River Basin in the Tangle Lakes Archaeological District there is ample evidence for early Holocene occupation of the area by hunter gatherers as early as 10,000 years B.P. (West 1996). Occupation in the Tangle Lakes spanned the entire Holocene, with a possible occupational hiatus between the Denali and Northern Archaic age occupations (West 1975). However, some of the most intriguing sites in the area follow an ancient, elevated strandline of a fossil, pro-glacial lake shore, which dates to around the end of the Pleistocene and the early Holocene (West 1996). The Tangle Lakes Archaeological District alone contains over 500 archaeological sites clustered near the headwaters of both the Gulkana and Delta Rivers (Bowers 1989).

The prehistory south of the Alphabet Hills and the Tangle Lakes Archaeological District is limited to knowledge gleaned from a handful of sites along some of the youngest landforms of the Gulkana and Copper Rivers. The Copper River Basin's prehistory is limited to the last thousand years from excavations at Dakah De'Nin's village (Shinkwin 1979), the Ringling Site (Workman 1976; Hanson 1999), and at Paxson Lake (Ketz 1983). One of these sites, the Ringling Site, appears on a low, relatively young river terrace that is approximately 200 feet lower in elevation than the surrounding Lake Ahtna sediments. Thus, no intact sites have been located or excavated south of the Alphabet Hills that are older than about 1,000 years B.P.

There is tantalizing evidence for much older occupations of the Copper River Basin. During construction of the Trans-Alaska Pipeline, Hogan Hill 1 (or GUL-078) was largely destroyed and left out of context by material removal from a nearby rock quarry. The site was believed to originate on the beach sands of the former pro-glacial lake level at about the 2,350 foot contour (Clark 1975). Artifacts consisted of waste flakes and a few formed artifacts, including a flat based dart sized, projectile point (Clark 1975). However, testing in the vicinity located no in situ materials (Clark 1975).

Clark also located Little Tonsina 21 on a large moraine/terrace west of the Little Tonsina River, which yielded a number of waste flakes and a single wedge shaped microblade core reminiscent of Denali cores (Clark 1975). This site was, however, largely a surface scatter with little subsurface potential (Clark 1975). Both of these sites indicate the likelihood that a much richer prehistory exists within the Copper River Basin than has previously been documented.

Most of the Gulkana-Delta region falls within the territories claimed ethnographically by the Gulkana-Gakona band of the Ahtna, an Athapaskan speaking group who occupied the majority of the Copper River Basin (de Laguna and McClellan 1981). This band occupied the Gulkana and Gakona River watersheds from below the confluence of the Gulkana River with the Copper River north to the southern end of the Alaska Range (de Laguna and McClellan 1981). Their lands bordered to the north within the Delta River valley, near the northern edge of the region, with the lands of the Tanana, who primarily used the Delta River Valley as a trade and exchange route with the Ahtna (McKennan 1981).

Ahtna subsistence patterns generally focused on runs of anadromous salmon, with a more limited focus on resident mammals, birds, and fish. Most resources were pursued from seasonal satellite camps. Salmon camps were occupied through the spring and summer, while dispersed hunting camps were occupied through the fall (de Laguna and McClellan 1981). Within the area of Paxson Lake, large numbers of caribou were driven into the lake and speared from skin boats (Reckord 1983a). During the winter, families congregated in large winter houses near the summer fish camps, dispersing in January and February to exploit other resources which included a larger proportion of fur bearing mammals after European contact (de Laguna and McClellan 1981).

Major Ahtna villages were generally located near the confluences of rivers. Two major winter villages of this band were located at the confluences of the Gulkana and Gakona Rivers with the Copper River (de Laguna and McClellan 1981). A large winter village located on the shores of Paxson Lake, also known as Spring Water Lake, was occupied by the Gulkana-Gakona band during the 1800s (Reckord 1983a). The large winter villages were comprised of less than nine multifamily houses, which were typically rectangular and semi-subterranean (de Laguna and McClellan 1981).

The Ahtna's first contact with Europeans came around 1796, when Tarkhanov traveled from Yakutat to the Copper River Delta; here Tarkhanov encountered Chief Kaltysh from the village of Takekat, who traveled annually down the Copper River to prepare yukola (Lethcoe and Lethcoe 2001). After Russian interests in Alaska passed to the U.S. in 1867, Lieutenant W. R. Abercrombie of the U.S. Army unsuccessfully attempted to enter the Copper River Basin in 1884. Subsequently, in 1885, Lt. Henry Allen led an expedition into the basin where he came into contact with the lower Copper River Ahtna, including Chief Nicolai of Taral (Sherwood 1995). Large scale Euro-American contact with the Gulkana-Gakona band of the Ahtna did not occur until after the discovery of gold on the Yukon River in 1896.

Gold seekers attempted to reach the Yukon gold fields via an all-American route reported by Lt. Abercrombie in 1885, resulting in a stampede of prospectors into the Port of Valdez and over the Valdez Glacier in 1898 (Lethcoe and Lethcoe 2001). These prospectors followed a variety of routes across the basin while prospecting and attempting to reach the Yukon (Lethcoe and Lethcoe 1996). A number of these routes used existing Ahtna trails, including a route along the Copper River past the mouth of the Gulkana River (Lethcoe and Lethcoe 2001).

The military trail between Eagle City and Valdez was established in 1899, largely following the Copper River north from Copper Center. A branch of the trail toward Fairbanks became the dominant route for gold seekers when gold was discovered in the Tanana Valley in 1902 (Philips 1984). During the same year that gold was discovered in the Tanana Valley, the U.S. Army completed the Valdez to Eagle portion of the Washington Alaska Military Cable and Telegraph System (Quirk 1974). The original Valdez to Fairbanks route had followed the Gakona River northward; later, the newly formed Alaska Road Commission, the Board of Road Commissioners for Alaska, realigned the route with a new parallel segment of road along the Gulkana River (Bleakley 1996).

Gold was discovered in 1903 far to the east of the Valdez to Fairbanks trail in an area called Valdez Creek near the Susitna River (Dessauer and Harvey 1980). Since the most viable access to the entire Copper River Basin was from the port of Valdez and the newly pioneered trail, several branch trails were traced westward, often following older native trails toward the gold fields (Dessauer and Harvey 1980). These trails included the Bear Creek Trail, the West Fork of the Gulkana Trail, the West Fork Trail via Clearwater Creek, the Middle Fork of the Gulkana Trail, a trail from Paxson's Roadhouse to the Maclaren crossing, and the Yost Trail (Dessauer and Harvey 1980).

Almost all of these trails later fell into disuse after the construction of the Alaska Railroad between Seward and Cantwell in 1919 and the blazing of a new overland route to Valdez Creek via Cantwell (Dessauer and Harvey 1980).

Long after the Valdez to Fairbanks section of the military trail was completed in 1906 as a packhorse trail and as a winter road by 1908, however, it remained in heavy use by travelers (Bleakley 1996). The route became passable for automobiles by 1913 and was re-designated as the Richardson Road in 1919 (Bleakley 1996). The Washington Alaska Military Cable and Telegraph System line eventually followed the same route as the Richardson Road, with a new line strung from Gulkana to Big Delta that was operational by 1907 (Phillips 1984). This section of telegraph line was in service until 1925 when it was decommissioned in favor of wireless radio communication (Phillips 1984).

Heavy use of the Valdez to Eagle and Valdez to Fairbanks routes by visitors and residents of the state created a demand for small entrepreneurs to provide food and lodging at various intervals on the trails. As early as 1898, Andrew Holman established a temporary roadhouse at Copper Center to serve as a shelter, store, and post office for the early miners entering the area (Phillips 1984). Since that time and up to and including recent years, roadhouses have appeared at various locations along the trail and road system. Various establishments have included Dry Creek Roadhouse, Gulkana Trading Post and Hotel, Gakona Roadhouse, Gillespie's Roadhouse, Roosevelt Roadhouse, Timberline Roadhouse, Poplar Grove Roadhouse, Sourdough Roadhouse and Trading Post, Our Home Roadhouse, Abbott's Roadhouse, Meier's Roadhouse, Paxson's Roadhouse, Yost's Roadhouse, Casey's Cache, Miller's Roadhouse, and Rapids Roadhouse (Phillips 1984). Since the heyday of the roadhouses from about 1898 to about 1923 (Phillips 1984), the Richardson Highway has continued in modern use and has been the primary route for development of the Copper River Basin.

One of the Cold War developments along the Richardson Highway within the planning area was the U.S. Air Force's Ballistic Missile Early Warning System (BMEWS)/Rearward Communication also know as the "White Alice System." The system was constructed as a link between Distant Early Warning (DEW-Line) radar systems monitoring the Soviet Union and the North American Air Defense (NORAD) headquarters in Colorado (Reynolds 1988). Several microwave facilities, known as TD-2 Stations, were constructed along the Richardson Highway as part of the "A" route, which connected Neklassen Lake to the south with Pedro Dome to the north (Reynolds 1988). The TD-2 facilities located within the planning area included Glennallen (GUL-126), Aurora (GUL-125), Paxson (GUL-127), McCallum (XMH-393), and Black Rapids (XMH-392), all of which were constructed in 1960 and operational by 1961 (Reynolds 1988).

(2) Current Status

Although the Gulkana-Delta region has received the most archaeological work, the area has a large number of inventory gaps. Neither the Delta nor the Gulkana Wild and Scenic River Corridors have received any systematic surveys despite having their headwaters in the dense early Holocene archaeology of the Tangle Lakes Archaeological District. Therefore, little is known about prehistoric subsistence patterns within the Copper River Basin as a whole, since only recent sites (e.g., 1,000 years old and newer) have been excavated south of the Tangle Lakes. Beginning in fiscal year 2003, the BLM initiated a systematic random sample and geoarchaeological investigation of the Gulkana River corridor, which has borne initial fruit by increasing knowledge about prehistoric resources and the distribution of more recent historic (and possibly proto-historic) aged sites (Keating and Jangala 2003). These surveys have increased baseline knowledge about the river corridor's archaeology and the potential effects of future management strategies on those resources. Additional and similar surveys are planned along the Delta River corridor starting in fiscal year 2007.

Beyond gaps in inventories and archaeological knowledge, there are currently three threats to cultural resources located within the boundaries of the Glennallen Field Office. Since the addition of the Tangle Lakes Archaeological District to the National Register of Historic Places in 1972, there has been an increase in both OHV use and trail impacts to archaeological sites in this area. These increases have removed some of the vital vegetative cover from the thin, fragile soils covering several recorded sites spanning virtually the entire Holocene. In response to this problem, the BLM has used experimental trail hardening materials in those areas with wet soils that are not able to withstand the weight and traffic to which they have been exposed. The trail hardening would also attempt to discourage the user-created braided trail patterns that have developed in these wet areas. The BLM has also increased signage along both designate and non-designated trails. This signage is continually replaced each year due to heavy attrition from non-compliant OHV enthusiasts. Increased law enforcement has also resulted in the issuance of a small number of fines to the minority of OHV users in the area who intentionally travel off designated trails. While these efforts have reduced overall impacts to sites and slowed the apparent creation of new trails, compliance with vehicle restrictions remains a problem within the Glennallen Field Office.

The second threat to heritage resources within this region is the natural decay and disturbance of sites. There are several cabins and cabin remains that have naturally decayed and collapsed, with virtually no possibility of reconstruction. However, there are a small number of historic cabins, including the Dawson Norwood Cabin on the Gulkana river, which are in immanent danger of collapse. There is the possibility that some of these may be suitable for future stabilization efforts and interpretive use. Other sites, including the Sourdough Gene site at Sourdough Campground, are eroding from a combination of human traffic and natural erosion from flooding.

The third threat to cultural resources in the region is deliberate vandalism and looting; however, only a few of these incidents have come to light within the planning area. There have been at least two looting incidents in the Tangle Lakes Archaeological District. The first documented case was of a looter in the Kenai National Wildlife Refuge who also had in his possession several artifacts looted from the Tangle Lakes and an unknown number of sites. The second incident relates to a looter's pit dug into a site above Tangle Lakes campground, located during fieldwork in fiscal year 2000 (Jangala 2001). A few historic cabins have also been vandalized along the Middle Fork of the Gulkana River canyon; timber from the structures had been removed to feed campfires.

The BLM is attempting to lessen the risk of this kind of looting and vandalism on at least two properties through periodic monitoring. The BLM has agreed to monitor two sites near the Paxson Lake Campground to ensure that no adverse effects impact the sites.

e) Nelchina Region

(1) Prehistory and History

At the time of European contact, the area was occupied primarily by the Ahtna Athapaskan Natives, although the area was also used by the Tanaina of the Knik Arm and Susitna River (de Laguna and McClellan 1981; Townsend 1981). The majority of trade and interaction between these people occurred to the north of the project area near the source of the Susitna River between the Upper Ahtna and Tanaina (de Laguna and McClellan 1981).

The Tyone-Mendeltna band of the Ahtna occupied the area around Tazlina and Susitna Lakes as well as the area around Lake Louise. Major villages in the area included lodges at the mouth of the Mendeltna River, Matanuska Village, Lake Louise, and Tyone Lake (de Laguna and McClellan 1981).

The first Euro-American exploration of the project area was accomplished under the orders of Captain Edwin Glenn in 1899, who directed Lieutenant J. C. Castner to cut a trail from Knik Arm to the Matanuska River (Cole 1992). Castner succeeded in continuing past the Matanuska's headwaters to Lake Louise, the Delta River, and eventually to the Tanana River (Cole 1992). The area, however, did not see much use until construction of the Glenn Highway during World War II. Monies were appropriated for the Alaska Road Commission in 1941 to construct the highway, which was completed in about four years.

(2) Current Status

The BLM oversees few activities in this area. Section 106 work for compliance with the National Historic Preservation Act is required in the area on a sporadic basis that leaves no ability to plan for projects. However, there is currently a paleontological inventory

need within the Talkeetna Mountains to assess additional potential for significant vertebrate remains. This is a project that is proposed for an undetermined time when the University of Alaska Fairbanks can work on this project jointly with the BLM, perhaps as a Cooperative Ecosystems Study Unit project.

f) Tiekel Region

(1) Prehistory and History

Although this region was largely inundated during most of the Pleistocene by the waters of Pro-Glacial Lake Ahtna, it was opened to human occupation around 9500 years B.P. after the lake's draining (Ferrians et al. 1983). The few excavations conducted in this area, namely Dakah De'Nin's village, have yielded relatively young remains (Shinkwin 1979) that fall within the nineteenth century. Conversely, there is only a vague hint of earlier archaeology in the area from deflated surface sites in the Tonsina drainage, notably Little Tonsina 21, which was discovered by Clark (1975). This small surface site contained several waste flakes and a single wedge shaped microblade core similar to those ascribed to the Denali Tradition (Clark 1975). Little else is known about this region's prehistory.

According to de Laguna and McClellan (1981), the project area lies on the border of territory claimed by the Lower Ahtna Athapaskan Natives and the Chugach Pacific Eskimo at the time of Euro-American contact. The Ahtna people occupied numerous primary residential sites along the Copper River including the vicinities of Copper Center, Lower Tonsina, and Chitina (otherwise known as Taral). These residences were occupied most of the year, primarily due to stored salmon caught during the summer (de Laguna and McClellan 1981). Short term hunting camps were once located close to seasonally available resources such as moose, caribou, and sheep (Buzzell and McMahann 1995). The Chugach primarily occupied the coast of Prince William Sound, hunting marine mammals and fishing for a variety of fish.

The Ahtna utilized numerous transportation networks. In general, local paths were used for subsistence activities while longer trails were used for trade and occasionally for raiding (Bleakley 1996). These routes usually followed natural corridors such as river valleys and traversed the more obvious mountain passes. Trade occurred among the different Alaska Native groups and both oral and documentary evidence suggests that the Ahtna regularly held intertribal trade fairs within the Richardson Highway corridor, including ones near Thompson Pass (Bleakley 1996). According to West and Workman, the "trade route used by the Ahtna to bring copper and other interior products to the sea up to the 1860s crossed the divide via the Tiekel River and followed the valley of the Lowe River to the Valdez Arm . . . This route parallels the Richardson Highway" (1970).

Russian explorers discovered the mouth of the Copper River in 1783. In 1819 Russian Ensign Klimovskii made the first successful ascent of the Copper River, reaching the mouth of the Chitina River (Bleakley 1996). Here he established a trading post which endured, off and on, for the next 40 years. The Spanish explorer Francisco de Eliza visited Prince William Sound in 1790; during this voyage, one of his captains, Salvador Fidalgo, named the Port of Valdez after the celebrated Spanish naval officer Antonio Valdez y Basa. The U.S. purchased the region in 1867; during the 1880s several American expeditions entered the area to explore and trade. The discovery of gold on the Klondike (1896-98) precipitated the first intensive movements of non-native explorers into the project area. Lured by local promoters, thousands of stampeders were brought to Port Valdez in hopes of following an “all-American route” to the Klondike. Unfortunately, the prospectors found only one way across the Chugach Range: an exceptionally difficult and dangerous path over the Valdez and Klutina Glaciers (Bleakley 1996). These miners constructed cabins and other structures along the route, most notably along the shores of Klutina Lake at locations called Peninsula Camp and Klutina City (Benedict 1899).

In the spring of 1898 the army sent Captain William R. Abercrombie to Port Valdez to locate a safer path. The captain followed the remains of the Chugach Trail leading to the north toward Keystone Canyon and an Ahtna path leading up the western bank of the Copper River, both routes eventually utilized by the Valdez Trail (Bleakley 1996). Apparently similar paths existed elsewhere along the route. Specifically concerning the project area, “Lieutenant Walter C. Babcock related finding an ‘old Indian . . . foot trail’ along the Little Tonsina River. It had evidently been much used at one time, as there were numerous signs of brush cutting done many years ago, and the trail for long distances was worn down to a foot or more below the natural surface” (Babcock 1899).

In 1899 Abercrombie returned to the region and, utilizing hand tools, his soldiers built a 93-mile packhorse trail from Valdez to the Tonsina River. The construction continued and in 1901 the trail was completed to Eagle City. This trail has been called the Valdez-Fairbanks Trail, Military Trail, Government Trail, Eagle Trail, and Valdez Trail (Phillips 1984). The trail was originally created for pack and saddle horses, but was passable by wagon by 1910. By 1913 the first motorized vehicle traveled the entire length of the trail (Bleakley 1996).

By the fall of 1898 gold had been discovered in the Tonsina and Tiekel areas. During the next three years discoveries were made on the Chistochina, Nabesna, and Nizina Rivers. Gold strikes in the vicinity of Fairbanks around 1902 helped established another branch of the trail. About 1906, the main trail was diverted at Gulkana and directed towards Fairbanks (Phillips 1984). Through the years road houses were built along the trail corridor to provided food and shelter. Approximately 56 roadhouses were reported to have been built along the corridor.

This route follows the Tsina River to the Tiekel, which it traces to its headwaters. It next crosses a low divide leading to the top of the little Tonsina. Here two variations exist: a summer trail, bearing to the east, traverses Kimball Pass and descends Bernard Creek

to the Tonsina River, while a winter path, bearing further west, follows the Little Tonsina to the same destination (Bleakley 1996). The route then heads north to Copper Center and follows the west banks of the Copper River to the Gulkana River. Here the trail splits: one branch leads east to Eagle and the other continues up the Gulkana River, eventually ending in Fairbanks.

Overlying and closely paralleling the trails are the Richardson Highway and the Tok Cut-off. The Valdez-Fairbanks trail eventually became known as the Richardson Highway, named after General Wilds P. Richardson, who was president of the Alaska Road Commission from 1905-17 and played a prominent role in the highway's construction. Little evidence of the original trail exists today as changes and reroutes were made throughout the years. Major sections of the trail were obliterated by turning the trail first into a wagon road, then into a motor vehicle route, and finally into a modern highway (Phillips 1984).

One year after the military trail began, the Federal government authorized the building of the telegraph line to connect the various Army forts in the state. The communication link was called the Washington-Alaska Military Cable and Telegraph System. In 1901 the cable was installed from Valdez to Gulkana, and by 1902 the line was connected from Valdez to Eagle (Phillips 1984). The entire system connecting the Army forts with the central station at Fort St. Michael on Norton Sound was operational by 1903 (Quirk1974). The telegraph line utilized the Valdez-Eagle trail as a transportation corridor – the line was installed adjacent to the trail. The telegraph line roughly follows the Richardson Highway to Gulkana, except in the Tonsina drainage where it follows the Valdez-Fairbanks "summer trail" through Kimball Pass (Phillips 1984). Between Valdez and Gulkana a total of six telegraph stations were installed between 1900-01: Keystone, Tsina River, Tiekel, Tonsina, Copper Center, and Gulkana. In 1905 plans were made to replace the original telegraph stations with new log cabins. Through the years all stations along the line were replaced. In the 1920s the Signal Corps decided to phase out the telegraph system on the Richardson Highway. In 1925 the closing down of the system began. After 1936 the telegraph line was used as a telephone line.

(2) Current Status

The Tiekel region is currently the site of several commercial helicopter-accessed recreational skiing operations, though few Section 106 investigations per the National Historic Preservation Act occur yearly. Additionally, since the area is predominantly used for recreation and hunting, there are few heavily impacting activities in the area. Recent BLM work has begun to focus on possible features and archaeological remains associated with the early Holocene shorelines of Lake Ahtna in the vicinity of the Little Tonsina's headwaters. Inventories have been conducted to inventory trails and associated historic remains of the 1898 to 1940s Valdez Trail as well as local historic mining and trapping related structures and camps (Jangala 2002; 2003). These inventories have pointed to serious historic resource problems in the area caused by impacts to sites from visitor use

These inventories have led to the discovery of two historic sites: a pre-1917 prospector camp associated with the Valdez Trail and a 1920s mining camp. Both sites are currently being impacted by recreational OHV traffic, with one of the sites exposed and its context degraded by passage of OHV traffic. Since this site may be eligible as a contributing property under the Valdez Trail Multiple Property Nomination, it is of special concern for management purposes. The other site is being impacted by OHV users scavenging wood from collapsed structures for fires.

Another impact noted during surveys is the discovery of recent evidence of looting within archaeological sites of National Register significance. The 1898 Peninsula Camp site was recently looted by an unknown party using a metal detector for remains. It has been noted that this looting of sites on public lands, lands managed by both the BLM and the State of Alaska, has occurred for a long period of time and over a broad area, evidenced by extensive collections of historic remains in the Copper Center Museum.

