

**SUSITNA FLATS  
STATE GAME REFUGE  
MANAGEMENT PLAN**

**MARCH 1988**

**Prepared by the  
Divisions of Habitat and Game**

**Alaska Department of Fish and Game  
333 Raspberry Road  
Anchorage, Alaska 99518**

**Don W. Collinsworth, Commissioner**



## ACKNOWLEDGEMENTS

The Susitna Flats State Game Refuge Management Plan has been prepared by the Department of Fish and Game (ADF&G) biologists Debra Clausen (Habitat Division) and John Matthews (Game Division) with special assistance from clerical staff Juanita Henderson and Joyce Villard and technical support from Frances Inoue and Carol Barnhill.

The planning team has participated in the plan's development from its initiation, reviewing and commenting at every stage. Planning team members are as follows:

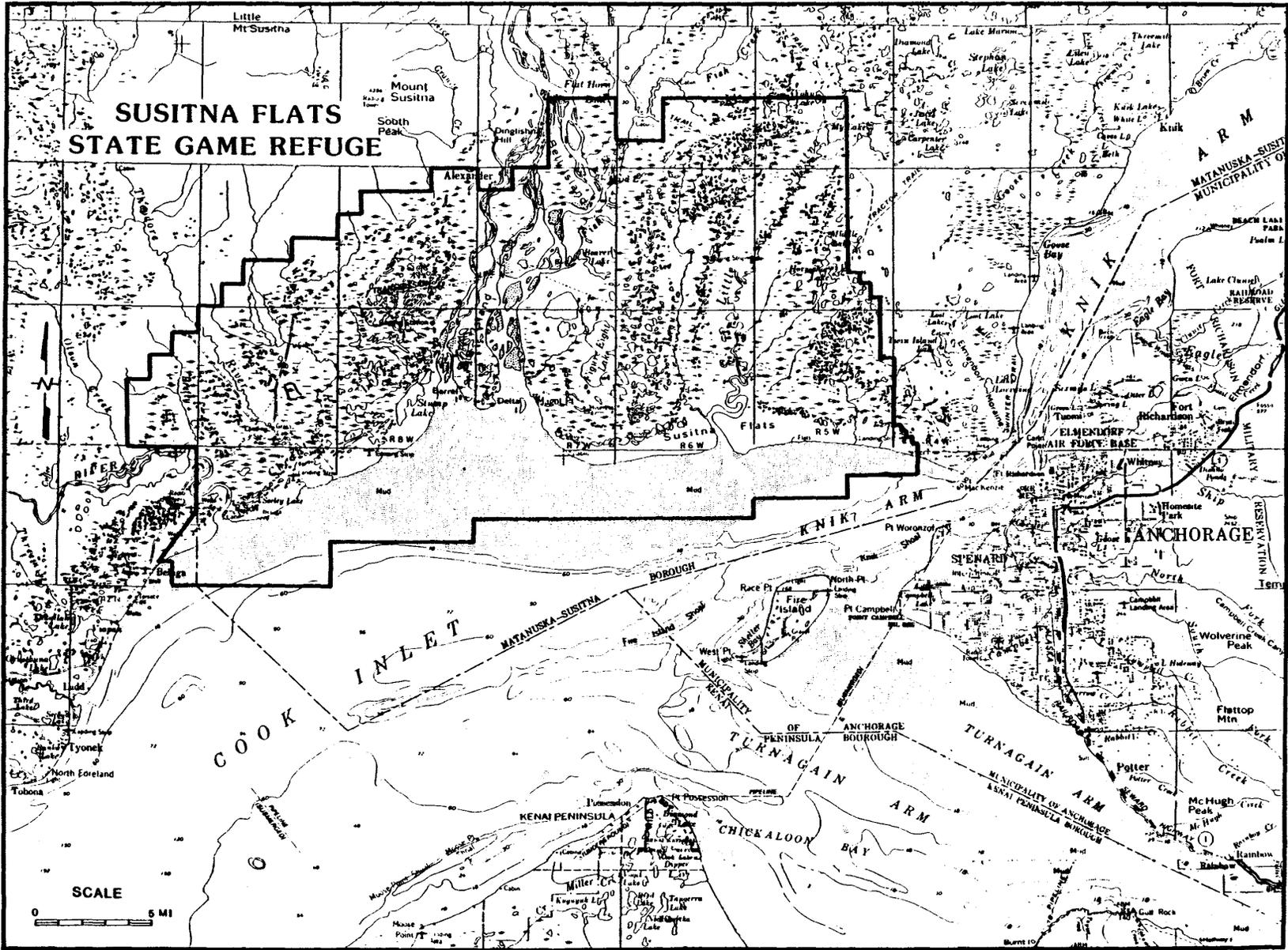
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Other Department of Fish and Game staff have also contributed significant time and expertise in developing this plan, including Lance Trasky, Carl Yanagawa, Gary Liepitz, and Phil Brna of Habitat Division and Jack Didrickson, Jim Faro, and Dan Rosenberg of Game Division. Department of Natural Resources staff Bill Beebe, Division of Forestry, and Mitch Henning, Division of Mining also deserve recognition for their contributions in the development of this plan.

Cover Photo: Mt. Susitna from Lewis River Slough by Dan Rosenberg.

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## INTRODUCTION

Susitna Flats State Game Refuge, located between Beluga River and Point MacKenzie on the west side of Cook Inlet was established by the Alaska Legislature in 1976. It was created to ensure the protection of fish and wildlife populations, particularly waterfowl nesting, feeding, and migration; moose calving areas; spring and fall bear feeding areas; and salmon spawning and rearing habitats. It was also established for public use of fish and wildlife and their habitat, particularly waterfowl, moose, and bear hunting; viewing; photography; and general public recreation in a high quality environment.

The purpose of the Susitna Flats State Game Refuge Management Plan is to provide consistent long-range guidance to the Department of Fish and Game in managing the refuge.

The Susitna Flats State Game Refuge encompasses approximately 300,800 acres and supports spectacular spring and fall concentrations of migrating waterfowl and shorebirds. The refuge also supports several major salmon streams and productive moose and bear habitat. Susitna Refuge attracts large numbers of waterfowl hunters and sport fishermen and is the site of a commercial set net fishery for salmon.

Since creation of the refuge in 1976, the Anchorage and Matanuska-Susitna Valley populations have increased dramatically and the Point MacKenzie agricultural development has occurred adjacent to the refuge. Susitna Flats State Game Refuge has grown to be one of the most popular recreational hunting and fishing areas in the state. Many multiple use activities have been proposed for and have occurred on the refuge since its creation. In order to evaluate the compatibility of these uses with the protection of fish and wildlife, their habitats, and public use of the refuge, the Department of Fish and Game has undertaken this comprehensive refuge management planning process.

The plan presents management goals and objectives for the refuge 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 refuge. The plan will guide management of the refuge for the next ten years and will be reviewed after 5 years for necessary updates or amendments. The plan affects state lands only, not private or municipal lands. The plan does not address harvest regulations.

This document is the result of a public planning process led by the Department of Fish and Game. The plan has been developed by a planning team representing state, federal, and municipal agencies including: The Alaska Departments of Fish and Game, Natural

Resources, and Environmental Conservation; Matanuska-Susitna Borough; Kenai Peninsula Borough; and the United States Fish and Wildlife Service. At the outset of the public planning process public meetings were held in Wasilla, Anchorage, and Soldotna to explain the planning process and solicit citizens' issues, interests, and concerns for the refuge. The results of these meetings were used by the planning team to identify a list of issues to be addressed in the plan. At the same time resource information on the refuge'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.

The planning team developed refuge management goals and objectives. The team also developed alternative policies to address the identified issues. Each alternative policy was analyzed according to its ability to meet the refuge management goals and objectives. The draft plan went out for public review. Based on comments received during the public review process, final policies were developed. The goals, objectives, and policies were then adopted by the Commissioner (5 AAC 95.510). A specific regulation (5 AAC 95.515) which provides detail in implementing the plan was also adopted.

The plan is implemented by the Department of Fish and Game in several ways. A Special Areas Permit is required for any construction work, including any habitat altering activity, in a designated State Game Refuge (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. The Habitat Division will review all proposed activities for consistency with the goals, objectives, and policies outlined in this plan. Activities will be approved, conditioned, or denied based on the direction provided in this plan as well as state laws and regulations.

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

Other state, federal, and local agencies have management responsibilities on refuge lands as well. Any use, lease or disposal of resources on state land in the refuge 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 for 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 Matanuska-Susitna and Kenai Peninsula boroughs review and comment on all permit proposals within the coastal zone, including the Susitna Flats State Game Refuge.

This plan will be formally reviewed and, if appropriate, updated every ten years. Public

participation will be solicited during the update process.

## STATUTES

Alaska Statutes which pertain specifically to the establishment and management of Susitna Flats State Game Refuge are as follows:

Sec. 16.20.036. Susitna Flats State Game Refuge. (a) The following state-owned land, including tide and submerged land, and all land, including tide and submerged land, acquired in the future by the state lying within the parcels described in this subsection is established as the Susitna Flats State Game Refuge:

- (1) Township 13 North, Range 4 West, Seward Meridian Section: 6
- (2) Township 13 North, Range 5 West, Seward Meridian Sections: 1-10
- (3) Township 13 North, Range 6 West, Seward Meridian Sections: 1-18
- (4) Township 13 North, Range 7 West, Seward Meridian Sections: 1-18
- (5) Township 13 North, Range 8 West, Seward Meridian Sections: 1-24
- (6) Township 13 North, Range 9 West, Seward Meridian Sections: 1-36
- (7) Township 13 North, Range 10 West, Seward Meridian Sections: 13, 23-26, 36 (excluding uplands above the toe of the bluff)
- (8) Township 14 North, Range 4 West, Seward Meridian Sections: Lots 1-6, SE  $\frac{1}{4}$  NW  $\frac{1}{4}$ , W  $\frac{1}{2}$  NE  $\frac{1}{4}$  NW  $\frac{1}{4}$ .
- (9) Township 14 North, Range 5 West, Seward Meridian Sections: W  $\frac{1}{2}$  1, 2-11, W  $\frac{1}{2}$  12, 13-36
- (10) Township 14 North, Ranges 6-9 West, Seward Meridian Sections: All
- (11) Township 14 North, Range 10 West, Seward Meridian Sections: 12-14, 22-27, 34-36
- (12) Township 15 North, Range 5 West, Seward Meridian Sections: 3-10, 15-22, SW  $\frac{1}{4}$  26, 27-35, SW  $\frac{1}{4}$  36
- (13) Township 15 North, Range 6 West; Seward Meridian Sections: All
- (14) Township 15 North, Range 7 West, Seward Meridian Sections: 1-4, E  $\frac{1}{2}$  5, 7-36
- (15) Township 15 North, Range 8 West, Seward Meridian Sections: 1, 2, 8-36
- (16) Township 15 North, Range 9 West, Seward Meridian Sections: 23-28, 32-36
- (17) Township 16 North, Range 5 West, Seward Meridian Sections: 19-22, 27-34
- (18) Township 16 North, Range 6 West, Seward Meridian Sections: 21-28, 31-36
- (19) Township 16 North, Range 7 West, Seward Meridian Sections: 22-27, 34-36

(b) The Susitna Flats State Game Refuge is established to protect the following:

(1) fish and wildlife habitat and populations, particularly waterfowl nesting, feeding and migration areas; moose calving areas; spring and fall bear feeding areas; salmon spawning and rearing habitats;

(2) public uses of fish and wildlife and their habitat, particularly waterfowl, moose and bear hunting; viewing; photography; and general public recreation in a high quality

environment.

(c) Entry upon the Susitna Flats State Game Refuge for purposes of exploration and development of oil and gas resources shall be permitted when compatible with the purposes specified in (b) of this section; however, all existing leases shall be valid and continue in full force and effect according to their terms.

(d) Land selected by the Matanuska-Susitna Borough within the area described in (a) of this section shall be included in the Susitna Flats State Game Refuge, subject to borough approval. If the borough relinquishes the selection of the land, the selected land becomes part of the Susitna Flats State Game Refuge.

(e) The state may not acquire by eminent domain privately-owned land within state-owned land specified in (a) of this section for inclusion in the Susitna Flats State Game Refuge. The Department of Natural Resources may adopt, in accordance with the Administrative Procedure Act (AS 44.62), zoning regulations governing privately-owned land within the Susitna Flats State Game Refuge, only to the extent that these regulations may insure compatibility with the intended use of the refuge.

(f) Egress and ingress to and from private property within the parcels described in (a) of this section shall be allowed through access corridors established through agreement between the Department of Natural Resources, the Department of Fish and Game, and the private property owners involved. The establishment of a refuge under this section does not impair or alter existing rights of access to set net site leases.

(g) The establishment of a refuge under this section does not impair or alter existing rights of a borough or city to select state land under AS 29.18.190-29.18.200.

## GOALS

Activities that occur on the Susitna Flats State Game Refuge will be consistent with the following goals in accordance with the purposes for which the refuge is established (AS 16.20.020 and 16.20.036(b)):

1. Manage the refuge for the protection, preservation, and enhancement of fish and wildlife habitat and populations.
2. Manage the refuge to protect, maintain, and enhance public use of fish and wildlife and their habitat and general recreation in a high quality environment.
3. Manage multiple use activities to ensure compatibility with goals #1 and #2 of this plan.

## OBJECTIVES

All management decisions on the Susitna Flats State Game Refuge, whether affecting activities undertaken by the department, other agencies, or the public, will be in accordance with the following objectives:

### I. Fish and Wildlife Habitat and Populations.

#### Waterfowl Populations and Their Habitat

1. Maintain, protect, and where feasible enhance the quality and quantity of nesting, rearing, and staging habitat for migrant and breeding waterfowl.
2. Maintain and enhance waterfowl production.
3. Minimize harmful disturbance to nesting, rearing, and staging waterfowl.

#### Moose Populations and Their Habitat

1. Maintain, protect, and where feasible, enhance important moose winter and calving habitat.
2. Maintain natural movement corridors for moose to and from the refuge.
3. Minimize harmful disturbance of wintering/calving moose.

#### Brown and Black Bear Populations and Their Habitat

1. Protect important brown and black bear spring and fall feeding habitat.
2. Minimize harmful disturbance to brown and black bears.

#### 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.

### Nongame Populations and Their Habitat

1. Protect important nongame habitat.
2. Minimize harmful disturbance of nongame species.
3. Protect Bald Eagle nesting habitat.

### Marine Mammal Populations and Their Habitat

1. Protect important marine mammal habitat.
2. Minimize harmful disturbance of marine mammals.

### Fish Populations and Their Habitat

1. Maintain, protect, and where feasible, enhance fish habitat and populations.
2. Minimize harmful disturbance to spawning, rearing, and overwintering fish.

## II. Public Use.

### Public Use of the Refuge

1. Maintain and where appropriate enhance public access to the refuge.
2. Maintain and enhance opportunities to hunt, fish, trap, and recreate in a high quality environment.
3. Maintain and enhance opportunities to view, photograph, and study fish and wildlife and use the refuge habitat in a high quality environment.
4. Provide information to the public about the refuge when compatible with refuge goals and objectives.
5. Allow other public uses when compatible with refuge goals and objectives.

## III. Management Activities.

### Fish and Game Management Activities

1. Conduct activities necessary to achieve goals, objectives, and policies of the

Susitna Flats State Game Refuge Management Plan, as funding allows.

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 that require approval under 5 AAC 95.420 for use of the refuge on a case-by-case basis and determine compatibility with the goals and other objectives of the refuge plan. Allow compatible activities under terms and conditions consistent with protecting, preserving, and enhancing fish and wildlife habitat and populations and public use and general recreation in a high quality environment.

#### Explanation of Terms

Minimize: Minimize means to reduce harmful effects to a level that does not significantly adversely affect fish or wildlife populations or their habitat on the refuge or reduce public opportunity for successful harvest or non-consumptive use of fish and wildlife.

High quality environment: The high quality environment of the refuge refers to the natural values for which the refuge was established including diverse and productive fish and wildlife habitats, abundant fish and game populations, undisturbed open space, and scenic beauty.

Harmful disturbance: Harmful disturbance to fish or wildlife refers to any activity that displaces animals from their natural habitat or interrupts animals' seasonal activities at a frequency or duration that significantly affects refuge fish or wildlife populations. Harmful disturbance does not refer to the legal harvest of fish or wildlife.

## POLICIES

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

### Information/Education

To promote public awareness, understanding, and enjoyment of refuge resources, the department will provide a formal information/education program about the refuge including information about refuge values, rules, and recreational opportunities.

### Public Use Facilities

Where appropriate, the department will encourage the development of facilities including trails, parking areas, and other facilities necessary to accommodate public use of the refuge in a manner consistent with the character and purposes of the refuge. To ensure the protection of refuge resource values, minimize harmful disturbance to fish and wildlife, and accommodate a variety of refuge users the department will, as appropriate, establish regulations governing the use of public use facilities.

### Public Access on the Existing Beluga Road System

The department will encourage the continuing public use and maintenance of the existing Beluga Access Road System in the western portion of the refuge.

### Motorized Vehicle Use

To ensure the protection of sensitive habitats, avoid harmful disturbance to fish and wildlife, and accommodate a variety of refuge users, the department will, as appropriate:

- (A) establish ORV use corridors and seasonal and vehicle use restrictions under a general permit (5 AAC 95.770).
- (B) establish motorboat use restrictions on the refuge. The department will monitor boat use on the Little Susitna River and, if necessary, establish motorboat use restrictions consistent with upstream river management policies.
- (C) establish seasonal aircraft landing restrictions in sensitive areas on the refuge.

### Overflights

Recommended overflight restrictions for general public aviation and on-refuge projects in prime waterfowl habitat are 500 feet above ground level (AGL) for fixed wing and 1500 feet AGL for rotary wing aircraft from April 1 through October 31. Recommended overflight restrictions for on-refuge projects over swan nests are 1500 feet AGL and 1/4 mile lateral distance from May 1 through August 31. Recommended aircraft overflight restrictions for on-refuge projects over Bald Eagle nests are 500 feet AGL for fixed wing, 1500 feet AGL for rotary wing and 500 feet lateral distance from April 1 through August 31\*.

### New Permanent Roads

New permanent roads and rights-of-way may be allowed on the refuge for uses and activities that are in the overall public interest and for which there is no feasible alternative.

