ANCHOR RIVER/FRITZ CREEK
CRITICAL HABITAT AREA
MANAGEMENT PLAN

JUNE 1989

Prepared by the
Divisions of Habitat and Wildlife Conservation

Alaska Department of Fish and Game
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Anchorage, Alaska 99518

Don W. Collinsworth, Commissioner

ACKNOWLEDGEMENTS

The Anchor River/Fritz Creek Critical Habitat Area was first proposed by the Kenai Peninsula Critical Habitat Task Force, a group of citizens concerned about the protection of this important area. It is largely through their support and the support of the citizens of Homer that the Anchor River/Fritz Creek Critical Habitat Area was established in 1985.

The Anchor River/Fritz Creek Critical Habitat Area Management Plan was prepared by a multi-agency planning team lead by the Department of Fish and Game (ADF&G). Planning team representatives are as follows:

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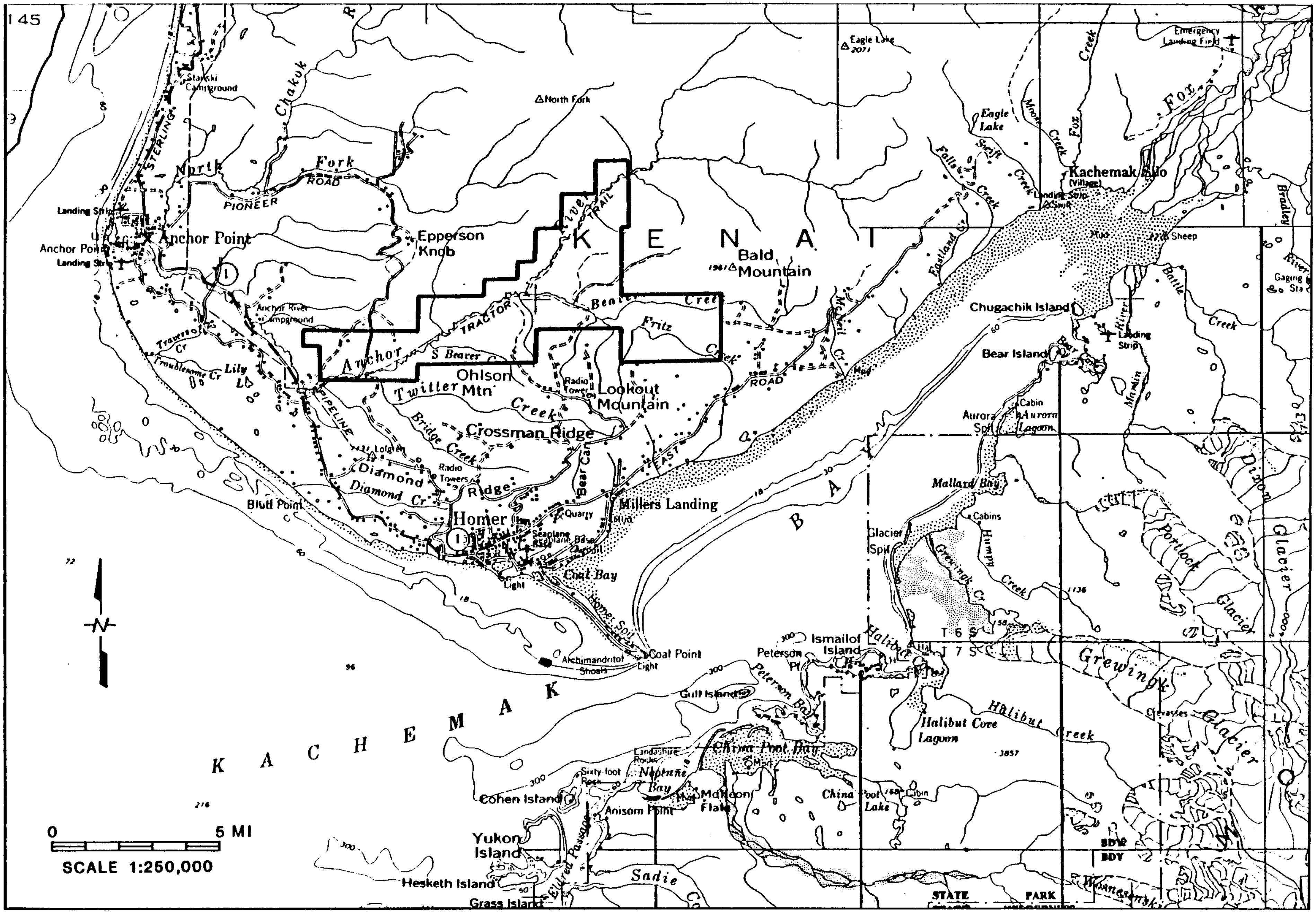
Other ADF&G staff have contributed significant time and expertise in developing this plan including Lance Trasky and Steve Albert of Habitat Division, Tom Schroeder of Commercial Fisheries Division, and John Westlund of Wildlife Conservation Division. Department of Natural Resources staff Helen Nienhueser, Division of Land and Water Management; Wade Wahrenbrock, Division of Forestry; Mitch Henning, Division of Mining; Bonnie Friedman, Division of Agriculture; and Leila Weiss, Division of Oil and Gas also deserve recognition for their contributions in the development of this plan.



ANCHOR RIVER FRITZ CREEK CRITICAL HABITAT AREA

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INTRODUCTION

Anchor River/Fritz Creek Critical Habitat Area, located in the southern Kenai Peninsula north of Homer, includes 19,000 acres of river bottoms, muskegs, upland spruce forests and subalpine meadows in the upper portions of the South Fork Anchor River and Fritz Creek drainages. The critical habitat area was established by the Alaska Legislature in 1985 for the purpose of protecting natural habitat critical to the perpetuation of fish and wildlife, especially moose. The critical habitat area contains portions of two of the most important moose ranges on the southern Kenai Peninsula.

The purpose of the Anchor River/Fritz Creek Critical Habitat Area Management Plan is to provide consistent long-range guidance to the Department of Fish and Game in managing the critical habitat area.

A variety of commercial and recreational activities have occurred in or been proposed for the critical habitat area. In order to evaluate the compatibility of these activities with the protection of fish and wildlife, their habitats, and public use of the critical habitat area, the Department of Fish and Game has undertaken this comprehensive critical habitat area management planning process.

The plan presents management goals for the critical habitat area and its resources and identifies policies to be used in determining whether proposed activities are compatible with the protection of fish and wildlife, their habitats, and public use of the area. The plan will guide management of the critical habitat area for the next ten years and will be reviewed after five years for necessary updates or amendments. The plan affects state lands only. Private lands within the boundaries of the area are not subject to critical habitat area authority. Harvest regulations for fish and wildlife populations are not addressed by this plan.

This document is the result of a public planning process led by the Department of Fish and Game. It was developed by a planning team represented by the following state, federal, and municipal agencies: the Alaska Departments of Fish and Game, Natural Resources, and Environmental Conservation; the Alaska Power Authority; Kenai Peninsula Borough; City of Homer; and the United States Fish and Wildlife Service. At the outset a public meeting was held in Homer to explain the planning process and solicit citizens' issues, interests, and concerns for the critical habitat area. Public input from this meeting was used by the planning team to formulate a list of issues to be addressed in the plan. At the same time resource information on the critical habitat area's fish and wildlife populations and their habitats, other natural resources, existing land use and land ownership was being collected and synthesized. This

information, presented in both map and narrative form comprises the plan's Resource Inventory.

Management goals and policies for the critical habitat area were developed by the planning team to address the identified issues. All policies were developed with consideration of their ability to meet the formulated management goals. In some cases alternative policies were developed. Each alternative policy was analyzed according to its ability to meet the management goals.

The draft plan went out for public review. Based on comments received during the public review process, the final plan was prepared. The plan is now being sent to the legislature for approval as directed in AS 16.20.605(d). Finally, the Commissioner of Fish and Game will adopt the plan for use by the department in managing the critical habitat area. At that point, the plan can be implemented by the Department of Fish and Game.

Future land use activities within the critical habitat area, including those proposed by the state, will be approved, conditioned, or denied on the basis of their consistency with the goals and policies provided in this plan as well as state laws and regulations. A Special Areas Permit is required for any habitat altering work, including any construction activity, in a designated Critical Habitat Area (5 AAC 95). A Special Areas Permit application form can be obtained from any Department of Fish and Game office and should be submitted to the Habitat Division Regional Office in Anchorage.

Future management activities of the Department of Fish and Game in the critical habitat area will also be directed by this plan. Research programs, public use facilities and other department projects will be consistent with the goals and policies presented in this plan.

Other state, federal, and local agencies have management responsibilities on critical habitat area lands as well.