8. Paleontological Resources

Paleontological remains on Glennallen Field Office lands span from Late Triassic age pelecypods, to Cretaceous age hadrosaurs, to Pleistocene age mammal remains and early Holocene age plant remains. Paleontological research has been at a standstill, with only occasional and accidental discoveries by amateur paleontologists and mining operations adding additional information to the region's prehistory.

Currently no systematic inventory for paleontological resources occurs within the Glennallen Field Office. Because the Statewide Inventory of cultural resource sites maintained by the State of Alaska also includes known paleontological sites on BLM lands, that information is also reviewed whenever every Section 106 review is done for compliance with the National Historic Preservation Act. Occasional remains are located on an irregular and unpredictable basis. Paleontological research permits are issued on an as-needed basis by the BLM Alaska State Office as well as by the Glennallen Field Office to interested researchers. This permit requires that the researcher submit a report of the season's findings so that the BLM is better able to manage newly located remains.

During the past few years, independent paleontological research has been conducted in only two areas. The recession of the Bering Glacier has exposed a variety of botanical and invertebrate specimens from the last 10,000 years. These remains have been studied by several researchers from the University of Alaska Anchorage as part of an ongoing paleontological research project focused on past climate. Additional, incidental research has been conducted by researchers in the Talkeetna Mountains, where 90 million-year-old dinosaur and marine reptile remains have been located. The recent 2003 location of a set of marine reptile remains was found as part of a research effort in the vicinity of Cameron Pass by a University of Alaska Fairbanks paleontologist in his spare time. Future work is planned at both the Bering Glacier and in the Talkeetna Mountains to locate and collect a variety of paleontological remains. However, both projects are dependent upon university funding and the availability of the interested researchers.

The following information is organized by regions delineated for purposes of both this paleontological resources discussion and the previous cultural resources discussion. Map 43 on page 283 illustrates the boundaries of these regions.

a) Bering Glacier-Icy Bay Region

There are numerous paleontological sites located in the Bering Glacier region, with deposits ranging from the Pliocene to the Jurassic/Cretaceous as well as the Late Holocene, with the oldest sediments being farthest inland (Lindsey 1986). The oldest

fossils, poorly preserved brachiopods, pelecypods, gastropods and forams, are Jurassic or Cretaceous aged and located in the greywacke, argillite and slate of the Yakutat group; however only one locality has been noted on BLM lands (Lindsey 1986). The Kushtaka and Kulthieth Formations are Late Eocene and Early Oligocene age deposits of sandstones, siltstones, and thin coal beds, which contain both marine gastropods and pelecypods as well as terrestrial plants (Lindsey 1986, p. 13). Elsewhere, the Katalla and Poul Creek Formations, which range in age from the Oligocene to the Miocene and possibly the Pliocene, contain terrestrial plants, angiosperms, and pectins, as well as marine fauna, mostly pelecypods and gastropods (Lindsey 1986).

During an overflight of the Bering Glacier's terminus in 1998, a BLM wildlife biologist located the ancient remains of sheared off trees and other organic debris in a small drainage. In 1998 and 1999, biologists and paleontologists from the University of Alaska were contacted and subsequently conducted an investigation of the area. The site is estimated to be approximately 10-15 acres in size and is located at the bottom of a drainage. It contains standing and collapsed dead trees as well as a peat layer around the tree roots. The site contains numerous species of plants in the peat layer and a large percentage of the site area is fully exposed. Tree ring counts indicate the Bering specimens were between 160 and 250 years old when overrun by the glacier.

b) Denali Region

There are numerous paleontological remains within the Denali region and to the east, along a large portion of the Alaska Range. Fossils within the Healy quadrangle are from Late to Middle Devonian aged limestones (Lindsey 1986). These rocks contain coelenterates, bryozoans, brachiopods, corals, gastropods, and trilobites, which are poorly preserved but represent the oldest fossils found in this range (Lindsey 1986).

More recent quaternary fossils include two tusk fragments likely from a mammoth (*Mammuthus* sp.) as well as a caribou (*Rangifer*) antler fragment from deep gravels excavated by Cabior Mining Company in the Valdez Creek drainage (Gangloff 1995). These fossils represent some of the best evidence for Pleistocene megafauna south of the Alaska Range.

c) Gulkana-Delta Region

Numerous Pennsylvanian aged fossils of brachiopods, corals, ammonites, and trilobites have been reported in the vicinity of the Delta River and Phelan Creek in an area known as Rainbow Ridge (Lindsey 1986). However, the majority of the southern region (south of the end of the Delta River National Wild and Scenic River's wild and recreational portion designations) is poorly known paleontologically. Recently, a fossil specimen, apparently belonging to the order Dendroidia, was located in frost fractured argillite

cobbles along a remnant glacial feature east of the Tangle Lakes and north of Swede Lake in the Tangle Lakes Archaeological District (Jangala 2003).

Additionally, one important Quaternary age fossil locality is known to occur within the Tangle Lakes Archaeological District. This site has been dated by a series of nine radiocarbon dates to between 11,800 and 7,700 years B.P., and consists of a 14 meter-long, 3 meter-thick organic-rich exposure eroding out of a 20 meter-high bluff, which is associated with an early Holocene fossil lake shore strandline. This site has added significantly to our understanding of the area's late Pleistocene and early Holocene paleocology, and has a direct bearing on the location and dating of the region’s early archaeology. The site has yielded perhaps the earliest direct date (7,700 B.P.) of post-glacial spruce macrofossils in Alaska (Bowers 1989), and has been described in preliminary reports by Schweger (1981) and West (1981).

d) Nelchina Region

There are a variety of paleontological remains eroding from the southern portion of the Talkeetna Mountains, including numerous invertebrates and the only truly fossilized remains discovered south of the Alaska Range. These were a set of Hadrosaur, or duckbilled dinosaur, remains located in shallow marine sediments in 1994 and exposed by a private gravel pit alongside the Glenn Highway. Recently a paleontologist from the University of Alaska Fairbanks reported finding a previously unrecorded example of possible plesiosaur remains near the Cameron Pass vicinity. Also located in this vicinity in 1990 was an Edmontonia skull from a Nodosaurid Anklosaur in a creek bed in the western part of this range (Gangloff 1995).

9. Visual Resources

The BLM's Visual Resource Management (VRM) program attempts to balance the uses of public lands with the protection of areas containing a high scenic values. Scenic quality is an essential component of most recreation activities. Recent studies indicate Americans enjoy a wide variety of outdoor activities that depend on high quality visual resources.

The BLM is responsible for managing the negative impacts that surface-disturbing activities can have on the visual resources of all public lands. Visual Resource Management ensures that scenic values are maintained while allowing for multiple uses to occur on public lands. The VRM classes and their objectives are:

- **Class I.** Objective: To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
- **Class II.** Objective: To retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
- **Class III.** Objective: To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
- **Class IV.** Objective: To provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

All mining operations within the planning area are required through their Plan of Operations to mitigate for impacts to visual resources. These measures can include revegetation of impacted areas with native seed, using natural barriers to disguise mining activities, seasonal restrictions on surface disturbing activities, and transport of mining equipment. Currently, there are no large scale mining activities within the planning area.

Timber sales within the Glennallen Field Office are generally small in size because of a lack of infrastructure and the unavailability of high value, marketable timber. A timber sale proposed for the Tonsina Bluffs area near Kenny Lake has used buffer distances from existing trails to address public concern about the visual and social impacts of a timber sale in that area (Calderwood 2003b). Forestry practices will address visual resources through the use of frozen ground and snow cover to mitigate surface disturbing activities and their associated scars on the land and vegetation, as well as the replanting of forested areas to sustain the resource.

The effect of fire on the visual resource is primarily beneficial but can be adverse in areas of high visual sensitivity. In general, areas of high visual sensitivity correspond to major travel corridors and population centers. Wildfire is an integral part of the ecological process that maintains or enhances natural visual diversity. In the short-

term, a small fire (up to 50,000 acres) may blacken an area, creating sharp visual contrast and possibly visual interest (Calderwood 2003a). Extremely large, severe fires (over 50,000 acres) with few unburned or less severely-burned inclusions, can create large expanses of blackened landscape which are monotonous and result in reduced visual impact on some users (viewers), although others will view the scene positively or make no value judgment. Even large burned areas may create a pleasing visual effect once vegetation regrowth has begun.

Fire suppression can cause highly adverse damage to visual resources. Short-term impacts are generally acceptable unless viewed from observation positions such as highways, high use areas, or scenic overlooks (Mclain 2004). Long-term impacts are unacceptable and are usually a result of bulldozed firelines. Bulldozers disturb the organic mat and expose mineral soil, creating distinct unnatural lines across the landscape and sharp color contrast that may take decades to disappear (Mclain 2004).

Increased OHV use throughout the Field Office has created a web of trail systems that change the characteristic of the land. In some areas, because of wet and muddy conditions, the trail braiding has reached a width of 100-300 feet (ICRC 2001; ICRC 2002). This is not only a resource damage issue but a visual resource issue as well. Through trail rerouting, revegetation of scarred landscape with native seed, and proper trail construction and maintenance these visual impacts are being mitigated. The response to trail proliferation and degradation is still in the reactive stage, focusing on the Wild and Scenic River corridors and unencumbered BLM lands within the Glennallen Field Office.

a) Visual Resource Management Inventory

In the summer of 2003 a VRM inventory of the planning area was conducted. Through the spatial analysis of overflight information using GIS software, on-the-ground observations, scenic quality ratings, distance classes, viewsheds, sensitivity classes, and specialist input, VRM inventory classes were developed for all lands within the Glennallen Field Office.

Twenty travel routes were used in this evaluation: Alaska Railroad, Parks Highway, Denali Highway, Valdez Creek Road, Delta River, Gulkana River, Richardson Highway, Coal Mine Road, Tok Cut-off, Nebesna Road, Mentasta Spur Road, Glenn Highway, Lake Louise Road, Klutina Road, Old Edgerton Highway, Edgerton Highway, McCarthy Road, Old Copper River Railroad, Copper River Highway, and Mineral Creek Road.

Map 17 on page 111 in Chapter II shows the current VRM inventory classes within the planning area.

10. Areas of Critical Environmental Concern (ACEC)

a) Background

The designation of an area as an Area of Critical Environmental Concern (ACEC) is a management designation unique to the BLM. BLM regulations (43 CFR Part 1610) define an ACEC as an area "within the public lands where special management attention is required (when such areas are developed or used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards." While an ACEC may emphasize one or more unique resources, other existing multiple-use management can continue within an ACEC so long as the uses do not impair the values for which the ACEC was designated.

b) Nominated Areas

Currently, there are no ACECs within the planning area. The 1980 Southcentral Management Framework Plan recommended ACEC designation for three different: the Nelchina caribou calving area, habitat for *Smelowkia borealis villosa* (at that time a threatened plant species), and the Tangle Lakes Archaeological District. None of these areas was ever designated. Since that time, the threatened plant species has been de-listed.

During the scoping process for this resource management plan, the Glennallen Field Office actively solicited nominations and comments from the public on areas that should receive consideration as ACECs. A total of seven nominations were received from the public, some for the same areas. The nominations were as follows:

- Denali Highway ACEC – nominated by Copper County Alliance, supported by Alaska Center for the Environment.
- Bering Glacier ACEC – nominated by Alaska Coalition, Wilderness Society, Alaska Center for the Environment, supported by EcoTrust and Lynn Canal Conservation.

In addition, BLM specialists identified areas for ACEC consideration based on review of important resource values, State (DNR) planning documents, and past BLM planning documents (including a 1989 draft RMP for the area that was halted due to budget constraints and conveyance concerns).

c) Potential ACECs

Based on interdisciplinary review, the following areas met both the relevance and importance criteria and will move forward for additional consideration as alternatives within this EIS. The Denali Highway was found to meet the relevance and importance criteria, but is considered as a Special Recreation Management Area because of the recreational use that occurs there. For more specific information on specific measures proposed for these areas, see the detailed alternative comparison tables in Appendix B.

(1) Delta Bison Calving Range

The Delta River riparian zone between Black Rapids and Buffalo Dome (approximately) on BLM-managed land is a narrow river corridor and the southernmost extent of the traditional calving range for the Delta River bison herd. The majority of bison remain at higher elevations along the Delta River corridor throughout calving season (April through June) and into the summer months of July and August, before migrating to lower elevations as the season progresses. In addition, grizzly bears are known to concentrate in this same area during spring and prey upon newborn bison calves.

Since the 1950s, the Delta bison herd has become a source of conflict between private agricultural interests and ADF&G as more lands in the Delta Junction area have been developed for crop and livestock production. In response, the 1979 Alaska Legislature established the 90,000 acre Delta Junction State Bison Range for the purpose of perpetuating free-ranging bison by providing adequate winter range and altering seasonal movements of bison and thus reducing damage to agriculture (ADF&G Division of Wildlife Conservation 1998). This effort by ADF&G not only reduces the amount of crop and property damage incurred on private lands, but it also reduces the likelihood of disease exposure (brucellosis) between cattle and bison.

In the spirit of interagency cooperation, Alternative C recommends that the BLM designate and manage bison habitat in the Delta River corridor as an Area of Critical Environmental Concern. Protection, maintenance, and possibly even enhancement of bison calving habitat would aid ADF&G in their efforts to sustain/prolong bison seasonal occupancy of public lands as long as possible throughout the year, thereby further reducing conflicts with private interests. Map 10 on page 101 in Chapter II displays the location of the 19,000 acre recommended Delta River bison range ACEC. These lands are all unencumbered BLM lands.

(2) Nelchina Caribou Calving Range

The eastern Talkeetna Mountains and their foothills are recognized as the traditional calving area of the Nelchina caribou herd (ADF&G, Division of Wildlife Conservation 1973). Approximately the northern third of the total known Nelchina caribou herd calving area is on State-selected lands currently managed by the BLM.

Due to the extreme importance of the Nelchina caribou herd's integral part in a wholly complete and functioning ecosystem, and for their importance to local subsistence efforts in Southcentral Alaska, Alternative C recommends that all lands managed by the BLM that are occupied by the Nelchina caribou herd during calving season be designated an Area of Critical Environmental Concern (ACEC). Map 11 on page 102 in Chapter II displays the location of the 389,000 acre recommended Nelchina Caribou Calving ACEC.

(3) West Fork of the Gulkana River Watershed

The West Fork of the Gulkana River contains a large percentage of the world's known population of trumpeter swans (Cygnus buccinators), a BLM-Alaska designated Sensitive Status Species. The majority of these birds are breeders, utilizing the multitude of lakes in the West Fork watershed as breeding and rearing areas for their cygnets.

It is recommended in Alternative C that the entire West Fork of the Gulkana River, including both North and South branches, be designated an ACEC to provide protection for trumpeter swan habitat. Map 12 on page 103 in Chapter II displays the location of the recommended 490,000 acre West Fork ACEC. These lands are predominantly State-selected lands currently managed by the BLM.

In addition, this area is an important breeding area for large numbers of other waterfowl. These wetlands provide habitat for many nesting bald eagles and osprey which feed on both the waterfowl and the algae numbers of fish in the area. The south face of the Alphabet Hills provides important habitat for trophy class bull moose, a habitat area beginning to be impacted by OHVs. The West Fork Gulkana River and its tributaries provide extensive spawning areas for sockeye and king salmon stocks, which in turn provide significant numbers of fish for subsistence, sport, and commercial users.

d) Potential Research Natural Area

(1) Background

According to 43 CFR Subpart 8223, a research natural area is "an area that is established and maintained for the primary purpose of research and education." The land must have at least one of the following characteristics:

1. a typical representation of a common plant or animal association
2. an unusual plant or animal association
3. a threatened or endangered plan or animal species
4. a typical representation of common geologic, soil, or water features
5. outstanding or unusual geologic oil, or water features

The area must be of sufficient acreage and size to adequately provide for scientific study, research, and demonstration purposes. Currently, no land within the planning area is designated as a RNA.

There are currently no RNAs within the planning area.

(2) Bering Glacier and Surrounding Glacier-influenced Environment

The entire Bering Glacier icefield and the surrounding glacially-influenced environment is unique to BLM-managed lands across the nation for its dynamic landscape, pristine environment, and outstanding biodiversity. Its harsh conditions, physical isolation, and frequently dynamic landscape are thought to have encouraged the evolution of unique plants and animals. The Bering Glacier is the largest (5,200 sq km) and longest (190km) glacier in North America. It is bounded to the north by the St. Elias Mountain range and to the south by the Gulf of Alaska. In various places, this tidewater glacier has a thickness of over 800 meters. The extent of the combined Bagley Ice Field and Bering Glacier, including all tributaries, encompasses a multitude of variant natural communities including marine, post-glacial freshwater ponds and lakes, coastal lowlands, non-vegetated terminal moraines, mountainous highlands, nunataks (isolated hills or peaks that project through the surface of a glacier), and the glacier itself.

The Bering Glacier area is a seasonal home or migratory staging area for numerous species of birds, and a yearlong home to various species of mammals and fish. Among these are mountain goats, harbor seals, waterfowl (including trumpeter swans, dusky Canada geese, tule white-fronted geese, Vancouver Canada geese, and red-throated loons), moose, wolves, coyotes, fox, beavers, coastal brown bears, and black bears. Vitus Lake (in the foreground of Bering Glacier) and adjacent lowlands/riparian areas provide important parturient habitat for harbor seals, trumpeter swans, dusky Canada geese, and other species of waterfowl, shorebirds, and songbirds considered Sensitive Status Species by BLM-Alaska. The area's floristic elements include those from Beringia, the Aleutian/Asian connection, southeast coastal ranges, and the Cordilleran Range of the Interior.

In summary, the entire Bering Glacier system is considered a national treasure and unique natural laboratory by researchers and scientists, and is deserving of local, statewide, and national recognition as such. Therefore, it is recommended under Alternatives C and D that the entire portion of BLM-managed lands in the Bering Glacier area be designated a RNA to provide for protection of this unique natural environment and the unique assemblage of living creatures found there, and to encourage continued investigations focused on the many aspects of a glacially-influenced and dominated landscape. Map 13, on page 104 in Chapter II, displays the location of the 827,000 acre recommended Bering Glacier RNA.

11. Wild and Scenic Rivers

Through passage of the Wild and Scenic Rivers Act of 1968, Congress established the National Wild and Scenic River System (NWSRS) to preserve some of the nation's most precious waterways. To qualify for designation, a river or river segment must be in free-flowing condition and must be deemed to have one or more "outstandingly remarkable values" as defined by the Act. These values include scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values. The act recognizes three designations of protected rivers: wild, scenic, and recreational. Wild rivers are "free flowing, essentially primitive, and unpolluted representing vestiges of primitive America." Scenic rivers are "largely undeveloped, but accessible in places by roads." Recreational river are "readily accessible" and "may have some development," including impoundments or diversions.

Every river in the NWSRS must be administered in such a way as to protect and enhance the values that made it eligible for designation, but not to limit those other uses that do not substantially interfere with public use and enjoyment of those values. The heart of river protection, and the essence of the act, is protection of free-flowing character. The existence, however, of low dams, diversion works, or other minor structures at the time any river is proposed for designation does not automatically bar it from consideration for inclusion.

There are two rivers within the planning area that are designated as part of the NWSRS: the Delta National Wild and Scenic River (designated as wild, scenic, and recreational) and the Gulkana National Wild River (designated as wild). The Delta Wild and Scenic River Corridor also includes the Upper Tangle Lakes. Together these two river corridors comprise some of the larger contiguous blocks of unencumbered BLM lands within the Glennallen Field Office.

Intensive management takes place on the Delta and Gulkana Rivers, as well as on the Upper Tangle Lakes, each summer season from mid-May through mid-September when the majority of the use within the river corridors occurs. Winter use consists of subsistence hunting and trapping and recreation by means of dog sleds and snowmachines.

Management of the Delta and Gulkana Rivers is carried out in a variety of ways. In a given year, BLM river crews generally take three to four river trips on the Delta, four to five trips on the Gulkana, and two trips on the Upper Tangle Lakes. These trips include general cleanup of litter and refuse, documentation of all camp encounters, monitoring of impacted sites, public contacts and user education, facility maintenance (e.g., outhouses, portages, signs), overflights (to observe and verify use levels), and site rehabilitation and monitoring.

A revision of the 1983 River Management Plan for the Gulkana National Wild River is near completion. The revised plan will set visitor use limits and identify measures to address other impacts on the river. Revision of the plan has been a cooperative effort between the BLM and the State of Alaska.

a) Delta National Wild and Scenic River

Section 603(47) of the Alaska National Interest Conservation Act (ANILCA) established the Delta River as part of the National Wild and Scenic Rivers System. The designated segment begins and includes all of the Tangle Lakes to a point one-half mile north of Black Rapids. The upper third of the segment is designated as recreational, the middle third as wild, and the lower third as scenic. ANILCA also directed the Secretary of the Interior to establish detailed boundaries, prepare a management and development plan, and present this information to Congress by December 2, 1983. In response to these directives, the River Management Plan for the Delta National Wild and Scenic River established the detailed boundaries and developed the management policies for the Delta National Wild and Scenic River.

The Delta River watershed is located in the Alaska Range. Access to the Delta River is along the Denali Highway about 21 miles west of Paxson. The watershed drains an area of about 150,000 acres and contains a network of 160 miles of streams and 21 lakes. The Tangle River flows through and connects several lakes in the Tangles Lakes system, then drains into the Delta River which is Clearwater until the confluence with Eureka Creek when it becomes a braided, glacial river. The Delta then flows north through the Alaska Range and joins the Tanana River, which flows into the Yukon River. The terrain around Tangle Lakes is predominantly tundra-covered rolling hills with glacial features such as moraines, eskers, and kettles. Gravel benches above Lower Tangle Lake indicate that the lake was at one time about 50 feet higher than the current level. The land adjacent to the upper Delta River includes steep alluvial slopes, rock cliffs, and spectacular geologic features. Elevations average 2,800 feet at the Tangle Lakes, after which the drainage falls 650 feet in 51 river miles. (BLM 1983a)

In addition to the diverse geological features of the Delta WSR, the Delta River area provides habitat for many fish species including grayling, round whitefish, lake trout, burbot, and longnose suckers. Users of the area primarily fish for grayling but good lake trout is available in late winter and early spring (BLM 1983a).