### Winter Roads

Private non-exclusive or public use winter roads on the refuge may be allowed where compatible with refuge goals and objectives.

### Concessions

Exclusive or non-exclusive concessions may be allowed at major public access points on the refuge where compatible with refuge management goals and objectives.

### Cabins/Tent Platforms/Duck Blinds/Commercial Facilities/Camping

To maintain public use opportunities and experiences, protect refuge resources, and preclude proprietary use of refuge land, the department will:

- (A) not allow the construction of new private or personal use cabins on the refuge.
- (B) establish a public use cabin program on the refuge using existing (unclaimed) cabins or new public use cabins on the refuge.

\*This policy is not intended to restrict landings and take-offs on the refuge for purposes of hunting, fishing, trapping, and other legitimate refuge use.

- (C) allow only commercial set net cabin leases which are essential for the purposes of operating set nets authorized under a commercial fisheries limited entry permit and a shore fisheries lease. A lease will be limited to the

minimum acreage necessary to accommodate the facility and associated uses.

- (D) allow only temporary tent platforms which will not significantly preclude existing public use of the refuge. Permanent tent platforms will not be allowed. Use does not convey any future or exclusive rights and may not exceed one season's use.
- (E) not allow permanent, semi-permanent, or commercial facilities, including commercial guide facilities, that would significantly reduce or preclude existing or future public use of the refuge unless in the larger public interest as detailed in the goals, objectives, and policies of this plan.
- (F) establish camping use restrictions where determined necessary.
- (G) allow only temporary, portable duck blinds on the refuge. Permanent duck blinds will not be allowed. Use does not convey any future or exclusive rights and may not exceed one season's use.

#### Fish and Wildlife Habitat and Population Enhancement

To maintain and improve the productivity of fish and wildlife populations on the refuge, the department will evaluate and, as appropriate, encourage implementation of fish or wildlife habitat and population improvement projects.

#### Fire Management

Fire management policy on the refuge is one of limited suppression. Wildfires will be allowed to burn unless the department specifically directs the state fire fighting forces to fight a fire on the refuge.

## Land Acquisition

To ensure protection and consistent management of fish and wildlife resources and habitats within the refuge, the department will evaluate and, where appropriate, acquire through purchase, trade or other means private lands within the refuge boundaries from willing sellers as time and money permit.

## Oil and Gas

Oil and gas exploration, development, and production activities will be allowed on the refuge under terms and conditions consistent with the goals, objectives and policies of this plan, terms and standards of 5 AAC 95, and the purpose for which the refuge was established. Terms and conditions for oil and gas activity on the refuge will be based upon existing lease conditions for oil and gas activity on the refuge.

## Hazardous Wastes

Hazardous wastes may not be stored or deposited on Susitna Flats State Game Refuge.

## Timber Harvest

The harvest of timber for commercial or personal use may be allowed only when alteration of forest habitats by these activities benefits fish, wildlife, or public use and enjoyment, and the proposed activities are compatible with the objectives of the refuge plan.

## Mining

Mining on existing claims may be allowed only in a manner and under terms and conditions consistent with the goals, objectives, and policies of this plan, terms and standards of 5 AAC 95, and the purpose for which the refuge was established. The department will recommend closure of all refuge lands except certain lands along the northern boundary of the refuge no new locatable mineral entry and new mineral leasehold operations as depicted on a map incorporated in this management plan. Refuge lands recommended for closure include all fish streams and 200 feet of land on either side of those fish streams. The department supports closure of tide and submerged lands on the refuge to offshore prospecting and closure of refuge lands to coal leasing.

### Material Extraction

Gravel extraction may be allowed in existing or new gravel pits on the refuge for use in refuge activities where there is no feasible alternative.

### Grazing

With the exception of incidental grazing of pack animals in transit across refuge lands, grazing of domestic or feral animals on the refuge will not be allowed.

### Utilities

New utilities may be allowed to cross the refuge where there is no feasible off-refuge alternative, using existing corridors wherever possible, consistent with refuge goals and objectives.

### Other Uses Defined in 5 AAC 95.420

To protect refuge habitat and fish and wildlife populations the department may allow by permit only those activities compatible with the purposes for which the refuge was established, terms and standards of 5 AAC 95, and the goals, objectives, and policies of this plan. All activities defined in 5 AAC 95.420 which are not compatible with the purpose for which the refuge was established, terms and standards of 5 AAC 95, and the goals, objectives, and policies of this plan will not be permitted.

## REGULATIONS

5 AAC 95.510 SUSITNA FLATS STATE GAME REFUGE MANAGEMENT PLAN. The goals, objectives, and policies of the Susitna Flats State Game Refuge Management Plan dated March, 1988 are adopted by reference. The plan presents management goals, objectives, and policies for the refuge and its resources which the department will use in determining whether proposed activities in the refuge are compatible with the protection of fish and wildlife, their habitats, and public use of the refuge. Under 5 AAC 95.420, a special area permit is required for certain activities occurring in a designated state game refuge. The department will review each special area permit application for consistency with the goals, objectives, and policies adopted by reference in this section. A special area permit issued for the Susitna Flats State Game Refuge will be approved, conditioned, or denied based on the criteria set out in those goals, objectives, and policies, and on the standards contained elsewhere in 5 AAC 95. (Eff. 09/15/88, Register #107 Oct 88)

Authority:	AS 16.05.020
	AS 16.05.050
	AS 16.20.020
	AS 16.20.036
	AS 16.20.060

EDITORS NOTE: Copies of the Susitna Flats State Game Refuge Management Plan are available at the Anchorage office of the Department of Fish and Game, 333 Raspberry Road, 99518-1599 and at the department's Juneau office, P.O. Box 3-2000, 99802.

5 AAC 95.515. SUSITNA FLATS STATE GAME REFUGE. The following conditions apply to activities in the Susitna Flats State Game Refuge.

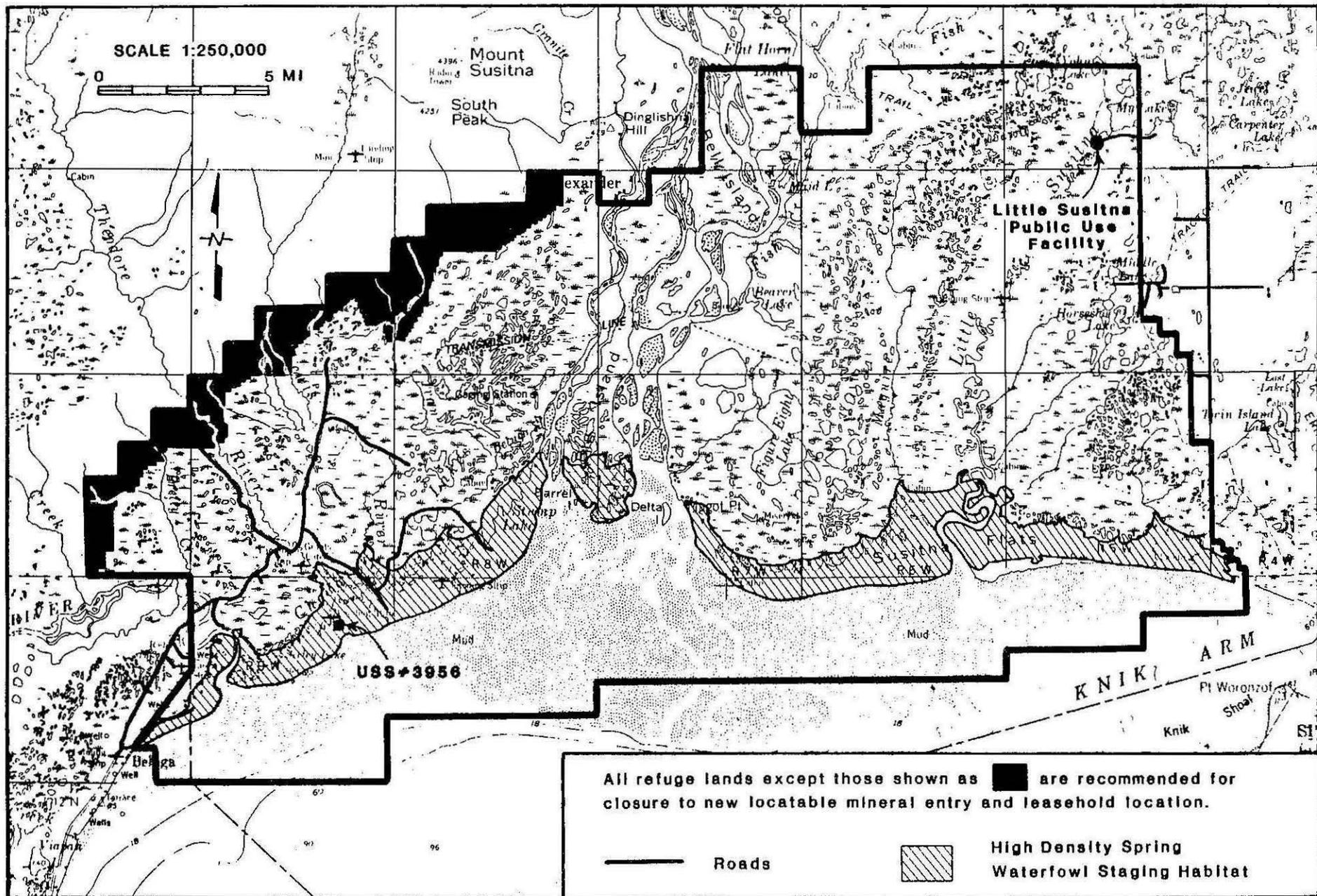
- (1) Off-road vehicles. No wheeled, tracked, or other ground-effect motorized vehicle may be used off of an authorized paved or gravel surface road or permitted winter road in the Susitna Flats State Game Refuge, except that
  - (A) the department will, in its discretion, issue a general permit under 5 AAC 95.770 for the off-road use of a wheeled, tracked, or other ground-effect motorized vehicle of less than 1,000 lbs. gross vehicle weight for the period from April 1 through November 8 within 1/8 mile of mean high tide or as designated by the department;
  - (B) the department will, in its discretion, issue a general permit under 5 AAC 95.770 for the off-road use of a wheeled, tracked, or other ground-effect motorized vehicle of less than 1,000 lbs. gross vehicle weight for the period from November 9 through March 31;
  - (C) the department will, in its discretion, issue an individual special area permit under 5 AAC 95 for the off-road use of a wheeled, tracked, or other ground-effect vehicle not covered under (A) or (B) of this paragraph if the use is consistent with 5 AAC 95.510 and fulfills a demonstrable need for which there is no feasible alternative.
- (2) Motorboats. A motorboat, including a motorized vehicle capable of carrying a person in or over the water, may be used in the Susitna Flats State Game Refuge except from May 15 through August 31 on the Theodore River upstream from private parcel USS No. 3956 depicted on a map in the March, 1988 Susitna Flats State Game Refuge Management Plan, incorporated by reference in 5 AAC 95.510, in order to prevent conflict with the sport fishery.
- (3) Aircraft. The landing or taking off of aircraft is prohibited from April 1 through May 15 in high density spring waterfowl staging habitat as depicted on a map in the March, 1988 Susitna Flats State Game Refuge Management Plan incorporated by reference in 5 AAC 95.510, except that the department will, in its discretion, issue a special area permit for the landing and taking off of an aircraft if the use is consistent with 5 AAC 95.510, and fulfills a demonstrable need for which there is no feasible alternative.

- (4) Little Susitna Public Use Facility. The following restrictions apply to the use of the Little Susitna public use facility as depicted on a map in the March, 1988 Susitna Flats State Game Refuge Management Plan incorporated by reference in 5 AAC 95.510:
- (A) No person may bring waste or refuse from outside the refuge into the public use facility for disposal, and no person may place waste or refuse in the public use facility except in a public use facility waste receptacle.
  - (B) No person may disturb, damage, deface, or remove any state property, facility, or sign.
  - (C) No person may disturb, damage, deface, or remove a natural object including a tree, plant, moss, rock, or gravel.
  - (D) From May 1 through August 25, no person may bring, or keep, a dog or other pet in the public use facility unless the dog or other pet is on a leash not exceeding nine feet in length and is under control by a person at all times. No person may have a dog or other pet in the public use facility which creates excessive noise, a public safety hazard, or unsanitary conditions. An authorized representative of the state will, in his or her discretion, seize a dog or other pet running at large in the public use facility and take appropriate action if it is mad, vicious, or harassing wildlife.
  - (E) No person may organize or conduct an assembly of more than 20 people in the public use facility unless authorized by a special area permit under 5 AAC 95.
  - (F) No person may start or maintain a fire in the public use facility except in a portable campstove or confined to a structure provided by the department for fires.
  - (G) No person may use or discharge a weapon in the public use facility.
  - (H) For the preservation of the public use facility, an authorized representative of the state will, in his or her discretion, limit the number of vehicles and persons occupying a campsite unit.
  - (I) Camping is permitted only at a developed campsite in the public use facility. If all developed campsites are occupied, a self-contained camper/trailer may

be used in another established parking area as determined by an authorized representative of the state.

- (J) From May 1 through August 25, a person using the developed campground must occupy the campsite the first night after setting up camping equipment or parking a vehicle at the campsite. A representative of the state will, in his or her discretion, impound camping equipment and any vehicle left unattended for a period of 48 hours at a campsite, unless advance arrangements have been made with an authorized representative of the state.
- (K) No person may camp in the public use facility for more than 15 consecutive days in a calendar year unless authorized by a special area permit under 5 AAC 95. If it is determined by an authorized representative of the state that the public use facility might be damaged or is subject to unusual demand, the authorized representative of the state will, in his or her discretion, limit camping to a period of less than 15 days. An authorized representative of the state will post notice of any time limit of less than 15 days in the public use facility.
- (L) No person may solicit, sell, or peddle any food or beverage, or distribute circulars, or hawk, peddle, or vend goods, wares, services, or merchandise within the public use facility except under a special area permit issued under 5 AAC 95.
- (M) Users of the public use facility shall comply with all traffic control signs in the public use facility.
- (N) An authorized representative of the state will, in his or her discretion, establish and post campground rules to limit certain activities, or hours of activity, in the public use facility for the purpose of preserving the public peace, safety, comfort, and convenience. (Eff. 09/15/88, Register #107 Oct 88).

Authority: AS 16.05.020  
AS 16.05.050  
AS 16.20.020  
AS 16.20.036  
AS 16.20.060



**Susitna Flats State Game Refuge Management Plan**

28

27

T 16N R 5W

Section Line



Undeveloped Road

MY CREEK

MANAGEMENT ZONE

Bluff Edge

Developed Road

DEVELOPMENT ZONE  
200' from center line of road or 200' from edge of any parking lot or H.C. trail (Bluff edge north side)

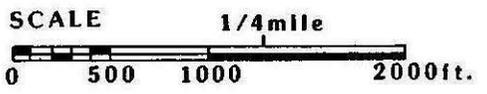
LITTLE SUSITNA RIVER

Top of Bluff

MANAGEMENT ZONE

Undeveloped Trail

Susitna Flats State Game Refuge Boundary



# Little Susitna Public Use Facility

Section Line

33

34

## IMPLEMENTATION

The Susitna Flats State Game Refuge 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 on the refuge.

Special Area Permits. A special area permit is required for any construction work, including any habitat altering activity, in Susitna Flats State Game Refuge. 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 Susitna Flats State Game Refuge on a regular basis and provide on-the-ground enforcement of harvest regulations, refuge 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 refuge. This operational management plan will detail implementation of the policies adopted in this plan and will provide details on the projects, their schedules, and budgets necessary for management of the refuge.

Other Agencies' Actions. It is anticipated that this document will be used by other state, federal, and local decision makers in planning for and making decisions under their respective statutory authorities regarding lands within Susitna Flats State Game Refuge.

# **APPENDIX**

**SUSITNA FLATS STATE GAME REFUGE**  
**RESOURCE INVENTORY**

**RESOURCE INVENTORY  
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## INTRODUCTION

Susitna Flats is an expansive coastal lowland on the northwest side of Cook Inlet, extending westerly approximately 35 miles from Point MacKenzie to just east of the Beluga River. The refuge encompasses approximately 301,947 acres of which about 22 percent is tidal, 11 percent is occasionally flooded salt marsh and meadow, and 67 percent is a combination of lakes, bogs, low shrub and mixed lowland forest. The Susitna River, 24 miles west of Anchorage, divides the refuge in half. The east side of Susitna Flats is transversed by the Little Susitna River; on the west side the Ivan, Lewis, Theodore, and Beluga rivers cross the refuge.

## HISTORY

Archaeological evidence indicates that the Susitna Flats has been inhabited for an extensive period of time. It is believed that between 1500 and 2000 years ago, Athabascan Indians called Dena'ina (Tanaina) established themselves on the Susitna River drainage in seasonal hunting, fishing, trapping, and trading camps.

It is from the Tanaina, specifically the Upper Cook Inlet dialect, that the names of many of the geographical features within the area originate. There are several sites of possible prehistoric significance within the refuge area. Pit caches have been found at the Little Susitna River access site (Reger and Shaw, 1986). Two other sites are recorded in the Alaska Heritage Resource Survey; Alexander Village (TYO-013) and Horseshoe Caches (TYO-035). Today all that remains of the old Alexander Creek Village are pits on the west bank of Alexander Creek at the confluence with the Susitna River; a house depression with associated artifacts; and a graveyard. The site has been disturbed by some private building and river erosion. Horseshoe Caches is located on the west side of the creek that drains Horseshoe Lake into the Little Susitna River. Five cache pits are located at the outlet on a terrace three meters above the lake level. The pits measure 1.5 meters across and 1.0 meters deep.

Captain James Cook, with ships Discovery and Resolution, sent William Bligh, master of the Resolution, to scout Knik Arm (1776-1780). Captain George Vancouver explored the Alaskan coast in 1794 and it is his expedition that is credited with the naming of nearby Point MacKenzie (Carberry, 1979).

In 1818 the Russian explorer Vasili Malakov came to the Susitna River. In 1834 his son, Peter Malakov, explored the river and was the first to report the name Sushitna or the Russian "Reka Sushitna" (Susitna River), reported to originate from the Tanaina word "Sasutna'," meaning "sandy river." Over the next half century Russian explorers and trappers utilized the Susitna and Beluga rivers, with the report of the first permanent trading post being established in the Tyonek-Beluga region in the 1870's.