Any use, lease or disposal of resources on state land in the critical habitat area requires Department of Natural Resources authorization. Activities affecting air or water quality require authorization from the Department of Environmental Conservation. The U.S. Army Corps of Engineers evaluates applications of the Department of the Army (DA) permits for discharging dredged and fill material in waters of the United States including wetlands. Various federal and state agencies, along with local governments, review proposals for DA permits, pursuant to the Fish and Wildlife Coordination Act (16 USC 661-666R). The Kenai

Peninsula Borough reviews and comments on all permit proposals within the coastal zone, including the Anchor River/Fritz Creek Critical Habitat Area.

This plan will be formally reviewed and, if appropriate, updated every ten years. Public participation will be solicited during the update process.

STATUTES

AS 16.20.500. Purpose. The purpose of AS 16.20.500 - 16.20.690 is to protect and preserve habitat areas especially crucial to the perpetuation of fish and wildlife, and to restrict all other uses not compatible with that primary purpose.

AS 16.20.605. Anchor River and Fritz Creek Critical Habitat Area established. (a) All state land and water contained in the following described areas are established as the Anchor River and Fritz Creek Critical Habitat Area:

(1) Township 4 South, Range 13 West, Seward Meridian
Section 25
Section 35
Section 36

(2) Township 5 South, Range 12 West, Seward Meridian
Sections 17 - 20

(3) Township 5 South, Range 13 West, Seward Meridian
Section 2
Section 3
Section 4 E ½
Section 8 S ½
Sections 9 - 11
Sections 13 - 20
Section 21 W ½
Section 24

(4) Township 5 South, Range 14 West, Seward Meridian
Section 13
Section 20 NE ¼
Sections 21 - 24
Section 26 N ½
Section 27 N ½
Section 28 N ½

(b) Notwithstanding AS 16.20.500 and the establishment of the Anchor River and Fritz Creek Critical Habitat Area under (a) of this section,

(1) the use of and appropriation of water rights from Fritz Creek for a municipal and community water source is protected within the Anchor River and Fritz Creek Critical Habitat Area;

(2) the possibility of the construction of a dam and reservoir on Fritz Creek is reserved within the Anchor River and Fritz Creek Critical Habitat Area.

(c) The use and enjoyment of valid existing rights and interests within the Anchor River and Fritz Creek Critical Habitat Area are protected. Future conveyances, including but not limited to rights-of-way, timber sales, municipal entitlements, grazing leases, and oil and gas leases, may occur.

(d) A management plan for the Anchor River and Fritz Creek Critical Habitat Area shall be adopted and may be revised by the Department of Fish and Game in consultation with the Department of Natural Resources under the Administrative Procedure Act (AS 44.62). The management plan shall reflect the concurrence of the Kenai Peninsula Borough as it applies to land committed by the borough to the Anchor River and Fritz Creek Critical Habitat Area.

(e) The department shall establish a citizen's advisory committee to work with the department and advise on implementation and revisions of the management plan for the Anchor River and Fritz Creek Critical Habitat Area.

(f) Appointments to the citizen's advisory committee shall be recommended by the Kenai Peninsula Borough and the City of Homer and shall include representatives from

(1) industry and commercial users;

(2) hunters, trappers, fishermen, and recreational users; and

(3) officials representing the Kenai Peninsula Borough and the City of Homer. (§§ 1, 2 ch 47 SLA 1985; am §§ 1, 2 ch 170 SLA 1990)

REGULATIONS

5 AAC 95.600. ANCHOR RIVER AND FRITZ CREEK CRITICAL HABITAT AREA MANAGEMENT PLAN. The goals and policies of the Anchor River and Fritz Creek Critical Habitat Area Management Plan dated June 1989 are adopted by reference. The plan presents management goals and policies for the critical habitat area and its resources which the department will use in determining whether proposed activities in the critical habitat area are compatible with the protection of fish and wildlife, their habitats, and public use of the critical habitat area. Under 5 AAC 95.420, a special area permit is required for certain activities occurring in a designated state critical habitat area. The department will review each special area permit application for consistency with the goals and policies adopted by reference in this section. A special area permit for the Anchor River and Fritz Creek Critical Habitat Area will be approved, conditioned, or denied based on the criteria set out in those goals and policies and on the standards contained elsewhere in 5 AAC 95. (Eff. 11/18/90, Register 116)

Authority: AS 16.05.020
AS 16.05.050
AS 16.20.520
AS 16.20.530
AS 16.20.605

GOALS

Activities which occur on Anchor River and Fritz Creek Critical Habitat Area will promote the following goals in accordance with the purpose for which the critical habitat area is established (AS 16.20.500). All management decisions in the Anchor River/Fritz Creek Critical Habitat Area whether affecting activities undertaken by the department, other agencies, or the public, will be in accordance with these goals.

I. FISH AND WILDLIFE HABITAT AND POPULATIONS - Manage the critical habitat area for the protection, preservation, and enhancement of fish and wildlife habitat and populations with concern for the maintenance of the integrity of natural communities.

Moose Populations and Their Habitat

1. Maintain, protect, and where feasible and appropriate enhance important moose winter and calving habitat.

2. Maintain natural movement corridors for moose to, from and through the critical habitat area.

3. Minimize harmful disturbance to moose in fall, winter and spring.

Brown and Black Bear Populations and Their Habitat

1. Protect important brown and black bear summer and fall feeding and winter denning.

2. Minimize harmful disturbance to brown and black bears.

Fish Populations and Their Habitat

1. Maintain, protect, and where feasible, enhance fish habitat.

2. Minimize harmful disturbance to spawning, rearing and overwintering fish.

Furbearer Populations and Their Habitat

1. Protect important furbearer habitat.

2. Minimize harmful disturbance to furbearers.

Small Game Populations and Their Habitat

1. Protect important small game habitat.

2. Minimize harmful disturbance of small game.

Non-game Populations and Their Habitat

1. Protect important non-game habitat.

2. Minimize harmful disturbance of non-game species.

3. Protect Bald Eagle nesting habitat.

II. PUBLIC USE - Manage the critical habitat area to protect, maintain, and enhance public use of fish and wildlife and their habitat in a manner compatible with Goal I of this plan.

Public Use of the Critical Habitat Area

1. Maintain public access to and within the critical habitat area consistent with the goals of this management plan.

2. Maintain opportunities to hunt, fish, trap and recreate in the critical habitat area.

3. Maintain opportunities to view, photograph and study fish and wildlife in the critical habitat area.

4. Provide information to the public about the critical habitat area.

5. Allow other public uses when compatible with critical habitat area goals.

III. MANAGEMENT ACTIVITIES - Manage critical habitat area uses and activities to ensure compatibility with goals I and II of this plan.

Fish and Game Management Activities

1. Conduct activities necessary to achieve the goals and policies of the Anchor River/Fritz Creek Critical Habitat Area Management Plan, as funding allows. Foster cooperative research investigations with other agencies and institutions where appropriate.

2. Use the most appropriate methods and means consistent with resource and habitat protection to accomplish management activities including, if necessary, those not available to the general public.

Multiple Use Activities

1. Evaluate proposals for use of the critical habitat area on a case-by-case basis and determine compatibility with the goals of the critical habitat area management plan. Allow compatible activities under terms and conditions consistent with protecting, preserving and enhancing fish and wildlife habitat and populations and maintaining public use.

Explanation of Terms

Minimize: Minimize means to reduce harmful effects to a level which does not significantly adversely impact fish or wildlife populations or their habitat in the critical habitat area or significantly reduce public opportunity for successful harvest and/or non-consumptive use of fish and wildlife.

Harmful disturbance: Harmful disturbance to fish and/or wildlife refers to activities which displace animals from their natural habitat or interrupt animals' seasonal activities at a frequency or duration which causes significant impact to critical habitat area fish and/or wildlife populations. Harmful disturbance does not refer to the legal harvest of fish and/or wildlife.

Significant: A measurable and persistent change not attributable to natural fluctuations in the size, productivity, or distribution of a fish, bird or mammal population, or in an area's carrying capacity for such a population, or in the availability of such a population for human use.

POLICIES

The policies provided in this plan will be used to guide department decisions on management activities and special area permits in the critical habitat area.

Information/Education

Develop an information/education program for the critical habitat area which will inform the public about critical habitat area values, rules, and recreational opportunities through signs, bulletin boards, brochures, community presentations, and other appropriate means.

Fish and Wildlife Habitat Enhancement

Evaluate and, as appropriate, implement wildlife or fish habitat enhancement projects. Give specific attention to enhancement of moose winter habitat.

Water Rights/Reservations

Recommend in-stream flow water reservations to ensure the maintenance of fish and wildlife populations in all waters important to anadromous fish in the Anchor River drainage.

Public Access

Establish trailheads/corridors on state land between Ohlson Mountain Road and the critical habitat area and in Fritz Creek drainage to accommodate public access to the critical habitat area.