Wildlife and bird habitat are also an important aspect of the Delta WSR. Hunters in this area seek moose, caribou, bear, Dall sheep, and snowshoe hare. Trappers concentrate on taking beaver, fox, wolf, marten, lynx, wolverine, otter, muskrat, and mink. One hundred ten species of birds inhabit this area, most of which are only summer residents. Migratory birds, waterfowl, and raptors can be seen on the lakes and river throughout the summer season. Along with the hunting and trapping activities, these animals provide visitors with opportunities for wildlife viewing and photography (BLM 1983a).

All of the Tangles Lakes, the Tangle River, and the “wild” section of the Delta River are within the Tangle Lakes Archeological District which is listed on the National Register of Historic Places. Many known prehistoric archeological sites are located within the designated “scenic” and “wild” river areas. Cultural resources of the historic period include cabin sites and mining trails associated with the mineral activities just outside the Delta WSR corridor in the Rainy and Eureka Creek areas in the Alaska Range (BLM 1983a).

b) Gulkana National Wild River

Section 603(49) of the Alaska National Interest Conservation Act (ANILCA) established the upper portion of the Gulkana River, including the Middle Fork and West Fork, as a component of the National Wild and Scenic Rivers System. Subject to valid existing rights, ANILCA classified and designated approximately 181 miles of the Gulkana River system as a Wild river pursuant to the Wild and Scenic Rivers Act.

The three forks of the Gulkana flow through the rolling valleys and low ridges of an upland spruce-dominated forest. Lakes are abundant in the surrounding hills. For several short stretches of river, most notably at Canyon Rapids, the river cuts sharply through ridges, providing short gorge-like settings. Soils are poorly drained and often tussocky. Vegetation includes spruce forests and thick willow, alder, and berry underbrush. Vegetation usually grows along the river’s edge, although there are numerous gravel bars providing a more open river corridor. (BLM 1983b)

Fish, wildlife, and birds species are abundant and diverse throughout the Gulkana River system. Fish species include the King salmon, red salmon, rainbow trout, lake trout, grayling, whitefish, burbot, and suckers. Heaviest use of the river by fishermen occurs from mid-June through mid-July when salmon are ascending the river.

Wildlife along the Gulkana River is important for the recreation it provides hunters, trappers, photographers, and others who enjoy viewing wildlife. Hunters focus their taking on moose, caribou, black bear, and grizzly bear. Trappers utilize the wolf, marten, wolverine, otter, weasel mink, fox, coyote, lynx, beaver, and muskrat populations. (BLM 1983b)

Users of the river enjoy the viewing and photography of the many birds who inhabit the river including bald eagles, many species of duck, loons, trumpeter swans, geese and owls. These birds can be observed in their natural habitat with many eagle nests visible from the river. (BLM 1983b)

The first 10 miles of the Middle Fork Gulkana River, below Dickey Lake are within the Tangle Lakes Archeological District, which is listed on the national Register of Historic Places. Several known prehistoric archeological sites are located within the designated “wild” river area and other sites are expected to exist. Cultural resources of the historic period include several cabins, cabin sites, trails, and part of freighting sleds associated

with the time, around 1910, when the West Fork and Middle Forks were routes used to reach the Denali Mining District about 80 miles west of the area. (BLM 1983b)

c) Eligibility and Suitability Review

Section 1326(b) of ANILCA states, "[n]o further studies of Federal lands in the State of Alaska for the single purpose of considering the establishment of a conservation system unit, national recreation area, national conservation area, or for related or similar purposes shall be conducted unless authorized by this Act or further Act of Congress." A conservation system unit as defined by Section 102(4) of ANILCA includes wild and scenic rivers.

Inventory and review, however, may be conducted as part of a comprehensive planning effort, such as the creation or revision of a resource management plan. The settlement agreement for the 1993 case of American Rivers et al. vs. the Secretary of the Interior states:

> The Director, Bureau of Land Management (BLM) will rescind BLM Instruction Memorandum No. 91-127, which provides an exception for Alaska from the general BLM requirement to conduct wild and scenic river studies as part of the resource management plan (RMP) process, and instruct BLM, Alaska to follow the BLM guidelines, presently set out as part 8351 of the BLM Manual, for conducting such studies. It is understood that these guidelines may change with time and it is the mutual intent of the plaintiffs and the federal defendants that BLM, Alaska follow the same policies and procedures that are followed by BLM throughout the rest of the United States (U.S. District Court 1993).

Consistent with these directives, the East Alaska RMP planning team conducted an eligibility review for the planning area. Review was based largely on an earlier review conducted in 1989 as part of a draft RMP effort that was halted due to budget constraints and conveyance concerns. At that time, the team considered over 300 rivers in the area for eligibility based on criteria described in the Wild and Scenic Rivers Act and BLM's 8351 Manual. After interdisciplinary review, the 1989 team came up with a list of 25 eligible rivers within the planning area. Rivers are considered eligible through a determination that they are free-flowing and, with their adjacent land area, possess at least one outstandingly remarkable value. The 1989 team then classified the eligible rivers as wild, scenic, or recreational. The 2004 team reviewed the eligibility and classification of these 25 segments and assessed the segments for suitability, based on criteria listed in BLM's 8351 Manual. The list of eligible rivers and the team's suitability determinations were presented in the Draft RMP/EIS.

Of the 25 rivers listed as eligible in the Draft RMP/EIS, only one was shown to be suitable for inclusion into the National Wild and Scenic Rivers system. Most river segments considered eligible run through uplands that are State or State-selected lands. In assessing suitability, this was a major consideration and in most cases the

primary reason for a finding of non-suitability. According to BLM Manual 8351 (Policy and Program Direction for Identification, Evaluation, and Management of Wild and Scenic Rivers):

> "In situations where there is limited public lands (shoreline and adjacent lands) administered by the BLM within the identified river study area, it may be difficult to ensure those identified outstandingly remarkable values could be properly maintained and afforded adequate management protection over time. Accordingly…river segments may be determined suitable only if the entity with land use planning responsibility supports the finding and commits to assisting the BLM in protecting the identified river values."

In their written comments throughout the planning process, the State of Alaska is opposed to any additions to the Wild and Scenic River system.

BLM received numerous comments on the Draft RMP/EIS on our eligibility and suitability determinations and on the lists presented in the Draft. Most comments supported protection of the identified eligible segments and opposed BLM's finding of non-suitability. Several commenters asked BLM to defer suitability determinations until State entitlements are met and land status is determined in the planning area. BLM also received comments on proposed additions and deletions to the eligibility list. Based on public comments and on the fact that our primary consideration for suitability was land status (which is in a constant state of change until entitlements are met), the decision was made to defer suitability.

The planning team then re-considered the list of eligible rivers, based on public comment and on internal (BLM) comments received during the planning process. The edited list of eligible rivers is presented in Table 27. Appendix I presents a more detailed description of the outstandingly remarkable values for each river, maps, and interim protective measures. If State-selected uplands are conveyed to the State, these river segments will not be considered for suitability and interim protective measures will no longer apply. Interim protective measures will only apply until conveyance takes place or a suitability determination is made. Any remaining rivers eligible for suitability will have a suitability determination EIS completed by 2011, when all land conveyances are anticipated to be complete. For rivers that were included on the eligible list in the Draft RMP/EIS that were removed from the list, an explanation is provided in Appendix I.

Table 27. Rivers Eligible for Wild and Scenic River Designation

River	Segment	Class*	Description of Outstandingly Remarkable Value(s)
Brushkana Creek	Entire river, 12 miles	S, R	Historic, Scenic, Recreational
Clearwater Creek	Entire creek, 22 miles	W, R	Scenic, Recreational
Duktoth	Upper portion of drainage, 12 miles	W	Scenic, Cultural, Recreational
Hungry Hollow	Entire creek, 14 miles	S	Fisheries, Wildlife, Cultural

River	Segment	Class*	Description of Outstandingly Remarkable Value(s)
Kulthieth River	Middle portion of drainage, approximately 8 miles	W	Scenic, Cultural, Fisheries, Wildlife
Kosakuts River	Northern portion, 10 miles	W	Scenic, Fisheries, Wildlife
Liberty Creek	Entire creek, 14 miles	S	Scenic, Recreational
Maclaren River	Entire river, 50 miles	S	Scenic, Wildlife, Cultural, Recreational
Monsoon Creek	Entire creek, 13 miles	W	Fisheries, Recreation
Nenana River	Headwaters to Wells Creek, approximately 30 miles	R	Scenic, Recreational
Susitna River	Headwaters to Kosina Creek, approximately 150 miles	S	Recreational, Cultural
Tonsina River system	BLM-managed portions of Tonsina, Little Tonsina, and Greyling Creek, approximately 75 miles	W, R	Scenic, Recreational, Fisheries, Cultural
Tweleve Mile Creek	Entire creek, 12 miles	S	Fisheries
Victor Creek	Entire creek, 20 miles	W	Wildlife, Fisheries
South Branch of West Fork of Gulkana	15 miles	W	Recreation, Scenic, Wildlife, Fisheries

* W = Wild; S = Scenic; R = Recreational

12. Climate Change

Based on current scientific research, there is growing concern about the potential effects of primary greenhouse gases on global climate. Through many complex interactions on a regional and global scale, the lower layers of the atmosphere experience a net warming effect. These trends could be caused by greenhouse warming or natural fluctuations in the climate. There is an ongoing scientific debate about the cause of these trends.

The assessment of the impacts of climate change is in its formative phase, and it is not yet possible to know with confidence the net impact of such change. The potential effects of global climate change could alter water supply, food security, sea-level fluctuations, increasing levels of ultraviolet radiation, and natural variances in the ecosystem (ACIA 2004). Global climate change may affect surface resources in the Planning Area.

The average temperature of the Arctic has risen at almost twice the rate as the rest of the world in the last few decades (ACIA 2004). From 1954 to 2003 the average annual atmospheric surface temperatures in the Alaska region has risen ranging from 2 to 3 degrees Celsius. This increase in temperature has had a direct effect on increased glacial melt which contributed about 0.15 to 0.30 mm/yr to the average rate of sea-level rise in the 1990s. Other factors observed within the Artic regions include an increase in river discharge with the spring runoff occurring earlier and a decrease in snow-cover by 5-10% since 1972. All of these changes are attributed to an increase in overall global temperature. (ACIA 2005)

Anticipated effects of climate change specific to the planning area are discussed in Chapter IV under Cumulative Effects.

E. Issue 4: Lands and Realty

1. Lands and Realty Programs and Administration

Land actions constitute resource allocations, and, as such, are made through a variety of means but generally fall into five broad categories: use authorizations, disposal actions, acquisitions, exchanges, and withdrawals. Each proposal or application for a lands action is considered on a case-by-case basis and is either authorized or rejected.

The primary objective of the lands program in the Glennallen Field Office is to provide the public with the land it needs for rights-of-way, land use permits, leases, and sales. The secondary objective is to provide support to other programs to protect and enhance the resources. Overlaying these first two objectives is the need to support the Alaska State Office in the Alaska Land Transfer Program, which involves the survey and conveyance of lands to the State of Alaska, Native Corporations, Native Allottees, and other inholders. The final goal of all these objectives is a balance between land use and resource protection that best serves the public at large.

a) Land Use Authorizations

(1) Unauthorized Use/Trespass

It is the responsibility of the BLM to protect the public's best interest in regards to BLM-managed lands. Over the years, individuals have built structures for various purposes (e.g., occupancy, commercial uses, recreational uses) with no regard for who actually owned the land on which they built. The Glennallen Field Office is attempting to manage this problem through a program of detection, control, and abatement. While the size of the district has not allowed a complete inventory to be conducted, a large number of trespasses have already been identified. Once a trespass has been identified it is handled in one of three ways:

1. 1If the structure is used for permittable purposes as defined by Sec. 302 of FLPMA, and is compatible with other resource management objectives, the trespass can be controlled by authorizing it under a specific set of conditions.
2. If the structure is not permittable under FLPMA, but is compatible with other resource objectives, it could be transferred to Federal ownership and maintained as a public use cabin or for administrative purposes.
3. If the structure is unpermittable under FLPMA and is either unsuitable for public use or is incompatible with other management objectives, it is removed.

Currently, 150 known trespass cases are scattered throughout the planning area.

(2) Use Authorizations

Use authorizations and patents issued prior to the passage of FLPMA in 1976 are controlled and regulated under the acts by which they were issued. For example, rights-of-way for communication sites and transmission lines were issued under the Act of March 4, 1911. However, this and many other laws and statutes were repealed by FLPMA. In general, all new disposal, lease, easement, and right-of-way actions on public lands are now regulated by FLPMA.

Use authorizations respond to public demand for specialized and more or less temporary uses of the public lands. Examples are right-of-way grants, airport leases, R&PP leases, and all FLPMA leases, permits, and easements. These do not cause the lands to leave the public domain, although they may restrict or benefit certain uses. They may be set for a period of time or may be open-ended. They tend to cover small, scattered areas and cannot be anticipated through the planning process.

(3) Airport Leases

The Act of May 24, 1928, as amended, authorizes the Secretary of the Interior to lease for use as a public airport any contiguous unreserved and unappropriated public lands not to exceed 2,560 acres in area. In accordance with the regulation, those lands leased for airport purposes will not be subject to appropriation under the public land laws, including the mining laws. The Glennallen Field Office currently authorizes one airport lease.

(4) R&PP Leases

The Act of June 14, 1926, as amended, commonly known as the Recreation and Public Purposes Act, authorizes the Secretary of the Interior to lease any public lands that are not (1) lands withdrawn or reserved for national forests, national parks and monuments, and national wildlife refuges, (2) Indian lands and lands set aside for the benefit of Indians, Aleuts, and Eskimos, and (3) lands which have been acquired for specific purposes under conditions set forth in 43 CFR 2740 and 2912. Under these regulations, lands leased for R&PP are segregated from entry under the public land laws, including the mining laws (43 CFR 2091.3-2). The Glennallen Field Office currently authorizes four R&PP leases. Two R&PP lease applications are pending.

(5) FLPMA Leases and Permits

The Southcentral Management Framework Plan resulted in the decision to open those public lands in the Tiekel Block and the Clearwater Block (previously known as the Denali Block), not otherwise segregated by Native corporation selections or other valid existing rights, to lease and permit proposals under FLPMA. Sec. 302 of FLPMA contemplates a wide variety of land uses for lease and permit including, but not limited

to, habituation, cultivation, and the development of small trade or manufacturing concerns. In general, leases are for long-term land uses while permits are used to authorize short-term land uses. This section of the Act is implemented by regulations in 43 CFR 2920 and BLM Manual 2920, which define these uses further to exclude private recreational habitation such as seasonal use cabins. All such proposals are to be reviewed under the criteria established by FLPMA on a case-by-case basis and require a site specific environmental assessment. The Glennallen Field Office issues approximately 20 FLPMA permits and 10 leases.

(6) FLPMA Easements

A FLPMA easement is an authorization for a non-possessory interest in lands that specifies the rights of the holder and the obligations of the BLM to use and manage the lands in a manner consistent with the terms of the easement. For example, easements may be used to assure that uses of public lands are compatible with non-Federal uses occurring on adjacent or nearby land. There are currently no FLPMA easements authorized by the Glennallen Field Office.

b) Disposal Actions

Disposal actions are usually initiated in response to public requests or applications. These actions result in a transfer of title, and the lands leave the public domain. Examples are State entitlements, Native settlement claims, private or State exchanges, airport conveyances, R&PP sales, and FLPMA sales. Disposal may depend upon the recipients meeting certain conditions, such as in an R&PP patent, or may be absolute, as in a sale. In addition to these existing disposal programs, there are a number of programs occurring within the planning area that, while the acts authorizing them have been repealed, there is still a residual of disposal actions taking place. These include the Native Allotment Act, trade and manufacturing sites, headquarter sites, and homesites. With the exception of State entitlements and Native settlement claims, these disposals tend to involve scattered, discrete parcels and cannot be anticipated through the planning process.

(1) Airport Conveyance

The Airport and Airway Improvement Act of September 3, 1982, and 43 CFR 2640 authorize and regulate the issuance of conveyance documents for lands under the jurisdiction of the Department of Interior to public agencies for use as airports and airways. Under the regulations those lands proposed for conveyance are segregated from appropriation under the public land laws, including the mining laws. Furthermore, airport patents contain provisions allowing for reversion of the lands to the United States under certain circumstances. There are currently no airport conveyance sales within the Glennallen Field Office.

(2) R&PP Sales

The Act of June 14, 1926, as amended, commonly known as the Recreation and Public Purposes (R&PP) Act, authorizes the Secretary of the Interior to convey those public lands that are not (1) lands withdrawn or reserved for national forests, national parks and monuments, and national wildlife refuges, (2) Indian lands and lands set aside for the benefit of Indians, Aleuts, and Eskimos, and (3) lands which have been acquired for specific purposes, under conditions set forth in 43 CFR 2740. Though minerals remain reserved to the United States, there is no provision for mineral entry or development on R&PP patents. R&PP patents contain provisions allowing for reversion of the lands to the United States under certain circumstances. The Glennallen Field Office has currently authorized 10 R&PP sales for such purposes as a cemetery, a church camp, and a Boy Scout camp.

(3) FLPMA Sales

Section 203 of FLPMA establishes criteria under which public lands may be considered for disposal. In general, all such proposals are to be reviewed under the criteria established by FLPMA on a case-by-case basis and will require a site specific environmental assessment. However, there are situations existing within the transportation and utility corridor where, due to highway realignments, small slivers of public land have been created between the new highway and what was once land owned by adjacent property owners. This land use planning process will determine specifically what areas may be available for disposal, including Slana, subject to the criteria listed in Chapter II.

(4) Native Allotments

The Act of May 17, 1906, as amended, authorizes the Secretary of the Interior to allot not to exceed 160 acres of vacant, unappropriated, and unreserved nonmineral land in Alaska, to any Indian, Aleut, or Eskimo. The purpose of this act was to enable individual natives of Alaska to acquire title to the lands they have historically used and occupied, and to protect these lands from the encroachment of others. If it is determined that the applicant has met the requirements, as contained in the law and 43 CFR 2561, administration of the land passes to the Bureau of Indian Affairs (BIA). Upon survey and conveyance these lands are then held in trust by the BIA for the applicant or their heirs. While this act was repealed in 1971 by ANCSA, there is still a large case load of pending applications. Most of these applications consist of several smaller parcels of land scattered throughout the Glennallen Field Office, making the distribution of the total number of private holdings too cumbersome to depict. There are currently 56 pending applications.

The Alaska Native Veterans Allotment Act of 1998 enables certain Alaska Native veterans who, because of their military service, were not able to apply for an allotment in the early 1970s under the Act of 1906, to do so now. In addition to meeting the

requirements of the original act of 1906, there are additional restrictions as to which lands are available for veteran selection.

(5) Settlement Claims (Slana)

FLPMA repealed the Alaska Settlement Laws effective October 21, 1986. The criteria for disposal under FLPMA was applied to two areas know as north and south Slana in the 1983 amendment to the Southcentral Management Framework Plan, and it was determined that these lands were suitable for disposal. On September 26, 1983, Public Land Order 6456, opened 10,250 acres of lands in the Slana area to settlement for trade and manufacturing sites under the Act of May 14, 1898, and for homesites or headquarters under the Act of March 3, 1927. These lands previously had been and currently remain closed to mining but open to mineral leasing.

The Act of May 14, 1898, as amended, authorized the sale of not-to-exceed 80 acre parcels of unappropriated and unreserved public land in Alaska for trade and manufacturing sites. These sites must be used for actual trading, manufacturing, or other productive industry.

The Act of March 3, 1927, as amended, authorized the sale of not-to-exceed 5 acre parcels of unappropriated and unreserved public lands in Alaska for homesites or headquarters sites. Homesites are for the purpose of actual residency; headquarters sites are not required to have actual trade or manufacturing taking place on them, but must be used in conjunction with some kind of business located in Alaska.

Under the Alaska Settlement Laws an applicant has a five year statutory time frame in which to prove up on a claim and file an application to purchase. This means that within five years of the repeal of the settlement laws on October 21, 1986, applicants will have submitted any claims that could go to patent for purchase and the remaining claims will have been closed as their individual statutory lives expire. However, due to the large number of claims filed, it will be some time before all of the remaining valid claims can be conveyed.

As more claims go to patent in the Slana settlement area, a pattern of isolated and unmanageable tracts of land is emerging. In some instances, failed claimants who do not have title to lands still occupy public land in trespass. In other cases, failed claimants have left the area and abandoned personal possessions (including buildings, old cars, and other junk) on public lands. Some limited sales within the highway/utility corridor may be possible to alleviate management problems and facilitate clean-up of abandoned material.

c) Acquisitions

The Federal Land Policy Management Act of 1976 authorizes the acquisition of real property where it is consistent with the mission of the department and departmental land use plans. This is particularly applicable to designated Conservation System Units (CSU). ANILCA created two CSUs within the Glennallen Field Office: The Delta National Wild and Scenic River and the Gulkana National Wild River. When these CSUs were created most existing or potential interests and private inholdings were cherry stemmed out of the corridor boundaries, creating a complicated and unmanageable boundary between the corridor and private property.

d) Exchanges

Title 43 CFR 2200 regulates the procedures for the exchange of public lands or interests for non-Federal lands and interests. There are currently no exchanges taking place within the Glennallen Field Office.

3) Withdrawals

A withdrawal is a formal action that sets aside, withholds, or reserves Federal lands by administrative order or statute for public purposes. The effect of a withdrawal is to accomplish one or more of the following:

- segregate and close Federal land to the operation of all or some of the public land laws and one or more mineral laws;
- transfer total or potential jurisdiction of Federal land between Federal agencies;
- dedicate Federal land for a specific public purpose.

Millions of acres underlying both BLM public land and BLM-managed State or Native selected lands are withdrawn by public lands orders issued pursuant to Section 17(d)(1) of ANCSA. The (d)(1) withdrawals are a series of public land orders issued from 1972 to 1975 that placed a protective withdrawal on Federal lands for the purpose of study and review to determine the proper classification and “to ascertain the public values in the land . . .” The intent of the withdrawals was to limit appropriation of the lands in order to complete inventories of resources and assessment of values which would then allow for an orderly development of the BLM’s management objectives for present and future public needs. In the 1980s studies and assessments were completed, and opening orders were issued on some lands covered by the (d)(1) clause. No further actions have been taken since that time. The current land use planning process is now the means to assess resource values and make recommendations on opening lands withdrawn by the ANCSA (d)(1) orders.