U.S. sponsored surveys occurred at the turn of the century, spurred by the basin's mineral resources. Two expeditions, Lt. H. G. Learnard under the command of Edward Forbes Glenn and George Eldridge, a geologist with the U.S.G.S., reported the Tanaina Indian Village of Alexander.

In 1909, the Alaska Commercial Company founded several new trading posts, one near the mouth of the Beluga River. They transferred their store from Tyonek, making Beluga their new "trans-shipment point." Alfred Brooks confirmed the use of the Beluga post in his 1911 report (Bacon, 1983). Also c. 1910-1911, the Iditarod Trail was surveyed and blazed by W. L. Goodwin by order of the Alaska Road Commission. This opened the supply and mail route from the ports of Seward and Knik to Nome.

During World War I, the Beluga Whaling Company harvested whales in the Upper Cook Inlet and also salted salmon at the mouth of the Beluga River (Bacon, 1983).

In 1927, the Alaska Road Commission, while on trail reconnaissance from Nancy to Tyonek, noted two Alaska Commercial Company warehouses from c. 1909 (Bacon, 1983).

"Beluga, mile 54, has two large buildings used as a trading post by the old A. C. Co., but now deserted. It is situated near the mouth of the Beluga River, and the tide water extends above the station a distance of approximately two miles."

The growth of Anchorage and the advent of plane travel in the 1930's reduced resident and seasonal populations in the vicinity of Susitna Flats and use of trails across the flats.

Recognition of the importance of Susitna Flats to waterfowl occurred early in statehood. In 1969, the Alaska Department of Fish and Game recommended that the Susitna Flats be classified and held in trust as a waterfowl recreation management unit.

In 1971, the flats received further attention by the state and Matanuska-Susitna Borough when a cooperative agreement was implemented which provided for the management of Susitna Flats.

In 1976, the state legislature created the Susitna Flats State Game Refuge for the "protection of

- 1) fish and wildlife habitat and populations, particularly waterfowl nesting, feeding and migration areas; moose calving areas; spring and fall bear feeding areas; salmon spawning and rearing habitats; and
- 2) public uses of fish and wildlife and their habitats, particularly waterfowl, moose and bear hunting; viewing; photography; and general public recreation

in a high quality environment."

## PHYSICAL ENVIRONMENT

### Climate

The mean annual average temperature for both Anchorage and Beluga, the closest weather stations, is just over 35°F. Temperatures range from a record high of 85°F and 84°F to a record low of -34°F and -40°F for Anchorage and Beluga respectively. Local temperatures are moderated by Cook Inlet and the surrounding mountains which prevent extreme variations associated with continental weather found in interior Alaska. September is the wettest month, averaging over 2 inches of rainfall in Anchorage and over 5 inches of rainfall in Beluga. May, the driest month, averages less than one inch in both locations. Maximum snow accumulation occurs November through March, averaging between 8 and 18 inches per month. Spring thawing usually begins in April, and freezeup occurs in October. All rivers are usually iced over during the coldest months of winter.

### Soils

Soils descriptions are a synopsis of the Soil Survey of Susitna Valley Area, Alaska (Schoephorster and Hinton, 1973). Soils of the Susitna Flats fall into three associations:

- \* Nancy-Delyndia = Dominantly nearly level to steep, well-drained and somewhat excessively drained silt loams that are moderately deep and shallow over sand or gravelly sand on uplands.
- \* Clunie-Tidal Marsh = Dominantly nearly level, very poorly drained, fibrous peats and poorly drained, clayey sediments on tidal plains;
- \* Salamotof-Jacobson = Dominantly nearly level, very poorly drained fibrous peats in muskegs; and nearly level, very poorly drained, very stony silt loams along the edges of muskegs.

In all cases the soils that developed are a reflection of the origins of the parent material which is basically glacial or fluvial. The Nancy series is a silt loam over very gravelly glacial drift or fine sand. The Delyndia series developed in a silt loam overlying a deep fine sand. Clunie soils result from a buildup of woody vegetation on poorly drained sites typical of tidal plains where accumulation of plant material greatly exceeds decomposition. Tidal Marsh soils are a direct result of silt deposition from both river and tidal flooding. The Salamotof series is another peat soil developing in very poorly drained sites. Sphagnum moss is the primary contributor of plant material to these soils which are typically inland from the tidal plain. The Jacobsen series is another soil associated with nearly level poorly drained sites in stony silt-loam alluvium and colluvium. All of these soils are associated

with site conditions and vegetation best suited for wildlife habitat (Schoephorster and Hinton, 1973).

### Glaciation/Geology

Historically, this area was periodically covered by advancing and retreating glaciers. Consequently, much of the area is covered by a layer of glacial material that has subsequently been modified by erosion, flooding, and earthquake activity. Major rivers crossing the refuge continue to bring millions of tons of glacial silt into Cook Inlet.

The Susitna River is the largest system draining into Knik Arm. This system discharges millions of tons of glacial silt annually into Cook Inlet. As a result of the second highest tides in North America, much of this silt is deposited near the mouth of the river creating extensive mud flats that have become colonized by a variety of vegetation. Old stream channels and variations in silt accumulation have also created a large network of shallow ponds and sloughs ideal for waterfowl.

The 1964 earthquake raised portions of the refuge several feet which has accelerated tidal erosion and the subsequent draining of several ponds and lakes.

### Hydrology

Water levels in the ponds and lakes of the refuge are maintained by a combination of poor drainage, periodic flooding by high river levels and high tides, snow melt and rainfall.

## BIOLOGICAL RESOURCES

### Vegetation

The Susitna Flats State Game Refuge is composed of tide flats, bogs, lakes, ponds, creek levees, sloughs, and hardwood and softwood forests. Trees occur in pure and mixed stands of cottonwood (*Populus balsamifera*), birch (*Betula* spp.), and spruce (*Picea* spp.) on better drained sites. The remaining features can be grouped into two land form types that are predominant on the refuge: shrub-moss-bog and the natural levee-creek-slough-marsh complex. These land forms are predominated by herbaceous and shrubby vegetation.

The U.S. Department of Agriculture, Soil Conservation Service in cooperation with the State of Alaska mapped the land cover types of the Susitna Basin, including Susitna Flats State Game Refuge. That information can be found on the accompanying resource inventory vegetation map.

Sellers (1979) has classified non-forest vegetative communities into five major groups:

Tidal Flats extend towards the inlet from about mean high tideline and consists of exposed mud flats vegetated only by algae.

Puccinellia-Triglochin community is located just inland from mean high tide and is dominated by patches of creeping alkali grass (*Puccinellia phryganodes*), clumps of alkali grass (*Puccinellia grandis*), and seaside arrow-grass (*Triglochin maritimum*) interspersed with patches of mud often colonized by slender glasswort (*Salicornia europaea*), spurry (*Spergularia canadensis*), sea blight (*Suaeda depressa*), and algae. Other important plants in these communities are goose tongue (*Plantago maritima*), Pacific silverweed (*Potentilla egedii grandis*), and sea milkwort (*Glaux maritima*). Recently exposed mud, such as where ponds were drained by tidal guts, often supports nearly pure patches of creeping alkali grass.

Ramenski Sedge-Shallow Pond Community begins further inland where Ramenski sedge (*Carex Ramenskii*) gains dominance over the Puccinellia-Triglochin community. Clumps of seaside arrow-grass are often scattered in the Ramenski Sedge-Shallow Pond Community. Ponds within this habitat are shallow (generally less than two feet) with sharply defined shorelines, little emergent vegetation and usually unvegetated bottoms. Near the interface with the Marsh community, ponds are deeper and have four-leaf mare's tail (*Hippuris tetraphylla*) and may support pondweed (*Potamogeton filiformis*). Slightly elevated ground, such as banks of tidal guts and edges of oxbows, are vegetated by grass-forb communities featuring beach rye (*Elymus arenarius mollis*), bluejoint (*Calamagrostis canadensis*), blue grass (*Poa eminens*), red fescue (*Festuca rubra*), Pacific silverweed, Arctic daisy (*Chrysanthemum arcticum*), wild iris (*Iris setosa*), squirrel-tail barley (*Hordeum*

jubatum), lupine (*Lupinus arcticus*), beach lovage (*Ligusticum scoticum*), wild celery (*Angelica lucida*), shooting star (*Dodecatheon pulchellum*), and *Saussurea nuda*.

Marsh Community is a diverse interspersed of wetland, wet meadow and grass forb communities. Waterbodies vary from shallow ponds to small lakes, and are characterized by indistinct shorelines with a fringe of emergent vegetation. Many of the smaller wetlands are nearly covered by emergents, the most prevalent being sedges (*Carex* spp.), creeping spike rush (*Scripus paludosus*), four-leaved mare's tail and bulrush (*Scripus validus*). Many ponds support submergents including pondweeds (*Potamogeton* spp.), horned pondweed (*Zanichellia palustris*), water milfoil (*Myriophyllum spicatum*), and wigeon grass (*Ruppia spiralis*). Wet meadows are inundated by high tides (+32 feet) several times during the year. Plants growing there (sedges, silverweed, goose tongue, and seaside arrow-grass) are tolerant of saturated alkaline soil conditions. Drier sites have grass and forb species as described for the Ramenski Sedge-Shallow Pond Community.

Shrub-Bog Community is the least affected by tidal flooding and covers the largest area on Susitna Flats State Game Refuge. It extends inland from the marsh community to the point where elevation and drainage allow upland plants to grow. Ponds within this habitat are generally deeper and have distinct, though often floating, shorelines and little aquatic vegetation. The plants include sweet gale (*Myrica gale*), dwarf birch (*Betula nana*), Arctic dock (*Rumex arcticus*), water hemlock (*Cicuta douglasii*), cotton grass (*Eriophorum* spp.), bluejoint (*Calamagrostis canadensis*), marsh five finger (*Potentilla palustris*), and buckbean (*Menyanthes trifoliata*). Slightly drier sites have willow (*Salix* spp.), black spruce (*Picea mariana*), labrador tea (*Ledum palustre*), and bog laurel (*Kalmia polifolia*).

### Succession

As a result of millions of tons of silt being deposited annually, the mud flats of the refuge are extending seaward over time. These newly created lands provide seed beds for those species capable of tolerating the extremes in edaphic conditions (Vince, 1981). Soil conditions become more moderate and stabilize further inland with less frequent tidal flooding. Consequently, vegetation occurs in bands parallel to the shoreline with the less tolerant species further inland. Tidal action and a raising of the area following the 1964 earthquake have resulted in many ponds and lakes draining. A general drying of the area will allow the advance of associated species.

### Faunal Diversity

The diverse vegetative communities found on the refuge combined with productive estuarine, riverine, wetland and upland habitat types helps to support a diversity of fauna. A large number of birds, mammals, and fish species are all present within the boundaries of the refuge.

### Amphibians

The only amphibian recorded for this part of the state is the wood frog (*Rana sylvatica*) (Ritchie et al., 1981).

### Birds

Susitna Flats State Game Refuge has a wide variety of habitats from the salt marshes along the coast to the riparian habitats along the major rivers, and the birch and spruce forests on higher ground. These habitats support a broad spectrum of bird species (Table 1). The accompanying bird resource maps depict distribution and seasonal use patterns on the refuge.

The most noteworthy bird group on the refuge is waterfowl. Spring migration of ducks, geese, and swans number well in excess of one hundred thousand birds. Sandhill cranes (*Grus canadensis*) and many species of shorebirds are also common migrants through the refuge.

Waterfowl - Distribution and Abundance. Cook Inlet intertidal wetlands are particularly important to spring migrating geese and swans. Peak use by geese and swans occurs between 18 April and 10 May and exceeds 100,000 birds (Butler and Gill, 1985; Butler and Gill, 1987). Upwards of several hundred thousand ducks use the coastal marshes of upper Cook Inlet. A large percentage of ducks use the Susitna Flats as a feeding and resting area during spring and fall migration to and from western and interior nesting areas. Timing of peak spring use by ducks is consistent annually with geese, although ducks generally begin to arrive a week or two earlier. Fall use is more dispersed than spring, and use of the flats by all waterfowl may begin to increase in late August and remain high through early October. Major staging areas are depicted in the accompanying Resource Inventory Maps.

Table 1. Bird and Vegetation Associations in the Susitna Flats Area (ADF&G, 1984)

Bird Species	Coniferous		Mixed	Deciduous		Wetlands	Tidelands Marshes
	Forest	Forest	Forest	Shrubland	Grassland		
Great blue heron	x		x				x
Goshawk	x		x	x			
Sharp shinned hawk	x		x	x	x		x
Bald eagle	x		x				
Merlin	x		x	x	x		x
Spruce grouse	x		x	x	x		x
Willow ptarmigan	x		x	x	x		x
Rock ptarmigan	x		x		x		x
Great horned owl	x		x	x			
Northern hawk owl	x		x	x			
Boreal owl	x		x				
Rufous hummingbird	x		x	x	x		x
Hairy woodpecker	x		x	x			
Downy woodpecker	x		x	x	x		x
Olive-sided flycatcher	x		x				
Tree swallow	x		x	x			
Gray jay	x		x	x			
Steller's jay	x		x	x			
Black-billed magpie	x		x	x	x		x
Common raven	x		x	x	x		x
Black-capped chickadee	x		x	x	x		x
Boreal chickadee	x		x	x			
Red breasted nuthatch	x		x				
Brown creeper	x		x	x			
Winter wren	x		x	x	x		x
American robin	x		x	x	x		x
Varied thrush	x		x	x	x		x
Hermit thrush	x		x	x	x		x
Swainson's thrush	x		x	x	x		x
Gray-cheeked thrush	x		x	x	x		x
Golden-crowned kinglet	x		x				
Ruby-crowned kinglet	x		x	x	x		x
Bohemian waxwing	x		x		x		x
Orange-crowned warbler	x		x	x	x		x
Yellow-rumped warbler	x		x	x	x		x
Black-poll warbler	x		x	x	x		x
Wilson's warbler	x		x	x	x		x
Pine grosbeak	x		x	x	x		x
Common redpoll	x		x	x	x		x
Pine siskin	x		x	x	x		x
White-winged crossbill	x		x				
Savannah sparrow	x		x	x			

Table 1. Bird and Vegetation Associations in the Susitna Flats Area (ADF&G, 1984) (cont.)

Bird Species	Coniferous		Mixed	Deciduous	Grassland	Wetlands	Tidelands Marshes
	Forest	Forest	Forest	Shrubland			
Dark-eyed junco	x		x		x	x	
White-crowned sparrow	x		x	x	x	x	
Song sparrow	x		x		x	x	
Townsend's warbler				x			
Northern waterthrush				x			
Rosy finch				x			
Rough-legged hawk					x	x	
Northern harrier					x	x	x
Short-eared owl					x	x	
Alder flycatcher					x	x	
Yellow warbler					x	x	
Tree sparrow					x	x	
Golden-crowned sparrow					x	x	
Fox sparrow					x	x	
Lincoln's sparrow					x	x	
Common loon							x
Pacific loon							x
Red throated loon							x
Red necked grebe							x
Horned grebe							x
Tundra swan							x
Trumpeter swan							x
Canada goose							x
Brant							x
Greater white- fronted goose							x
Tule white- fronted goose							x
Snow goose							x
Mallard							x
Gadwall							x
Northern pintail							x
Green winged teal							x
Blue winged teal							x
Northern Shoveler							x
Eurasian wigeon							x
American wigeon							x
Canvasback							x
Redhead							x
Ring-necked duck							x
Bufflehead							x
Greater scaup							x

Table 1. Bird and Vegetation Associations in the Susitna Flats Area (ADF&G, 1984)

Bird Species	Coniferous		Mixed	Deciduous	Grassland	Wetlands	Tidelands Marshes
	Forest	Forest	Forest	Shrubland			
Lesser scaup							X
Common goldeneye							X
Barrow's goldeneye							X
Oldsquaw							X
Harlequin duck							X
White-winged scoter							X
Surf scoter							X
Black scoter							X
Hooded merganser							X
Common merganser							X
Red-breasted merganser							X
Sandhill crane							X
Semipalmated plover							X
Lesser golden plover							X
Black-bellied plover							X
Hudsonian godwit							X
Whimbrel							X
Greater yellowlegs							X
Lesser yellowlegs							X
Solitary sandpiper							X
Spotted sandpiper							X
Wandering tattler							X
Ruddy turnstone							X
Red-necked phalarope							X
Common snipe							X
Short-billed dowitcher							X
Long-billed dowitcher							X
Surfbird							X
Western sandpiper							X
Least sandpiper							X
Pectoral sandpiper							X
Dunlin							X
Glaucous-winged gull							X
Herring gull							X
Mew gull							X
Bonaparte's gull							X
Arctic tern							X

Cook Inlet marshes also serve as staging areas for drake and nonbreeding ducks and non- or failed-breeding geese prior to migrating to molting areas in late June or early July. Little information is available on the importance of the Susitna Flats to pre-molting or molting birds.

One subspecies of Canada geese, the cackling Canada goose (*Branta canadensis minima*), which nests on the Yukon- Kuskokwim Delta in western Alaska and uses upper Cook Inlet coastal wetlands exclusively during spring migration, has experienced dramatic population declines in recent years. From 1965 to 1984 the population dropped from over 350,000 to about 30,000. The population had increased to about 80,000 by 1987. Spring cackler staging on the Susitna Flats is of short duration but high intensity, generally peaking between 30 April and 10 May (Timm, 1982; T. Rothe, pers. comm.).

Having large, undisturbed resting and feeding areas along the migration route are a key element to ensure the continued recovery of the population and maintain higher population levels. Arctic nesting geese depend heavily upon stored energy reserves (lipids) for egg production and incubation. Accumulation of reserves along the migration path is essential, so when arriving on the nesting grounds prior to spring thaw, nesting can be initiated before new food supplies become abundant (Raveling, 1979).

Large numbers of two other subspecies of Canada geese, the Taverner's Canada Goose (*B. c. Taverneri*) and the lesser Canada goose (*B. c. parvipes*) use the Susitna Flats as a feeding and resting area during spring and fall migration.