Trails

Provide for the continuing motorized and non-motorized use of existing trails and seismic lines. Evaluate these trails and provide for further management direction for non-motorized trails within the critical habitat area where determined to be in the overall public interest, where there is a demonstrated public need, and which meet the goals of this management plan, based on a trail plan developed with further analysis of critical habitat area values and public involvement. No new motorized trails will be allowed.

Motorized Vehicle Use

To ensure the protection of sensitive habitats from crushing, erosion and siltation, avoid harmful disturbance of fish and wildlife, and accommodate a variety of critical habitat area users, establish ORV corridors and seasonal and vehicle type use restrictions under a general permit

(5 AAC 95.770). Until such time as a trail plan is developed based on further analysis of critical habitat area values and public involvement, allow the off-road use of any wheeled, tracked, or other ground effect motorized vehicle of limited weight or ground effect, from August 20 through November 30 on designated trails, and from December 1 through March 31 on all critical habitat area lands, with fordings of south fork Anchor River and Beaver Creek authorized at traditional stream crossing sites only. If snow cover and/or frost sufficient to protect soils and vegetation from erosion does not exist on December 1, the critical habitat area will remain closed until such time as sufficient snow cover and/or frost are present. It is the intent of this policy to authorize normal recreational transit and is not intended to authorize use of industrial or construction type equipment. In addition, specified off-road vehicle use including critical habitat area management activities may be allowed under an individual special areas permit on a case-by-case basis where compatible with the goals of this management plan.

Land Acquisition

Purchase or trade to acquire private lands or conservation easements within the critical habitat area from willing sellers as time and funding permit.

Municipal Selections

To provide uniform management of land within the critical habitat area and to ensure protection of its fish and wildlife habitat and resources, recommend and encourage the relinquishment of municipal selections (Seward Meridian T.5S, R.13W, SECTIONS 14-15) within the critical habitat area.

Existing Roads

Maintain public access on state lands along the North Fork Road.

Winter Roads

Private non-exclusive and/or public use winter roads in the critical habitat area may be allowed where compatible with critical habitat area goals.

New Year-Round Roads

Do not allow new year-round roads in the critical habitat area.

Forest Management/Insect and Disease Management

Forest management activities may include monitoring, and where necessary, management of forest insects. When an insect is judged to be gaining outbreak population levels and when a given insect species is judged to be detrimental to the critical habitat area, forest management activities consistent with the goals of this management plan may be allowed to prevent otherwise manage insect and disease occurrence.

Forest Management/Limited Tree Removal

To promote public use and enjoyment of the critical habitat area and to meet local demand for Christmas trees and home yard transplants, a general permit may, in the Commissioner's discretion, be issued for limited tree removal of young sapling size trees in appropriate areas and during appropriate seasons in the critical habitat area.

Forest Management/Timber Harvest

Timber harvest for commercial, scientific or personal use may be allowed only when alteration of forest habitats by these methods provides a positive benefit to fish, wildlife, and/or public use and enjoyment and the proposed activities are compatible with the goals of this management plan. The harvest of dead and down timber may be allowed where appropriate including for trail maintenance and campfires.

Fire Management

Wildland fire protection will be at a level identified in the Kenai Peninsula Interagency Fire Management Plan. The entire critical habitat area is either full protection status or (adjacent to human habitation or structure) in critical protection status. Prescribed fire may be used as a management tool when such burning activity will produce favorable habitat improvements.

Oil and Gas

Oil and gas exploration, development, and production activities may be allowed in the critical habitat area under terms and conditions compatible with critical habitat area statutes and the goals of this management plan.

Material Extraction

Do not allow material extraction in the critical habitat area, unless for a use within the critical habitat area

which will benefit a critical habitat area management goal where no feasible alternative exists.

Leasible Minerals

Do not allow leasing of coal in the critical habitat area.

Locatable Minerals

Recommend closure of the critical habitat area to new locatable mineral entry.

Utilities

New utilities and/or corridors which are compatible with the goals of the management plan, in the overall public interest, and for which there is no feasible alternative may be allowed to cross the critical habitat area. Existing authorized utility and road corridors will be used wherever possible.

Grazing

New grazing leases or permits, or renewal of existing grazing leases may be allowed in the critical habitat area under terms and conditions compatible with critical habitat area statutes and the goals of this management plan. Manage grazing permit and lease areas to maintain existing habitat values based on guidelines established in consultation with the Soil Conservation Service and the Alaska Department of Natural Resources through development of range management plans.

Other Uses in 5 AAC 95.420

To protect critical habitat and fish and wildlife populations the department may allow by permit only those activities compatible with the purposes for which the critical habitat area was established, terms and standards of 5 AAC 95, and the goals and policies of this plan. Activities on valid existing permits, leases, sales or rights-of-way will be allowed to continue through the authorized term. Additional terms and conditions may be required by the department, however, to provide for consistency with the goals and policies of this plan and terms and standards of 5 AAC 95. Terms and conditions of these special area permits shall allow for the use and enjoyment of valid existing rights and interests.

IMPLEMENTATION

The Anchor River/Fritz Creek Critical Habitat Area Management Plan will be implemented by the Department of Fish and Game through its day to day on-the-ground management activities, through its annual budgeting process, and through special area permits issued for land use activities in the critical habitat area.

Special Area Permits. A special area permit is required for any habitat altering activity, including construction work, in Anchor River/Fritz Creek Critical Habitat Area. A special area permit application form can be obtained from any Department of Fish and Game office and should be submitted to the Division of Habitat's Region office in Anchorage (5 AAC 95).

Fish and Wildlife Protection. State fish and wildlife protection officers patrol the Anchor River/Fritz Creek Critical Habitat Area on a regular basis and provide on-the-ground enforcement of harvest regulations, critical habitat area regulations and permit requirements.

Operational Management Plan. Subsequent to the adoption of this plan, the Department of Fish and Game will proceed to develop an operational management plan for the critical habitat area. This operational management plan will detail implementation of the policies adopted in this plan and will provide details on the projects, their schedules, staffing requirements, and budgets necessary for management of the critical habitat area. Projects to be included in the operational plan include:

1. Monitoring moose population trends, mortality factors, composition, habitat relationships and areas of important habitat.

2. Monitoring seasonal brown bear population status and habitat use.

3. Determining the frequency of occurrence and distribution of furbearer species as related to habitat type.

4. Compiling and maintaining a list of necessary biological baseline studies for the area.

5. Preparing in-stream flow reservation applications for streams in the Anchor River drainage.

6. Evaluating existing trail uses and their impacts on the area and preparing a trail plan that identifies ORV

corridors; non-motorized areas or trails; sign needs; and new trail and public access improvements needs.

7. Designing a public information program for the critical habitat area.

8. Coordinating borough relinquishment of municipal selections within the critical habitat area.

9. Assistance to Department of Natural Resources in filing mineral closing orders for the critical habitat area.

10. Pursuing the acquisition of private lands or conservation easements within the critical habitat area from willing owners.

Citizen's Advisory Committee. Subsequent to the implementation of this plan, the department will establish a citizen's advisory committee to advise the department on issues relating to the protection and management of the critical habitat area.

Other Agencies' Actions. It is anticipated that this document will also be used by other state, federal, and local decision makers in planning for and making decisions under their respective statutory authorities regarding lands within Anchor River/Fritz Creek Critical Habitat Area.

APPENDIX

ANCHOR RIVER/FRITZ CREEK

CRITICAL HABITAT AREA

RESOURCE INVENTORY

RESOURCE INVENTORY

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INTRODUCTION

The Anchor River/Fritz Creek Critical Habitat Area is located in the heart of the southern Kenai Peninsula, spanning the Anchor River and Fritz Creek drainages. Created in 1985 to protect natural habitat critical to perpetuation of fish and wildlife, especially moose, the area is one of the only major moose overwintering areas on the southern Kenai Peninsula.

HISTORY

Two distinct peoples, the Pacific Eskimos and the Dena' ina Indian were the original settlers of the southern Kenai Peninsula/Kachemak Bay region. In the later 1700's the Russians arrived in the area in their quest for furs. In the late 1800's American prospectors arrived in their search for gold and coal. In the early 1900's fox farms sprang up along the shores of Kachemak Bay, homesteads were established at the lower elevations, and communities began to grow. However, none of these activities appear to have permanently affected the critical habitat area and no permanent settlement is known to have occurred in the critical habitat area.

PHYSICAL ENVIRONMENT

(Taken from Albert, 1987 draft)

Climate

Climatic conditions in the Homer area, in the Anchor River/ Fritz Creek Critical Habitat Area (ARFCCHA), are primarily influenced by the moderating maritime effects of Cook Inlet and Kachemak Bay resulting in cool summers and mild winters. The Alaska Range shields the area from the most severe cold air masses that flow from the Interior while the Kenai Mountains to the east cut off the cold breezes and many of the storms from the Gulf of Alaska and Prince William Sound.