Table 28. Major Withdrawals within the Planning Area

Withdrawal	Acreage*	Effect of Withdrawal
Original ANCSA (d)(1)		
PLO 5174	808,000	Withdrawn from mineral leasing and entry
PLO 5176	374,000	Withdrawn from mineral leasing and entry
PLO 5178	1,766,000	Withdrawn from mineral leasing and entry
PLO 5179	739,000	Withdrawn from mineral leasing and entry
PLO 5184	711,000	Withdrawn from mineral leasing and entry
Other Withdrawals		
PLO 5150 (transportation and utility corridor, inner corridor)	261,000	Withdrawn from mineral leasing and entry
PLO 5151 (transportation and utility corridor, outer corridor)	173,000	Withdrawn from mineral leasing but allows for entry for metalliferous metals
PLO 5180	2,171,000	Withdrawn from mineral leasing but allows entry for metalliferous metals

* Current acres of BLM-managed lands withdrawn as of 9/30/2004.

In addition, there are hundreds of acres of administrative, recreation, power site, military, and other withdrawals in place, many of which were created for a specific purpose that may now be obsolete. This planning process will evaluate the need for maintenance or revocation of these withdrawals. Table 6 describes these withdrawals and recommendations for maintenance or revocation can be found on page 118 in Chapter II.

2. Utility and Communication Corridors

a) Transportation and Utility Corridor

The Transportation and Utility Corridor, withdrawn by PLO 5150 in December of 1971, is primarily identified with the Trans-Alaska Oil Pipeline System (TAPS), but it is reserved as a utility and transportation corridor in aid of programs for the U.S. government as well as the State. In accordance with section 17(c) of ANCSA, the State and ANCSA corporations were not permitted to select lands from the withdrawal area. In the 1979 Utility Corridor Management Framework Plan (MFP), the BLM management decision was to retain all lands in Federal ownership. However, in response to continual pressure and formal requests by the State, two major amendments to PLO 5150 allowed approximately 1.1 million acres to be opened and conveyed to the State of Alaska. These BLM decisions to allow the disposal of lands within the Utility Corridor were made through the land use planning/NEPA process and included assessing if the

Map 44. Transportation and Utility Corridor

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Map size: 11x17

disposal of land would be in the national interest in compliance with Section 102(a) of FLPMA. The land use decisions to allow disposal of the lands to the State were made under the 1983 Utility Corridor MFP Amendment and the 1989 Utility Corridor RMP (BLM 1989l). Protests to both these BLM planning documents were filed, with the impact to subsistence use and needs being the basis raised in the majority of the protests that were filed. BLM denied the protests citing, in part, that subsistence uses would not be restricted and would be protected through the State of Alaska maintained subsistence preference of resources. Both these land use planning documents were developed during the time when the State managed subsistence resources throughout the entire state. After 1990, the Federal government was obliged to directly manage the ANILCA Title VIII rural subsistence priority on Federal public lands. The State continues to manage State-defined subsistence and other hunting and fishing activities, including on Federal public lands, except where these are closed to non-Federally qualified subsistence uses.

Approximately 453,000 acres within the planning area are currently withdrawn by PLO 5150. Contained in this area is 114 miles of the TAPS out of the total 372 miles that crosses Federal land. Within the planning area, lands withdrawn for the utility corridor make up 63 percent of the Federal subsistence hunting area within the Glennallen Field Office. Hiking, OHV use, rafting, and other recreational activities also take place within the transportation and utility corridor and two SRMAs (Tiekel and Delta Range) are included in this area as part of the Proposed RMP (see descriptions on page 208). In addition, the southern portion of the transportation and utility corridor (Tiekel) contains stands of white spruce that provide commercial and personal firewood, houselogs, and sawlogs to residents of the Copper Basin. It is one of the few areas accessible to the public for personal use firewood. Electrical and telecommunication companies also utilize the utility corridor. Future pipeline needs (such as a natural gas pipeline) could be accommodated along this existing route.

Map 44 shows the current withdrawal for the transportation and utility corridor.

Power transmission lines outside of the corridor are generally confined to the road net within the planning area. The Copper Valley Electric Association (CVEA) is the commercial producer and distributor of electric power for all of the Copper River Basin. CVEA has a powerline right-of-way that was issued in conjunction with the Solomon Gulch Power Project licensed by FERC. The powerline goes from Valdez to Glennallen along the Richardson Highway, 34 miles of which are on BLM public lands. From Glennallen, the power is distributed on lines run along the Glenn, Richardson, and Tok Cut-off highways.

Specific permitted communication sites are discussed under *Transportation and Facilities*. With a growing population in the planning area, it is expected there will be an increased demand for the use of these sites.

b) Trans-Alaska Pipeline System (TAPS)

The Trans-Alaska Pipeline System delivered the first oil from Prudoe Bay on the North Slope to Valdez Marine Terminal in Prince William Sound on July 28, 1977. This 800 mile pipeline, crosses 30 major rivers, 800 smaller stream, and three mountain ranges. Eleven pump stations were originally constructed along the pipeline for the purposes of moving the oil through the pipe and for pressure control. Currently seven are operating, Pump Stations 1,3,4,5,7,9, and 12. Other infrastructure associated with the TAPS include approximately 284 roads, 13 bridges, 71 communication sites, and such support services as fire management, earthquake monitoring, and oil spill emergency response. (BLM, 2002) The East Alaska Planning Area encompasses 114 miles of the TAPS on Federal lands including Pump Stations 11 and 12 and several hundred miles of access roads.

All impacts of TAPS are clearly outlined and analyzed within the Final Environmental Impact Statement for the Renewal of the Federal Grant for the Trans-Alaska Pipeline System Right-of-Way which was signed in November of 2002. (BLM, 2002)

TAPS is monitored and administered through the Joint Pipeline Office (JPO) which was established in 1990. JPO is comprised of many Federal and State Agencies each with clear and direct regulatory authority over various TAPS activities. Table 29 outlines the responsibilities of those agencies a part of the Joint Pipeline Office. Alyeska Pipeline Services Company is responsible for the daily operation of the pipeline.

Table 29. Members of the Joint Pipeline Office

Agency	Responsibilities
Federal Agencies	
U.S. Department of the Interior, Bureau of Land Management	Issues and administers rights-of-way and permits for land use and cultural survey activities, and material sales related to pipeline use on federal land.
U.S. Department of Transportation, Office of Pipeline Safety	Regulates the transportation by pipeline of hazardous liquids and gases, as well as drug testing related to pipeline safety, and conducts inspections of TAPS.
U.S. Environmental Protection Agency	Works in partnership with the Alaska Department of Environmental Conservation to administer regulatory programs such as the Clean Air Act, Clear Water Act, and Oil Pollution Act.
U.S. Coast Guard	Issues approvals of work associated with construction and maintenance of bridges at aerial pipeline crossings over navigable waters and other activities that may impact navigation; oversees vessel movement in and out of the Valdez Marine Terminal area; and Terminal safety issues.
U.S. Army Corps of Engineers	Issues approvals of structures or activities in navigable waters and approvals of placement of dredged or fill material in waters of the U.S. including wetlands.
U.S. Department of the Interior, Minerals Management Service	Manages the nation's natural gas, oil, and other mineral resources on the outer continental shelf.

Agency	Responsibilities
State Agencies	
Alaska Department of Natural Resources	Administers state-owned land, as well as rights granted in land-use leases, permits, material sales, water rights, and water use
Alaska Department of Environmental Conservation	Regulates and issues permits to operate facilities that may affect air quality, generate waste, hazardous material treatment storage and disposal, and oil spill contingency plan approval.
Alaska Department of Fish and Game	Regulates activities affecting fish passage, anadromous fish streams, and hazing of wildlife in connection to oil spills, issues permits for beaver takings, and comments on subsistence issues.
Department of Labor and Workplace Development	Reviews practices and procedures pertaining to occupational safety and health; mechanical, electrical and pressure systems; and wage and hour codes to protect employees of the pipeline company
Department of Public Safety, Division of Fire Prevention	Concentrates on fire and safety inspections, plan reviews, fire investigations, and public safety education.
Department of Transportation Public Facilities	Provides design, construction and maintenance of primary and secondary land and marine highways and airports.

(Joint Pipeline Office, 2005)

F. Issue 5: Vegetation Management

This section describes management of vegetation within the planning area. For information regarding the occurrence and current condition of vegetation, see *Issue 3: Natural and Cultural Resources*, *Vegetation (Including Sensitive Status Plant Species)* on page 220.

1. Fire Management

a) Historical Fire Role

Fire occurrence in the Copper River Basin follows the general pattern found throughout the boreal forest region of the northern hemisphere. Fire plays a dominant ecological role in the establishment and appearance of the expansive forests of this region. Indeed, the greatest testimonial to the past fire history of the Copper River Basin is in the forest itself, where a complex mosaic of forest types indicate where fires have previously burned. This broad mosaic can be seen from nearly any vantage point in the basin (Calderwood 2003a).

Some of the earliest records of Euro-American exploration contain evidence of the magnitude of fire occurrence during the exploration era of this region. The journals of Canadian explorer-authors W. H. Davies 1843 and A. P. Low 1896 contain references to numerous large fires (Sherwood, 1995). These writers attribute large areas of burned forest to the Native population, who were known to start fires to enhance hunting, kill insect pests, and kill timber for firewood. Carelessness with camp and cooking fires was also a leading cause of wildfire.

Almost all early Euro-American explorers reported encountering forest fires. William R. Abercrombie in his journal of the Copper River Exploring Expedition (Abercrombie, 1990) described large fires in the vicinity of Klutina Lake. He stated, “the entire valley seemed to be on fire, which made traveling through the timber very dangerous, as the falling trees were liable to injure man or beast if they did not stampede the entire pack train.”

On his journey to the Tanana River in 1898, E.F. Glenn traveled through the country north of the Tazlina River. He reported, “[w]e entered what we called the burned district which seemed to extend as far as the country is visible toward the Copper River and to the northward almost to the Alaska Range” (Sherwood 1995).

With the discovery of gold in the Klondike and copper in the Chitina Valley, new residents and visitors began to bring in their own brand of carelessness. The Copper River Valley was a principal route from the coast to the gold fields of the north.

Construction of the Copper River and Northwestern Railroad (CR&NWRR) and the Valdez to Eagle telegraph (the Washington Alaska Military Cable and Telegraph System built by the U.S. Army) further added the rapid spread of development. With this influx into the Copper River country, an increase in the incidence of human-caused fire was inevitable. There appeared to be a widespread belief that fires were “good for the land.” Intentionally-set fires became more common for reasons that included increased moose browse and grass production, mosquito abatement, and to make prospecting easier. Fires due to carelessness also increased. Railroad and construction fires, debris burning, campfires, and tobacco smoking were additional causes.

From 1939 until 1945, fire control in Alaska was the responsibility of the Alaska Fire Control Service of the U.S. General Land Office. In 1946 the BLM became the responsible fire control and record keeping agency.

Improved communication and equipment availability in the 1960s aided in more efficient initial attack, and most fires were suppressed when small in size. However, notable exceptions were the Ahtell Creek Fire in 1967 which burned 2,200 acres on both sides of the Tok Cut-off Highway and threatened the community of Slana, and the 1969 Kenny Lake Fire, which burned 1,830 acres and several buildings. Both fires were human-caused.

In 1979 the State of Alaska acquired fire protection responsibility from the BLM. In June of 1981, the Wilson Camp Lightning Fire burned 13,000 acres on the western slopes of Mt. Drum – 8,000 acres the first day – and threatened to jump the Copper River between Glennallen and Copper Center.

b) Fire Occurrence

Prior to 1950 and the era of well-organized fire suppression, large wildfires occurred in the planning area. Table 30 details several sizable fires that occurred within the Copper River Basin.

After 1950, large fires were less frequent. Map 45 on page 331 shows the fire history for the planning area from 1950-2002. Lack of large fire occurrence is due in part to fire suppression, but also to the abundance of wetlands and other natural breaks interspersed throughout the planning area.

Table 30. Large Fire History Within the Glennallen District, 1915-47

Year	Fire Name	Location	Cause	Acres Burned
1915	Sourdough Hill	From Chitina to the Kennecott River, and from the Chitina River to the mountains on the north.	Sparks from CR&NWRR	348,000
1915	Kennecott	Around Kennecott Mine	Intentionally set to kill timber to produce fuelwood for sale at Kennecott Mine	64,000
1927	Willow Creek	Copper River and Tonsina River, with Richardson Highway as western boundary	Construction crew activities	128,000
1947	Tazlina	From Tazlina Lake to the Glenn Highway	Unknown	125,000

c) Current Fire Policy

Within the planning area fire management has been conducted by agreements executed on an interagency, landscape-scale basis since the early 1980s. This effort standardized policies and procedures among land managing agencies in Alaska. As a result, four wildland fire suppression management options (Critical, Full, Modified, and Limited) are utilized statewide by all Federal, State, and Native land managers. Table 31 provides a definition of each suppression class and acres within the planning area for each class. Each management option is defined by objectives, management constraints, and values to be protected. The management option categorizations ensure that:

- Human life, property, and natural and cultural resources receive an appropriate level of protection given available firefighting resources,
- The ability to achieve land use and resource management objectives is optimized, and The cost of the suppression effort is commensurate with the values identified for protection.
- Options are assigned on a landscape scale across agency boundaries. Management option categorizations are designed to be ecologically and fiscally sound, operationally feasible, and sufficiently flexible to respond to changes in objectives, fire conditions, land use patterns, resource information, new technologies, and new scientific findings (BLM 2004c).

The designation of a management option pre-selects strategies (appropriate management response) assigned to accomplish established land use and resource objectives. Regardless of management option classification, firefighter and public safety is the highest priority for all fire activities. Map 46 on page 333 shows the current suppression classes within the planning area. Suppression classes can be changed based on RMP or other land use planning objectives.

Map 45. Fire History 1950 to 2002

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Map size: 11x17

Map 46. Wildland Fire Management Classes

File size: 181 KB
File name: 46_firemgmt.pdf
Map size: 11x17

An essential attribute of the interagency fire planning in Alaska is the flexibility to change the fire management option as warranted due to changes in land use, resource objectives, protection needs, laws, suppression concerns, mandates, or policies. As part of the annual management option review, if the appropriate management response for the designation is not followed for a fire, the area in which the fire occurred will be evaluated to determine if the management option designation is suitable and meeting current land use and resource objectives.

Table 31. Wildland Fire Management Options

Fire Suppression Class	Definition	Acres Within Planning Area*
Critical	Highest priority for allocation of initial attack suppression forces. The objective is to protect human life, populated areas, inhabited property, designated physical developments, and structural resources designated at National Historic Landmarks. Protection of human life has priority over property. The appropriate response to fires that occur in this option is aggressive and continuing actions to provide complete protection of specifically-identified sites from fire.	22,000
Full	Second priority, below Critical, for assignment of available initial attack suppression resources. Full is assigned to cultural and historical sites, uninhabited private property, natural resource high-value areas, and other high-value areas that do not involve the protection of human life and inhabited property. The appropriate response to fires occurring within or immediately threatening areas with this designation is aggressive initial attack dependent upon the availability of suppression resources to minimize resource damage and suppress fires at the smallest reasonably possible number of acres.	1,260,000
Modified	Third priority, below Full, for assignment of available initial attack suppression resources. The goal is to balance acres burned with suppression costs and, when appropriate, to use wildland fire to accomplish land and resource objectives. The option provides flexibility in the selection of suppression strategies. When risks are high, the response is analogous to Full; when risks are low, the appropriate response is analogous to Limited.	2,189,000
Limited	This option acknowledges fire as a vital component of Alaskan ecosystems. Wildland fire is used as a management tool to maintain, enhance, and improve ecological condition. Under this option, wildland fires will be allowed to burn under the influence of natural forces within predetermined areas, while human life and site-specific values continue to be protected. This option is also assigned to areas where the cost of suppression exceeds the value of the resources to be protected or the environmental impacts on the resources than the effects of fire. Generally, this designation receives the lowest priority for allocation of initial attack resources. The appropriate response is routing surveillance to observe fire activity and to determine if site-specific values or adjacent higher priority management option areas are compromised.	11,011,000

* Includes all lands within the planning area regardless of land ownership.

Extensive fire activity in a single year, or multi-year incidents within the same hydrologic unit also trigger the need to initiate an interagency review for that unit (BLM 2004c). Reviews on a collaborative, interagency level after extensive fire activity are encouraged to ensure management option designations are still meeting all land managers' land use and resource objectives. The effects noted by Native villagers residing adjacent to or within the area should be weighed in management option reviews.

d) Prescribed Burning

Prescribed burning efforts have been focused solely on the Alphabet Hills with the objective to improve moose winter range. Early efforts through the 1980s and 1990s failed to meet objectives, in part because of a very narrow burning window. In 2003, 5,000 acres were burned, and in 2004, 41,000 acres burned resulting in a mosaic pattern. Objectives were met in 2004, a year when wildfires burned more than 5 million acres in the state.

e) Fuel Conditions and Fire Behavior

The fuels in the Copper River Basin are similar to those in much of Alaska and contribute to similar fire behavior and problems. The majority of the fire-prone areas are typified by complexes of fine fuels, both living and dead, which react rapidly to changes in relative humidity. These fuels are capable of rapid drying, even after substantial rainfall. Fuel beds are often continuous, with few breaks. Deep organic mats allow fires to be carried beneath the surface, increasing the possibility of hold over fires and the difficulty of mop-up.

Black spruce and white spruce are often associated with these fuel complexes and contribute to additional fire behavior considerations. Spruce trees (especially black spruce) often have branches growing near the ground, and the trees retain a large number of dead branches. These dead fuels form a vertical ladder that easily carries a surface fire into the crowns. The problems associated with crown fires are increased when the spruce grow in dense stands with closed canopies, forming a continuous fuel bed above the ground. In addition to crowning, spotting ahead of the main fire is a common problem in spruce stands. The embers are lofted as crowns burn, and are carried by wind to points ahead of the main fire. (Calderwood 2003a)

Fuels under broadleaf stands and tall shrub communities do not create the same problems because they are not as dense, they usually do not burn as readily, and crown fires are rare. Fires occur in this fuel type after snowmelt but before green-up in spring, then again after leaf drop in the fall. However, the potential for suppression problems does exist after periods of extensive drying.

Map 47. Fuels Types

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Map size: 11x17

A third important fuel type in the planning area is tussock tundra. From a fuels and fire viewpoint, the tussock tundra is essentially a grassland. Virtually all of the burnable material is small diameter and loosely packed dead grass and sedges. This fuel wets and dries very rapidly, burns quickly, and, because there is typically a substantial amount of fuel, the fires can be remarkably intense when burning under dry, windy conditions. This situation presents a set of suppression problems unique to the fuel type. Line building may be questionable and is certainly time consuming because of the commonly deep layers of organic material. For the same reasons, mop-up is slow and tedious. Because the dead grass fronds are retained on the tussocks, this fuel type is ready to burn any time the area is snow free, and even beyond that under the right circumstances. (Calderwood 2003a)

Elevations above 3,000 feet form effective barriers to fire spread because they generally do not support enough vegetation to carry fire. Extensive high elevation areas in the Wrangell Mountains, Chugach Mountains, Talkeetna Mountains, and the Alaska Range are unvegetated and form natural firebreaks. Major, wide rivers such as the Copper, Susitna, and Chitina form natural, but not invincible, firebreaks as well. Map 47 on page 337 shows the distribution of fuel types in planning area.

f) Role of Fire on Wildlife Habitat

Fire is a natural occurrence within Alaska ecosystems. Generally, the effects of fire on habitat are much more significant than the effects on resident animals. Habitat changes determine the suitability of the environment for future generations of animals. Fires may have a short-term negative impact on resident animals by displacing them, disrupting critical reproductive activities, or, rarely, killing them. However, these animal populations recover quickly if suitable habitat is available. Generally, fire improves the habitat for a wide variety of species. The adverse effects that the immediate generation of wildlife may experience are usually offset by the benefits accrued for future generations (Calderwood 2003b).

Most of the planning area is covered with a mosaic of forest, bog, and tundra habitat types that have been collectively termed the northern boreal forest. Fire is the primary agent of change in the boreal forest and is responsible for maintaining habitat heterogeneity. Wildlife have evolved in the presence of fire and have adapted to its presence. Indeed, the continued well-being of most species of wildlife depends on periodic disturbance of the habitat by fire.

The grasses and herbaceous plants that quickly reestablish on burned areas provide an ideal environment for many species of small mammals and birds. A rapid increase in microtine population usually occurs following a fire. This abundance of small prey animals in turn makes the recently burned area an important foraging area for predatory animals and birds. However, the size of the fire and the subsequent proximity to cover and denning or nesting sites affects the degree of use by larger animals.

Fire severity and frequency greatly influence the length of time that the grass and herbaceous plant stage will persist. Severe burning delays the reestablishment of shrubs, a benefit to grazing animals and seed-eating birds. Frequent reburning of a site further retards generation of shrubs and seedlings and prolongs the grassland environment.

For some species of wildlife, such as bison, this perpetuation of a grassland environment is beneficial. Where bison are present, a management program that entails periodic burning to preclude invasion by shrubs and trees can supplement the rangeland that is naturally available along the braided river courses.

Browsers such as moose, ptarmigan, and hares can benefit from the fire as soon as shrubs and tree seedlings begin to reestablish. If a fire leaves most of the shrub root and rhizome systems intact, sprouting will occur very soon after burning. In the case of early season fires, some forage may be available by the end of the growing season and limited use by browsing animals may occur. Forage quality is much improved, with increased digestibility and protein and mineral content for some years after fire. As tall shrubs and tree saplings begin to dominate, the site provides shelter and forage for a greater variety of wildlife. Although the rate of regrowth varies among burned areas and is dependent on many factors, this productive stage can persist for as long as 30 years after fire.

The greatest diversity of wildlife will be found during the tall shrub-sapling stage. Many species, which up to that point have frequented the burned area only to hunt or forage, begin to find that it provides shelter and denning or nesting sites as well. This abundance and diversity of wildlife, in turn, makes these burned areas extremely important to people, whether it be to hunt and trap or to view and photograph.