Snow geese (*Chen caerulescens*) are also abundant in upper Cook Inlet during spring migration. Large numbers of snow geese arrive in Cook Inlet usually by mid-April and numbers may continually increase until about 10 May. Butler and Gill (1985) counted nearly 34,000 snow geese in upper Cook Inlet on 2-3 May 1985 and over 32,000 on 9-10 May 1985. Almost 21,000 snow geese were counted on the Susitna Flats on 9-10 May.

Snow geese migrating through Cook Inlet nest on Wrangel Island off the coast of Siberia, where the population has ranged from 40,000 to 100,000 birds since 1970. A large proportion of, if not the entire population, may pass through Cook Inlet in the spring. Even more than with Canada geese, Cook Inlet coastal marsh vegetation provides nutrients that replenish lipid reserves that snow geese require for successful nesting in the arctic.

Tundra swans (*Cygnus columbianus*) and trumpeter swans (*C. buccinator*) are common migrants on the Susitna Flats. Butler and Gill (1985) observed large numbers of swans in upper Cook Inlet from 25 April to 10 May. On 25 April there were over 5,500 swans on the Susitna Flats. Numbers declined through 10 May when 1,079 swans were counted. The majority of swans using the Susitna Flats are tundra swans, headed for nesting areas in the Yukon-Kuskokwim Delta and Alaska Peninsula. Most trumpeter swans using the refuge probably nest in southcentral Alaska. At least five pairs are known to have nested on the

refuge in recent years (see accompanying Resource Inventory Map). Swans also use the refuge as a fall staging area from mid-September to early October prior to migrating south.

White-fronted geese using upper Cook Inlet habitats are relatively low in numbers compared with other species of geese, however timing of use is similar to other geese (Butler and Gill, 1987). Campbell (1984) reported about 4,500 Pacific white-fronts (*Anser albifrons frontalis*) passing through Cook Inlet on 2 and 3 May 1983. Butler and Gill (1985; 1987) reported about 2,000 white-fronts in 1985 and about 1,000 in 1986 using upper Cook Inlet marshes with peak concentrations on 2-3 May and 24-25 April respectively. The authors reported 205 white-fronts on the Susitna Flats on 9-10 May 1985. Pacific white-fronted geese use the Susitna Flats to feed and rest during migration, primarily in the spring.

Tule white-fronted geese (*A. a. gambelli*) nest, rear broods, and molt on west side Cook Inlet marshes including the Susitna Flats. The entire population of this subspecies numbers about 5,000 birds. Tule white-fronted geese arrive in Cook Inlet as early as mid-April and have usually departed by early September. Relatively little is known about the nesting habits of this subspecies. Broods have been observed in the areas of Seely Lake, Lewis River Slough, and the mouth of the Little Susitna River (B. Campbell, pers. comm.) (See accompanying Resource Inventory Maps).

Mallards (*Anas platyrhynchos*), northern pintails (*A. acuta*), American wigeon (*A. americana*), green-winged teal (*A. crecca*), and northern shovelers (*A. clypeata*), are the most abundant species of ducks using the Susitna Flats during migration.

Major waterfowl nesting populations on the refuge are mallards, northern pintails, American wigeon, green-winged teal, northern shovelers, greater scaup (*Aythya marila*) and lesser Canada geese. Densities of dabbling ducks during the nesting period ranged from 32.6 to 95.4 birds per square mile from 1975 through 1978 (Timm, 1978). Diving ducks breeding bird densities ranged from 2.2 to 12.7 birds per square mile for the same period. The accompanying Resource Inventory Maps depict breeding waterfowl concentration areas. No data on the nesting densities of Canada geese are available. Sellers (1979) counted 149 adults and 411 goslings on the refuge on 19 July.

Mallards and pintails begin nesting by mid-April. The majority of nests hatch by 5 June with some nests not hatching until 1 July. Green-winged teal nests hatch throughout June and wigeon and shoveler hatch peaks the last half of June. Broods of greater scaup hatch the first week of July (Sellers, 1979).

Habitat use during spring migration is influenced by the pattern of ice and snow melt in coastal areas. The first habitat exposed is at the mouths of riverine and tidal drainages and in those areas most frequently exposed to tidal flooding. Breakup proceeds inland and as new areas open waterfowl spread out, becoming less concentrated.

Bird use thus proceeds inland from the Puccinellia-Triglochin Community to the Ramenski Sedge-Shallow Pond Community to the Marsh Community. The Shrub-Bog Community receives little use by waterfowl. As the coastal wetlands become snow and ice free throughout the various habitat types, species segregate by preferred habitat.

In spring, migrant snow geese, which often feed heavily on the rhizomes of sedges, especially Carex lyngbyaei, and the rootstocks of Triglochin palustris, prefer the outermost habitats landward of the Tidal Flats. Canada geese, which graze more than snow geese, prefer the Puccinellia-Triglochin Community along the coast, but also use the Ramenski Sedge-Shallow Pond Community and to a lesser extent the Marsh Community. White-fronts and swans prefer the Marsh Community. Ducks, during migration, are scattered throughout all communities, but are most abundant in the Ramenski Sedge-Shallow Pond Community, the Marsh Community, and the Tidal Flats, where intertidal invertebrates constitute an important food source. During low tide the Tidal Flats are used by ducks and geese for resting.

Sellers (1979) evaluated use of habitat by the following bird groups:

Ducks - The density of adult dabbling ducks was consistently highest in the marsh community, ranging from 300 birds per square mile in July to over 1,100 per square mile during the fall migration in August. For three days following tidal flooding mallards and pintails heavily used the Puccinellia-Triglochin Community which was covered by two to three inches of water. After flood waters receded duck use of this habitat diminished drastically. Use of tidal flats, particularly by mallards and American wigeon, increased in late August. During the early part of hunting season (September and early October), ducks concentrated on these mud flats where they found food (mollusks and algae) and security from hunters.

Marsh and Ramenski Sedge-Shallow Pond Communities received most brood use in July (46 and 23 broods per square mile, respectively).

Northern Pintail adults and broods used the shallow ponds in the Ramenski Sedge Community throughout the summer more than any other species, although green-winged teal did show some preference for this habitat in August. Brood use of the Ramenski Sedge-Shallow Pond type was somewhat surprising because these wetlands offer little escape cover. Food (Chironomid larvae, other invertebrates, and aquatic plants) did not appear more abundant than in Marsh ponds.

Diving ducks, mergansers, loons, and grebes used deeper waterbodies within Marsh and, to a lesser extent, Shrub-Bog Communities.

Geese - Canada geese used all habitats from Marsh to Tidal Flats during June. Aerial surveys suggest that Marsh or Ramenski Sedge-Shallow Pond Communities are important during the middle of summer (July, early August). By late August, Canada geese were concentrated on the tide flats, and used the Puccinellia-Triglochin and Marsh habitat only moderately.

Tule white-fronted goose nesting or brood rearing habitat was not evaluated by Sellers (1979). Broods located by B. Campbell and D. Timm (pers. comm.) were found in the Marsh Community and at the interface of the Marsh Community with the Shrub-Bog Community and the Ramenski Sedge-Shallow Pond Community.

Shorebirds - Shorebirds are known to frequent the refuge both during migration and as nesting residents. Concentrations in lower Cook Inlet (Arneson, 1978), suggest more of an outer coastal route or southern route for the numerous shorebirds which utilize the Copper River Delta (Isleib and Kessel 1973; Senner 1977). Primary shorebird species represented on the refuge are breeders that winter along coastal-marshes as far south as the tip of South America (Hall 1960).

Yellowlegs (Tringa melanoleucus) were primarily associated with Marsh in June, with Shrub-Bog Community habitat used secondarily. Later in the summer, use of Tidal Flats and Ramenski Sedge-Shallow Pond Community increased and use of Shrub-Bog Community areas dropped.

Yellowlegs, common snipe (Gallinago gallinago), and red-necked phalarope (Phalaropus lobatus) are common in spring and summer and likely to breed throughout the refuge. Short-billed dowitchers (Limnodromus griseus) and least sandpipers (Calidris minutilla) may also be summer residents and breeders (Sellers 1979; Bakus et al. 1979). In summer species such as snipe feed on dipterans (aquatic fly larvae) and other bog invertebrates (Tuck, 1972).

Unlike other shorebirds, sandhill cranes and common snipe preferred the Shrub-Bog Community. The heaviest use of this habitat by sandhill cranes occurred in August, while snipe shifted from this habitat to the Ramenski Sedge-Shallow Pond Community in August.

Short-billed dowitchers preferred Marsh habitat in June, but later in the summer, as the water levels dropped, they switched to feeding on the mud bottoms of shallow ponds in the Ramenski Sedge-Shallow Pond Community. When these ponds were full, in early June, a sharp edge was formed where thick Ramenski sedge cover

abutted water several inches deep. Perhaps this sharp shoreline gradient discouraged use by short-billed dowitchers which prefer to wade and feed on exposed mud or in very shallow water.

Hudsonian godwits (Limosa haemastica) were most abundant in July and used a combination of Marsh, Ramenski Sedge-Shallow Pond Community, and Puccinellia-Triglochin habitats. Like dowitchers, Hudsonian godwits concentrated on exposed mud flats adjacent to shallow water. In July, only Hudsonian godwits made significant use of tidal sheet water on the Puccinellia-Triglochin habitats. Least sandpipers and semipalmated sandpipers (Calidris pusilla) were abundant during July on tidal mud flats and on exposed mud fringes of drying wetlands.

Gulls - Nysewander and Trapp (1985) indicate that colonies of mew gulls (Larus canus), herring gulls (Larus argentatus) and glaucous-winged gulls (Larus glaucescens) are common on the refuge. Many of the gulls found nesting on the refuge are intergrades between glaucous-winged and herring gulls. There is some concern that these gulls may reduce waterfowl production via predation on nests and young.

Raptors - A wide variety of raptors use the refuge during the year. Migrants and occasional visitors include: golden eagle (Aquila chrysaetos), osprey (Pandion haliaetus), red-tailed hawk (Buteo jamaicensis), rough-legged hawk (Buteo lagopus), and merlins (Falco columbarius). Nesting raptors probably include goshawks (Accipiter gentilis), red-tailed hawks, marsh hawks (Circus cyaneus), osprey, great-horned owls (Bubo virginianus), and hawk owls (Surnia ulula). Bald eagles (Haliaeetus leucocephalus) are a common nesting raptor on the refuge. Nest sites are typically found along the channels of major rivers including the Susitna and Theodore rivers where access to spawning eulachon and salmon is assured (Modafferi, 1986).

Other Avifauna - Spruce grouse (Dendragapus canadensis) are resident in the coniferous forests of the refuge. A wide variety of passerines can be found seasonally on the refuge. Ravens are common winter residents.

## Mammals

The presence of a wide variety of habitats provides niches for a wide variety of mammals. The accompanying Resource Inventory Mammal Map depicts distribution and seasonal use patterns.

Moose (*Alces alces*) are found throughout the refuge. In fact some of Alaska's highest density moose populations occur in the Susitna River valley. Suitable moose habitat includes birch, aspen, cottonwood and white spruce woodlands and forests, riparian alder-willow shrublands, and sphagnum-shrub bogs. Moose winter concentrations occur along river and stream valleys, including the Susitna River floodplain and the lower, timbered portions of the Theodore and Lewis rivers. In excess of 100 moose winter along the Susitna River. Within the refuge an estimated several hundred moose winter along the Theodore and Lewis rivers where mature forest stands with dense canopies provide cover for escape, relief from deep snow conditions, and perhaps protection from wind. Moose calving takes place in lowland bogs beginning in late May and extending through June. Wet marshy lowlands consisting of open areas interspersed with dense stands of shrubs and trees are preferred calving grounds. The Little Susitna River flats and areas along the Little Susitna River are important moose calving areas on the refuge.

The refuge also provides important cover for moose. In summer moose feed in open areas and utilize the bordering shrub and forest areas for cover. Moose usually bed down near cover.

Both black bears (*Ursus americanus*) and brown bears (*Ursus horribilis arctos*) are common on the refuge. The grass flats and sedge meadows west of Susitna River are important spring feeding areas for brown bear. Known brown bear concentration areas occur along the Lewis and Theodore rivers in the summer during salmon spawning season. Black bears are usually limited to forested areas. Black bears prefer open forests and mixed habitat types composed of fruit-bearing shrubs and herbs, lush grasses, and succulent forbes. Salmon are often utilized heavily during salmon spawning season, and berries are the most important food item in late summer and fall.

Furbearers are also abundant on the refuge. Muskrats (*Ondatra zibethicus*), beaver (*Castor canadensis*), river otter (*Lutra canadensis*), mink (*Mustela vison*), least weasel (*Mustela nivalis*), ermine (*Mustela erminea*), wolverine (*Gulo gulo*), coyote (*Canus latrans*), wolf (*Canus lupus*), lynx (*Lynx canadensis*), red fox (*Vulpes vulpes*), snowshoe hare (*Lepus americanus*), marten (*Martes americana*), red squirrel (*Tamiasciurus hudsonicus*), and northern flying squirrel (*Glaucomys sabrinus*) are all resident on the refuge.

Muskrat, beaver, and river otter are closely associated with freshwater aquatic habitats. The most productive beaver habitat is characterized by a dependable water supply with little fluctuation in stream flow and by willow, aspen, cottonwood, or birch vegetation. Muskrat favor shallow ponds interspersed with wetland vegetation. River otter often can be found

hunting and travelling along marine, lake or river shorelines, feeding on a variety of fish, invertebrates, and small mammals. Mink also travel along the edges of lakes, ponds, sloughs, and rivers feeding on a variety of prey, including small rodents, fish, and aquatic invertebrates (ADF&G, 1984).

Lynx have a limited distribution, confined primarily to the northern boreal forest, they feed primarily on snowshoe hares. Lynx may prey on red fox, lemmings and ptarmigan when hare supplies are low. Snowshoe hares are ubiquitous throughout coniferous, deciduous, and mixed forests and in tall shrub habitats on the refuge. The most important factors affecting habitat suitability are browse availability (spruce, willow, alder, and birch) and cover (ADF&G, 1984).

Red fox are often found hunting around the edge of lakes and riparian areas feeding on ptarmigan, muskrat, and other small rodents. Coyote can also be found scavenging for small prey items. Wolves and wolverine range throughout the area feeding on larger game (ADF&G, 1984).

Marten, red squirrels, and northern flying squirrels are found in mature coniferous and mixed deciduous forests. White and black spruce seeds (cones) are the most important component of red squirrels diet, while northern flying squirrels feed on a variety of fruits and plants, and marten feed on small rodents. Short-tailed weasels occupy a variety of habitat types, preferring open black and white spruce forests and birch-shrub communities where they feed on rodents and other small prey (ADF&G, 1984).

Calkins (1984) delineated belukha whale (*Delphinapterus leucas*) concentrations from the mouth of the Little Susitna River to west of the Beluga River. It is estimated that between 300 and 400 belukhas concentrate in this area in late May and June. Belukha gather in these nearshore waters to feed on the large runs of eulachon ("hooligan") fish that return to spawn in the Susitna River. Large numbers of outmigrating salmon smolt and mature salmon returning to spawn may also attract belukhas. In addition, it is possible that the whales are attracted to the warmer waters of this area for calving; but this has not been determined conclusively.

Harbor seals (*Phoca vitulina*) frequent the nearshore waters of upper Cook Inlet and may be found in the refuge feeding on fish in marine waters and the mouth of the Susitna River.

## Fish

Both resident and anadromous fish are abundant in waters located within the refuge (see accompanying Resource Inventory Fish Map). King salmon (*Oncorhynchus tshawytscha*), pink salmon (*Oncorhynchus gorbushca*), coho salmon (*Oncorhynchus kisutch*), sockeye salmon (*Oncorhynchus nerka*), chum salmon (*Oncorhynchus keta*), Arctic grayling (*Thymallus arcticus*), rainbow trout (*Salmo gairdnerii*), Dolly Varden (*Salvelinus malma*) and burbot (*Lota lota*). Other fish species present in refuge waters are surf smelt (*Hypomesus pretiosus*), eulachon ("hooligan") (*Thaleichthys pacificus*), threespine stickleback (*Gasterosteus aculeatus*), round whitefish (*Prosopium cylindraceum*), humpback whitefish (*Coregonus clupeaformis*), Bering Cisco (*Coregonus laurettae*), longnose sucker (*Catostomus catostomus*), slimy sculpin (*Cottus cognatus*), starry flounder (*Platichthys stellanus*), Pacific lamprey (*Lampetra tridentata*), Arctic lamprey (*Lampetra japonica*) and Pacific herring (*Clupea pallasii*) are all present on the refuge.

Freshwater systems within the refuge to which salmon return and in which resident fish live are critical to the maintenance of their populations. Salmon and other species utilize freshwater habitat for migration, spawning, incubation and juvenile rearing. Habitat needs of fish vary with seasons, life cycle and stage species.

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

Beluga River. All five anadromous salmon species are present in this drainage as well as resident rainbow trout and Dolly Varden. Eulachon and Bering Cisco are also known to enter this system. This is a glacial system and population numbers are unknown. That portion of the Beluga River flowing through the refuge is primarily used as a migration corridor for adult salmon and outmigrating salmon smolt.

Pretty Creek. Pink, coho, sockeye and chinook salmon are found rearing and spawning in Pretty Creek.

Theodore River. This river is utilized by anadromous pink, chinook and coho salmon. Sockeye and chum salmon have been seen in the lower river, but are probably using it as a milling area. Rainbow trout and Dolly Varden also reside in the river. Population numbers are known only for adult chinook salmon, which are estimated at 2,000. That portion of the river within the refuge is used for migration, spawning, incubation and rearing of anadromous and resident fish species.

Lewis River. The Lewis River is utilized by anadromous pink, chinook and coho salmon. Sockeye and chum salmon have been seen in the lower river but, like the Theodore, are probably using it as a milling area. Rainbow trout and Dolly Varden are also present in the river. Population numbers are known only for adult chinook salmon, which are estimated at

1,500. That portion of the river within the refuge is used for migration, spawning, incubation and rearing of anadromous resident fish species.

Ivan River. Pink and chinook salmon, rainbow trout and Dolly Varden utilize refuge waters for migration, spawning, incubation and rearing. Sockeye, chum and coho salmon can be found milling in the lower river reach. Population numbers are unknown for all species.