The early summer (May-July) period is somewhat dry and sunny. Beginning in August and throughout fall, cloudy rainy weather predominates. Winter temperatures rarely drop below zero. The main source of cold air is the occasional southerly flow of air from the Interior down the Susitna River valley and out over Cook Inlet.

At Homer, mean annual snowfall is approximately 125 cm (49 in) with an annual snow accumulation of 23 cm (9 in). Precipitation and snowfall increase dramatically in the higher elevations above Homer. At a weather station located

8 air km (5 mi) northwest of Homer at 305 m (1,000 ft), mean annual snowfall was about 380 cm (150 in).

Geomorphology

Much of the general Homer area is underlain by the Kenai Formation (Hinton 1971). This deposit of freshwater origin is several thousand feet thick and consists of moderately indurated sandstone, silt, and clay, mainly in thin intergraded beds and lenses, interbedded with a few thin lenses of fine conglomerate and many beds of subbituminous or lignitic coal (Barnes and Cobb 1959). The Kenai Formation bedrock can be observed in the Anchor River drainage, in the south face of Bald Mountain, and in the north-facing slopes of the Fritz Creek drainage. Because only a relatively short period of time has elapsed since the recession of the last ice sheet in the area, most of the Kenai Formation bedrock is covered by nearly continuous deposits of glacial drift and alluvial deposits.

According to Karlstrom (1964), the Homer area probably was glaciated several times. Areas just north of Homer are covered by deposits of the Eklutna Glaciation whereas deposits of the Naptowne Glaciation occur east of Homer. Floodplain deposits occurring in Fritz Creek valley consist of silt, sand, and gravel of more recent post-glacial age (Waller et al. 1968). Uplands are covered by wind-deposited silty material ranging from only a few inches thick on some steep slopes to 60 inches in other locations. This material probably is a mixture of loess that was derived from glacial material and ash from volcanoes in the Aleutian Range to the west of Cook Inlet.

Soils

The characteristics of any soil are derived from the combined influences of five natural environmental factors and the effects of the cultural environment and man's use of the soil (Hinton 1971). These five factors of soil formation are parent material, climate, vegetation, relief, and time.

Soils in the Homer area have predominantly formed in very shallow to deep deposits of silty wind-deposited materials that were derived from glacial deposits and volcanic ash from the Aleutian Range. In the Homer-Anchor Point-Kachemak Bay area, the volcanic ash is more dominant than in locations further north on the Kenai Peninsula. The silt-ash layer ranges from a few inches to 150 cm (60 in) in depth and is mantled in some cases directly on sediments of the Kenai Formation. Coarse gravelly moraines from previous glacial episodes are common in the Fritz Creek portion of

the ARFCCHA. Mutnala Series soils formed in this mantle of volcanic ash and other silty material on moraines and knolls of gravelly glacial till. These soils are commonly found on the wooded side-slopes of the Fritz Creek valley. The Kachemak Series soils also formed in volcanic ash mixed with silty material and lie directly over the tertiary bedrock sediments.

Peat soils derived from the accumulated remains of mosses and sedges fill many bottomland depressions. The Salamatof Series consists of deep, poorly-drained, nearly level peat soils in muskeg bogs of varying size. The Beaver Creek Flats area is an example of a relatively large muskeg in the ARFCCHA. The water table is always near the surface and is often ponded.

Surface Drainage

The principle streams of the ARFCCHA are the South Fork of the Anchor River, Beaver Creek, and Fritz Creek. The South Fork drains a large part of the southwestern front of the Caribou Hills-Boxcar Hills upland region. Beaver Creek carries a portion of the drainage of Bald Mountain into the South Fork of the Anchor River. Twitter Creek also flows in the South Fork of the Anchor River within the critical habitat area. Fritz Creek is a small watercourse draining into Kachemak Bay about 11 km (7 mi) northeast of Homer. In the downstream reaches of Fritz Creek, below East End Road, the stream cuts deeply into the soil mantle resulting in relatively steep valley slopes. Farther into the upstream portion of the drainage, the valley floodplain widens progressively, and the slopes become far more gentle. None of these streams carry glacial outwash materials.

BIOLOGICAL RESOURCES

Vegetation

Vegetative composition and distribution within the ARFCCHA is dominated by the effects of elevation, soil drainage and to a lesser extent, aspect exposure. Climatic occurrence is similar throughout the area and thus does not dictate any significant vegetation influence.

Treeline, as effected by elevation and/or other vegetative competition, is distributed from approximately 800 to 1100 feet. Topographic exposure also affects this line of demarcation but 1000 feet is an average for the treeline throughout the area. Above timberline is found Sitka alder, dwarf arctic birch and willow brush which all occur in dense homogenous thickets. Extensive grasslands occur in these higher elevations of the critical habitat area (CHA) with

the native bluejoint reedgrass being a principal species. This coarse perennial grass typically grows in tussocks and reaches up to 6 feet tall on favorable sites.

On the other elevational end of the CHA is found the Anchor River, Beaver and Fritz Creek drainages. Typical to these water courses is a neighboring riparian zone of relatively flat topographical relief. These lowland muskeg areas are characterized by poorly drained soils with frequent standing water. Plant species adapted to these site conditions are numerous with many plant families represented. Black spruce trees grow in this zone but are typically stressed and do not achieve a size for harvestable uses. Willow species favored by moose also grow in this wetland area. Common ground cover includes sphagnum moss, two feather moss species, cottonsedge, labrador-tea, and numerous berry species. Two carnivorous sundew species also occur in these bog areas.

Forested areas quantify the largest proportion of vegetative cover within the CHA and are of a primary importance for habitat. Occurring within the CHA forest configuration is the natural distribution of the following tree species:

Common Name	Scientific Name
White spruce	Picea glauca (MOENCH) VOSS
Sitka spruce	Picea sitchensis (BONG.) CARR.
Lutz spruce	Picea lutzii LITTLE
Black spruce	Picea mariana (MILL.) B.S.P.
Black cottonwood	Populus trichocarpa TORR. & GRAY
Quaking aspen	Populus tremuloides MICHX.
Paper birch	Betula papyrifera MARSH

A birch species variety known as Kenai birch (betula papyrifera var. kenaica -W.H. Evens- Henry) is recognized by some authorities but has only a minute difference in overall species habit and characteristics.

The spruce tree species are the most frequent and dominant forest inhabitant of the area. The spruce species configuration within the CHA is affected by the transitional zone of natural species distribution. This location on the Kenai Peninsula finds itself at the northern range of the coastal occuring Sitka spruce zone. At this distribution edge, white spruce common to the Alaskan interior gives way to the maritime favoring Sitka. In this transition a significant level of hybridization has occurred within the spruce family and the result has been a hybrid species identified as Lutz spruce. Though infrequent, botanically pure white and Sitka spruce trees may be found with careful search. However, the primary spruce species occurring in

the CHA is the hybridized Lutz spruce. Spruce occurs in homogenous stands over much of the area; however, stands of mixed timber consisting of spruce and very small amounts of birch are also common. Cottonwood has a limited representation in the CHA, and is found along the lower reaches of the South Fork of the Anchor River and in upland poor drainage sites. Aspen reaches the southern limit of its known range distribution on the Kenai Peninsula in two small stands along the South Fork of the Anchor River within the CHA. As referenced, black spruce serves the limited forest role of a pioneer species on muskegs and bogs.

The amount of vegetation underneath the forest canopy at the ground level to a large extent is dictated by forest crown closure and thereby sunlight. The plant species variety covering the forest floor, however, are fairly uniform throughout the forested area. Mosses, lichens and numerous prostrate berry species combine to completely eliminate soil exposure and form a sometimes deep humos layer. Common upright plant species are fireweed, grasses, menziesia, highbush cranberry, willows, mountain-ash and well known devilsclub.

The forest resource in the CHA supports a wide variety of habitat for wildlife as well as providing a productive watershed in the South Fork of the Anchor River for salmon, steelhead, and other fish populations. Only a minimal amount of the CHA has early successional stage forest occurrence favored by moose for browse areas. Thus the opportunity for habitat enhancement of moose is extensive.

Birds

The critical habitat area supports only a limited amount of waterfowl breeding and migratory staging habitat which explains the low number of ducks found in the area. The red-breasted merganser (Mergus serrator) is the only species known to breed in the CHA; however, on the basis their local distributions, common goldeneye (Bucephala clangula) and mallard (Anas platyrhynchos) are suspected breeders. Some common spring and fall migrants are: green-winged teal (A. crecca), mallard, northern pintail (A. acuta), American wigeon (A. americana) and northern shoveler (A. clypeata).