On most sites the young trees outgrow the shrubs and begin to dominate the canopy after 25-30 years. At this point the shrub component thins out and changes as more shade-tolerant species replace the willows. Subsequently, use by browsing animals such as moose, hares, and ptarmigan declines. On mesic sites which are developing into black spruce forest, the lichen biomass becomes significant during this period and increases in abundance for 50-60 years.

As the forest canopy develops and the understory species disappear, a burned site becomes progressively less productive. Relatively few animal species find the requirements necessary for their survival in the mature spruce forest that will eventually develop in the absence of further fire.

Because lichen cover increases in these more mature stages of black spruce stands, these areas are valuable for lichen-foraging animals such as caribou. In older stands, lichens are slowly replaced by feather and sphagnum mosses. On valley bottoms where a muskeg-bog situation exists, lichen cover also develops, but, contrary to the upland sites, lichens may persist as succession advances.

Generally speaking, large, severe fires are not nearly as beneficial to wildlife as are more moderate fires (Calderwood 2003a). Less intense fires quickly benefit browsing animals and their predators by opening the canopy, recycling nutrients, and stimulating sprouting of shrubs. In addition, the mature trees that are killed but not consumed by the fire provide nesting sites for hole nesters such as woodpeckers, flickers, kestrels, and chickadees, as well as some cover for other animals. A severe fire that burns off the aboveground biomass and kills root systems slows the regeneration of the important browse species, which must then develop from seeds.

Some sites, however, have progressed so far toward a spruce forest community that very little shrub understory exists from which regeneration of the site may occur. Furthermore, many sites are so cold and poorly drained that black spruce have a competitive edge over the less tolerant shrub species. In these situations, a light fire simply results in more spruce. Severe fire or frequently recurring fires are necessary to kill the seeds in the spruce cones and prepare a suitable seedbed for other species, resulting in the greatest enhanced value of the site to the most species of wildlife.

2. Forest Products

The forests of interior Alaska have a very diverse mixture of tree species. There are several species that have the potential for commercial value depending on the market conditions and fiber availability. These tree species include: white spruce (*Picea glauca*), paper birch (*Betuala papyrifera*), aspen (*Populus tremuloides*), and balsam poplar (*Poulus balsamifera*). Pure stands of a single species are rare, whereas mixed stands of hardwood and conifers are common. Tree diameters vary widely through a stand, which makes maximum utilization difficult. In most stands well over 75 percent of the trees are not large enough to utilize as saw logs or house logs. In order to maximize the use of the fiber from these forests, an integrated mill with multiple processing capabilities would be necessary.

Within the Glennallen Field Office, the Tiekel region represents the most productive timber stands. Map 48 on page 3434 shows the location of the most productive commercial stands within the planning area. The timber stands are composed primarily of white spruce and either balsam poplar and/or aspen. Most stands are situated on gently rolling topography with well-drained soils. Over the last 10-15 years the stands have suffered high rates of mortality due to an infestation of the spruce bark beetle (*Dendroctonus rufipennis*). Map 49 on page 345 shows the areas with bark beetle infestation. In some stands affected by the bark beetle, upwards to 80-90 percent of the mature white spruce has died. The lack of adequate access to this low value fiber has limited utilization.

The region exhibits potential for small commercial harvesting of standing timber stocks. Present inventory of the region indicates roughly 25 percent of the area is covered by forest. The USDA Forest Service has estimated that 287,000 acres of the timber crop is of commercial grade, with 303.8 million cubic feet of growing stock and a board-foot

volume of 1,159.6 million feet. Additionally, a non-commercial stratum was examined that had substantial standing volume but did not meet the growth criteria for commercial forest land. This stratum contained 152,800 acres with a volume of 157.9 million cubic feet. There are small timber sales in the planning area that are conducted by the Department of Natural Resources, the BLM, and the Ahtna Native Corporation. The timber harvested in these sales is used locally for house logs, saw timber, and firewood. Timber within Wrangell-St. Elias National Park and Preserve is also used for firewood and house logs. The mountain ranges surrounding the Copper River Valley rise abruptly from the plateau confining most timber stands, including non-commercial timber, to a 5- to 25-mile wide band along the larger rivers. The only exception is the Lake Louise area extending northwest to the Talkeetna Range and Alaska Range foothills. Within that area are many acres of the non-commercial, poorly drained, black spruce sites typical of much of interior Alaska.

Of the units inventoried both by area (76 percent) and volume (85 percent), white spruce is predominant. Aspen is next, followed by cottonwood, with no birch type, although scatterings of birch are found mixed with other types. The best and highest volume stands are found along the Klutina River; other good stands are on river-bottom terraces and levees adjacent to the Copper, Chitina, and Tazlina Rivers.

a) Demand for Forest Products

Annual demand for firewood in the Tiekel region over the last 10-15 years has averaged about 400 cords. House log demand in the same time period has averaged between 400-500 logs. It is also estimated that similar quantities are taken each year unlawfully (without permits) from the Tiekel area.

The forecast for firewood demand is that it will remain stable and potentially increase with any new population increases. With the large stands of bark beetle-killed timber, the fiber should be available. There is a potential for a commercial firewood operation to supply local demand. With the limited access to remote BLM lands, a significant portion of the firewood demand has come from State and Native lands.

Much of the national and international demand for softwood lumber, pulp, and paper products is supplied by the western states and Canada. Demand for these products in southcentral Alaska has diminished in the past several years (Calderwood 2003b).

At this time there is one commercial timber harvest operating in the Tiekel region. The sale will remove approximately 400 cords of spruce from 59 acres. There are approximately 40 free use firewood permits issued annually. Fiber utilization potential could increase with increased access to remote timber stands.

The Tiekel region consists of a large percentage of mature stands. In order to secure the long-term sustainability of these timber stands for commercial and public use, a reforestation program may have to be developed. With upwards of 80-90 percent of the

trees dead in some stands, natural regeneration will be extremely slow (Calderwood 2003b). Planting seedlings would ensure a diversity of both forest and habitat types are sustained.

Significantly more fiber could be utilized in the foreseeable future on a sustainable basis. The key to utilization is access. The vast majority of the Tiekel region is currently not accessible by road. The lack of access not only prohibits the local community from utilizing the bark beetle-kill trees for personal firewood, but also increases the danger of a wildfire that could threaten private property. The public is increasingly aware of this danger and generally support a fuels reduction program.

Map 48. Productive Commercial Timber Stands

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Map size: 8.5x11

Map 49. Areas Affected by Beetle-Kill

File size: 190 KB
File name: 49_beetle.pdf
Map size: 11x17

G. Issue 6: Leasable and Locatable Minerals

1. Geology

a) Physiographic Regions

The East Alaska planning area includes diverse terrain ranging from glaciated mountains to river deltas. Most of the mountainous portions of the planning area host glaciers and icefields; practically the entire region was covered in ice during periods of Pleistocene glaciation (Wahrhaftig 1965). The physiographic description of Alaska compiled by Wahrhaftig remains the definitive reference. Portions of the descriptions of physiographic subdivisions within the planning area are excerpted below; Map 50 on page 349 shows the boundaries of these subdivisions.

(1) Alaska Range (Central and Eastern Portion)

The eastern part of the Alaska Range consists of rugged glaciated ridges surmounted by extremely rugged snowcapped mountains more than 9,500 feet in altitude. Most of the range drains to the Tanana River; the south flank drains to the Copper River. Streams are swift and braided, and most rivers head in glaciers. The high mountains are sheathed in ice, and long valley glaciers extend from them. Short valley glaciers lie in north-facing valleys in the lower parts of the range. Rock glaciers are common. Permafrost is extensive and solifluction features are well developed.

The internal structure of the Alaska Range is a complex synclinorium having Cretaceous rocks in the center and Paleozoic and Precambrian rocks on the flanks. This synclinorium is cut by great longitudinal faults that trend approximately parallel to the length of the range and are marked by lines of valleys and low passes. The synclinorium was probably formed near the close of the Mesozoic Era. Many roughly oval granitic stocks and batholiths support groups of high mountains that have cliffs as high as 5,000 feet. Synclinal areas of Tertiary rocks underlie lowlands that trend parallel to the length of the range. Much of the major topography of the range was probably produced from mid-Tertiary structures by removal of easily eroded Tertiary rocks to form lowlands. Recently formed scarplets as high as 30 feet can be seen on several longitudinal faults. At least four periods of glaciation have been recognized; the earliest is indicated only by scattered giant granite erratics on uplands in the foothills to the north (Wahrhaftig 1965).

(2) Northern Foothills of the Alaska Range

The Northern Foothills are flat-topped east-trending ridges separated by rolling lowlands. The foothills are largely unglaciated, but some valleys were widened during the Pleistocene Epoch by glaciers from the Alaska Range. The major streams of the foothills flow north to N 20° W to the Tanana River. A few small lakes lie in the lowland passes. There are no local glaciers, although a few glaciers from the Alaska Range terminate in the area.

Crystalline schist and granitic intrusive rocks make up most of the ridges, which are anticlinal. Poorly consolidated Tertiary rocks underlie the lowlands; thick coarse conglomerate near the top of the Tertiary section forms cuestas and ridges where it dips 20°-60°, and broad dissected plateaus where it is flat lying. The topography reflects closely the structure of monoclines and short, broad flat-topped anticlines having steep north flanks. Flights of tilted terraces on north-flowing streams indicate Quaternary tilting and uplift of the Alaska Range. The Tertiary rocks contain thick beds of sub-bituminous coal (Wahrhaftig 1965).

(3) Broad Pass Depression

General topography. The Broad Pass Depression, 1,000-2,500 feet in altitude and 5 miles wide, is a trough having a glaciated floor opening to the east to a broad glaciated lowland. The eastern part of the depression drains to the headwaters of the Susitna River. Most streams head in glaciers in the surrounding mountains and are swift, turbid, and braided. Many long, narrow lakes lie in morainal depressions in the central part of the trough. Morainal and thaw lakes are common in the eastern part. There are no glaciers. Most of the depression is underlain by permafrost.

Patches of poorly consolidated Tertiary coal-bearing rocks, in fault contact with older rocks of the surrounding mountains, show that this depression marks a graben of Tertiary age. Most of the bedrock consists of highly deformed slightly metamorphosed Paleozoic and Mesozoic rocks that are also exposed in the surrounding mountains. Ground moraine mantles the lowland (Wahrhaftig 1965).

(4) Clearwater Mountains

The Clearwater Mountains consist of two or three steep, rugged east-trending ridges rising to altitudes of 5,500-6,500 feet, separated by U-shaped valleys 3,000-3,500 feet in altitude. They are intensely glaciated. The ridges are asymmetrical; long spurs on their north sides separate large compound cirques; their south sides are relatively smooth mountain walls grooved by short steep canyons. The entire section is tributary to the Susitna River. There are a few rock-basin lakes in cirques and passes. The largest lake is less than 1 mile long. The north slopes of the highest peaks have a few cirque-glaciers.

Map 50. Physiographic Regions

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Map size: 11x17

The Clearwater Mountains are underlain chiefly by Triassic greenstone and Mesozoic argillite and graywacke. The rocks are highly deformed, strike generally east, and dip steeply (Wahrhaftig 1965).

(5) Gulkana Upland

The Gulkana Upland consists of rounded east-trending ridges separated by lowland glacial deposits showing morainal and stagnant-ice topography and containing large esker systems. The southeastern and eastern part drains south to the Copper River; the western part drains southwest to the Susitna River; and the north-central part drains north via the Delta River to the Tanana and Yukon. Many long, narrow lakes occupy rock-cut basins in notches through the ridges. Irregular lakes abound in some areas of morainal topography. A few cirque glaciers lie on the north sides of the highest ridges. The termini of a few glaciers from the Alaska Range are in this section. The upland is underlain by permafrost and contains ice-wedges, pingos, and altiplanation terraces.

Bedrock is chiefly greenstone and of late Paleozoic and Mesozoic age; structure trends eastward. Areas of relatively low relief in the northern part are underlain by poorly consolidated Tertiary sedimentary rocks (Wahrhaftig 1965).

(6) Copper River Lowland

The eastern part of the Copper River Lowland is a relatively smooth plain trenched by the valleys of the Copper River and its tributaries. The Copper and Chitina valleys, eastward prongs of this lowland, contain longitudinal morainal and ice-scoured bedrock ridges that rise above axial outwash plains. The western part of the Copper River Lowland, the Lake Louise Plateau, is a rolling upland and has morainal and stagnant-ice topography; the broad valley of the Nelchina and Tazlina Rivers separates this upland from the Chugach Mountains. The eastern and southern parts of the Copper River Lowland are drained by the Copper River and its tributaries. The northwestern part is drained by the Susitna River. Low passes lead to the heads of the Delta, Tok, and Matanuska Rivers. Most rivers head in glaciers in surrounding mountains and have braided upper courses. Salty ground water has formed salt springs and mud volcanoes. Large lakes occupy deep basins in the mountain fronts. Thaw lakes are abundant in the eastern plain. Lakes occupy abandoned melt-water channels; those in morainal depressions in the western upland are as much as 6 miles across. Beaches and wave-cut cliffs border lakes more than 2 miles wide whereas irregular muskeg marshes encroach on smaller lakes. There are no glaciers. The entire lowland is underlain by permafrost. The permafrost table is within 5 feet of the surface and permafrost is at least 100 feet thick.

Bedrock beneath the southern part of the lowland is chiefly easily eroded sandstone and shale of Mesozoic age; bedrock beneath the northern part is chiefly resistant late Paleozoic and Mesozoic metamorphosed volcanic rocks. Tertiary gravels cap some hills. Ground and end moraine and stagnant ice deposits mantle much of the lowland.

The eastern plain is underlain by glaciolacustrine and glaciofluvial deposits at least 500 feet thick (Wahrhaftig 1965).

(7) Wrangell Mountains

The Wrangell Mountains are a group of great shield and composite volcanoes that rises above a low plain on the north and west and above heavily glaciated cliffed and castellated ridges on the south and east. Six volcanoes at altitudes higher than 12,000 feet make up the greater part of the mountains. Most of the section drains to the Copper River, which encircles the mountains on the west. The remainder drains to the Tanana River via the Nabesna and Chisana Rivers and to the Yukon River via the White River. There are a few rock-basin lakes in the extreme northern part. Several ice-marginal lakes lie in Skolai Pass at the east end of the mountains. A large icecap covers most of the high mountains and feeds large valley glaciers. Rock glaciers are common in the southeastern Wrangell Mountains. Permafrost is probably present in the glacier-free areas, but its extent is unknown.

The Wrangell Mountains are a great pile of Cenozoic volcanic rocks that rests on deformed Paleozoic and Mesozoic sedimentary and volcanic rocks, among which are cliff-forming units of limestone and greenstone. Some granitic masses intrude the Mesozoic rocks. An important belt of copper deposits, including the Kennicott Mine, lies on the south side of the Wrangell Mountains (Wahrhaftig 1965).

(8) Kenai-Chugach Mountains

The Kenai-Chugach Mountains form a rugged barrier along the north coast of the Gulf of Alaska. High segments of the mountains are dominated by extremely rugged east-trending ridges 7,000-13,000 feet in altitude. Low segments consist of discrete massive mountains 5-10 miles across and 3,000-6,000 feet in altitude, separated by a reticulate system of through valleys and passes one-half to one mile wide that are eroded along joints and cleavage. The entire range has been heavily glaciated, and the topography is characterized by horns, aretes, cirques, U-shaped valleys and passes, rock-basin lakes, and grooved and mammillated topography. The south coast is deeply indented by fiords and sounds, and ridges extend southward as chains of islands. The north front is an abrupt mountain wall. The drainage divide is along the highest ridges, and is commonly only a few miles from the Pacific Ocean. Streams are short and swift; most head in glaciers. The Copper River crosses the eastern part of the Chugach Mountains in a canyon 6,000-7,000 feet deep. Large lakes fill many ice-carved basins along the north margin of the Chugach Mountains and throughout the northern Kenai Mountains. All higher parts of the range are buried in great icefields, from which valley and piedmont glaciers radiate. Many of the glaciers on the south side of the mountains end in tidewater. The extent of permafrost is unknown.

The Kenai-Chugach Mountains are composed chiefly of dark-gray argillite and graywacke of Mesozoic age that are mildly metamorphosed and have a pronounced vertical cleavage that strikes parallel to the trend of the range. In the Prince William

Sound area large bodies of greenstone are associated with the argillite and graywacke. A belt of Paleozoic and Mesozoic schist, greenstone, chert, and limestone lies along the north edge of the Kenai and Chugach Mountains. All these rocks are cut by granitic intrusions.

(9) St. Elias Mountains

The St. Elias Mountains are massive isolated blocklike mountains rising from a myriad of narrow ridges and sharp peaks. The average altitude of icefields in the interconnected valley system is 3,000-7,000 feet. Local relief is extreme and jagged cliffs abound. Drainage is almost entirely by glaciers. There are no lakes. All parts of the range gentle enough to hold snow are sheathed in glacial ice. A continuous network of icefields and glaciers penetrates the range and feeds piedmont glaciers to the south. The extent of permafrost is unknown

The high mountains are probably underlain by crystalline schist and granitic intrusive masses. A belt of Permian and Triassic volcanic and sedimentary rocks extend along the north side of the range. Lower Cretaceous sedimentary rocks lie in down-faulted basins in the center of the range and probably underlie ice-filled valleys. The entire sequence is thrust southward against Cretaceous and Cenozoic rocks; thrusting may be active today. Cenozoic volcanoes are present in the northern part of the range; some of these may still be active (Wahrhaftig 1965).

b) Structural Geology and Tectonics

Geographically the East Alaska planning area extends from the Talkeetna Mountains in the west to the Wrangell and St. Elias Mountains in the east and southeast. The Chugach Mountain Range and the Gulf of Alaska form the southern border and the eastern extension of the Alaska Range forms the arching northern border.

The southcentral region of Alaska was created from a series of island arcs and their associated oceanic sedimentary basins being thrust onto North America by the geological subduction zone which rims the northern Pacific Ocean. By the late Paleozoic age the large Alexander, Wrangellia, and Peninsular terranes had been attached to Alaska (Nokleberg et al. 1998). The Chugach and Prince William terranes had followed by early Paleocene times completing the accretion of south-central Alaska. With the long history of subduction along the Alaskan coast, there is an equally long history of intense faulting and volcanism which forms the current geology of south-central Alaska.

The large scale faulting in the East RMP is associated with the subduction environment of its formation. The infamous Denali fault forms a southeast trending arc where it is the northern border of the Glennallen Field Office. The Totschurda, Border Ranges, Chugach-St. Elias and Contact faults are nearly parallel to the Denali fault's east-west

to southeast trend. Likewise many of the intrusive geologic features in the accreted terranes of the south-central Alaska have a similar geographic orientation (Beikman 1980). There are numerous, generally mafic, intrusive bodies scattered throughout the sedimentary geologic formations of the planning area. The coincidence of intrusives and volcanics with the predominant orientation of the structural trends is expressed in the mineral terranes of the area. Mineral terranes are where known mineral occurrences are extrapolated to adjacent areas of similar geology.

c) Mineral Terranes

The East Alaska planning area is underlain by five Mineral Terrane units whose geologic settings are considered highly favorable for the existence of metallic mineral resources (U.S. Bureau of Mines 1995). Specific commodities and mineral deposit types are more likely to exist within each terrane based on a terrane's particular geologic nature. Unmapped areas are generally evaluated as having poor to only moderate mineral potential. The mapped terranes include Granitic Intrusive, Mafic-Ultramafic Intrusive, Felsic Volcanic-Sedimentary, Mafic Volcanic-Sedimentary, and Continental Sedimentary dominated units. Map 51 on page 355 presents the mineral terranes and the locations of producing placer districts, significant commodities/mineral deposits, and the aerial extent of mineral terranes in the planning area.

The Granitic Intrusive Terrane includes mainly Jurassic to Tertiary age felsic and alkalic intrusive rocks of typically granite to granodiorite composition. This terrane is generally permissive to copper, gold, molybdenum, tin, tungsten, uranium, thorium, and rare earth element deposits. Specific deposit models likely to occur include disseminated intrusive gold, gold-copper skarn, polymetallic vein, copper-molybdenum-gold porphyries, tin greisens, and tungsten deposits.

Mafic-Ultramafic Intrusive Terrane in the area exists mainly along the Border Ranges Fault, and represents hot, deep-seated gabbroic to ultramafic bodies, intruded along major fault sutures as differentiated igneous complexes. There is high potential in these areas for copper, nickel, chromium, and platinum group element (PGE) deposits, with by-product cobalt. A number of large exploration projects are currently underway in 2004, actively exploring for Noril'sk-model and other magmatic sulfide types of mineralization in the Central Alaska Range.

The Felsic Volcanic-Sedimentary Terrane occurs in only a small portion of the northern planning area, northeast of Paxson. Among the commodities associated with this rhyolite-dominated rock suite are copper, lead, zinc, gold, silver, uranium, and thorium.

Mafic Volcanic-Sedimentary Terrane is the most extensive in the planning area and has a high potential for discovery of copper, zinc, and by-product gold and silver deposits. Kennicott (basaltic) copper and Besshi-type massive sulfide target models are the most applicable, with host lithologies ranging from shallow marine basaltic to tholieitic flows, ophiolites, volcaniclastic sedimentary rocks, and local black shale and conglomerate.

Map 51. Mineral Terranes and Producing Placer Districts

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Map size: 11x17

This terrane is seated mainly along the three major faults that transect the planning area.

The Continental Sedimentary Terrane potentially hosts significant gold, silver, lead, zinc, copper, and tin resources. Additionally, coal-bearing sandstone and shale are present. Metamorphic gold vein, plutonic-related gold vein, polymetallic massive sulfide, skarn, copper and gold deposits in greywacke, shale, and limestone are the prospective mineral deposit types to target.

2. Minerals Occurrence, Potential, and Administration

a) Leasable Minerals

(1) Coal

All or parts of four coal fields reside inside the planning area. Map 52 on page 359 shows the location of these fields. A coal field, as used here, is an area that has high resource potential and contains one or more known coal beds of mineable thickness and quality. This does not imply that coal within these fields is economical to mine. There are no existing coal lease in the planning area. However, one Federal coal lease was issued in 1984 at the Jarvis Creek Field.

Coal is classified by rank in accordance with standard specifications of the American Society for Testing and Materials. Most of the coal in the planning area is low to medium rank (lignite to subbituminous). The Bering River field, however, does contain bituminous, semi-anthracite and anthracite coal. It is unlikely that these coal resources will be developed within the next 15-20 years.