Susitna River. The Susitna River and its tributaries is one of the most important fish producing drainages in southcentral Alaska. All five anadromous fish species are present as well as resident rainbow trout, arctic grayling and Dolly Varden. Other species present include burbot, eulachon (hooligan), round and humpback whitefish, Bering cisco, longnose sucker, stickleback and sculpin. Since the Susitna River is glacial, population numbers are difficult to estimate. Anadromous salmon production (harvest and escapement) approaches 5 million annually (Florey pers. comm.). The population of hooligan in the river numbers in the millions (Barrett pers. comm.). That portion of the river within the refuge is primarily used as a migration corridor for adult salmon and outmigrating salmon smolt, although there are juvenile salmon rearing in adjacent interconnected lakes and ponds, and in sloughs such as Fish Creek. Millions of eulachon do utilize all the braided river channels in the lower river for spawning during late May and early June.

Little Susitna River. All five anadromous salmon species and resident rainbow trout, Dolly Varden, burbot, and arctic grayling are present in this system. In addition sculpin, stickleback, whitefish and lampreys, inhabit these waters. Salmon production (harvest and escapement) in the Little Susitna River is estimated at 225,000 fish annually. Resident fish numbers are unknown. That portion of the river within the refuge is used primarily for migration and rearing of anadromous and resident fish. Some spawning does occur, but the majority of spawning occurs in waters upstream of the refuge.

Lakes. Flathorn Lake supports chinook, coho, and sockeye salmon and rainbow trout. Horseshoe Lake supports coho salmon and rainbow trout. Figure Eight Lake is known to contain burbot, whitefish and longnose sucker.

## HUMAN USE OF FISH AND WILDLIFE

Susitna Flats State Game Refuge is a popular hunting, fishing and trapping area for many different user groups (see accompanying Resource Inventory Fish and Wildlife Harvest Map).

### Waterfowl Hunting

In recent years Susitna Flats has provided a significant portion of the state's waterfowl hunting opportunity (Table 2). Relatively close proximity to the state's largest population center in combination with extensive wetlands makes the refuge an ideal location for waterfowl hunting. Each year approximately 10 percent of the waterfowl harvest in the state occurs on Susitna Flats, with about 15,000 ducks and over 500 geese taken. Primary modes of access for waterfowl hunting are floatplane landings on lakes, wheel-plane landings on existing roadways and dry areas, and by boat.

Table 2. Estimated waterfowl hunter activity and harvest on Susitna Flats, based on state mail surveys. Percentages of statewide totals in parentheses.

<u>Year</u>	<u>Hunter Days</u>		<u>Duck Harvest</u>		<u>Goose Harvest</u>	
1971	3,885	(8.7)	7,442	(8.9)	669	(5.9)
1972	3,798	(6.4)	9,696	(10.5)	357	(3.3)
1973	7,060	(12.2)	16,385	(18.3)	1,030	(5.6)
1974	3,112	(5.8)	6,750	(9.4)	173	(1.3)
1975	3,763	(6.4)	9,485	(10.8)	224	(1.2)
1976	5,280	(7.9)	11,836	(11.6)	418	(2.9)
1982	6,325	(10.3)	16,710	(14.9)	1,170	(8.9)
1983	6,913	(9.1)	14,584	(11.8)	602	(4.1)
1984	5,701	(7.5)	8,129	(8.0)	487	(3.2)
1985	5,890	(11.1)	13,770	(17.3)	980	(11.2)

### Trapping

Furbearer trapping is also an important use of the refuge (Didrickson and Faro, pers. comm.). Trapping is done primarily from snow machine and winter camps. Beaver, muskrat, river otter, mink, coyote, lynx and wolf are target species.

### Moose Hunting

Moose hunting effort is growing, especially in the western portions of the refuge along the Theodore, Lewis and Beluga rivers and Pretty Creek. Moose hunters access the area primarily on wheel planes. Bear hunting and beluga whale hunting occur in the spring.

### Sport Fishing

Sport fishing is one of the most important recreational activities on the refuge in terms of individuals participating and total user-days. Approximately 45,000 days annually are spent by sport anglers fishing in refuge waters, and 15,000 anadromous salmon and 4,500 resident fish are harvested each year (Mills, 1986). The Little Susitna, Lewis and Theodore rivers are frequently visited by sport anglers. The majority of effort and harvest (80%) occurs on the Little Susitna River.

The Little Susitna River is accessed by road about 28 miles upstream of its mouth. The road enters the extreme northeastern edge of the refuge. Most of the fishing effort occurs through this access site, which becomes very crowded during the chinook salmon season in late May and June, and the coho season in late July and August. The lower river is also experiencing an increase in boat usage from anglers launching at Anchorage and crossing Cook Inlet to its mouth. These larger boats fish the lower 22 miles of the river.

The Theodore and Lewis rivers are primarily reached by small aircraft which utilize a nearby gravel road network as an airstrip. Almost all of the sport fishing effort is directed toward harvesting chinook salmon in June and early July. The Theodore River gets most of the use since it is more accessible than the Lewis River.

While very little sport fishing occurs on the lower Susitna River within the refuge, there is a considerable amount of boat traffic using these waters to access clearwater tributaries, such as Alexander Creek, upstream of the refuge boundaries. Much of this boat traffic departs from Anchorage and crosses Cook Inlet. These boaters are using this access route for sport fishing, hunting, commercial freight hauling and as access to permanent and seasonal residences. A limited hooligan sport fishery exists on the Susitna River, total harvest up to 5,000 fish.

### Commercial Fishing

Commercial salmon fishing is an important activity in the refuge. Commercial fishermen use small aircraft and boats to access their set net sites along the Cook Inlet shoreline. These sites are fished seasonally from June through August. All five species of Pacific salmon are targeted. The commercial fishery within the Refuge boundary consists of approximately 60 set gillnet permits with a maximum allowable three shore fishery leases each.

Salmon fishing seasons generally begins (by regulation) in the last week of June and ends (due to the cessation of effort) around the last week of August. Fishing usually takes place on Monday and Friday, and reductions or additions in fishing time are at the discretion of the Area Management Biologist via Emergency Order procedures. In 1986, an early-season chinook salmon fishery was established beginning June 1 and ending June 24 or when the harvest ceiling of 12,500 fish was reached. It is anticipated that these approximate season dates will not be altered appreciably in future years.

Mean annual commercial catch totals just under 150,000 salmon and is as follows: 1,289 chinook; 56,473 sockeye; 33,249 coho; 14,137 pink; and 26,074 chum salmon.

### Local Community Harvest

Provisions exist for commercial herring and smelt fisheries, however none exist at this time.

The communities of Alexander Creek, Beluga, and Tyonek hunt, fish, and trap in the refuge. Alexander Creek residents use the Susitna River area for waterfowl and moose hunting, fishing, and trapping. In the western portions residents of Beluga hunt waterfowl and moose and run traplines. Tyonek residents hunt waterfowl, harbor seals, and beluga whale on the refuge (ADF&G, 1986b).

Non-consumptive uses, such as photography and wildlife viewing, are currently slight, but there is potential for increases in these areas. Wildlife viewing opportunities on the refuge are varied but not well known or well utilized. There are no known organized tours/trips to the refuge specifically for the purpose of bird watching or other non-consumptive wildlife viewing.

### Habitat Enhancement

There are currently no wildlife habitat or population enhancement projects on the refuge. Waterfowl habitat enhancement has been discussed in the past with regard to draining and reflooding now drained shoreline lakes (e.g. Stump Lake) to provide additional waterfowl habitat. The logistics, engineering, and cost of this type of project have not been explored.

Moose habitat enhancement has been proposed in the form of timber harvest in the mixed deciduous/spruce forest. The enhancement potential of this forest and for moose habitat enhancement have not yet been determined.

The opportunities for other types of wildlife habitat or population enhancement (e.g. furbearer, marine mammal) have not been explored and no specific proposals have been received.

Fish habitat enhancement has not occurred to date on the refuge. The Little Susitna River has been stocked with coho salmon and there may be unexplored opportunities for stocking of refuge lakes and streams.

## OTHER HUMAN USE ACTIVITIES ON THE REFUGE

A diversity of multiple uses occurs on the Susitna Flats State Game Refuge (see accompanying Resource Inventory Land Use Map).

### Access

Major access points to the refuge are as follows: 1) road access to the Little Susitna River via the "Burma Road," 2) road access from Beluga to the Beluga, Theodore, Lewis, and Ivan rivers in the western portion of the refuge, 3) floatplane access to refuge lakes in ice free months, 4) wheelplane access to beach/tideflats in ice free months, and 5) skiplane access to refuge lakes in winter.

In addition, a winter trail crosses the northern end of the refuge connecting existing roads in the Point MacKenzie agricultural area and the oil well road system on the west side of the Susitna River. This route was apparently used extensively by oil companies to access the area for winter seismic and exploratory drilling programs in the 1960's and early 1970's. The route also receives considerable use by Beluga and Alexander residents. In 1983 and 1986, the ADF&G authorized construction of an ice road, including several ice bridges along this route.

Over 50 old seismic trails crisscross the refuge. These seismic trails receive some off road vehicle use from hunters and general recreationists. The Iditarod Trail follows one of these seismic trails extending from just north of the Little Susitna Access Road to Flat Horn Lake.

The as yet undeveloped Chuitna-Goose Bay right-of-way crosses portions of the refuge along the northern boundary. There are plans to develop this right-of-way as far as Fish Creek for access to a timber sale and for access to the Fish Creek Agricultural Project. Its development would have significant impact on access to and use of the refuge.

Some ATV use is associated with set net operations along the shoreline during summer months when 3-wheelers are used for transportation between set net cabins and set net sites. Off-road vehicles have established a trail along the north-south refuge boundary line extending from Pt. MacKenzie dairy project to Pt. MacKenzie homesteads.

### Cabins

There are today roughly 132 cabins on state land within Susitna Flats State Game Refuge. The majority of these cabins are "duck shacks" constructed to provide shelter to hunters during the fall hunting season. These cabins are generally located in coastal wetlands and are built on pilings of various sorts. In addition to the duck shacks, there are 11 cabins constructed by air taxi operators for use by their patrons and 11 cabins constructed by set net fishermen. These cabins have been built over the last fifty years; all were built in trespass. A few cabins were built in 1930's and 1940's. Throughout the 1950's and 1960's, an average

of two cabins were built each year, and by 1970, there were 51 duck shacks. The rate of cabin construction doubled in the 1970's and early 1980's to four cabins per year. By 1984, there were 113 duck shacks in the refuge. There are estimated to be approximately 40 cabins located on private inholdings in the refuge.

In 1982, ADF&G and ADNR devised the Personal Use Cabin Permit program whereby the use of all cabins built prior to August 1, 1984 would be authorized throughout the permittee's lifetime. The purpose of the program was to stop the construction of new cabins and to phase out the use of the cabins built in trespass. The Personal Use Cabin Permit program regulations were adopted in late 1984, and a one-time only application period was opened from January 2 to March 1, 1985 for all cabins in Susitna Flats and other northern Cook Inlet state game refuges. A total of 116 applications were received for cabins in the refuge during this application period. The ADNR adjudicated conflicting claims, and eventually, 102 permits were issued. Nine permit applications were delayed issuance because the cabins are located on Mental Health Lands, and the Mental Health Lands Trust lawsuit enjoined the state from making any land use decisions affecting mental health lands.

In the July 1985 report entitled "Cabins, Waterfowl, and Public Use on Trading Bay, Susitna Flats and Palmer Hay Flats State Game Refuges," the Game Division concluded that the number and density of cabins on the refuge had not caused measurable long-term biological impacts on waterfowl or their habitat. The Game Division also concluded that cabins are appropriate on these refuges to maintain reasonable public access and use.

At the same time that the Personal Use Cabin Permit program was initiated, the ADNR advised all the owners of commercial cabins that they would now need a negotiated lease for their cabin sites. During 1985 and 1986, 22 applications for leases and Special Area Permits for commercial cabins in the refuge were reviewed by the ADNR and ADF&G.

### Duck Blinds

Susitna Flats receives approximately 10,000 annual hunter days use for waterfowl hunting each fall. Most hunters operate out of planes or boats and temporary campsites. Duck blinds are sometimes constructed on the flats using available driftwood and other on-site materials. As a result of tidal activity most blinds do not remain from year to year.

## Oil and Gas

Prior to its creation as the Susitna Flats State Game Refuge in 1976, the area was leased for oil and gas exploration in the 1960's and early 1970's. The area was extensively explored and found to have exploitable gas reserves. There are now five gas development units on the eastern portion of the refuge.

Since refuge establishment, four state oil and gas lease sales, portions of which included refuge lands, have been held. Sale 33, held in 1981, offered all but a portion of the western side of the refuge. Sale 40 in 1983 offered 21 tracts, mostly along the northern refuge boundary. Sale 46A, an exempt sale held in 1985, offered one tract on the upper Lewis River and four offshore tracts. The most recent sale, Sale 49, was held in 1986 and offered 12 tracts.

The ADF&G was involved in the development of the conditions under which these sale areas were leased through the Major Projects Review process. These conditions are imposed as "Mitigating Measures" by the ADNR through their AS 38.05.035 authorities. Mitigating measures include lease stipulations, and "Terms of Sale," which are imposed as a condition of approval of plans of operations. Mitigating measures for state oil and gas leases have evolved over time, and a fairly standard set of terms has been developed. The mitigating measures for Sale 49, the most recent oil and gas lease sale including Susitna Flats State Game Refuge lands, can be found in the Appendix.

The level of oil and gas-related activity on the refuge has varied considerably among years, undoubtedly reflecting differences in oil industry interest and economics. There was a burst of oil and gas-related activity in the refuge in 1979, when nine geophysical programs, one exploratory drilling and four support projects were approved. There was no activity in 1982 and 1983. In 1984 and 1985, activity resumed with eight projects approved during those two years. Activity increased in 1986, when nine projects were approved.

Oil and gas-related activities within the refuge have been of three general types: 1) geophysical exploration, 2) drilling and production-related construction, and 3) support services.

Geophysical Exploration--The area that is now Susitna Flats State Game Refuge was extensively explored for oil and gas prior to refuge establishment. In the 1960's and 1970's, seismic exploration required the use of heavy equipment and the cutting of trails to accommodate the passage of seismic "trains." Although the state always required such work to occur in winter to prevent surface damage, the remnants of over 50 seismic trails are still present on the refuge.

Although the refuge had been extensively explored prior to refuge establishment,

exploration has continued as geophysical techniques have improved, and industry interest has remained high. The precise location of the seismic programs that have been approved by the ADF&G is confidential, but it can be safely said that the entire refuge, including its submerged lands, has been explored.

The ADF&G has approved 17 seismic programs, 3 gravity surveys, 1 geohazards survey, and 1 geological reconnaissance program. In approving these geophysical programs, the AD&FG regularly required that any work involving the use of heavy equipment occur in winter when the ground is frozen. The ADF&G also placed restrictions on the use of aircraft over the "primary waterfowl areas" and near swan nesting areas. Restrictions were also placed on the use of explosives near fish streams and on activities near known bald eagle nesting locations.

Drilling and Production-related Construction--The ADF&G has approved six drilling operations since refuge establishment in 1976. In conjunction with these well-drilling proposals, the ADF&G has approved the construction of approximately six miles of road and the burial of two pipelines to connect wells to the Enstar gas pipeline. These activities occurred in the Stump Lake, Lewis River and Pretty Creek Units.

Support Services--The ADF&G has approved a variety of projects required for the support of oil and gas exploration and development. These activities include gravel mining, water withdrawal, soil sampling, bridge repair and maintenance, and the movement and storage of equipment.

### Mining

Within the refuge, lands west of the Susitna River are currently open to leasehold location only for locatable minerals. Lands to the east of the Susitna River are open to mineral entry. Coal reserves have never been documented on the refuge and in accordance with the Susitna Area Plan lands to the west of the Susitna River are not available for coal leasing or prospecting. The tide and submerged lands on the refuge are closed to offshore prospecting (OPPs) and tidelands out to 1/4 mile are closed to the staking of mining claims. Several hundred locatable mineral entry claims and locatable mineral leasehold claims exist within Susitna Flats State Game Refuge all west of the Susitna River. With only one exception all were filed after creation of the refuge. Although these claims occur throughout the western portion of the refuge, actual mining activity has been slight and some claims may not currently be valid. Since 1976, only eight applications for placer mining operations within the refuge have been received.

All of the mining proposals have been made since 1980. Five proposals were made in 1980-1981. These proposals were diverse, involving one typical bulldozer-slucice box operation, one suction dredge operation, one hand tool operation, one cyanidation heap leaching system in an existing gravel pit, and one seismic exploration program using explosives and a tracked vehicle. The ADF&G initially denied the cyanidation heap leaching proposal based on the recommendation of the ADEC. The applicants were able to provide enough information to convince the ADEC that the proposal was sound, and the ADF&G later issued a permit. All of the other operations were approved; it is unknown whether any of the operations were active.

### Material Extraction

Prior to creation of the refuge, several gravel pits were opened near the Beluga and Theodore rivers to support oil and gas development. Seven permits for gravel extraction from four of these existing pits have been issued since 1981. The applicants for these permits have been service companies with contracts or hopes of obtaining contracts to provide gravel to Chevron USA, Inc., Union Oil Co., Chugach Electric Association and other businesses active in the Beluga area. In approving the extraction of gravel from these existing pits, the ADF&G has required that the pits be leveled after depletion to allow revegetation.

Of the four gravel pits from which gravel removal has been approved in recent years, two pits have not been used and are in early stages of revegetation, and one pit has been depleted. The fourth pit has enough gravel for perhaps one more year.

### Utilities

Two major utility lines cross Susitna Flats State Game Refuge -- the Chugach Electric Association, Inc. (CEA) electric transmission line and the Enstar natural gas pipeline. The Chugach line was constructed prior to refuge establishment, but there have been three recent upgrading programs that have required Special Area permits. The Enstar gas pipeline was constructed in 1983 and 1984. Future work involving the Enstar gas pipeline and the Chugach electric transmission line will probably be for maintenance. No major improvements to the gas pipeline are expected at this time. No other utilities have been proposed on refuge lands.