The expansive spruce forests in the area provide breeding habitat for the sharp-shinned hawk (Accipiter striatus), northern goshawk (A. gentilis) and red-tailed hawk (Buteo jamaicensis). Active and inactive Bald Eagle (Haliaeetus leucocephalus) nests have been documented within the CHA along the South Fork of the Anchor River. Species that are known to migrate through the area or occur there outside the breeding season include: sharp-shinned hawk, northern

goshawk, merlin (Falco columbarius), gyrfalcon (F. rusticolus), red-tailed hawk, Swainson's hawk (B. swainsoni) and rough-legged hawk (B. lagopus).

For a list of birds and seasonal associations in the Anchor River/Fritz Creek Critical Habitat Area, see Table 1.

Mammals

The species distribution of small mammals on the southern Kenai Peninsula, including the CHA, is poorly documented. Fuller (1981) collected small mammals near Gruber Lake in the Caribou Hills (Table 2). During October 1988, limited trapping in a mixed-age stand of spruce in Fritz Creek yielded catches of the masked shrew (Sorex cinereus), vagrant shrew (S. vagrans) and red-backed vole (Clethrionomys rutilus) (J. Brandt and D. Holdermann, unpubl. data).

The snowshoe hare (Lepus americanus) occurs in forest and shrubland habitats within the critical habitat area. Hare populations in southcentral Alaska follow a roughly "10-year" cycle of abundance and scarcity. In the lower Kenai Lowlands, hare abundance peaked about 1985 and has since declined to a low level (D. Holdermann, ADF&G/Homer, pers. comm.).

Red squirrels (Tamiasciurus hudsonicus) are common residents in mature spruce forests throughout the CHA. During the period 1981-1987, field observations from the lower Kenai Peninsula indicate a population trend from extreme to moderate abundance (D. Holdermann, pers. comm.).

Hoary marmots (Marmota caligata) can be found in low numbers along the bluffs north of the Homer Bench and in the gravel terraces that border the North Fork of the Anchor River (D. Holderman, ADF&G/Homer, pers. comm.). Similar gravel terraces exist along the South Fork of the Anchor River; consequently, it is quite probable that the critical habitat area supports a small population of marmots.

The beaver (Castor canadensis) is common along the entire length of the South Fork of the Anchor River and its tributaries as well as along the headwaters of Fritz Creek. Periodic winter flooding and subsequent refreezing may be a major source of mortality in beavers in this region. Muskrat (Ondatra zibethicus) are also known to occur but in low numbers along the South Fork of the Anchor River and its tributaries. (D. Holdermann, ADF&G/Homer, pers. comm.).

Table 1. Bird and Seasonal Associations in the Anchor River/Fritz Creek Critical Habitat Area

Bird Species	Spring	/ Summer	/ Fall	/Winter
Common goldeneye		x		
Bufflehead		x		
Red-breasted merganser		x		
Green-winged teal	x		x	
Mallard	x		x	
Northern pintail	x		x	
American wigeon	x		x	
Northern shoveler	x		x	
Sharpshinned hawk	x	x	x	x
Northern goshawk	x	x	x	x
Merlin	x	x	x	x
Bald Eagle	x	x	x	x
Northern harrier		x		
Gyrfalcon				x
Red-tailed hawk	x			
Swainson's hawk	x			
Rough-legged hawk	x			
Spruce grouse	x	x	x	x
Willow ptarmigan	x	x	x	x
Sandhill crane	x	x		
Common snipe		x		
Red-necked phalarope		x		
Long-billed dowitcher		x		
Short-billed dowitcher		x		
Least sandpiper		x		
Whimbrel		x		
Greater yellowlegs		x		
Lesser yellowlegs		x		
Spotted sandpiper		x		
Western sandpiper	x			
Pectoral sandpiper	x			
Bar-tailed godwit	x			
Mew gull		x		
Glaucous-winged gull		x		
Glaucous gull		x		
Great horned owl	x	x	x	x
Great gray owl	x	x	x	x
Boreal owl	x	x	x	x
Northern saw-whet owl	x	x	x	x
Northern hawk owl		x		
Short-eared owl		x		
Snowy owl				x
Belted kingfisher	x	x	x	x
Downy woodpecker	x	x	x	x
Hairy woodpecker	x	x	x	x
Three-toed woodpecker	x	x	x	x

Bird Species (cont.)	Spring	Summer	Fall	Winter
Black-backed woodpecker	x	x	x	x
Olive-sided flycatcher		x		
Alder flycatcher		x		
Tree swallow		x		
Violet-green swallow		x		
Bank swallow		x		
Cliff swallow		x		
Steller's jay	x	x	x	x
Gray jay	x	x	x	x
Black-billed magpie	x	x	x	x
Northwestern crow	x	x	x	x
Common raven	x	x	x	x
Black-capped chickadee	x	x	x	x
Boreal chickadee	x	x	x	x
Brown creeper	x	x	x	x
American dipper	x	x	x	x
Golden-crowned kinglet	x	x	x	x
Ruby-crowned kinglet	x	x	x	x
Gray-cheeked thrush		x		
Swainson's thrush		x		
Hermit thrush		x		
American robin		x		
Vaired thrush		x		
Water pipit	x		x	
Northern shrike	x	x	x	x
Song sparrow	x	x	x	
Orange crowned warbler		x		
Yellow warbler		x		
Yellow-rumped warbler		x		
Townsend's warbler		x		
Blackpoll warbler		x		
Northern waterthrush		x		
Wilson's warbler		x		
Savannah sparrow		x		
Fox sparrow		x		
Lincoln's sparrow		x		
Golden-crowned sparrow		x		
White-crowned sparrow		x		
Dark-eyed junco		x		
American tree sparrow				x
Snow bunting		x		x
Lapland longspur	x		x	
Rusty blackbird	x	x		
Red-wing blackbird	x			
Pine grosbeak	x	x	x	x
White-winged crossbill	x	x	x	x
Common redpoll	x	x	x	x
Pine siskin				x

Table 2. Small Mammals Collected by Fuller (1981) at Gruber Lake

Common Name	Scientific Name
Vagrant shrew	Sorex vagrans
Masked shrew	Sorex cinereus
Singing vole	Microtus miurus
Tundra vole	Microtus oeconomus
Red-backed vole	Clethrionomys rutilus
Northern bog lemming	Synaptomys borealis

Table 3. Mammals Which May Occur in the AR/FC CHA

Common Name	Scientific Name
Least shrew	Microsorex hoyi
Singing vole	Microtus miurus
Tundra vole	Microtus oeconomus
Northern bog lemming	Synaptomys borealis
Little brown bat	Myotis lucifugus
Northern flying squirrel	Glaucomys sabrinus
Hoary marmot	Marmota caligata
Red fox	Vulpes vulpes
Least weasel	Mustela nivalis

Porcupines (Erethizon dorsatum) are found throughout the Kenai Peninsula's boreal forests. On the lower Peninsula, porcupine abundance appears to have flucuated widely over the past 30 years due to unknown causes. Porcupine have been scarce in this region since at least 1981 (D. Holdermann, ADF&G/Homer, pers. comm.); however, they are reported to have been quite abundant during the early 1960s (Cecil Jones, pers. comm.).

The ermine (Mustela erminea) is distributed throughout the forested and alpine habitats of the Kenai Peninsula. It is considered common in all habitat types within the ARFCCHA (D. Holdermann, ADF&G/Homer, pers. comm.). However, little is known about the ermine's population status or ecology in this region.

Hall and Kelson (1959) show the Kenai Peninsula within the distribution of the least weasel (Mustela nivalis); however, to date, no positive collections are known from the Peninsula.

Mink (Mustela vison) are common residents along the South Fork within the ARFCCHA. Although their population status is unknown, they are sufficiently abundant to attract moderate trapping pressure along the South Fork/Anchor River.

River otters (Lutra canadensis) occur within the ARFCCHA along the South Fork of the Anchor River and its tributaries; however, their status in the Fritz Creek drainage is unknown (D. Holdermann, ADF&G/Homer, pers. comm.).

Field observations and ADF&G fur harvest records indicate that wolverines (Gulo gulo) are uncommon in the southern Kenai lowlands, which include the ARFCCHA. Wolverine numbers appear lower in the southern Kenai Lowlands than might be expected based on the availability of prey and carrion (i.e. moose). Human disturbance, overharvest, competition from other scavengers and predators, and predation by wolves may be responsible for the perceived low density. ADF&G fur harvest records show that only one wolverine was trapped in the ARFCCHA between 1981-1987 (D. Holdermann, ADF&G/Homer, pers. comm.).

The abundance of lynx (Felis lynx) appears to closely reflect flucuations in the roughly "10-year" hare cycle (Brand et al. 1976). Lynx are distributed throughout the Kenai Peninsula's forests in close association with snowshoe hares. Lynx population dynamics on the lower Kenai Peninsula are poorly understood; however, relative changes in reported lynx harvests and winter lynx sign suggest that

their density peaked during the 1986-1987 winter season (D. Holdermann, 1986).