(a) Broad Pass Field

The Broad Pass Field, located about 160 miles south of Fairbanks along the Parks Highway, is considered a northeastern extension of the Cook Inlet/Susitna basin (Merritt, 1986a). The Tertiary coal-bearing sequence occupies a narrow graben about 36 square miles in area and contains lignite seams 5 to 10 feet thick that dip between 2 and 9 degrees. Identified resources are estimated at 50 million short tons (Merritt and Hawley 1986; McGee and O'Connor 1975a; Barnes 1967; Hopkins 1951).

(b) Bering River Field

The Bering River coal field, most of which is located within Chugach National Forest near the Gulf of Alaska, is about 20 miles long and 2 to 5 miles wide (Smith and

Rao, 1987). The coal-bearing rocks are exposed in a belt running northeast from the eastern shore of Bering Lake. The field is bordered by the Martin River Glacier on the northwest and by the Bering Glacier on the southwest. The Bering River field contains four formations of Tertiary age; the Tokun, Kushtaka, Stillwater, and Poul Creek Formations. The exact relationship of these formations to one another is not known due to the lack of contacts. The middle part of the Kushtaka Formation is the primary coal-bearing strata in the field (Smith and Rao 1987). It contains bituminous, semianthracite, and anthracite coal with a total resource potential of 59 million tons. Past production has been less than 100,000 tons (Merritt 1986a).

The structure of the coal field is characterized by complex folding including isoclinal recumbent and overturned folds as well as northwest trending major faults and minor faults that run northeast. This structural deformation has resulted in thickness variations within short distances (a few inches to 60 feet), however, drilling data shows that continuity exists from outcrop to their subsurface extensions (Smith and Rao 1987).

(c) Jarvis Creek Field

The Jarvis Creek field, an easternmost, isolated subfield of the Nenana coal province, is located about 30 miles south of Delta Junction in east-central Alaska. The coal field covers about 16 square miles and is underlain by lower Paleozoic schist and coal-bearing Tertiary age rocks. The coal-bearing formation at Jarvis Creek, tentatively correlated with the Healy Creek and Lignite Creek formations in the Nenana coal, is about 2,000 feet thick and contains at least 30 coal beds of subbituminous rank, most of which are thin (1 to 10 feet) and discontinuous. Estimates of inferred reserves are reported at 100 million tons (Wahrhafitg and Hickox 1955; Wahrhaftig et al. 1969; Belowich 1987).

(d) Copper River Field

According to Merritt and Hawley (1986) the coal-bearing Gakona Formation crops out at several locations within the Copper River Field. The Tertiary age Gakona Formation contains lignite coal beds of unknown thickness. Sparse coal also occurs in upper Cretaceous sandstone along the Nelchina River (Williams 1985).

Subsurface data gathered from exploratory oil wells and water wells drilled in the Copper River Basin show several thin lignitic coal beds in Tertiary age rocks unconformably overlying the Cretaceous Matanuska Formation. A 5 foot thick coal bed was recorded in a drill hole south of Lake Louise at depths ranging from 126 to 167 feet (Williams 1985). Merritt (1986a) reports that coals of the Copper River field occur in the Frederika Formation of Tertiary age. Numerous beds up to 18 feet thick are found in isolated fault blocks, prisms, and erosional remnants.

Map 52. Coal Fields

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Map size: 11x17

(e) History and Development

One Federal coal lease was issued in the planning area in 1984 at the Jarvis Creek Field. The lease was issued as a result of a Preference Right Lease Application, which meant that a discovery of coal was made through a prospecting permit issued prior to August 4, 1976. This preference right lease terminated in 1994 due to lack of diligent development. The lease area has since been conveyed to the State of Alaska. In 1970, the Bureau of Mines estimated that a few hundred tons of coal had been mined from the Jarvis Creek Field in which the lease is located. The coal was mined by open pit methods and used locally for space heating.

(2) Geothermal

Geothermal energy consists of heat stored in rocks, and to a lesser extent in water or steam-filling pores and fractures. Water and steam transfer geothermal heat by convection to shallow depths within the earth's crust. This heat may then be tapped by drilling. Geothermal heat may also escape at the surface in geysers, thermal springs, mud volcanoes, and fumaroles (a vent, usually volcanic).

The distribution and extent of potential geothermal resources within southcentral Alaska is centered around the Mt. Wrangell volcanic pile, which contains over 11 million acres (ADGGS 1984). This massif, and the associated springs with temperatures ranging between 20 and 50 degrees Celcius, is located within the East Alaska planning area, mostly on National Park Service lands.

Geothermal leases are issued through competitive bidding for Federal lands within a Known Geothermal Resource Area (KGRA), or noncompetitively for Federal lands outside of a KGRA. KGRAs are areas where BLM determines that persons knowledgeable in geothermal development would spend money to develop geothermal resources. There are only three Known Geothermal Resource Areas (KGRAs) within Alaska. None of the KGRAs are in the East Alaska planning area.

(3) Coalbed Methane

Recent oil and gas exploration in the state has included a focus on coalbed methane (CBM) exploration, most notably in the Matanuska-Susitna Valley area located in the northeastern Cook Inlet basin, about 60 miles southwest of the planning area. Coalbed methane is a form of natural gas that occurs in large quantities in coal seams. The gas is typically contained within the internal surfaces of the coal and is held in place by hydrostatic pressure created by the presence of water. During production, this water is pumped to the ground surface which lowers the pressure in the coalbed reservoir and stimulates the release of gas from the coal. The gas itself, which is almost entirely methane, eventually flows through fractures in the coal to the well bore and is captured for use.

Until the 1980s, coal seams generally were not considered to be reservoir targets, even though producers often drilled through coal seams to reach deeper horizons. During the second half of the 1990s, CBM production increased dramatically nationwide to meet ever-growing energy demands.

The most accessible areas available for CBM exploration and development in the planning area are the Copper River Basin and identified coal resources near Summit Lake, about 10 miles north of Paxson. However, we know of no companies testing lignite coal for gas, and with present technology it is unlikely that industry will produce commercial amounts of gas from lignite coal within Alaska for the reasonably foreseeable future.

(4) Oil and Gas

There are no active Federal oil and gas leases within the planning area. Only one geophysical exploration oil and gas permit has been issued for Federal lands; this exploration permit was issued in 1984. BLM-administered lands within the planning area currently open for lease comprise about three million acres in the Denali, Tiekel, North Slana, and South Slana areas. Most of these areas are encumbered by State or Native selections.

(a) History and Development

1. Gulf of Alaska Onshore Basin

The petroleum potential of the onshore Gulf of Alaska Tertiary Basin was first recognized through the discovery of oil and gas seeps east of Katalla in 1896. Katalla is located on the Gulf of Alaska, approximately 15 miles west of the Bering Glacier. From 1901 to 1930, 44 shallow wells were drilled in the Katalla area; 28 wells at the Katalla field and 16 wells at nearby locations. Most wells had oil shows, some had gas shows, and 18 produced oil commercially (about 154,000 barrels) from fracture porosity in sandstone and siltstone of the Poul Creek Formation at depths ranging from 360 to 1,750 feet (Blasko 1976).

The Katalla field became the only commercially productive area in the Gulf of Alaska Tertiary Basin. Production within the first decade justified the expense of building a small refinery onsite. Between 1911 and 1933, refined products, including distillate, gasoline, diesel oil and kerosene were transported in 100-gallon steel drums and sold along the Alaska gulf coast to local canneries, mining companies and fisherman. Production abruptly ended when the refinery burned down in 1933 (Miller et al. 1959; Blasko 1976; Bruns and Plafker 1982). Although active natural gas seeps were known in this area, there are no records of gas production from this period.

East of Katalla in the coastal area of Cape Yakataga, located between the Bering Glacier and the Malaspina Glacier, oil and gas seeps are found on numerous rivers and creeks draining southward toward the ocean. The first

test well in this area, drilled between 1926 and1927, had shows of oil and gas but was plugged and abandoned. After WW II, leasing activity on previously withdrawn lands resumed and in 1951 hundreds of individuals applied for non-competitive leases covering nearly one million acres in the coastal areas between the Copper River and Cape Fairweather (Miller et al. 1959). Most, if not all, of the leases where obtained as speculative investments. Exploration for onshore oil and gas deposits within the basin continued from 1954 to 1963 when an additional 23 wells and 4 core holes were drilled. Although all were abandoned, records indicate shows of oil and/or gas in nine of the wells (Plafker 1971). No commercial hydrocarbon field has been discovered east of the Katalla field.

2. Copper River Basin

Since the late 1950s, Copper River Basin petroleum exploration efforts have produced aeromagnetic and gravity survey data, seismic surveys and eleven exploration wells. Aledo Oil drilled the first well, Eureka No 1, in 1957, in the southwest corner of the basin. The last well, Alicia No 1, was drilled in 1983 by the Copper Valley Machine Works in the east-central part of the basin, about 12 miles west of Glennallen. None of these wells produced oil or gas and all were subsequently plugged and abandoned.

In October 2000, the State of Alaska awarded a 5-year exploration license to Forest Oil Corp/Anschutz Exploration on approximately 398,445 acres within the Copper River Basin. At this time, results of the exploration have not been made public.

(b) Occurrence Potential

Several geologic elements are necessary for oil and gas to accumulate in sufficient quantities. These elements include an organic-rich source rock to generate oil or gas, the combined effects of heat and time, a porous and permeable reservoir rock to store the petroleum in, and some sort of trap to prevent the oil and gas from reaching the surface. Traps generally exist in predictable places - such as at the tops of anticlines, next to faults, in the updip pinchouts of sandstone beds, or beneath unconformities. Map 53 shows the occurrence potential for oil and gas throughout the planning area. It does not imply these resources can be developed economically.

Ehm (1983) delineated two petroleum basins that fall either partially or entirely within the planning area. These basins are generally considered prospective for oil and gas resources and serve as the focus for further analysis using available exploration and drilling data and U.S. Geological Survey play descriptions.

Four conventional oil and gas plays have been identified in the planning area by the U.S. Geological Survey (See Map 53 on page 365). A play is a set of discovered or undiscovered oil and gas accumulations or prospects that exhibit nearly identical geological characteristics. A play is defined, therefore, by the geological properties

(such as trapping style, type of reservoir, nature of the seal) that are responsible for the accumulations or prospects. All four plays identified by the U.S. Geological Survey 1995 National Assessment that occur within the planning area are considered hypothetical. Hypothetical plays were identified and defined based on geologic information but for which no accumulations of the minimum size have, as yet, been discovered. As such, hypothetical plays characteristically carry a much broader degree of uncertainty than do confirmed plays.

(c) Development Potential

Actual development activity within the planning area will be determined by accessibility to resources, including the perceived impact of lease stipulations by the petroleum industry; exploration and development costs; the success rate of wells drilled in the future; commodity prices; and production rates required to provide an economically viable return on investment.

1. Yakataga Fold Belt Play

The Yakataga Fold Belt Play is classified as a lightly explored area (22 exploratory wells, excluding the Katalla Field) with High potential for the generation of oil and gas and Low development potential. The most favorable accessible structures have been tested by previous exploration efforts. Structural complexity is so extreme as to make trap potential unfavorable on many, if not most, of the exposed onshore structures. This structural complexity may increase with depth. Well depths are estimated to be range the surface and at least 13,000 feet, with potential reservoirs up to 30,000 feet immediately offshore. The primary objectives are most likely the Cenozoic rocks harboring hard-to-define traps and major thrust faults that cut the region.

2. Yakutat Foreland/Lituya Bay Play

The Yakutat Foreland/Lituya Play is classified as a moderately explored area (13 exploratory wells) with High potential for the generation of oil and gas, and Low development potential. Within the boundaries of the planning area, over 80 percent of the play lies beneath the ice of the Malaspina Glacier. Well depths are estimated to range between 1,500 feet and at least 13,000 feet, with potential reservoirs up to 30,000 feet immediately offshore. The primary objectives are the Cenozoic and Tertiary sedimentary rocks near inferred gentle structural closures in the Icy Bay area.

3. Upper Cretaceous-Tertiary Biogenic Gas Play

The Upper Cretaceous-Tertiary Biogenic Gas Play is classified as a lightly explored area (9 exploratory wells) with Medium potential for the generation of biogenic gas and Low development potential. Well depths would be less than 2,000 feet and the primary objectives are the Tertiary non marine sedimentary

Map 53. Oil and Gas Potential and Occurrence

File size: 185 KB
File name: 53_ogpot.pdf
Map size: 11x17

rocks consisting of conglomerate, sandstone, siltstone, and local thin beds of lignite coal. The Tertiary section penetrated in the Salmonberry Lake and Rainbow wells contained low-grade (lignite) coals at depths between 700 and 2,000 feet. These coals measured up to 60 feet thick and could be targets for coalbed methane gas wells. Spacing is typically 640 acres for a shallow gas well.

4. Mesozoic Oil Play

The Mesozoic Oil Play is also classified as a lightly explored area (11 exploratory wells) with Medium potential for the generation of oil and gas and Low development potential. Evidence is lacking that sufficient oil has been generated to fill existing structural and stratigraphic traps. No significant oil shows have been reported in outcrop or from any of the wells drilled to date. The primary objectives for this play are the Early to Late Cretaceous marine sedimentary rocks of the Matanuska Formation at depths between 2,000 and 6,000 feet.

b) Locatable Minerals

(1) History and Development

(a) Valdez Creek Area

Valdez Creek discharges into the Susitna River near the former town of Denali. The placer mines along Valdez Creek and its tributaries, were the largest mines in the East Alaska RMP. Gold was first mined at Valdez Creek (formerly named Galina Creek) by hand methods starting in 1903. Tammany Channel was mined by underground methods and it and Dry Creek cut were also mined by hydraulicking. Gold production through 1979 totaled approximately 35,000 ounces. Valdez Creek Mining Company was formed to mine the creek by large-scale, open-pit methods and from 1984 until temporary shutdown in October of 1989 produced 179,417 ounces of refined gold .(Kurtak et al. 1992). Up to April 2000 the total production from Valdez Creek and its tributaries has been over 650,000 ounces of gold (Stevens, 2001:401) As of 1999 there was a large volume of sub-economic material upstream of the upper limit of mining which had been identified by Valdez Creek Mining Company's extensive drilling program (Stevens, 2001:401). Lucky Gulch, the next largest producer in the Valdez Creek Mining District, discharges into Valdez Creek itself, and had a total recorded production through 1925 of about 3,000 ounces. Since that date, cumulative production is probably about equal to that amount. (D. L. Stevens, personal observation, 1999). Lucky Gulch produced the coarsest placer gold in the district and the largest gold nugget which weighed 52 ounces.

(b) Nikolai Belt

Nickel and copper were discovered along the south flank of the Delta Range near Rainbow Mountain in the early 1950's. This mineralized area has become known as the Nikolai Belt, which is the name of the igneous formation that hosts the mineralized rocks. Several large companies have staked or optioned claims in the area and explored over the years, including Cominco, Falconbridge, and INCO. Smaller companies have also been active. Not until the 1990's, however, have platinum group elements (PGE) also been targeted along with the nickel and copper. Exploration over the years has included geologic mapping, geochemical sampling, airborne and ground geophysics, and diamond drilling.

Nevada Star Resources Corporation has put together a large land position in the area. Their MAN project is focused on locating nickel, copper, and PGE resources in prospective terrain north of the Denali Highway, approximately between the Richardson Highway on the east and the Maclaren River on the west. Several factors make this area particularly attractive for mineral exploration: The infrastructure of highways in the area makes it particularly accessible. There is a large known extent of Nikolai Belt afic-ultramafic rocks in the area, which are the potential hosts of Ni-Cu-PGE resources. The large extent makes the discovery of a large deposit possible. Prices for nickel, copper, and platinum are currently elevated. PGE exploration began fairly recently, making the area relatively under-explored. Finally, the United States has only one other mine that currently produces PGE (the Stillwater Mine in Montana).

(c) Upper Chistochina River area:

Gold was discovered in the upper Chistochina River area in 1898 (Mendenhall, 1905). The upper Chistochina district included several creeks, Slate Creek, Miller Gulch, the Big Four claims, the lower Chisna River, Ruby Creek, and Lime (or Limestone) Creek. Miller Gulch was the most profitable of the placer mines in the area. Intermittent production from the district has occurred to the present, but the greatest production came between 1901 and 1906 (Foley and Summers, 1990). Moffit (1912) reports that by 1910, more than $1,500,000 of gold production had occurred from the Chistochina district. Moffit later reports (1944) that according to USGS records, the Chistochina district produced about $3,000,000 worth of gold from 1900 to 1941, with $1,280,000 of gold produced prior to 1907. Significant production reportedly occurred until about 1926, and between 1979 and 1985 (Foley and Summers, 1990). In the later years, most production came from the operations of Ranchers Exploration and Development Corp. Foley and Summer (1990) report total production from the upper Chistochina area through 1988 at 178,926 ounces gold, and 17,344 ounces silver, with a value assigned at $17,171,527.

(d) Golden Zone Mine Area

The Golden Zone Mine is located about 25 miles southwest of the town of Cantwell, at the headwaters of Bryn Mawr Creek, a tributary of the West Fork Chulitna River. The mine produced 1,580 ounces of gold, 8,616 ounces of silver, and 20.9 short tons of copper between 1941 and 1942 (Hawley and Clark 1974: B34). As of April 7, 2000, the Golden Zone and other nearby properties such as Banner, Lupin, Bunkhouse, and Mayflower were considered to be active (Stevens, 2001: 88, 76, 78, 80, 82). All of the properties in the immediate area are lode deposits except for a small placer immediately downstream of the Golden Zone, the Bryn Mawr Creek placer prospect, which produced a small amount of gold in 1909.

The Golden Zone mine has been the center of extensive exploration activity especially between 1936 and 1996 which included 54,326 feet of drilling in 137 drill holes. There have also been numerous trenches and geochemistry samples taken. The underground workings include 1,900 feet of development on three levels. Geophysical work on the property includes close space helicopter aeromagnetic, and EM along with ground based IP (Stevens, 2001, p.88). The other properties in the vicinity have also been examined, although not nearly as well as the Golden Zone. As a result of this work it has been estimated that the Golden Zone and nearby properties have proven and probable reserves of 8 million tons of ore averaging 0.1 ounce of gold per ton (at a cutoff of 0.02 ounce of gold per ton), or about 800,000 ounces of gold (Stevens, 2001:89).

(e) Eastern Talkeetna Mountains Area

There are several inactive gold placer mines in the area, one of which (Yacko Creek) has produced an estimated 1,000 ounces of gold. The presence of coarse gold was noted in 1918 by Chapin. Placer and stream sediment samples taken on a number of streams such as Yacko Creek, Red Fox Creek, Tyone Creek, and Busch Creek indicate anomalous levels of gold and PGE in the gravels. There are large volumes of stream and bench gravel deposits which have the potential for development (Kurtak et al. 1992).

(f) Port Valdez Area

South of Port Valdez, on the west side of Solomon Gulch, 1.3 miles south of Solomon Lake, is the Midas Mine. Production from the Jumbo lode of the Midas Mine totaled more than 3,000,000 pounds of copper (Rose 1965, p.7). Most production occurred from 1911 to 1919 from the four underground mine levels. The Midas Mine is estimated to have reserves of 60,000 tons of mineralized rock with an average grade of 1.6 percent copper (Jansons et al. 1984, p. 92).

North of Port of Valdez, in the Mineral Creek watershed, are several mines with past production. All of these mines are listed as Inactive or Probably Inactive in the ARDF database and one, the Hercules, is listed as having inferred reserves. The Little Giant

has a reported production of 367 ounces of gold and 152 ounces of silver (Jansons et al. 1984, p.89). The Big Four mine had a reported production of 846 ounces of gold and 371 ounces of silver (Jansons et al. 1984, p.91). The Cash mine had an unknown production level. Small scale placer mining has occurred at various places along Mineral Creek. The Hercules mine had a reported production of 269 ounces of gold and 44 ounces of silver and has inferred reserves for this area of 450 tons of mineralized rock averaging 22.5 ppm gold and 9.1 ppm silver (Jansons et al. 1984, p.91).

(2) Resource Allocation

Locatable minerals are allocated through location of mining claims. Prospecting or exploration can take place without a claim, although an unclaimed discovery would be pre-empted by location of a claim.

By law, all public lands are open to mineral entry (mining claim location) unless specifically segregated or withdrawn. Map 20, on page 153 in Chapter II, shows those areas that are currently open to mineral entry.

Segregations occur on State and Native-selected lands. The purpose of a segregation from mineral entry would be to prevent new mining claim locations from clouding title to the lands which are selected. A mining claim carries an inherent right to carry a surface patent. If a new claim were located and a surface patent ensued, it would encumber the selection. Currently, 5.5 million out of 7.1 million acres of BLM-managed lands within the planning area are State or Native selected. Therefore, no mineral entry will occur on these lands until conveyance occurs or the selection is relinquished back to the BLM.

Withdrawals (as discussed on page 321 under *Issue 4: Lands and Realty*) also currently constrain mineral development on many lands within the planning area. Revocation of withdrawals that occur on State or Native selected lands would only allow subsequent mineral entry once conveyance occurs.

(3) Mining Claims and BLM Management

There are approximately 1,100 unpatented mining claims within the Glennallen Field Office, although claims are continuously being located or abandoned. Because mining claimants have the right to prospect, under the 1872 Mining Law, for locatable minerals, and locate mining claims without governmental approval, BLM's management is minimal until such time as the claimant wished to do some activity that will disturb the surface, at which time various laws and regulations must be followed before such disturbance can occur. Mining claim recordation and adjudication are handled at the BLM Alaska State Office (ASO) level. ASO handles Notices of Intent to perform annual assessments. District personnel use an interdisciplinary approach to approving a Plan of Operation under 43 CFR 3809 regulations for any activity that requires access across a wild and/or scenic river corridor or has planned operations that will disturb greater than five acres or has a cumulative disturbance greater than five acres. There are currently five plans of operations processed under these regulations. These plans must

be approved prior to any mining by the applicant. Operations currently being conducted on BLM-managed lands are small-scale placer mining operations, with annual disturbance less than five acres.