### Land Status & Acquisition

The refuge lands are primarily state owned including approximately 38,846 acres of mental health (state) land along the eastern boundary of the refuge. The tide and submerged lands are entirely state owned. There are ten private inholdings on the refuge totalling approximately 300 acres. There are three small state selected parcels still managed by the BLM. The enabling legislation allows for state acquisition of private property within the boundaries of the refuge from willing sellers. This could be accomplished through purchase or trade and would serve to consolidate management of Susitna Flats. None of the private landowners within the refuge have contacted the ADF&G regarding opportunities to sell their inholdings. Several property owners in the Pt. Mackenzie area with land directly adjacent to but not within the refuge have inquired into the state's interest in buying their property.

## MAP INFORMATION SOURCES AND MAP CATEGORY DEFINITIONS

(Note: Maps are not displayed on the web version of this management plan.)

### Bird Map

Information sources: ADF&G 1984; ADF&G 1986c; Nysewander and Patten 1983; D. Rosenberg, pers. comm.; D.G. Roseneau, pers. comm.; R. Stanek, pers. comm.

Map Category definitions:

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

Known gull nesting colonies - Areas where concentrations of one or more species of nesting gulls have been observed.

Waterfowl high density spring and fall staging areas - Areas where concentrations of ducks, geese, and swans have been observed during spring and/or fall migration.

Waterfowl low density fall staging areas - Areas where ducks, geese, and swans have been observed during fall migration.

### Waterfowl Nesting Map #1

Information sources: B. Campbell ADF&G, pers. comm.; D. Rosenberg ADF&G, pers. comm.; D. Sellers ADF&G, pers. comm.; D. Timm ADF&G, pers. comm.

Map category definitions:

Canada goose known nesting areas - Areas where pairs of Canada geese, nesting mounds, and/or goslings have been observed.

Canada goose known brood rearing and molting areas - Areas where goose broods have been observed during the summer.

Tule white-fronted goose known use areas - Areas where Tule white fronted geese have been observed in the spring, summer, and/or fall.

Known trumpeter swan nest sites - Sites where trumpeter swan nests have been documented.

### Waterfowl Nesting Map #2

Information source: Estimated from aerial survey data (Sellers, ADF&G, 1979).

Map category definitions:

Breeding duck densities: low, medium, high, very high.

Breeding duck densities are relative and have been extrapolated from breeding bird surveys and biologists estimates based on regional knowledge.

### Mammals Map

Information sources: ADF&G 1984; ADF&G 1986c; Calkins 1984; R. Stanek ADF&G, pers. comm.

Map category definitions:

Known moose calving concentration areas - Areas where concentrations of moose, especially parturient cows, and/or calves have been observed during the calving period for more than one year.

Known moose winter concentration areas - Areas where concentrations of moose have been observed during more than one winter.

Black bear intensive spring use areas - Areas where large numbers of black bear have been observed in the spring.

Brown bear concentration on fish streams - Areas where concentrations of brown bear have been observed on fish streams.

Belukha whale concentration areas - Areas where large numbers of belukha have been observed in spring and summer.

Harbor seal known use areas - Areas where harbor seals have been observed.

### Anadromous and Freshwater Fish Map

Information Sources: ADF&G, 1978; K. Delaney, pers. comm.; D. Watsjold, pers. comm.; S. Seaberg, pers. comm.

Map category definitions:

Known fish distribution - Areas where fish distribution has been documented.

### Fish and Wildlife Harvest Map

Information Sources: Jim Faro, pers. comm.; Dan Rosenberg, pers. comm.; ADF&G AK Habitat Management Guide 1986; Kevin Delaney, pers. comm.; Dave Watsjold, pers. comm.; Larry Engel, pers. comm., ADF&G Southcentral Regional Historical Access to Fish & Wildlife Vol. II; Lee Rogers, pers. comm.; Jack Whitman, pers. comm.

Map category definitions:

Sport hunting areas - Areas known to have been used consistently over time for sport hunting as allowed by the Alaska Board of Game.

Sport fishing areas - Areas known to have been used consistently over time for sportfishing, as allowed by the Alaska Board of Fisheries.

Commercial fishing areas - Areas known to have been used consistently over time for commercial fishing as allowed by the Alaska Board of Fisheries.

Community resource harvest areas - Areas known to have been used over time by a particular community for the harvest of selected species of fish, game, or plants.

### Vegetation Map

Information Source: USDA et al. 1986, Susitna River Basin Land Cover Type Map Atlas.

Map category definitions:

#### Forest - Closed - Coniferous

- 25 Tall stands white spruce - Main canopy usually greater than 30 ft. in ht., usually found at lower elevations on better sites, almost always found mixed with old and decadent deciduous trees (very rarely found as a pure type in Susitna Valley).

Characteristic plants are:

Trees: white spruce, paper birch  
Woody: willows, alder, bunchberry, crowberry, blueberry, lowbush cranberry, dwarf birch, spirea, rose  
Forbs: fireweed, starflower, five-leaf bramble, viola, wintergreen, bluebells  
Graminoids: bluejoint, sedges  
Others: horsetails, oak fern, mosses

- 41 Short stands black spruce - Main canopy usually less than 30 ft. in ht., generally found on wet and/or cold (poor) sites, may be found mixed with birch of poor quality but usually found as a pure type forming islands and stringers in bog areas or transition zones between bog area and forest areas. Understory is usually a thick moss and/or sedge mat.

Characteristic plants are:

Trees: black spruce, paper birch  
Woody: willows, blueberry, lowbush cranberry, labrador tea, dwarf birch, crowberry, cloudberry, rose  
Forbs: marsh five-finger, starflower, commandra, fireweed  
Graminoids: bluejoint, sedges, cottongrass  
Others: horsetails, mosses, lichens

- 42 Tall stands black spruce - Main canopy usually greater than 30 ft. in ht., can usually be identified as a fire formed stand, on relatively good sites, stands are remarkably pure and the stocking density is usually quite high, may be found mixed with very scattered birch.

Characteristic plants are:

Trees: black spruce, paper birch  
Woody: blueberry, lowbush cranberry, bunchberry, crowberry, willows, dwarf birch, labrador tea, twin flower  
Forbs: commandra, fireweed, starflower, wintergreens  
Graminoids: bluejoint  
Others: horsetails, ferns, mosses

#### Forest - Closed - Deciduous Mixed

- 24 Paper birch, aspen, white and black spruce mixture - medium age, 40-80 years - Canopy is usually fine textured as seen from above, openings may be fairly common but they are usually small. Elements of this type include birch, spruce and aspen. Birch is usually found as a main component of this type but percent composition may vary greatly depending on a number of factors, e.g., as the type increases in age, the percentage of white spruce as a crown component usually increases along with the amount of understory and number of stand openings. 40-100 year age.

Characteristic plants are:

Trees: paper birch, aspen, white spruce  
Woody: bunchberry, lowbush cranberry, rose, spirea, twin flower, highbush cranberry, alders, willows  
Forbs: fireweed, starflower, five-leaf bramble, commandra, winter greens  
Graminoids: bluejoint  
Others: horsetails, shield fern, oak fern, mosses

- 26 Paper birch, white spruce, black spruce mixture - old age, greater than 80 years - Canopy is usually somewhat coarser textured as seen from above, openings are usually common and may cover close to half of the stand area. Canopy may also appear smooth, but openings appear as definite holes in the crown. Deciduous trees in these old stands are usually decadent. Spruce is usually becoming the dominant species. The understory component of the stand is usually visible from above and includes bluejoint and alder as its most common species. These stands are always greater than 80 years old.

Characteristic plants are:

Trees: paper birch, white spruce, black spruce  
 Woody: alders, buhchberry, rose, highbush cranberry, willows, devils club, raspberry, lowbush cranberry  
 Forbs: starflower, fireweed, twisted stalk, five-leaf bramble  
 Graminoids: bluejoint, sedges  
 Others: horsetails, shield fern, oak fern, mosses

- 27 Cottonwood-young age, less than 40 years - Most commonly found on new islands, downstream ends of old islands and point bars of rivers. Cottonwood or poplar is usually found mixed with large alder and/or willow - (understory is sparse to nonexistent). 40 years old.

Characteristic plants are:

Trees: cottonwood  
 Woody: buffaloberry, mountain avens, alders, willows  
 Forbs: fireweed, wintergreens  
 Graminoids: bluejoint, sedges  
 Others: mosses, lichens, horsetails

- 28 Cottonwood - medium age, 40-100 years - Most commonly found in a riverine situation or within at least one mile of a river (alluvial soils). Stands are usually pure cottonwood or poplar, spacing is even and crown closure approaches 100 percent. Understory in the Susitna Valley is dominated by alder and devilsclub. 40-100 years old.

Characteristic plants are:

Trees: cottonwood, white spruce  
 Woody: alders, raspberry, highbush cranberry, rose, willows, devils club  
 Forbs: bluebell, starflower, bedstraw, twisted stalk  
 Graminoids: bluejoint  
 Others: horsetails, ferns

#### Forest - Open - Coniferous

- 43 Short stands - black spruce - Found in association with bog types. Black spruce are usually of very poor form. Site is either wet or cold or both - trees usually less than 15 ft. in height.

Characteristic plants are:

Trees: black spruce, paper birch  
 Woody: willows, labrador tea, blueberry, cloudberry, lowbush cranberry, crowberry, dwarf birch, alders

Forbs: coltsfoot, marsh five-finger  
 Graminoids: sedges, cottonsedges, bluejoint  
 Others: horsetails, shield fern, oak fern, mosses, lichens

Forest - Open - Deciduous Mixed

- 34 Paper birch and white spruce mixture - old age, greater than 80 years - Found in same general location as type 33. Found in association with grass and alder. Birch, in this type, is usually found in very small, tight clumps. Spruce are usually found to have an open grown form and are normally much younger than the hardwood component of the type.

Characteristic plants are:

Trees: paper birch, white spruce  
 Woody: alders, willows, highbush cranberry, bunchberry, spirea, blueberry, raspberry, currant, devils club, rose  
 Forbs: fireweed, starflower, five-leaf bramble, twisted stalk, burnet  
 Graminoids: bluejoint  
 Others: shield fern, oak fern, clubmoss, mosses

- 35 Cottonwood - medium age, 40-100 years - Usually found at tree line just above elevational limit of open white spruce. Found in pockets among low shrubs.

Characteristic plants are:

Trees: cottonwood, white spruce  
 Woody: willows, alders, devils club, highbush cranberry, rose, raspberry, bunchberry  
 Forbs: fireweed, wintergreens, starflower, bluebells  
 Graminoids: bluejoint  
 Others: horsetails, lady fern, shield fern, oak fern, mosses

Non-Forest - Saltwater Wetlands

- 50 Grassland - Grassland in areas of tidal influence. Usually found at edge of normal high water in sandy soil. Normally this type is found in areas where the shoreline gradient is relatively steep, usually found as a belt of grass along the shore.

Characteristic plants are:

Woody: sweetgale, willow  
 Forbs: arrowgrass, marsh five-finger, burnet  
 Graminoids: water sedge, cottonsedge, bluejoint

- 51 Low shrub - Myrica dominated shrubland located on tidal flats. Water level is

usually fluctuating seasonally. In areas that are more continuously wet, sedge replaces *Myrica*.

Characteristic plants are:

Woody: sweetgale, leatherleaf, labrador tea, dwarf birch, swamp  
cranberry  
Forbs: marsh five-finger, starflower, buckbean  
Graminoids: water sedge, bluejoint  
Others: horsetails, sphagnum moss

- 52 Tidal Marsh - Usually found in areas with many shallow lakes and little topographic relief (within tidal influence). Vegetation is dominated by various sedges. Woody plants may occur on the drier sedge and peat ridges that are common to this type.

Characteristic plants are:

Forbs: arrowgrass, silverweed, marestalk  
Graminoids: sedges, beaked sedge, water sedge, bluejoint  
Others: horsetails

#### Non-Forest - Tall Shrub

- 60 Alder - This type is dominated by tall (10-15 ft.) alder growing in dense thickets with grasses, ferns, and a great variety of forbs growing in the understory. Devil's club can be found as a dominant understory to the alder on wetter and steeper sites. Devil's club will normally exclude other understory vegetation. The type is found at or above tree line. At tree line it is often found mixed with open white spruce and cottonwood types.

Characteristic plants are:

Trees: white spruce, cottonwood  
Woody: alders, willows, blueberry, devils club, spirea, currants  
Forbs: fireweed, false hellebore, starflower, bedstraw, geranium,  
bluebell  
Graminoids: bluejoint, sedges  
Others: horsetails, shield fern, lady fern, oak fern

- 61 Alder-Willow (streamside vegetation) - This type is dominated by a mixture of very large alder and willow. This type is normally found on frequently flooded ground such as new islands, point bars, etc. Understory is sparse but may include horsetails and bluejoint. This type is often found mixed with young open cottonwood (in younger stands the cottonwood is almost indistinguishable from the willow and alder).

Characteristic plants are:

Woody: willows, alders, blueberry, bunchberry  
Forbs: fireweed, bluebells, false-hellebore, starflower, burnet, bedstraw  
Graminoids: bluejoint, sedges  
Others: horsetails, shield fern, mosses

#### Non Forest - Low Shrub

- 62 Willow - resin birch - This type is dominated by either willow or resin birch or a combination thereof. The type is often found in sheltered situations at high elevations, e.g., draws in mountainous terrain. This type is found at and above the transition between tall shrubland and tundra.

Characteristic plants are:

Woody: dwarf birch, resin birch, willows, blueberry, crowberry,  
lowbush cranberry, labrador tea, spirea, nagoonberry,  
bunchberry  
Forbs: fireweed, burnet, monkshood, bluebell, coltsfoot  
Graminoids: sedges, bluejoint  
Others: horsetails, ferns, mosses, lichens

#### Non Forest - Grassland

- 63 Calamagrostis grassland - This type is dominated by Calamagrostis 1 to 2 meters tall. Fireweed and various ferns are sometimes common. This type is most often found as an understory in the more open forest types and woodland areas where it is commonly associated with alder patches. This type can also be found unassociated with other types along small streams.

Characteristic plants are:

Trees: white spruce, birch, cottonwood  
Woody: raspberry, alder, nagoonberry, blueberry, fireweed, bluebell,  
cow parsnip, false hellebore, starflower, geranium, nettle  
Graminoids: bluejoint  
Others: horsetails, oak fern, shield fern

### Non Forest - Tundra

- 64 Sedge - Grass Tundra - This type is found above tree line on relatively flat, wet areas. Vegetation consists almost entirely of various wet sedges.

Characteristic plants are:

Woody:	willows, alder, blueberry, lowbush cranberry, spirea, crowberry, cassiope, cloudberry
Forbs:	roseroot, monkshood, jacob's ladder, anemones, fireweeds, arctic wormwood, violets, coltsfoot, bistorts, marsh five finger, burnet
Graminoids:	sedges, bluejoint, various grasses
Others:	horsetails, mosses

### Non-Forest - Freshwater Wetlands

- 68 Sphagnum bog - Cover is dominated by varying amounts of sedge, equisetum and moss (especially sphagnum). This type is usually found as a floating mat over several feet of water or as a thick mat directly over saturated or frozen soil. Shrubs and stunted trees (if present) may be found on drier peat ridges. (This type is similar to tidal marsh except that shallow lakes are less common, the peat ridges form a more continuous and regular pattern and the type is found inland beyond tidal reach.) Usually found as a pure type.

Characteristic plants are:

Trees:	black spruce
Woody:	dwarf birch, blueberry, sweetgale, willows, crowberry, bog rosemary, cloudberry, labrador tea
Forbs:	buckbean, marsh five-finger, starflower, sundew, violet
Graminoids:	sedges, cottonsedges, bluejoint
Others:	sphagnum moss, horsetails

- 69 Sphagnum/Shrub bog - Vegetation of this type is dominated by a thick moss mat (sphagnum) and/or sedge tussocks. Grass, ericaceous shrubs, salix, blueberry and cranberry may also be present. Ground water level usually varies seasonally but this type is usually never as wet as sphagnum bog. This type is usually mixed with open stands of short black spruce. Many other types may also be found in close association with sphagnum shrub bog. The associated types are usually found on glacial moraines and eskers within the bog area.

Characteristic plants are:

Trees:	black spruce
Woody:	dwarf birch, blueberry, sweetgale, willows, crowberry, bog

Forbs:	rosemary, labrador tea, cloudberry, bunchberry, lowbush cranberry, swamp cranberry, leatherleaf, shrubby cinquefoil marsh five-finger, buckbean, starflower, burnet, violets, sundew
Graminoids:	sedges, cottonsedges, bluejoint
Others:	sphagnum moss, horsetails

### Land Use Map

Information Sources: G. Bacon 1983; AK. Road & Rec. Map "Big Lake & Pt. MacKenzie" 1986; ADNR Land Status Files; James A. Bendzick, Beluga Area Atlas 1985.

## INFORMATION NEEDS

The abundance and distribution of many animal species on the refuge is not well documented. Some of the specific information needs for the refuge are as follows:

### Waterfowl

- Annual surveys of waterfowl populations, breeding success, and habitat use patterns on the refuge.
- Further investigations into the ecology and breeding biology of the Tule white-fronted goose.

### Shorebirds

- Periodic surveys of shorebird populations, and habitat use patterns on the refuge.

### Furbearers

- Identify numbers and habitat use patterns of furbearer populations on the refuge.

### Moose

- Survey moose population size, distribution, and habitat use patterns on the refuge.
- Identify the home range of moose dependent upon the refuge for winter range.

### Bear

- Survey brown bear population size, distribution, and habitat use patterns on the refuge.
- Survey black bear population size, distribution, and habitat use patterns on the refuge.

### Belukha

- A systematic census which could provide a more accurate determination of population estimates is needed.
- Food habit studies are needed to positively identify and quantify the relative importance of various food species.
- Movement studies are needed to better define the geographical range and seasonal

movements of the population.

#### Human Use

- A periodic survey of refuge uses would allow the department to identify changes in demand, anticipate user conflicts, and formulate plans to minimize them.

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# **STATE OIL AND GAS LEASE SALE #49**

## **MITIGATING MEASURES**

## Mitigating Measures

AS 38.05.035 (e) and the departmental delegation of authority provide the Director, Division of Oil and Gas, with the authority to impose conditions or limitations, in addition to those imposed by statute, to ensure that a resource disposal is in the state's best interests.