The wolf (Canis lupus) was extirpated from the Kenai Peninsula by the 1920s; but, apparently through emigration from mainland populations, wolves became widely re-established in the region by the 1970s (Bangs and Bailey, 1983). Today, an estimated 40-55 wolves inhabit the lower Peninsula (i.e. GMU 15C). Wolves are present in the ARFCCHA during most of the year with the greatest numbers occurring during the period December-April, when moose, a major prey item, are concentrated along the South Fork of the Anchor River and Fritz Creek. (D. Holdermann, ADF&G/Homer, pers. comm.).

Coyotes (Canis latrans) are common residents in the ARFCCHA. Field observations suggest that riparian habitats are especially important to coyotes during the winter period for foraging and travel. (D. Holdermann, ADF&G/Homer, pers. comm.).

The red fox (Vulpes vulpes) is uncommon on the lower Kenai Peninsula. Although red foxes probably occur in the ARFCCHA, no observations or collections of this species are known from this area.

Black bears (Ursus americanus) occur throughout the ARFCCHA during their active period (i.e. May-September), and probably den within the South Fork of the Anchor River and Fritz Creek drainages. During July and August, the tracks of bears which have been feeding on salmon are especially common along the South Fork of the Anchor River between its confluences with South Beaver Creek and Twitter Creek (D. Holdermann, ADF&G/Homer, pers. comm.). During the spring, public sightings of black bears in the Fritz Creek drainage are also common.

Brown bears (Ursus arctos) are thought to utilize portions of the ARFCCHA throughout the year. Bevins et al. (1984) reported on their efforts to identify areas of significant importance to brown bears on the Kenai Peninsula. They found that in July and August brown bears concentrated along the South Fork of the Anchor River to feed on spawning king salmon. That portion of the ARFCCHA along the South Fork of the Anchor River upstream from its confluence with Twitter Creek to its headwaters was designated a major brown bear feeding area. Brown bears continue to feed on silver salmon along this same stretch of river through early October (D. Holdermann, ADF&G/Homer, pers. comm.). An active brown bear den was discovered in March 1984 near the confluence of Twitter Creek and the South Fork of the Anchor River (D. Holdermann, ADF&G/Homer, pers. comm.). ADF&G harvest

records show that an adult male brown bear was killed in the upper Fritz Creek drainage during the 1987 spring season.

Moose (Alces alces) are widely distributed on the lower Kenai Peninsula and, because of their large recreational, esthetic and subsistence values, are considered one of the most economically important wildlife species in the region. An estimated 2,000-2,500 moose inhabit approximately 1,000 mi of primary range on the lower Kenai Peninsual (D. Holdermann, pers. comm.). Bailey et al. (1978) found that moose in this region generally exhibited migratory behavior with distinct seasonal habitat preferences.

During summer, moose are widely dispersed and show a preference for subalpine meadows and, to a lesser extent, river bottoms and adjoining spruce forest; however, a wide range of elevations and habitat types are used. Movement to traditional rutting areas, which are characterized by subalpine stands of open spruce and dense willow, occurs during mid-September. Moose remain aggregated at these areas until mid-October when they begin moving upslope to subalpine willow brushlands. During December, moose descend, in response to snow accumulations, from these subalpine brushlands and meadows through heavily timbered drainage areas enroute to winter ranges. Moose have generally attained their winter distribution by early January and remain on winter ranges until April or May. Winter ranges are either of the riverine type (e.g., Fox River, Fritz Creek, Anchor River ranges) or coast plain type (e.g., Homer Bench, Ninilchik and Kasilof ranges). Both winter range types occur in a moderated climatic zone below 700 ft elevation and provide a combination of abundant willow browse and spruce cover. In May and June, moose gradually return to their upland summer ranges as the snow melts and these latter areas once again provide green vegetation.

The ARFCCHA was established by the Alaska Legislature primarily because of its regional significance as a moose winter range. It is estimated that between 150 and 300 moose have overwintered in the CHA in recent years. Winter helicopter surveys conducted at monthly intervals showed that between 50 and 64 moose were present in the upper Fritz Creek drainage in 1987 (Table 4) (Holdermann 1987a, b, c, and d). During early winter, an established additional 200-400 moose move through the CHA on their way to other winter ranges.

Prior to 1917, caribou (Rangifer tarandus) were found on the Kenai Peninsula and probably occurred in the Anchor River drainage. Excessive harvest and extensive habitat changes related to wild fires are thought to have eliminated caribou

Table 4. Summary of moose counted during monthly helicopter surveys of the upper Fritz Creek drainage, February-May 1987, (ADF&G, Homer).

Date	No. adults[a]	No. Calves	% Calves	Total Moose	Min. Density moose/mi^2
12 Feb.	55	6[b]	11	61	25
12 March	50	5[b]	9	55	23
13 April	64	4[b]	6	68	28
10 May	5	1[b]	20	6	3

[a] Adult (1.5 years of age or older)

[b] No twins in sample.

from this area. Future attempts will probably be made to reintroduce caribou on the lower Kenai Peninsula.

Fish

Both resident and anadromous fish are present in waters located within the Anchor River/Fritz Creek Critical Habitat Area, including king salmon (Oncorhynchus tshawytscha), coho salmon (Oncorhynchus kisutch), pink salmon (Oncorhynchus gorbuscha), sockeye salmon (Oncorhynchus nerka), Dolly Varden (Salvelinus malma), and rainbow trout/steelhead (Salmo gairdneri).

Freshwater systems within the critical habitat area are essential to the maintenance of both resident and anadromous fish populations. All fish species within the area utilize freshwater habitat for migration, spawning, incubation and juvenile rearing. Habitat needs of fish vary with seasons and life cycles.

There are two streams flowing through the critical habitat area which are known to support anadromous and resident fish populations. A brief description of fish resources in these streams follow.

Anchor River: Anadromous king, coho, sockeye, and pink salmon are present in this system as well as anadromous Dolly Varden and rainbow trout (steelhead). A small number of resident rainbow trout inhabit the upper reaches of the river. King and coho salmon are the most abundant salmon species.

Annual adult king salmon production (harvest and escapement) has averaged about 2,300 fish during the last 19 years (Hammarstrom 1986). In 1987 a record return of over 5,000 king salmon was documented. King salmon enter the system from mid-May until the end of June. Spawning occurs in late July and early August in the entire length of the river. Juvenile king salmon spend one year in Anchor River prior to outmigration and are found throughout the drainage. They are generally found in higher velocity waters than are coho and are commonly distributed in riffle areas of varying velocity.

Coho salmon returns are unknown but based on harvest levels annual production is probably near 5,000. Coho salmon enter the stream from mid-August to late September and spawn in the upper reaches of the north and south forks in late September/early October. Juvenile coho salmon spend two years in the system prior to outmigration and are found throughout the drainage. They prefer low velocity waters and are therefore found in slack water areas and abound in

beaver ponds which are common to the upper reaches of both forks.

Pink salmon annual production probably averages less than 2,000. Pink salmon enter in mid-July and spawn in the lower and middle reaches of the river in August. Pink salmon juvenile migrate directly to salt water after emerging from the gravel in April and May.

Sockeye salmon are the least abundant of the anadromous salmon in the Anchor River drainage. Probably less than 100 sockeye salmon use the system each year. Their spawning and rearing areas are unknown.

Anadromous Dolly Varden is the most abundant species in the Anchor River. Until 1987 when a weir was installed, no estimates of the Dolly Varden population size were available. In 1987 approximately 19,000 Dolly Varden were enumerated. Based on past years' harvest information, there may be substantial fluctuation in production since 21,000 Dolly Varden were harvested in 1979. Dolly Varden enter the stream from mid-July until early September. They spawn throughout the river in October, overwinter in the river and return to salt water in April and May. Dolly Varden juveniles are found throughout the drainage. The length of residency prior to outmigration is unknown at the present time. Age analysis is presently being accomplished to determine length of residency and adult age composition of the population. Juvenile Dolly Varden prefer low velocity waters and inhabit areas similar to those utilized by coho salmon.

Both resident and anadromous rainbow trout utilize the Anchor River. Little is known about the resident population but they are primarily found in the upper reaches of the north and south forks. Although population numbers are unknown angler harvest levels are extremely low which indicate a small population exists. Anadromous rainbow trout (steelhead) are abundant. The Anchor River supports the largest steelhead population in all of Southcentral Alaska (excluding Kodiak Island). Population estimates have not been determined on a regular basis but annually average from 1,500 to 2,000 returning steelhead. The population appears to widely fluctuate as estimates have ranged from 500 in 1957 to 4,132 in 1978 (Balland 1986). Steelhead enter the system from mid-August to mid-October. They overwinter in deeper pools found in the lower reaches of the north and south forks and in the main stem below their confluences. In early spring (April) they generally move upstream to spawn and then migrate back to salt water primarily in May. Steelhead juveniles spend from two to four years in the system prior to migrating to salt water.