BLM compliance officers conduct inspections of placer mining operations on Federal claims. Currently, all operations are inspected at least twice each year, and most are inspected at least once during the mining phase of the operation and once at the end of the season after site reclamation has been completed. The primary concern of the compliance inspector is that the miner is operating appropriately and that reclamation work is acceptable. During each compliance visit an inspection record is completed that describes the inspector's observations of the operation. If any problems or violations exist at the mine site, the compliance inspector discusses them with the operator, sets a time frame for correction, and issues a notice of noncompliance, if necessary. The mine site is revisited to ensure that corrective actions have taken place.

c) Salable Minerals (Mineral Materials)

Salable minerals disposition is addressed under the Materials Act of July 31, 1947, as amended by the Acts of July 23, 1955, and September 28, 1962. These acts authorized that certain mineral materials be disposed either through a contract of sale or a free-use permit. The Materials Act of 1947, as amended, removes petrified wood, common varieties of sand, stone, gravel, pumice, pumicite, cinders, and some clay from location and leasing. These materials may be acquired by purchase only and are referred to as salable minerals.

Significant quantities of salable minerals known to be present in the planning area, include but are not limited to, sand and gravel aggregate, silica sand (abrasives), dimension and decorative stone, and common or bentonite clay. During the construction of the Trans-Alaska Pipeline, 1.7 million cubic yards of gravel were sold from the many established material sites along the Denali Highway. Production value of mineral materials sales were about $500,000 for FY 2001 statewide and the trend indicate increased sales yearly.

Many of the sites in the planning area are roadside materials sites owned by municipalities or the State. There are 41 documented occurrences of salable minerals in the planning area, 12 of which are currently active.

d) Renewable Energy

Consideration of renewable energy sources available on the public lands has come to the forefront of land management planning as demand for clean and viable energy to power the nation has increased. To date there has been no demand for development of renewable energy projects on BLM-managed lands within the planning area. In

cooperation with the National Renewable Energy Laboratory (NREL), BLM assessed renewable energy resources on public lands in the western United States (BLM et al. 2003). The assessment reviewed the potential for concentrated solar power, photovoltaics, wind, biomass and geothermal on BLM, BIA and Forest Service lands in the west. Unfortunately, Alaska was not included in this report. Following is a brief discussion on renewable energy in the planning area.

(1) Photovoltaics

Photovoltaics (PV) technology makes use of semiconductors in PV panels (modules) to convert sunlight directly into electricity. Criteria used for determining potential include amount and intensity of sunlight received per day, proximity to power transmission lines, and environmental compatibility. The use of photovoltaics to generate supplemental power for rural off-the-grid homes is not uncommon in the planning area. To date, though, the Glennallen Field Office has not authorized any PV facilities for commercial power production, nor has any interest been expressed by industry in developing such facilities on BLM lands.

(2) Wind Resources

Potential is measured by taking into account factors such as wind velocity, proximity to roads and electric transmission facilities, the degree to which State and local policies support wind energy development, and environmental compatibility. Given these factors, the likelihood of commercial wind energy generation facilities occurring in the planning area is low. To date, there has been no interest expressed. However, wind energy is utilized by some off-the-grid individuals in the planning area.

(3) Biomass

Biomass is the use of small diameter forest material for energy production. While black spruce would seem to be ideal for such a use, no such facility has been considered within the planning area.

H. Issue 7: Subsistence/Social and Economic Conditions

1. Subsistence

State and Federal law define subsistence as the "customary and traditional uses" of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing, and customary trade. Subsistence uses are central to the customs and traditions of many cultural groups in Alaska, including Aleut, Athabaskan, Alutiiq, Euroamerican, Haida, Inupiat, Tlingit, Tsimshian, and Yup'ik. Subsistence fishing and hunting are important sources of employment and nutrition in almost all rural communities. Current Customary and Traditional Use Determinations, by Game Management Unit for each species, can be found in the Subsistence Management Regulations for the Harvest of Wildlife on Federal Public Lands In Alaska, published annually.

Sport fishing and sport hunting differ from subsistence in that, although food is one product, they are conducted primarily for recreational values following principles of "fair chase." While subsistence is a productive economic activity that is part of a normal routine of work in rural areas, sport fishing and sport hunting usually are scheduled as recreational breaks from a normal work routine. From 1980-1990 the State managed subsistence hunting and fishing across Alaska in compliance with Title VIII of ANILCA. During that era, hunting by non-rural residents was commonly referred to as "sport hunting." After 1990, the Federal government was obliged to directly manage the Title VIII rural subsistence priority on Federal public lands. The State continues to manage State-defined subsistence and other hunting and fishing activities, including on Federal public lands, except where these are closed to non-Federally qualified subsistence uses. Since 1990, the state no longer refers to "sport hunters", since hunting by all Alaskans is considered state-defined subsistence hunting. State regulations do distinguish between "resident" hunting for all Alaskans and "non-resident" hunting by persons from other states or nations.

a) Subsistence Use Patterns and Harvest Levels

Rural residents continue their longstanding traditions of high rates of participation and production from subsistence hunting, fishing, and trapping, relying on a wide range of resources in the Glennallen Field Office, including the public lands in the planning area (Cuccarese and McMillan 1988). Table 32 summarizes information from 1988 concerning use of edible renewable resources by some of the region's communities. In terms of pounds of edible resources harvested, fish provided the greatest bulk (53.7%), followed by game (35.6%), unidentified vegetation (5.3%), berries (4.6%), and greens

and mushrooms (0.7%). There was a great deal of variation from these averages between communities. For example, fish contribution varied from 78.8% of the harvested food in Copper Center to 20.7% in Mentasta Lake. Game showed a similar variation—from 63.8% in Cantwell to 12.5% in Copper Center. Twelve communities relied on fish, while six relied more on game to provide the bulk of their subsistence resources. None utilized vegetation, berries, or greens and mushrooms heavily; these resources probably serve to supplement or complement fish and game.

Table 32: Use of Subsistence Resources

Community	Population (1988)	Total lbs. Harvested	Pounds per Household	% Fish	% Game
Cantwell	136	15,241	324	28.2	63.8
Chistochina	83	9,545	308	40.9	37.8
Chitina	43	8,166	340	61.4	25.6
Copper Center	435	49,536	384	78.8	12.5
East Glenn Highway	182	27,915	429	49.0	38.6
Gakona	108	21,764	640	69.2	25.1
Glennallen	915	61,327	228	52.4	40.1
Gulkana	122	13,526	315	59.7	31.0
Kenny Lake	232	17,413	249	41.4	45.3
Lake Louise	39	6,927	462	44.3	29.2
Lower Tonsina	35	4,479	498	63.4	23.7
McCarthy Road	53	6,915	384	38.2	50.2
Mentasta Lake	96	11,025	394	20.7	53.9
Nabesna Road	44	12,240	1224	51.3	45.8
Paxson-Sourdough	55	6,829	310	39.6	47.6
Slana	70	17,654	679	47.4	42.8
S. Wrangell Mtns.	34	6,689	418	26.5	65.6
Tonsina	229	22,643	298	61.1	26.9

Resource harvest and use patterns in the Copper River basin are consistently related to a complexity of factors (ADF&G 1984). Among the most prominent influences on resource harvesting were the seasonal availability and abundance of wildlife and fish populations. Relying on a complex body of traditional ecological knowledge, communities generally harvested resources during seasons and at locations conducive to efficient harvesting. While the abundance of fish and wildlife resources depended upon climate, habitat and other ecosystem dynamics, human population density, harvest pressure, and the accessibility of the area also played a role. Other important factors influencing harvest activities were the length and kind of wage available in an area. Length of residency, age, available means of transportation, participation in domesticated resource production, alternative sources of natural resources, and regulations are also related to resource harvest and utilization patterns.

A 1983 household survey conducted by ADF&G, Division of Subsistence, showed, in general, a higher dependence on subsistence resource by Native people in the area. As stated in the results of the survey: “Native households had an average length of residency in the Copper basin of 47 years, compared with ten years for non-Native households. An average of 340 pounds of red salmon (approximately 81 fish) was

harvested by Native households [in the Glennallen area], more than eight times the mean non-Native harvest of 43 pounds (10 fish). Particularly divergent patterns emerged between the Native and non-Native samples when comparing resource harvest and use by general categories. Quantities of fish harvested was four times greater for Native respondents than for non-Natives. The differing levels of use of fish, big game, berries, and total resources were all statistically significant. Only in plant and berry harvests were the two groups similar." (ADF&G 1984)

The Ahtna Athabascan Indians have lived in the Copper River Basin area and most of the present-day region encompassed by Game Management Units 11 and 13, for at least 1,000 years. During that time, caribou, along with moose, have been the principal big game animals hunted for subsistence use, and have probably ranked second overall to salmon as components of the annual subsistence harvest (de Laguna and McClellan 1981). Additional information about pre-historical settlement and subsistence practices is found in Section 7, Cultural Resources. Oral traditions documented by de Laguna and McClellan (1981), Reckord (1983a; 1983b) and others illustrate the continuing importance of caribou in the subsistence patterns of the Copper Basin area throughout the 20th century.

For specific data on subsistence fisheries, including the number of subsistence fisheries permits issued and number of fish harvested, see the *Subsistence Fisheries* section on page 278.

b) Traditional Use Areas

Traditional use areas for subsistence activities in the Copper Basin have been documented through several sources. Documents prepared by Ahtna, Inc. in the early 70's to aid in regional and community planning contain maps of traditional areas for hunting, trapping, berry-picking and other subsistence activities in the vicinity of each village (Ahtna Inc. 1973). Areas documented are in the vicinity of villages; consequently many of these lands are now Native or Native-selected. Some areas identified as important for traditional hunting, trapping, and berry-picking lie within the current boundaries of the transportation and utility corridor and are a part of the federal subsistence hunting area.

When interviewed in 1981, hunters from the Copper Basin communities did not report traveling elsewhere to hunt, while urban-based hunters named alternative areas if they could not hunt Nelchina caribou (Stratton 1982). Stratton noted:

> "The perception of alternative resources differed from area to area. Several Fairbanks residents mentioned three other caribou herds, the Delta, Forty-Mile, and Porcupine herds as options, ones they hunted prior to using the Nelchina Herd and ones they were utilizing instead. Hunters in that region also mentioned a wider variety of areas utilized for moose hunting…Consistently lifelong residents of the local areas did not share this attitude. When Nelchina caribou

> are not available to them, then the alternatives were local, either added emphasis on moose, and/or use of the Mentasta caribou herd. Salmon, lake fish, and small game were also the alternatives they commonly mentioned." (Stratton 1982)

Fall and Simeone, in their Customary and Traditional Use Worksheets prepared in March 2005 for the Board of Game, note:

> "Areas used for caribou hunting by Copper Basin communities are associated with the traditional areas of communities and families. For example, Stanek (1981) noted "Several people living in the Gulkana area have trap lines in the area west of the Richardson Highway or use the trail system running to the Ewan lake area and hunt that area." Stratton (1982) noted however that the use of Richardson Highway and Crosswind and Ewan lakes areas was affected by closure of winter season (under State permits) in 1972.
>
> The Division of Subsistence conducted a mapping project in Copper Basin communities in 1984. The project produced maps that depict areas used for caribou hunting from the early 1960's to the early 1980's (ADF&G 1985; Stratton and Georgette 1985; ADF&G 1991). These maps show that most caribou hunting by local communities occurs along road corridors and established trails, with areas off the Denali Highway, the Richardson Highway north of Gakona Junction, and the Lake Louise area being particularly important." (Fall and Simeone 2005)

The Richardson Highway north of Gakona Junction and portions of the Denali Highway are areas that are currently managed under the federal subsistence hunt.

The Bering Glacier area is included within the traditional subsistence harvest areas of the residents of Yakutat, Cape Yakataga and Cordova. Subsistence activities occur throughout a broad resource rich area, including the portion located near the Bering Glacier. Subsistence is important both as an economic and a social activity. It is necessary because human work is translated into food to eat similar to the "cash" economy. It is a social issue because it has been the traditional lifestyle of the Yakutat-Tlingit and is part of the general culture and social fabric of Yakutat residents. In 1987, 96.5% of area households participated in subsistence activities. (Yakutat Planning Commission, 2004).

c) Socio-cultural Factors

The importance of subsistence to area residents extends far beyond its economic contribution (Cuccarese and McMillan 1988). For example, the Ahtna Tanacross Association (1988), in an interim draft report submitted to Hart Crowser, summarized the sociocultural importance of subsistence to the Ahtna and Tancross people. The subject draft notes in part that it plays a central role in the maintenance of Indian

ceremonial and religious life. Natives honor deceased relatives with a funeral potlatch which features the giving and sharing of as wide a variety of wild products as are available. In time, the bereaved family reciprocates and holds a memorial potlatch to pay back the opposite clan for taking over the stressful duties of dressing the body, building the coffin, digging the grave, and erecting a grave fence or grave house (Ahtna-Tanacross Association, 1988).

The Ahtna Tanacross Association (1988) document goes on to point out that subsistence provides Natives with a wealth of psychological and medicinal benefits as well as nutritional rewards. Many Ahtna, while realizing that human and biological factors can each affect animal populations, maintain that the numbers of animals which make themselves available to hunters is generally more dependent on how humans treat them than on natural conditions. Today, as in the past, Athabaskans generally believe that if wild animals are mistreated or shown disrespect, their descendents will not return to the area and hard times will follow.

Subsistence is important in maintaining the identity of the Ahtna and Tanacross people and is central to social organization. Sharing of wild resources is a binding social force within and between villages and extends across the region (e.g., Halpin 1987; Haynes et al. 1984; Martin 1983). Demonstrated competency and success in hunting and fishing is very important to personal prestige, which is also gained through sharing.(Ahtna Tanacross Association 1988)

Subsistence is important in a sociocultural sense to non-Native residents of the study region, too. Reckford (1983) summarized this and Stratton and Georgette (1984) provided supporting evidence. Subsistence resources first became important to non-Native households because they were the principal sources of food. Today, non-Native resident hunting, fishing, and gathering activities not only help defray the high cost of living, they also have assumed a sociocultural role extending far beyond whatever recreational benefits are associated with them. Many non-Natives residing in remote settlements probably have consciously chosen to do so, in part, because they wish to live a rural lifestyle and desire to be dependent to some extent on products of the land.

d) History of Subsistence Administration

In deliberations leading to the Alaska Native Claims Settlement Act of 1971, the U.S. Congress acknowledged the importance of subsistence hunting and fishing to Alaska Natives but provided no specific protection of these rights. By the late 1970s when oil and gas development on Alaska's North Slope was booming, more direct action was obviously needed to protect subsistence activities in the state.

The Alaska National Interest Lands Conservation Act of 1980 requires that rural subsistence users have a priority over other users to take fish and wildlife on Federal public lands where a recognized customary and traditional pattern of use exists. When it is necessary to restrict the taking of fish and wildlife on these lands, rural subsistence

uses are given preference over other consumptive uses. Title VIII of ANILCA also mandated establishment of Regional Advisory Councils to ensure that local residents with specialized knowledge of subsistence resources and uses have a meaningful role in management. Under the cooperative federalism provisions of Title VIII, the Federal government would defer to a unified program of subsistence management by the State of Alaska, provided it met the requirements of ANILCA.

From 1980 to 1990 the State implemented a subsistence management program that complied with Title VIII of ANILCA, until this was overturned by the Alaska Supreme Court. Since 1990, the Federal Subsistence Board has directly managed the title VIII rural subsistence priority on Federal Public lands, including establishment of Federal Subsistence Regional Advisory Councils. The State continues to manage State-defined subsistence and other hunting and fishing activities, including on Federal lands, unless these have been closed to non-Federally qualified subsistence users.

As directed by the 9th Circuit Court in the Katie John case, and to meet the requirements of the rural subsistence priority in Title VIII of ANILCA, the Federal subsistence management program expanded on October 1, 1999, to include subsistence fisheries on the navigable waters of Alaskan rivers and lakes within and adjacent to Federal conservation units.

e) Current Program Administration

Subsistence fishing and hunting in the planning area are regulated by the State of Alaska or the Federal government, depending upon where the harvests occur. This system is called a “dual management system” because there are separate and sometimes overlapping State-Federal jurisdictions in many areas. The Federal government regulates Federal subsistence fisheries and hunts on Federal public lands and Federally-reserved waters in the planning area. Specifically within the planning area, on behalf of the Federal Subsistence Board the BLM administers subsistence hunting on unencumbered BLM public lands within the Delta and Gulkana Wild and Scenic River corridors, the transportation and utility corridor, and other small scattered parcels (see Map 2, General Land Status, in Chapter I). Regulations are developed by the Federal Subsistence Board, with administrative and technical support from the Office of Subsistence Management. The State of Alaska regulates State subsistence fisheries and hunts on all State lands and waters. In addition, hunting and fishing under State regulations is generally authorized on Federal lands, unless these have been closed to non-Federally qualified harvesters, by the Federal Subsistence Board in order to protect subsistence resources of Federal subsistence uses.

The Federal Subsistence Management Program involves each of five Federal agencies (USDA Forest Service, BLM, National Park Service, Bureau of Indian Affairs, and U.S. Fish and Wildlife Service), with the U.S. Fish and Wildlife Service serving as the lead agency. The director for each of these five Federal agencies or their designated representative in Alaska and a representative of the Secretary of the Interior, make up

the Federal Subsistence Board which oversees the subsistence program in Alaska. Subsistence Regional Advisory Councils and State representatives play an active role in Board deliberations.

The 10 Regional Advisory Councils were established by ANILCA as an administrative structure to provide a “meaningful voice” for subsistence users in the management process. BLM field staffers, along with those of other agencies, meet twice each year with the Regional Advisory Councils to identify emerging issues in conservation, allocation, and appropriate regulation of subsistence harvests. These meetings provide an ongoing forum for intensive dialogue among users and managers to solve problems.

Glennallen Field Office staff are specifically involved in the following facets of subsistence management:

- Involve subsistence users in issues identification and regional problem solving,
- Manage BLM land and habitat and assess impacts to subsistence,
- Monitor resource populations used for subsistence purposes,
- Participate in development of interagency subsistence management regulations and policies, and
- Manage subsistence harvests.

These are described in detail in *Chapter II*, *Issue 7: Subsistence/Social and Economic Conditions*, *Management Common to All Alternatives*.

2. Social and Economic Conditions

This section summarizes demographic and economic trend information and describes key industries in the planning area that could be affected by BLM management actions. Local industries most likely affected by BLM land management policies and programs are: 1) travel, tourism and recreation, 2) forest products, and 3) mineral exploration and mining. This section also describes subsistence and environmental justice.

a) Regional Overview

The planning area overlaps geographic provinces on either side of the Chugach Mountain Range: the interior basin, including the Copper River Basin, and the Bering Glacier area, in coastal Prince William Sound. The town of Glennallen is somewhat centered near BLM-managed land in the interior basin. It also has the largest population (554) of the more than 20 towns and villages in the planning area north of the Chugach Mountain Range. Glennallen is at the intersection of the Richardson and Glenn Highways, which provide access to the largest cities in Alaska, as well as access to Canada. Glennallen is the only town in the planning area located north of the

Chugach Mountains that has scheduled air service to cities (twice weekly). Valdez (population 4,036) lies 115 miles south of Glennallen and has direct highway access to the Copper River Basin. Cordova (population 2,454) and Yakutat (population 680) lie 80 miles to the west and east, respectively, of the Bering Glacier area. Neither Yakutat nor Cordova have road access to any other town. Both towns have daily scheduled airline service. Marine Highway (ferry) service is available to Valdez and Cordova.

The planning area has been characterized as a mixed subsistence-market economy. Villages such as Gulkana and Mentasta Lake fit this description closely, while Valdez is closer to the classic industrial-capitalist character. The community school, stores, fuel supplies, and support services are concentrated in Glennallen, a hub for the Copper River Basin.

The interior basin is not incorporated as a political subdivision, nor is it a census subdivision; rather, most of it is unincorporated, with pieces of the planning area included in several incorporated cities and boroughs. Fairbanks North Star Borough, Denali Borough, Matanuska-Susitna Borough, and the City of Valdez either bound or encroach upon the basin. BLM land near Prince William Sound is located between the Yakutat City and Borough, and the City of Cordova. Revenues are not discussed as the BLM planning areas are not within an organized borough; therefore, taxes cannot be levied. Data used in this analysis are from the Alaska Department of Labor and Workforce Development, the U.S. Census Bureau, the Copper Valley Development Strategy Report, and from the Sonoran Institute's Economic Profile System.

The planning area includes lands owned by two ANCSA Regional Corporations: the Ahtna Corporation and the Chugach Alaska Corporation.

Historic change agents in the planning area include construction of the TAPS, the passage of ANCSA, and the passage of ANILCA, including creation of Wrangell-St. Elias National Park and Preserve. These events directly resulted in increased population, employment, and income in the planning area. With growth of major population centers (Anchorage and Fairbanks), visitation, and use of area resources has dramatically increased, particularly in the last 20-30 years. Population in the interior basin has roughly tripled over the last three decades.

b) Demographics

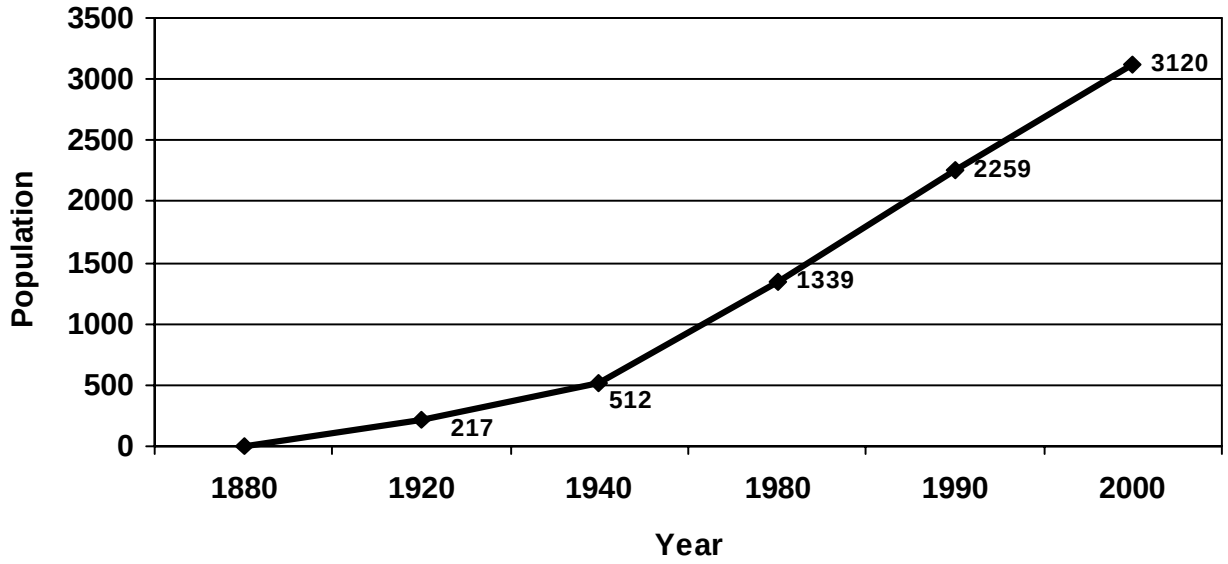
The 2000 census reported the Copper River Basin population as 3,120 living in the 20 communities.