Stipulations will be enforced throughout the term of the lease. Measures listed under Plans of Operations and Other Terms of Sale will be imposed through plans of operations and other permits to mitigate the social and environmental effects at lease activities. Restrictions on offshore activities apply to acreage below mean high tide. Human safety will take precedence over aircraft restrictions. These measures have been developed after considering social economic and environmental analysis (SEEAs) prepared for Upper Cook Inlet Sale 33 and Lower Cook Inlet Sale 35, agency revisions to these documents, public comments, and measures imposed in other oil and gas the sales.

### Stipulations

#### 1. Spill Prevention, Control, and Counter Measure (SPCC) Plan:

A Spill Prevention, Control, and Counter Measure (SPCC) Plan must be submitted to the Department of Environmental Conservation prior to onshore drilling operations and construction of onshore oil and gas storage facilities (with a capacity of greater than 660 gallons), transfer, and transportation facilities. In addition to addressing the prevention, detection, and cleanup of oil, the SPCC plan for drilling operations should include, and but not limited to, methods for controlling blowouts, location of spill cleanup equipment, identification and location of a suitable alternative drilling rig, and the time required to obtain equipment, mobilize, rig-up, and commence drilling of a relief well, if needed.

#### 2. Discovery of historic or archeological objects:

In the event any site, structure, or object of historic or archeological significance is discovered during operations on the leased area, the lessee must report such findings immediately to the Director, Division of Oil and Gas, and make every reasonable effort to preserve and protect such site, structure, or object from damage until the Director, Division of Oil and Gas, after consultation with the State Historic Preservation Officer, has given directions as to its preservation.

### Plans of Operations and Other Terms of Sale

Lessees must submit a detailed plan of operations to the Division of Oil and Gas for approval before conducting any exploratory or development operations. Plans of operations must identify the specific measures, design criteria and construction methods and standards that will be employed to meet the restrictions listed below. For explorations and

development activities occurring within the Matanuska-Susitna Borough or the Kenai Peninsula Borough, the lessee shall concurrently submit an informational copy of its plan of operations to the appropriate borough. Review of plans of operations and other required permits will be in accordance with consistency review procedures established under 6 AAC 50.

The following restrictions will be imposed on lands leased in this sale as a condition of the approval of plans of operation. Except as Indicated, these restrictions do not apply to geophysical explorations, which is governed by 11 AAC 96.

General:

1. A plan of operations for lease activities and specific permit applications which is subject to approval by the U.S. Corps of Engineers; which requires a Certificate of Reasonable Assurance from the Department of Environmental Conservation; or which requires other state agency authorizations must be submitted simultaneously for state agency review and approval at least 60 days prior to conducting the activities.
2. All lease-related activities in the coastal zone are subject to the standards of the Alaska Coastal Management Program (ACMP) (6 AAC 80) or to the provisions of the Matanuska-Susitna Borough Coastal Management Plan, as applicable. The Division of Oil and Gas will require, as a condition for consistency approval of lease operations, such medication or stipulations as may be necessary to ensure consistency with the Alaska Coastal Management Program, and with sound planning and management of coastal zone resources.
3. Onshore exploration activities must be supported by vehicles which do not cause significant damage to vegetation or the ground surface, or by existing road systems and port facilities, or air service. Construction of local roads in the vicinity of exploration sites may be allowed. Unrestricted surface travel may be permitted by the Director, Division of land and Water Management, and the Director, Division of Oil and Gas, if an emergency condition exists. Construction of year-round roads will be prohibited during the exploration phase of oil and gas development unless public and agency review show it to be in the state's best interests to have a permanent road constructed. When allowed, permanent roads must be designed, constructed, and maintained to the satisfaction of the Director, Division of Oil and Gas.
4. An application for water rights must be submitted to the Department of Natural Resources prior to diverting, impounding, or withdrawing water from any ground or surface source.

5. An Oil Discharge Contingency Plan will be required for offshore operations pursuant to AS 46.04.030.

Facilities and Structures:

6. The siting of onshore facilities, other than roads, docks or pipeline crossings, will be prohibited within 500 feet (152 m) of all fishbearing streams and lakes unless it is shown to the satisfaction of the Director, Division of Oil and Gas, after consultation with the Department of Fish and Game, that alternative site locations outside this buffer zone are not feasible or prudent. Additionally, the siting of facilities within one-quarter mile of the banks of the Anchor and Ninilchik Rivers, and Deep Creek, and within one-half mile of the banks of the Susitna, Drift, Theodore, Beluga, Chuitna, and Yentna Rivers and Alexander, Lake, and Harriet Creeks will be prohibited. Road and pipeline crossings must be aligned perpendicular or near perpendicular to watercourses.
7. Measures will be required to minimize the impact of industrial development on key wetlands. Key wetlands are those wetlands that are hydrologically important to fish, waterfowl, or shorebirds. Specific measures include the requirements that:
  - a. Lessees must identify on a map or aerial photograph the largest surface area within which it is anticipated that a facility is to be sited, or an activity is to occur. The map or photograph must accompany the plan of operations submitted to the Division of Oil and Gas. The Division of Oil and Gas will consult with the Department of Fish and Game to identify the least environmentally sensitive area(s) within the industry-identified area of interest. The industry-identified surface area must be large enough to contain the facility and to accommodate planned expansion.
  - b. Drill pads, roads, pipelines, and other facilities must be sited outside of key wetlands unless the Director, Division of Oil and Gas, after consultation with the Department of Fish and Game, determines that there are no feasible or prudent alternatives.
  - c. Where facilities must be sited within key wetlands, such facilities will be sited, designed, and constructed in manner that will maintain natural hydrological patterns and prevent oil contamination.
  - d. Draining or dewatering key wetlands is prohibited, unless no feasible or prudent alternative exists.
  - e. Dredging or filling of key wetlands will not be allowed unless the activity will not cause adverse impacts to the wetlands and no feasible or prudent

alternative exists.

8. Impermeable lining and diking will be required for sewage ponds and onshore oil storage facilities (with a storage capacity greater than 660 gallons). Buffer zones of not less than 100 feet (30 m) and up to 1,500 feet (457 m) will be required to separate onshore oil storage facilities (with a capacity greater than 660 gallons) and sewage ponds from marine areas and freshwater supplies, streams and lakes, and wetlands that are important to fish, waterfowl, or shorebirds unless the Director, Division of Oil and Gas, after consultation with the Department of Environmental Conservation, determines that such a requirement is not feasible or prudent. Sumps and reserve pits must be impermeable and otherwise fully contained through diking or other means.
9. To the extent feasible and prudent, all lease activities and structures must be designed, sited, and constructed to maintain normal water flow and drainage patterns and to allow free movement and safe passage of fish and mammals.
10. Facilities and surface transportation routes will, to the extent feasible and prudent, be sited and consolidated to avoid sensitive fish and wildlife habitat.
11. Exploration facilities, with the exception of drill pads and airstrips, must be temporary and must not be constructed of gravel. However, use of existing abandoned gravel structures may be permitted on an individual basis by the Director, Division of Oil and Gas, after consultation with the Director of the Division of Land and Water Management and the Department of Fish and Game. Approval for use of abandoned structures will depend on the extent and method of restoration needed to return these structures to a usable condition.
12.
  - a. Onshore pipelines will, to the extent feasible and prudent, be buried where soil and geophysical conditions allow. Pipelines must be located so as to facilitate the containment and cleanup of spilled hydrocarbons. In onshore areas where pipelines must be placed above-ground, the pipeline must be designed and constructed to provide free movement of moose and caribou. Where feasible, above-ground pipelines must be located on the upslope side of roadways and construction pads unless the Director, Division of Land and Water Management, determines that an alternative site is environmentally acceptable.
  - b. Offshore pipelines must be located to prevent obstruction to marine navigation and fishing operations.
13. Upon abandonment of materials sites, drilling sites, roads, buildings, airstrips or other facilities, such facilities must be removed and the site rehabilitated, unless

the Director, Division of Oil and Gas, after consultation with the Departments of Fish and Game and Environmental Conservation, determines that such removal and rehabilitation is not in the state's best interests. In state game refuges, this decision will be made by the Commissioner of the Department of Fish and Game.

14. Except for those on approved exploration drill sites, stationary fuel storage facilities must not be placed, nor vehicle refueling occur, within active floodplains. Exceptions for the refueling of slow-moving construction equipment may be allowed during the permitting process under AS 16.05.870.

Local Hire:

15. The lessee is encouraged to hire and employ local and Alaska residents to the extent they are available and qualified for work performed on the leased area.

Environmental Training:

16. The lessee must include in any exploration or development plan an environmental training program for all personnel involved in exploration or development activities (including personnel of the lessee's contractors and subcontractors) for review and approval by the Director, Division of Oil and Gas. The program must be designed to inform each person working on the project of specific types of environmental, social, and cultural concerns, which relate to the individual's job. The program must be formulated and implemented by qualified instructors experienced in each pertinent field of study and must employ effective methods to ensure that personnel understand and use techniques necessary to preserve archeological, geological, and biological resources. The program must also be designed to increase the sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which such personnel will be operating. The lessee must also submit for review and approval a continuing technical environmental briefing program for its supervisory and managerial personnel and those of its agents, contractors, and subcontractors.

Access:

17. No restriction of public access to, or use of, the leased area will be permitted as a consequence of oil and gas activities except in the immediate vicinity of drill sites, buildings, and other related structures. Areas where access is to be restricted must be identified in the plan of operations. No lease facilities or operations may be located where they would block public access to or along navigable and public waters as defined in AS 38.05.965 (12) and (16).
18. Surface use will be restricted, as necessary, to prevent unreasonable conflicts with

local subsistence harvests.

#### Third Party Interests:

19. If only the subsurface estate is owned by the state, or if the surface is owned by the state but subject to third party interests, the lessee must not enter upon such land until the lessee makes a good faith effort to agree with the surface interest holder on settlement of damages that may be caused by lease activities. If an agreement cannot be reached, the Director, Division of Oil and Gas, has the authority to approve the activity, provided adequate provisions have been made by the lessee with the state to pay for any damages the surface interest holder may suffer.
20. The activities under a plan of operations must not unreasonably diminish the use and enjoyment of lands encompassed within a native allotment. Before entering a pending or approved native allotment, lessees must contact the Bureau of Indian Affairs and the Bureau of Land Management and obtain approval to enter, if required.

#### Archeological and Historical Sites:

21. Prior to the construction or placement of any onshore structure, road, or facility resulting from exploration, development, or production activities, the lessee must conduct an inventory of archeological and historical sites within the area affected by an activity. Such inventory must consider literature provided by the Matanuska-Susitna Borough, Kenai Peninsula Borough, and local residents; documentation of oral history regarding historic and prehistoric uses of such sites; evidence of consultation with the Alaska Heritage Resources Survey and the National Register of Historic Places; and site surveys. The inventory must also include a detailed analysis of the potential effects estimated to result from the activity. The inventory must be submitted to the Director of the Division of Oil and Gas and the Director of the Division of Parks and Outdoor Recreation. In the event that an archeological or historical site or area may be adversely affected by an activity, the Director, Division of Oil and Gas, after consultation with the Director of the Division of Parks and Recreation, will direct the lessee as to what course of action will be necessary to mitigate the adverse effect.

#### Fishbearing Streams:

22. The measures listed below will be imposed by the Department of Fish and Game under AS 16 to protect anadromous streams. Similar provisions will be imposed by the Department of Natural Resources to protect nonanadromous fishbearing streams. Exception to these requirements may be allowed on case-by-case basis by the agency having jurisdiction.

- a. Alteration of river banks will be prohibited.
- b. Operation of equipment within riparian habitats will be prohibited.
- c. The operation of equipment, excluding boats, in open water areas of rivers and streams will be prohibited.
- d. Bridges must be used as watercourse crossings whenever feasible. Culverts may be used only when bridges are shown not to be feasible or prudent. The siting, design, and construction of both bridges and culverts must be approved prior to the placement of either of these structures.
- e. Removal of water from fishbearing streams and natural lakes shall be subject to prior approval by the Division of Land and Water Management and the agency having jurisdiction. Compaction of removal of snow cover overlying fishbearing waterbodies will be prohibited except to accomplish perpendicular crossings. If ice thickness is not sufficient to facilitate a crossing, ice and /or snow bridges will be required.
- f. Water intake pipes in fishbearing rivers and lakes must be surrounded by a screened enclosure to prevent fish entrainment and impingement. Pipes and screening must be designed and constructed so that the maximum water velocity at the surface of the screen enclosure is not great than .1 foot per second. Screen mesh size shall not exceed .04 inch unless another size has been approved.
- g. To protect fish and other aquatic fauna, geophysical surveys in freshwater will require the use of nonexplosive energy sources. Explosives must not be detonated within, beneath, or in close proximity of fishbearing waters unless the detonation of the explosive produces a pressure rise in the waterbody of no more than three psi or the waterbody, including its substrate, is solidly frozen. The minimum acceptable offset from fishbearing streams and lakes for various size charges is:

1-2pound charge	80 feet
5 pound charge	120 feet
10 pound charge	170 feet
25 pound charge	270 feet
100pound charge	530 feet

Lessees are advised that there are numerous documented anadromous streams within the sale area, including, but not limited to, the Susitna, Anchor,

Chuitna, and Theodore Rivers and Alexander Creek. Specific information on the location of documented anadromous waterbodies may be obtained by contacting the Department of Fish and Game.

Disposal of Wastes, Produced Waters, Drilling Muds, and Cuttings:

23. Solid waste disposal is subject to the approval of the Commissioner, Department of Environmental Conservation.
24. All garbage and refuse must be incinerated. Residue and non-burnables must be disposed of at an approved upland site. No new solid fill disposal sites, except possibly for the disposal of uncontaminated drilling muds and cuttings, will be approved during the exploratory phase.
25. Discharge of produced water, drilling muds, and cuttings is controlled by a general NPDES permit for Cook Inlet.
  - a. Disposal of produced water, drilling muds, and cuttings are prohibited shoreward of the 5 m (16 foot) isobath (as measured from mean lower low water) including intertidal areas, and shoreward of the 5.5 m (18 foot) isobath adjacent to the Clam Gulch Critical Habitat Area and the Polly Creek Clam beds which extend from Crescent River north to a point one-half mile north of Redoubt Point. Disposal within 100 m (3281 feet) of a costal marsh, river delta, river mouth, designated area meriting special attention (AMSA), game refuge, game sanctuary or critical habitat area is prohibited by NPDES permit. The seaward edge of a costal march is defined as the seaward edge of emergent wetland vegetation.
  - b. Disposal of drilling muds, and cuttings will be allowed in other offshore areas and will be subject to the conditions of the NPDES permits issued by the Environmental Protection Agency and those Alaska Coastal Management Program consistency requirements incorporated in or accompany the NPDES permit.
  - c. Disposal of produced waters to freshwater bodies, intertidal habitat, and estuarine waters at river mouths is prohibited. Disposal of produced waters in upland areas, including wetlands, will be by subsurface disposal techniques, except that the Department of Environmental Conservation may permit alternate disposal methods if it determines that subsurface disposal techniques are not feasible or prudent.
  - d. Discharge of produced waters, drilling muds and cuttings to lakes, streams, or rivers is prohibited.

- e. Short-term containment or permanent disposal of drilling muds and/or cuttings requires plan review and approval by the Department of Environmental Conservation prior to construction. Final disposal by landfilling requires a solid waste management permit from the Department of Environmental Conservation before disposing of material into a pit and before the pit is designed and constructed. Liquid waste disposal activities, including disposal of supernatant reserve pit fluids, requires a wastewater disposal permit from the Department of Environmental Conservation prior to disposal.

#### Gravel Mining:

26. All gravel mining operations must be consistent with applicable area plans developed by the Department of Natural Resources in coordination with other state and local agencies.
27. In meeting gravel needs for exploration, development, and production, gravel from nearby abandoned drill pads, roads, airstrips, and existing materials sites must be used first unless it is demonstrated to the Director, Division of Land and Water Management, after consultation with the Division of Oil and Gas and the Department of Fish and Game that use of these sources is not feasible or prudent or in the state's best interests. The Alaska Oil and Gas Conservation Commission will be consulted when gravel is to be removed from a wellhead.
28. Gravel mining sites required for exploration activities must not be located within an active floodplain of watercourses, unless the Director, Division of Land and Water Management, after consultation with the Department of Fish and Game, determines that no feasible and prudent alternative exists and that a floodplain source will cause the least adverse environmental impact. Mining site development and rehabilitation within the floodplains must follow the procedures outlined in Gravel Removal Guidelines for Arctic and Subarctic Floodplains, 1980, US Fish and Wildlife Service – Woodward Clyde Consultants. Department of Fish and Game approval is required if the mining site is located within an anadromous stream (AS 16.05.870) or could block fish passage (AS 16.05.840).
29. During development and production, gravel mining within active floodplains will be prohibited. Upland mining sites will be restricted to the minimum number necessary to efficiently develop the field. Where sufficient ground water is not available to meet the anticipated needs of lessees, lessees may be required to design and construct upland gravel sites to function as water reservoirs for future use.

### Seismic Activities:

30. State policy prohibits seismic activities that utilize high velocity explosives in or beneath marine or fresh waters.
31. Forest clearing by bulldozer or extensive forest clearing by other means solely for seismic exploration must be approved by the Director, Division of Oil and Gas, after consultation with the Division of Forestry and the Department of Fish and Game.

### Special Areas:

32. Portions of Tracts 210, 211, 263, and 266 are within the Clam Gulch Critical Habitat Area . Portions of Tracts 212, 216, 218, and 287 within the Kalgin Island Critical Habitat Area. Portions of Tracts 55, 57, and 58 are within the Goose Bay State Game Refuge. Portions of Tracts 61 through 67, 71, 73, 77, 82, and 83 are within the Susitna Flats State Game Refuge. Portions of Tracts 120 through 150 are within the Trading Bay State Game Refuge.

The management of legislatively designated state critical habitat areas and game refuges is the co-responsibility of the Department of Fish and Game under AS 16.20, and the Department of Natural Resources, under AS 38.05. The Department of Fish and Game is responsible for approving any exceptions to terms of sale imposed on Sale 49 leases in these areas. For activities occurring within a legislatively designated state critical habitat area or refuge, the lessee will be required to obtain permits from both the Department of Fish and Game and the Department of Natural Resources which specifies the terms and conditions of the lease operations. Permits will be issued upon receipt and approval of detailed plans of operations for all applicable phases of oil and gas development. All industrial operations within the refuges and critical habitat areas must comply with all Sale 49 terms and conditions as well as the requirements listed below.