They are distributed throughout the drainage and prefer pool/riffle areas and are commonly located in the same areas as king salmon.

Fritz Creek: Anadromous coho salmon and resident Dolly Varden are the only known fish species present in Fritz Creek. Coho salmon smolt were stocked by the Fisheries Rehabilitation, Enhancement, and Development Division in an effort to enhance the sport, subsistence, and commercial fisheries in Kachemak Bay. Stocking was initiated in 1978 and has continued intermittently depending on availability of smolt. A natural barrier (6 foot falls) near the mouth of Frtiz Creek precludes any salmon migrating up the stream. It is not intended that adults returning from these plants reproduce in Fritz Creek; rather that all be harvested in existing marine fisheries. Above the natural barrier only Dolly Varden are known to exist. Population numbers are unknown as is their distribution in the drainage. The Dolly Varden are the commonly found "stunted" variety which rarely exceed 6 inches in length. More than likely they are distributed throughout the drainage. Spawning occurs primarily during October.

HUMAN USE OF FISH AND WILDLIFE

Moose Hunting

Moose are the most abundant and accessible large game mammal on the lower Kenai Peninsula. Consequently, the hunting and viewing of moose are an important facet of the local economy and an essential aspect of local lifestyles. ADF&G harvest statistics show a sharp increase in moose hunting effort in this region during the past 10 years (Holdermann, 1985).

Precise estimates of moose hunter effort and moose harvest for the ARFCCHA are currently unavailable. However, harvest ticket statistics for recent years show that from 283-336 hunters annually have killed between 50-61 bull moose in the entire Anchor River drainage (Table 5). Based on extensive first-hand knowledge of this hunt, it is reasonable to assume that at least one-third of the drainage's hunting effort and bull harvest occurs with in the critical habitat area (D. Holdermann, ADF&G/Homer, pers. comm.). Moose hunting activities are primarily focused along the South Fork of the Anchor River corridor and the uplands to the north of the corridor.

Table 5. A summary of moose harvests and hunting effort in the Anchor River drainage (i.e. includes the ARFCCHA), Kenai Peninsula, Alaska.

Year	No. bulls killed	No. hunter	% Subunit harvest
1980			
1981			
1982			
1983	61	304	26
1984	50	336	23
1985	50	292	29
1986	60	283	24

Bear Hunting

Black bears and brown bears are occasionally taken by sport hunters in the critical habitat area. A review of harvest records shows that five brown bears and five black bears were killed within the critical habitat area boundaries since 1961 and 1973, respectively. Low harvest rates for bears probably reflects either a lack of interest in hunting bears (i.e. brown bear) or the relative difficulty of accessing and successfully hunting bears compared to other areas in the region (i.e. black bear) (D. Holdermann, ADF&G/Homer, pers. comm.).

Trapping

Trapping of beaver, mink, otter, and coyote is common along the Anchor River/South Fork corridor downstream from the confluence with Beaver Creek. Wolves are also periodically trapped along the South Fork of the Anchor River and in the Fritz Creek drainage. Although the numbers of furbearers harvested in the ARFCCHA are unknown, harvest records for the entire Anchor River drainage (i.e. includes ARFCCHA) allow some insight into the relative take of those furbearers which require sealing by ADF&G (Table 6).

Sport Fishing

Sport fishing is a major recreational activity on the Anchor River. In 1986 over 14,000 anglers made 26,400 trips to the Anchor River and accounted for 35,000 angler-days of fishing effort (Mills 1987).

Although the majority of these recreational users are utilizing the lower reach of Anchor River below the critical habitat area, the fish resources that the fishery is dependent on utilize the entire drainage. There is a growing Dolly Varden fishery on the South Fork of the Anchor River within that portion of the critical habitat area accessed by the road system. It is not known what portion of the total effort is directed on the South Fork.

Since 1978, the average annual harvest of king salmon, coho salmon, Dolly Varden, and steelhead has been 650; 2,000; 13,000; and 550, respectively (Balland 1986, Hammarstrom and Larson 1986). Dolly Varden and steelhead harvest is declining primarily due to increased regulatory restrictions imposed to reduce harvest levels and, in addition, steelhead anglers are practicing more catch and release.

The king salmon fishery occurs only below the junction of the north and south forks and for only four weekends

Table 6. A summary of recent furbearer harvest [a/] in the Anchor River drainage (i.e. includes the ARFCCHA), Kenai Peninsula, Alaska.

Season	Beaver		Lynx		Otter		Wolf		Wolverine	
	No. harvested	% of subunit harvest	No. harvested	% of subunit harvest	No. harvested	% of subunit harvest	No. harvested	% of subunit harvest	No. harvested	% of subunit harvest
1984/1985	26	41	0	-	1	4	1	14	0	-
1985/1986	44	67	6	27	2	8	3	19	1	25
1986/1987	26	36	5	29	5	33	2	25	0	-
Total	97		11		8		6		1	
Means		47		26		12		19		8

a/ Data from furbearer sealing certificates.

(including Mondays) beginning on Memorial Day. No salmon fishing is allowed above the junction of the forks. Anchor River is opened for fishing only from July 1 through December 31 except for the spring king salmon fishery. The majority of fishing effort in the Anchor River Critical Habitat Area occurs primarily from August until mid-October since this is the period when Dolly Varden migrate into the area. The salmon closure upstream of the forks' confluence is designed to protect spawning salmon.

Sport fishing on Fritz Creek is extremely limited due to the lack of fishery resources. Most effort on the stream is from local residents living nearby. There are no estimates of effort and harvest on this stream.

Approximately 73% of Anchor River anglers are Alaska residents and 37% of these anglers reside in the local area. Non-local Alaska residents were primarily from Anchorage (93%) (Nelson et al. 1987).

Nonconsumptive Use

Nonconsumptive use in the ARFCCHA occurs incidental to other activities such as cross-country skiing, snowshoeing, berry-picking, hiking/backpacking, or fishing. The most accessible moose viewing opportunities occur in Fritz Creek during winter.

Habitat Enhancement

The primary management objective for the lower Kenai moose population is to provide the greatest sustained opportunity to participate in hunting moose. The secondary objective is to provide the greatest additional opportunity to view and photograph moose.

Moose winter range is a limiting factor in the carrying capacity of the lower Kenai Peninsula. Moose winter range on the lower Kenai Peninsula has been significantly impacted by residential and commercial development during the past three decades. In order to maintain a healthy moose population it will be necessary to seek ways to protect and enhance the remaining winter habitat.

Moose habitat enhancement has been proposed in the Anchor River/Fritz Creek Critical Habitat Area as off-site mitigation for the Bradley Lake hydroelectric project. A complete and detailed account of the enhancement opportunities and methods are presented in Albert 1987, draft.

There are currently no fish habitat or population enhancement projects on the Anchor River. There have been proposals to enhance the steelhead stocks in Anchor River but there are opponents to the project and present plans preclude enhancement of any Anchor River fish stocks.

Fritz Creek has been stocked with coho salmon smolts in the lower reach. The project has had mixed success and is still being evaluated to determine whether to continue with stocking.

OTHER HUMAN USE ACTIVITIES IN THE CRITICAL HABITAT AREA

Access

Access to the critical habitat area is gained from the Anchor River North Fork Loop Road on the western end; from trails off of Ohlson Mountain Road on the south; and from Fritz Creek drainage on the east. Numerous well established and regularly used trails crisscross the critical habitat area.

Utilities

The Homer Electric Association transmission line crosses the critical habitat area in the Fritz Creek drainage.

Oil and Gas

Parts of the lower Kenai Peninsula have been leased for oil and gas exploration and development, however, leases within the CHA are no longer in effect. Several wells have been drilled, and a gas discovery was made at North Fork, approximately two miles north of the CHA. The field was shut-in. Future discoveries of oil and gas are possible; however, the lower Kenai's geology makes a gas discovery more likely than an oil discovery.

Timber

The majority of forest within the CHA is old growth forest composed of stands ranging from near mature age to over-maturity. Though the forest has an uneven age distribution throughout, the majority of the timber stands range from 90 years to 200 years in age. From a commercial forest production stand-point 110 to 120 is the ideal spruce rotation age while the biologically mature age is approximately 150 years. Average tree diameters range from 10" diameter at breast height (DBH) to 16" DBH while tree heights run 50 feet to 70 feet. Wood volumes have a much wider range than indicated by the above average tree sizes, a result of site quality differences that affect tree stem density. Stem densities run from approximately 200 trees per acre up to the closed canopies of 400 per acre. Volumes range from an approximate equivalent of 3,500 BF per acre to 8,000 BF per acre. Some small pockets of timber may exceed 11,000 BF per acre.