Table 33. Population per Community, Historical Data U.S. Census-Copper River Basin Only

Community	Year						
	1940	1950	1960	1970	1980	1990	2000
Chisana	29	0	0	0	0	0	12
Chistochina	34	31	28	33	55	60	93
Chitina	176	92	31	38	42	49	123
Copper Center	138	90	151	206	213	449	362
Copperville	0	0	0	0	0	163	179
Gakona	46	50	33	88	87	25	215
Glennallen	0	142	169	363	511	451	554
Gulkana	25	0	51	53	104	103	88
Kenny Lake	0	0	0	0	0	423	410
McCarthy	49	0	0	0	23	25	42
Mendeltna	0	0	0	0	31	37	63
Mentasta Lake	15	0	40	68	59	96	142
Nelchina	0	0	0	0	0	0	71
Paxson	0	0	0	0	30	30	43
Silver Springs	0	0	0	0	0	0	130
Slana	0	0	0	0	49	63	124
Tazlina	0	0	0	122	0	247	149
Tolsona	0	0	0	0	0	0	27
Tonsina	0	0	0	0	135	38	92
Willow Creek	0	0	0	0	0	0	201
Total population	512	405	503	971	1339	2259	3120

The growth of the Copper River Basin began in earnest in the 1960s. Older census data is unreliable because none of the area villages are reported. The 2000 census recognized the last several older villages that had been lumped with other towns (Glennallen, Valdez). The population jump from 2,259 in the 1990 census to a population of 3,120 in the 2000 census (72 percent growth) makes this one of the highest growth areas in the state. However, the change in population adjusted for earlier census reporting in Valdez, for example, would indicate a lower growth rate. Figure 3 illustrates the population changes for the entire area from 1880 to 2000.

Figure 3. Population Growth in the Copper River Basin 1880-2000



According to the 2000 census of the 3,120 people of the Copper River Basin, 1,660 are male and 1,448 are female. The average age is 37 years and the median age is 33.7. According to the census, 20 percent of the population is Native American, mostly Athabaskan Indians, and 80 percent of the population is non-native.

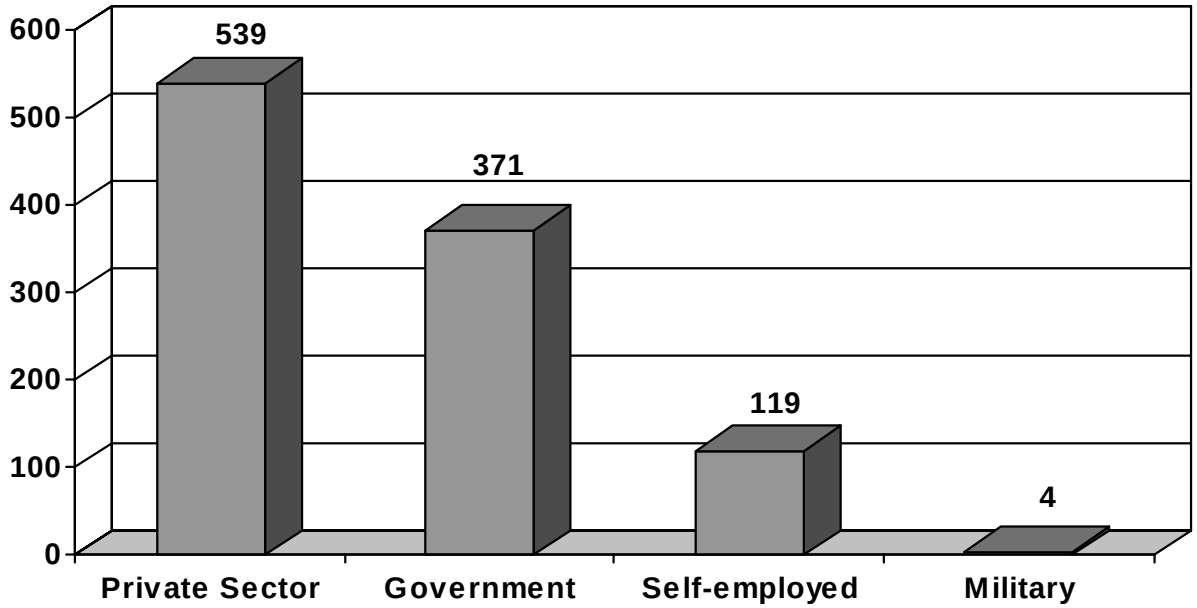
The population of other selected communities outside the Copper River Basin is shown in Table 34. These communities are included since they are either in the planning are (Cantwell), they are the closest communities to the planning area (Cordova, Yakutat), or have populations that may influence or use BLM-managed land in the planning area.

Table 34. Population of Selected Communities Outside the Copper River Basin

Community	Year						
	1940	1950	1960	1970	1980	1990	2000
Cantwell	17	67	85	62	89	147	222
Cordova	938	1165	1128	1164	1879	2110	2454
Valdez	529	554	555	1005	3079	4068	4036
Yakutat	292	298	230	190	449	534	680
Fairbanks	3,455	5,771	13,311	14,771	22,538	30,843	30,224
Anchorage	4,229	32,000	82,833	126,385	174,431	226,338	260,283
Total population	9,460	39,855	98,142	143,577	202,465	264,040	297,899

c) Employment and Labor Force

Figure 4. Jobs Per Economic Sector



Year-round employment can be found with service industries, Federal and State agencies, the local school district, Ahtna Inc., Alyeska Pipeline, Copper River Native Association, and other tribal governments. The majority of the seasonal employment is geared toward tourism and construction. Federal and State agencies also hire seasonal employees for fire protection, maintenance, and visitor services. Residents also work outside the region in Valdez and on the North Slope. The Copper River Basin area has no industrial enterprises and limited commercial agriculture in the Kenny Lake area. Many residents augment income with subsistence activities and Alaska permanent fund dividends.

Table 35 shows the most recent information available the area employment by sector.

Table 35. Copper River Basin Area Employment by Sector*

Employment by Sector	Number Employed
Agriculture, forestry, fishing, hunting, mining	22
Construction	118
Manufacturing	15
Wholesale trade	38
Retail trade	106
Transportation, warehousing and utilities	85
Information	9
Finance, insurance, real estate, rental and leasing	41
Professional scientific, management, administrative and waste management	50
Education, health and social services	264
Arts, entertainment, recreation, accommodation and food services	87
Other services	99
Public administration	113

* Information from 2000 Census-Copper River Basin only (Copper Valley Economic Council 2003)

Employment figures specifically for the Copper River Basin are not provided by the Alaska Department of Labor but are grouped with the Valdez/Cordova Census area. It is estimated that unemployment estimates range as high as 41 percent in one community. Underemployment is common in the region. Because of the seasonal nature of employment in the region, unemployment rates vary greatly between summer and winter as shown in Figure 5. The 2000 Census Bureau data on unemployment for individual towns and villages is presented in Table 37 on page 388.

In 2002, 18 percent of the Alaskan workforce was classified as non-resident; 30.5 percent of the Valdez/Cordova census area workforce was classified as non-resident.

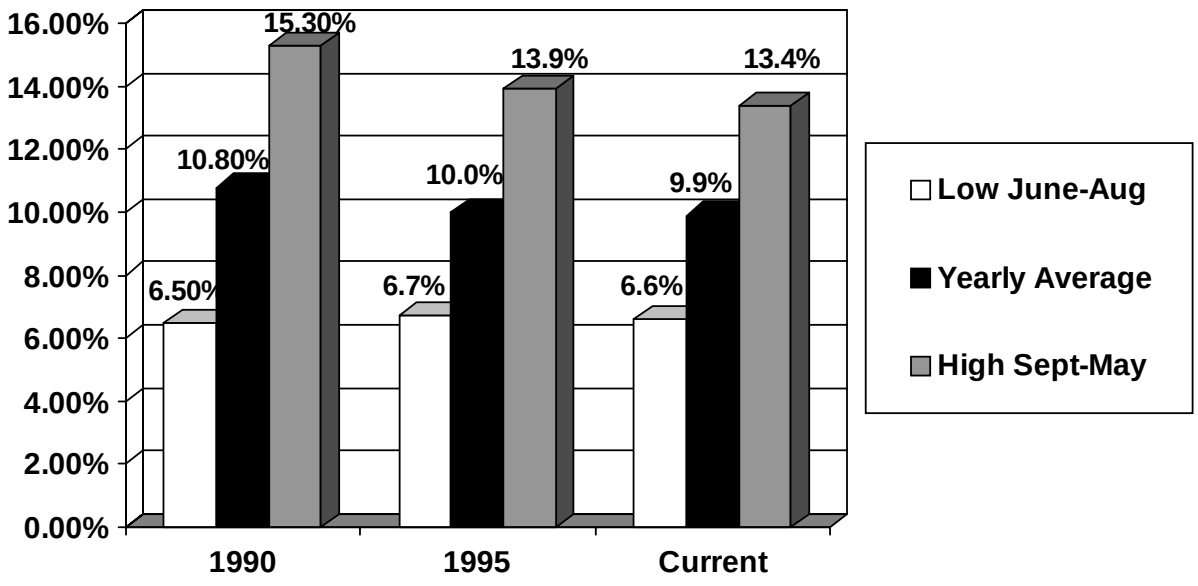
Two mining projects in the area may provide employment and income. They are not on BLM land.

The Mann Project, north of the Denali Highway and Paxton, AK is an array of claims primarily on land recently conveyed to the State of Alaska. Existing mining claims also extend onto the outer transportation and utility corridor. This project is still in the exploration stage. Employment is currently estimated at 10 in a field crew for at least part of the year. (P. Bittenbender, USBLM, personal communication, 10/24/05). The prospects are expected to continue in this stage for the foreseeable future.

The Pogo Mine Project lies northeast of Delta Junction. A final feasibility study was issued in May, 2004. An underground mine and mill operation is currently under construction with startup planned for the first quarter of 2006. This mine will eventually produce 2500 short tons per day (STPD) and may employ as many as 288 at 2500 STPD at this output. (EPA 2003). The direct effect of employment at the mine will be felt primary in Fairbanks, and the Fairbanks North Star Borough. The mine lies outside the planning area.

The RFDS prepared by BLM for the planning area concluded that the likely mineral development activity will be small placer operations. It should be noted that no new mining will occur in the Copper River basin until segregations resulting from native and state selections end with either conveyance out of BLM ownership, or the selections are relinquished or rejected. Mining exploration and development activities such as Man and Pogo are occurring on existing mining claims and patented land.

Figure 5. Seasonal Unemployment Rates*



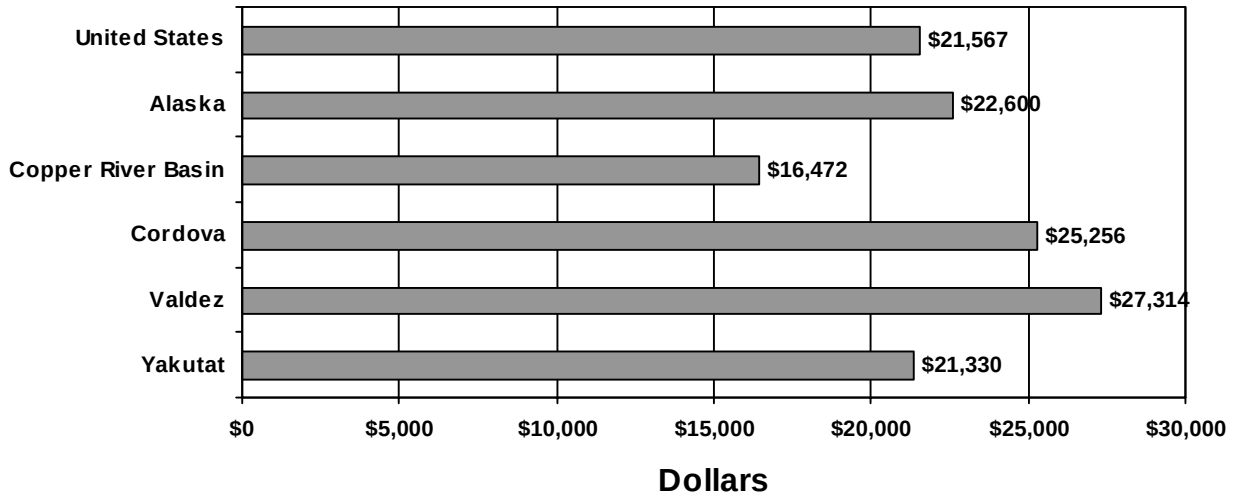
* Alaska Department of Labor Valdez-Cordova Census Area

d) Income

Community and regional wages per capita from the 2000 Census are shown on the chart below. This is compared with Alaska and national averages. The State per capita income average for 2000 was $22,660, which is close to the national average of $21,567. The 2000 Census Bureau data on per capita income are for individual towns and villages is presented in Table 37 on page 388.

The Alaska Division of Public Assistance and Department of Education and Early Development showed that in the 1999-2000 school year, 23 percent of area school children in local district schools were living with parents receiving public assistance, including temporary assistance, Medicaid, or food stamps.

Figure 6. Comparison of Per Capita Income



e) BLM Spending

The BLM operates a permanent office in Glennallen that employs local residents. Personnel at this office are estimated to remain at the 2004 level for less than five years, or until land conveyance diminishes the land managed by the agency.

Table 36. BLM Spending*

Fiscal Year	Number of Positions	Total Budget
2001	24 ($1574)	2,777
2002	21 ($1380M)	2,264
2003	24 ($1675M)	2,565
2004	29 ($2030)	3,365
2005 (estimate)	29	N/A
2010-15 (estimate)	20	N/A

* Source: BLM internal budget records (dollar figures in thousands)

3. Environmental Justice

The Athabaskan Natives are the predominant minority population of the planning area. The Athabaskans continue to supplement their diets with subsistence foods. Other minorities within the planning area include Eyak and Tlingit Natives, and in one community, Asians. Demographic characteristics for communities within the planning area are presented in Table 35 on page 384. Data shows that several villages or towns have minority populations in excess of 50 percent. These same locales have high

percentages of individuals and households with incomes below poverty level, although there is wide variability between villages.

Environmental Justice is an initiative that culminated with President Clinton's February 11, 1994, EO 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," and an accompanying Presidential memorandum. The EO requires that each Federal agency consider environmental justice to be part of its mission. Its intent is to promote fair treatment of people of all races so no person or group of people bears a disproportionate share of the negative environmental effects from the country's domestic and foreign programs. While the EO focuses on minority and low-income populations, the USEPA defines environmental justice as the "equal treatment of all individuals, groups or communities regardless of race, ethnicity, or economic status from environmental hazards" (Envirosense 1997; U.S. Department of Energy 1997). Specific to the EIS process, the EO requires that proposed projects be evaluated for "disproportionately high adverse human health and environmental effects on minority populations and low income populations."

EO 13175, "Consultation and Coordination with Indian Tribal Governments," requires the BLM to consult with Athabaskan and other tribal governments of the planning area on Federal matters that significantly or uniquely affect their communities. The USEPA's Environmental Justice guidance of July 1999 stresses the importance of government-to-government consultation. As one way to foster tribal participation, the BLM held scoping meetings in every village in the planning area.

Scoping meetings and alternative development meetings were held during development of the draft RMP and EIS. The scoping meetings were held during February through June, 2003, in the 30 communities in the planning area, including Anchorage, Fairbanks, and Palmer. During this scoping process, the BLM received feedback on specific Environmental Justice concerns of local residents. In addition, the BLM held alternative development meetings at the same locations from April through June, 2004.

Major concerns expressed at these meetings included:

- Maintain subsistence opportunities
- Continue access/opportunities for subsistence hunting (concern from non-Native community); Impacts to subsistence activities, mostly related to increased recreational/sport hunting and fishing activities (concern from Native community).
- Maintain the transportation and utility corridor in Federal ownership
- Protect Native Allotments

A more detailed discussion of public concerns is provided in the East Alaska Resource Management Plan Scoping Report (BLM 2003b) and Comment Summary.

Table 37. Environmental Justice Data from the Alaska Department of Labor and Workforce Development

State or City	Per Capita Income	Percent of Population as a Minority[1]	Percent of Individuals Below Poverty Level Income[2]	Percent of Households Below Poverty Level Income[2]	Percent of Unemployed Population Over 18 Years of Age
Alaska	$22,660	19.0	9.4	6.7	6.1
Cantwell	$22,615	27.0	2.0	0.0	7.5
Chisana[3]	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
Chistochina	$12,362	63.4	29.0	29.6	25.3
Chitina	$10,835	49.0	13.0	33.0	16.3
Copper Center	$15,152	50.6	19.0	18.6	13.9
Copperville	$21,733	21.2	7.0	11.7	9.4
Cordova	$25,256	15.0	8.0	4.3	4.6
Gakona	$18,143	17.7	11.0	8.4	7.1
Glennallen	$17,084	12.1	8.0	4.8	3.5
Gulkana	$13,548	73.9	41.0	35.3	23.0
Kenny Lake	$13,121	13.4	26.0	22.7	1.3
Lake Louise	$11,057	10.2	56.7	0.0	16.7
McCarthy	$16,045	0.0	15.0	0.0	41.4
Mendeltna	$11,289	7.9	0.0	0.0	14.6
Mentasta Lake	$11,275	71.1	35.7	21.9	15.4
Nelchina	$10,742	9.9	17.8	18.0	6.1
Paxson	$26,071	0.0	0.0	0.0	0.0
Silver Springs	$23,464	8.5	7.4	6.9	5.9
Slana	$20,018	15.3	23.6	20.0	23.2
Tazlina	$23,992	30.2	8.1	7.3	9.3
Tolsona	$10,000	14.8	0.0	0.0	0.0
Tonsina	$13,390	9.8	8.7	7.4	10.6
Valdez	$27,341	10.2	6.2	6.0	4.5
Willow Creek	$18,242	11.9	0.0	3.8	7.7
Yakutat	$21,330	55.1	16.7	11.8	6.7

[1] Native Alaskan/Native American is the dominant minority.
[2] The poverty level is $8,794 for individuals and $21,320 for households.
[3] No data available.

Source:http://www.labor.state.ak.us/research/cgin/cenmaps/profile

I. Other Program Areas

1. Hazardous Materials

Hazardous Materials is a BLM program that focuses on environmental protection. Environmental protection encompasses the land, water, people, and habitat associated with Federal lands. The backbone of this program is found in Federal and State environmental laws and regulations. Federal and State laws cover the release, storage, handling, and disposal of hazardous materials, fuels, and other liquid hydrocarbons; the laws provide guidance for investigation and cleanup of contaminated lands, worker chemical safety or exposures, transportation of hazardous materials, and legal liabilities.

Hazardous materials are sometimes used or produced by recreational or industrial processes, or result from illegal activities such as dumping or drug manufacturing. Authorized industrial processes may include mineral exploration or production; recovered minerals may include oil and gas, metallic ores, and gravel or rock material for construction processes.

The Glennallen Field Office strives to be in full compliance with all Federal laws, regulations, and policies, including those addressing hazardous materials. Activities on BLM lands are analyzed according to NEPA. As part of this analysis, impacts related to hazardous materials are evaluated. Activities that would adversely impact lands or resources, or activities that would not be in compliance with Federal laws, regulations, and policies, would not be approved, and or must be altered to be approved. Inspection and monitoring is conducted on an as-needed basis. Requests for inspections have come from concerned citizens, Native Corporations, State agencies, other Federal agencies, and BLM personnel. Most hazardous material program investigations and cleanup activities have been related to the problems associated with abandoned mine lands and illegal dumping.

Generally the lands within this planning area are unaffected by hazardous materials; however, some past human activities have created contaminated sites within the area. One of the most common and expensive hazardous material site categories is that of abandoned mines. Former mine claimants and operators have left hazardous materials in the form of drums of chemicals, fuels, oils, solvents; as well as batteries, asbestos, and contaminated soils. Hazardous materials also impact BLM lands from illegal dumping, trespass activities, oil and gas activities, or any activity that uses or produces a hazardous material as defined by 49 CFR 171.8. Basically, a hazardous material, as defined here, means a substance or material that is capable of posing an unreasonable risk to health, safety, and property (i.e., the environment).

a) Management Concerns

Current management concerns related to hazardous materials in the planning area consist of several active and inactive hazmat sites. These sites are discussed below.

(1) Dennis Dump Site

The Dennis Dump Site was discovered in 2001 and is on an 8 acre parcel of BLM land located near Eureka. The site is located at Section 18, T. 21 N., R. 12 E., Copper River Meridian, off the Belanger Pass Road. BLM contractors removed several drums of waste oil, 60 cubic yards of contaminated soil, 50 wrecked vehicles, and 60 cubic yards of solid waste. The BLM is still awaiting post removal soil samples. Violators have been prosecuted.

(2) Maclaren Glacier Mine Site

The Maclaren Glacier Mine Site is located at T. 19 S., R. 6 E., Section 11 and 14, Fairbanks Meridian, at the headwaters of the Maclaren Glacier. The site is a former copper mine on the south side of the Alaska Range. Remnants of the abandoned mine included over 200 drums of waste oils, fuel, and solvents, contaminated soils, miscellaneous solid waste, and an open mine adit. A BLM contractor cleaned up the site in 2000, excavating 900 cubic yards of contaminated soil and land spreading it to a 6-12 inch lift for bio-remediation. Currently, the site is being monitored by taking soil samples to test whether or not the land farm soils meet the DEC acceptable limits.

(3) Susitna Lodge Dump

The Susitna Lodge Dump is a garbage dump on BLM property. The dump is west of the Denali Highway on BLM land. The dump has been in use by the Susitna River Lodge for many years and contains drums, vehicles, and other trash.