Grazing

There are several long term grazing leases in the critical habitat area.

University Fields

There are seven fields totalling 55 acres on the eastern-most boundary of the critical habitat area in the Fritz Creek drainage. The fields were originally cleared during the late 1970's and early 1980's by the University of Alaska Homer Research Center. The site was originally intended to be used to study the efficacy of various fertilizer treatments for hay production, soil fertility, and performing grazing studies. Approximately one-fourth of the area was planted in timothy grass for hay production in spring, 1981. Foxtail barley and horsetail (Equisetum spp.) are also present in moderate amounts throughout the fields, which have been abandoned since 1983.

Coal Resources

The Anchor River/Fritz Creek Critical Habitat Area is located within the Homer District of the Kenai Coal Field. The Kenai Coal Field has an areal extent of approximately 1100 square miles on the west side of the Kenai Peninsula between Tustumena Lake and Kachemak Bay.

The Anchor River/Fritz Creek Critical Habitat Area is underlain by approximately 5,000 feet of non marine coal bearing, sediments (plate 1) of the Kenai Group. The Kenai group is a sequence of middle to late Tertiary fine-grained sedimentary rocks. The units crop out almost continuously in wave cut cliffs and steep walls of stream canyons from Fritz Creek northeast to Fox River and from Happy Creek north to about 11 km south of the Kasilof River mouth. Less continuous exposures occur from Fritz Creek north to the Anchor River, and in steep walls of the valleys of Anchor River, Happy Creek, Deep Creek, and Ninilchik River. The sequence consists of at least 1500m of moderately to weakly indurated, locally conglomeratic sandstone with interbedded siltstone, claystone, and many beds of sub-bituminous and lignitic coal. The proportion of sandstone increases northward and the number and thickness of coal beds and the quality of the coal decreases. The coal ranges in rank from lignite to sub-bituminous B, with the bulk of the coal resources being classed as sub-bituminous C. The coal beds are thickest in the southern portion of the Homer District, with 30 coal beds ranging in thickness from 3 feet to 7 feet. The coal occurs in many lenticular beds, and is most abundant in the lower portion of the Kenai Group.

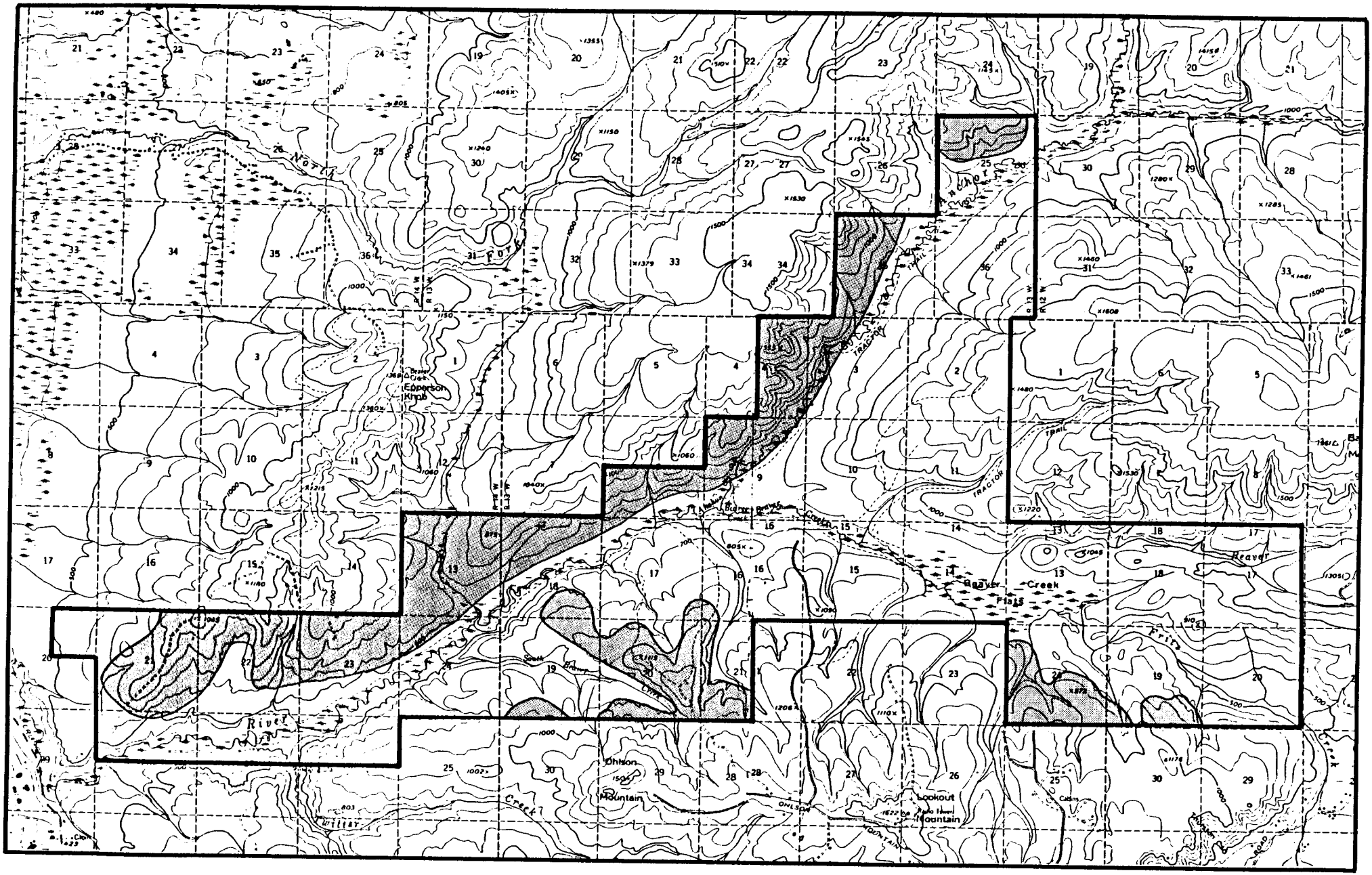

PLATE 1. DISTRIBUTION OF COAL BEARING KENAI GROUP SEDIMENTS IN THE ANCHOR RIVER-FRITZ CREEK CRITICAL HABITAT AREA

Structure of the district is simple, being characterized by a broad structural basin or trough locally modified by gentle folds high angle faults with displacements ranging from a few cm to near 25m.

Indicated coal reserves of the Homer District are estimated to total approximately 400 million tons in beds 2 feet or more in thickness. Of that number, 300 million tons occur in beds more than 5 feet thick (Barnes, 1959). Plate 1 shows the general distribution of coal bearing Kenai Group sediments within the Anchor River/Fritz Creek Critical Habitat Area.

Locatable Minerals

At present time no active mining claims exist within the critical habitat area. Potential for placer deposits within the area must be considered low. Bedrock is overlain by a widespread complex of unconsolidated deposits laid down as a direct or indirect consequence of glaciation or by subsequent stream activity (Karlstrom, 1964). The most extensive deposits are glacial till and organic swamp deposits. Stream floodplains are underlain by granular alluvium and are bounded by discontinuous fluvial terraces. Wind-blown silt (loess) forms a blanket 0.1 to 0.4m thick, almost everywhere. The thickness of the surficial deposits varies from less than 1m to more than 50m.

MAP INFORMATION SOURCES AND MAP CATEGORY DEFINITIONS

Mammals Map

Information Sources: ADF&G D. Holdermann, unpublished data; Bevins et al. 1984; Holdermann, D.A. 1985; Holdermann, D.A. 1986.

Map Category Definitions:

Moose Winter Concentration Areas - Areas where concentrations of moose have been observed in the winter.

Late Fall/Early Winter Moose Concentration Areas - Areas where concentrations of moose have been observed in the late fall and/or early winter.

Early Winter Movement Corridors - Areas known to be traditionally traversed between seasonal use areas by moose in early winter.

Brown Bear Major Feeding Area - Areas where brown bear have been observed feeding on salmon during summer months.

Birds and Fish Map

Information Sources: ADF&G D. Holdermann, unpublished data; ADF&G 1986 Anadromous Waters Atlas.

Map Category Definitions:

Anadromous Fish Streams - Streams where fish distribution has been documented.

Known Bald Eagle Nest Sites - Sites where active or inactive Bald Eagle nests have been observed.

Vegetation Map

Information Source: Dowl Engineers Inc., A Comparison of Automated and Manual Techniques Used in Classifying and Mapping Vegetation in the Kenai and Seldovia Quadrangles of Alaska, 1983.

Land Status Map

Information Source: Department of Natural Resources. Anchor River and Fritz Creek CHA Title Report, 1988.

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