- a. Surface discharge of produced waters will be prohibited.
- b. Disposal of drilling muds and cuttings will be allowed only at approved upland sites.
- c. Surface entry will be prohibited within Clam Gulch Critical Habitat Area, and on tidelands and wetlands within the Kalgin Island Critical Habitat Area and Goose Bay State Game Refuge. Surface entry may be allowed on uplands within Kalgin Island Critical Habitat Area and Goose Bay State Game Refuge, subject to the terms of the permits issued by the Department of Fish and Game and the Department of Natural Resources. Directional drilling will be allowed

from adjacent sites.

- d. From April 1 to October 31, aircraft flying over Goose Bay State Game Refuge and the primary waterfowl habitat within the Susitna Flats and Trading Bay State Game Refuges will maintain a minimum altitude of 1500 feet above ground level or a horizontal distance of one mile.
  - e. No drilling will be permitted until the lessee demonstrates the capability to expeditiously detect, contain, and cleanup any hydrocarbon spill that may result from lease activities before the spill significantly impacts fish and wildlife populations or their habitats. This includes the capability to drill a relief well in the event of a loss of well control.
  - f. All lease facilities must be designed and constructed to prevent the spread of hydrocarbons and facilitate cleanup, both above and below ground.
  - g. Lease facilities must include all available design features to minimize the possibility of accidental oil spills or fires resulting from vandalism or hunting accidents.
  - h. Upon abandonment or expiration of a lease, all facilities must be removed and the sites rehabilitated to the satisfaction of the Department of Fish and Game and the Department of Natural Resources, unless the departments determine that it is in the best interests of the public to retain some of all of the facilities. Specific rehabilitation requirements will be identified in the Habitat Protection Permit issued under AS 16.20.060.
  - i. Exploration, development and major maintenance within the Susitna Flats and Trading Bay primary waterfowl areas will be allowed only between November 1 and March 31, unless an extension is approved by the Department of Fish and Game. Routine maintenance and emergency repairs will be permitted on a year-round basis during the production phase. A detailed plan describing routine maintenance activities to be conducted between April 1 and October 31 must be submitted to the department for review and approval.
  - j. Gravel pads and well heads are the only permanent above ground structures that will be allowed within the Susitna Flats and Trading Bay primary waterfowl areas. The design and construction of the gravel pads and well heads must be approved by the Department of fish and Game and the Department of Natural Resources and utilize the best proven technology to minimize the visual, biological and physical impacts of these structures.
33. Peregrine falcon nesting sites are not known to occur within the sale area.

However, lessees are advised that disturbing a peregrine falcon nest violates federal law. If the lessee discovers active peregrine falcon nest sites, the lessee must immediately report the nest locations to the Director, Division of Oil and Gas. To comply with state and federal endangered species acts, the following restrictions will apply in the vicinity of peregrine falcon nests sites, except as otherwise approved by the Department of Fish and Game, after consultation with the US Fish and Wildlife Service. All known nest sites will be considered active between April 15 and June 1. Known nest sites that have not been surveyed will be considered active throughout the summer season. Nest sites not having a peregrine falcon present by June 1 will be considered inactive, and oil and gas activities near inactive nests will not be subject to the restrictions listed under b, c, and d. Activities at existing development sites within two miles of newly established nests will not be subject to these restrictions.

- a. Within one mile (1.6 km) of all nest sites -- Facilities, including but not limited to roads, pipelines, disposal sites, gravel mines, storage facilities, and camps will be prohibited.
  - b. Within one mile (1.6 km) of active nest sites -- Between April 15 and August 31, surface entry will be prohibited and aircraft overflights must avoid nest sites by 1500 feet (457 m) above nest level.
  - c. Within two miles (3.2 km) of active nest sites – Noisy activities, including blasting and gravel washing, will be prohibited between April 15 and August 31. Airfield, construction camps, disposal sites, compressor stations, and other permanent facilities that occupy large areas, which are noisy, or which require sustained human occupancy will be prohibited.
  - d. Within 15 miles (24 km) of active nest sites – Except for limited non-aerial applications of approved non-persistent insecticides, pesticide use will be prohibited.
34. If the lessee discovers previously unreported active or inactive bald eagle nest sites, the lessee must immediately report the nest locations to the Director, Division of Oil and Gas. Lessees are advised that oil and gas activities likely to disturb nesting eagles will be subject to the provision of the Bald Eagle Act of 1940, as amended. Permanent facilities may be prohibited within one-quarter mile (.4 km) and will be prohibited within 500 feet (152 m) of bald eagle nests, whether currently active or inactive. Surface entry, fixed wing aircraft flights below 500 vertical feet (152 m), and helicopter flights below 1500 vertical feet (457 m) will be prohibited within 500 feet (152 m) of all active bald eagle nests between April 1 and August 31. Temporary activities within 500 feet (152 m) of bald eagle nest sites may be allowed between September 1 and March 31 if they will not alter bald

eagle habitat. The Department of Fish and Game will make maps identifying documented bald eagle nest site locations available to the Director, Division of Oil and Gas, and lessees within 60 days of the date a request for approval of a plan of operations is received.

35. The siting of facilities within a 2000 yard-wide vessel trackline in Cook Inlet may be prohibited. The US Coast Guard will not allow oil and gas activities to obstruct navigation in Cook Inlet.
36. Pipelines should be consolidated to the extent feasible and prudent and must be designed, sited, and constructed to allow safe passage of moose. Adequate elevation, ramping, or burial of pipelines will be required in areas identified by the Department of Fish and Game as important moose movement zones.
37. Off shore drilling facilities are prohibited in Tracts 103, 107, and 108 from the mean high tide line to one mile seaward.
38. The special measures listed below will be imposed to preserve Tule goose and trumpeter swan habitat adjacent to Redoubt Bay and Trading Bay. In addition to all other Sale 49 lease terms, activities on tracts 135, 137, through 140, 142, and 144 through 150 west of Trading Bay, and tracts 156 through 159, 162, 165 through 169, 180, 181, 197, 198, and 206 west of Redoubt Bay shall comply with these provisions. The Division of Oil and Gas, the Department of Environmental Conservation and the Department of Fish and Game will also recommend that the same provisions, as well as all other applicable Sale 49 terms, be imposed for lease-related activities occurring on adjacent unleased state lands in the Redoubt and Trading Bay area.
  - a. No surface entry will be allowed in the core Tule goose and trumpeter swan nesting and molting corridors along the Big, Kustatan and McArthurs rivers. Portions of tracts 135, 137 through 140, 142, 144, 147, 148, 149, 150, 156 through 159, 165 through 169, and 181 are within the corridors.
  - b. For tracts and portions of tracts outside of the corridors, the following conditions will be imposed:

Exploration, development, and major maintenance such as well workovers will be allowed only between November 1 and March 31. Routine maintenance and emergency repairs will be permitted on a year-round bases during the production phase. A detailed plan describing routine maintenance activities to be conducted between April 1 and October 31 must be submitted to the Director, Division of Oil and Gas, for review and approval.

Gravel pads, wellheads, and buried pipelines are allowed but must be constructed between November 1 and March 31. The design and construction of gravel pads and wellheads must utilize the best proven technology to minimize biological, physical, and visual impacts of these structures.

Production facilities must be consolidated, if feasible and prudent, at the existing Trading Bay production facilities site on the West Forelands. Essential production facilities may be sited elsewhere, except within identified core areas, if the Director, Division of Oil and Gas, with the concurrence of the Department of Fish and Game, determines that siting of facilities at Trading Bay is not feasible and prudent, and that such facilities can be sited, designed, constructed, and operated in a manner that minimizes adverse affects on Tule goose or trumpeter swan nesting and molting habitat.

Local roads between drill sites may be allowed, but hydrologic alteration of wetlands will be prohibited.

Gravel extraction will be allowed outside of wetlands and only at approved sites.

No drilling will be permitted until the lessee demonstrates the capability of expeditiously detect, contain, and cleanup any hydrocarbon spill that may result from lease activities before the spill significantly impacts fish and wildlife populations or their habitats. This includes the capability to frill and relief well in the event of a loss of well control.

All lease facilities must be designed and constructed to prevent the spread of hydrocarbons and facilitate cleanup, both above and below ground.

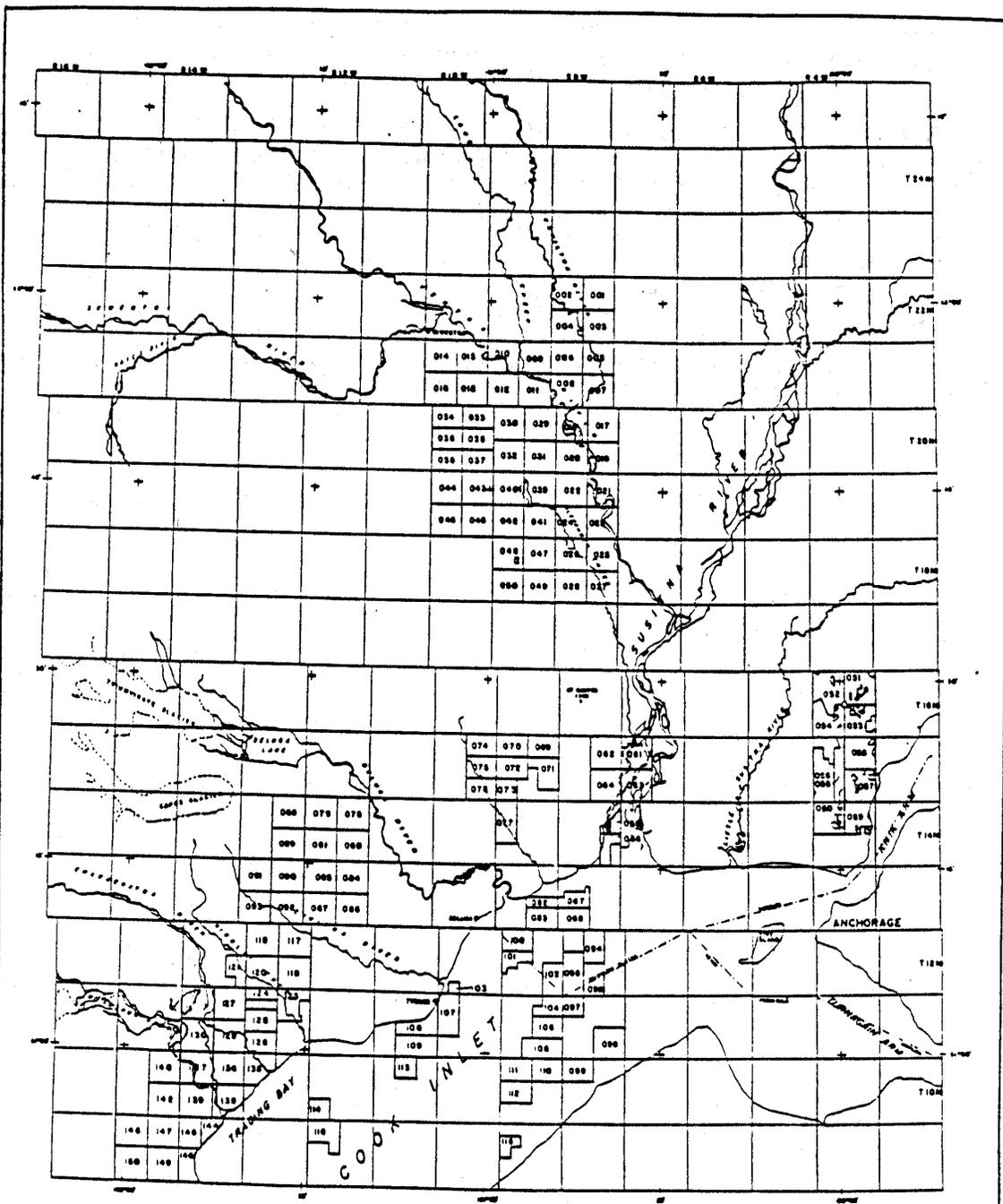
Lease facilities must include all available design features to minimize the possibility of accidental oil spills or fires resulting from vandalism or hunting accidents.

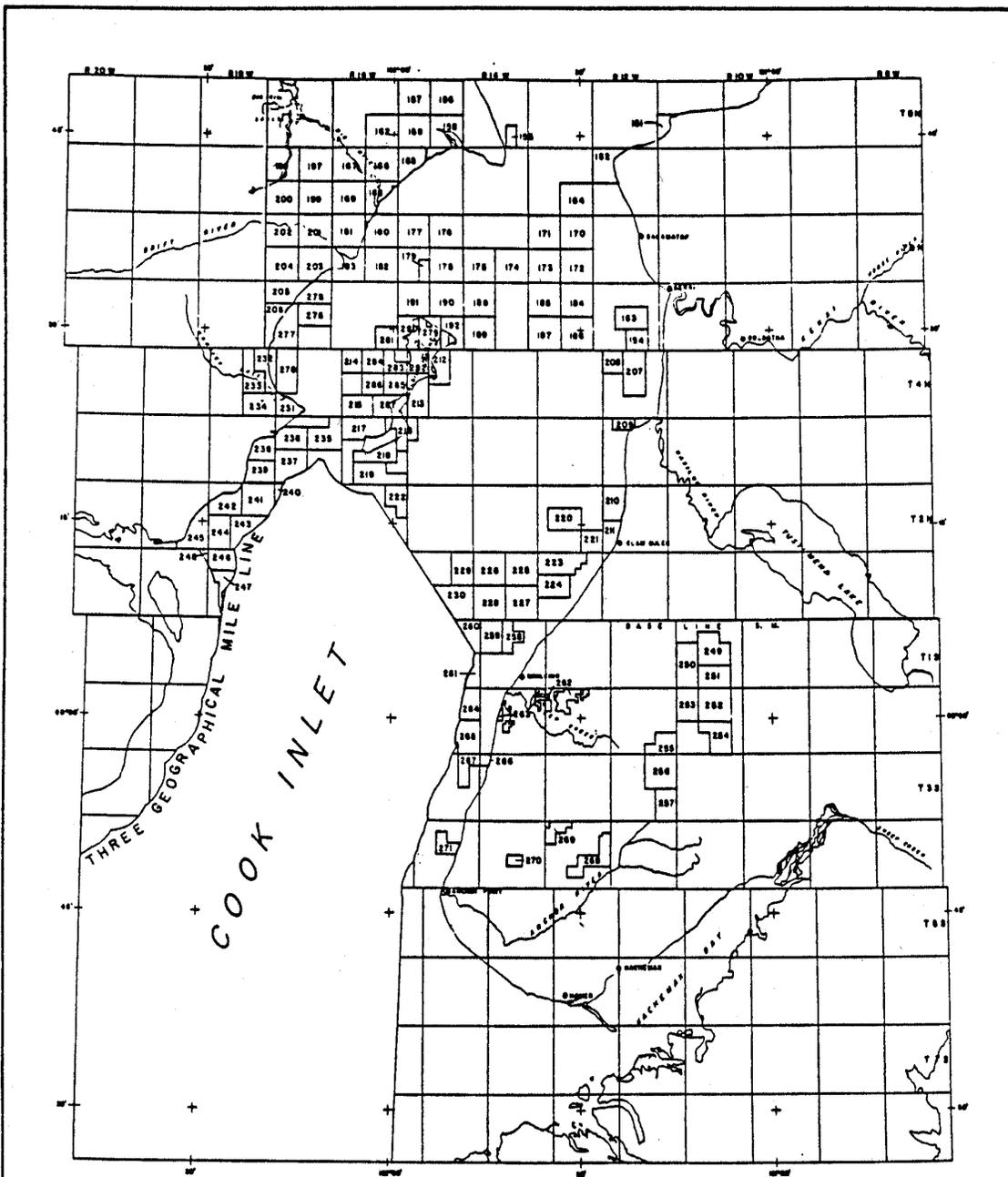
Disposal of produced waters must be by commonly practiced subsurface disposal techniques. Surface discharge of produced waters will be prohibited.

Disposal of drilling muds and cuttings will be allowed only at approved upland sites. Sump and reserve pits must be bermed and rendered impermeable, or otherwise fully contained through diking or other means.

Removal of riparian vegetation for required gravel pads and wellheads will be allowed. Removal of riparian vegetation for other than required gravel pads and wellheads will be restricted and may be prohibited.

- c. From April 1 to October 31 aircraft will maintain a minimum altitude of 1,500 feet above ground level or a horizontal distance of one mile from the identified core areas, excluding take-offs and landings.
39. Surface entry for lease operations will be prohibited within  $\frac{1}{4}$  mile of trumpeter swan nesting sites during the period May 1 through August 31. Except as provided in terms 32 and 38, aircraft overflights will be prohibited within 1,500 vertical feet and  $\frac{1}{4}$  mile lateral distance of trumpeter swan nesting sites during the period May 1 through August 31. The siting of permanent facilities, including roads, materials sites, storage areas, powerlines and above ground pipelines, will be prohibited within  $\frac{1}{4}$  mile of nest sites unless approved by the Director, Division of Oil and Gas, in consultation with the Department of Fish and Game. At the request of the lessees, trumpeter swan nesting sites will be identified by the Department of Fish and Game prior to the submissions of plans of operations.





STATE OF ALASKA  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL & GAS  
**PROPOSED OIL AND GAS LEASE SALE 49**  
**COOK INLET**  
**TRACT MAP**

SCALE 1:600,000 1" = 0.5 MILES APPROX. 60 MM

DIRECTOR, DIV. OF OIL & GAS KAY BROWN <i>Kay Brown</i> LEASING MANAGER PAMELA ROGERS <i>Pamela Rogers</i>	DRAWN BY DATE APPROVED 7/17/78 O.D.S. <i>SEE LIST APPROPRIATE 2/27/78</i> CHECKED BY <i>3/2/78</i> <small>THIS MAP IS A REPRODUCTION OF THE ORIGINAL MAP AND IS NOT TO BE USED FOR ANY OTHER PURPOSE.</small>
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NOTE: THIS MAP IS NOT TO BE CONSTRUED AS AN OFFICIAL TRACT MAP. A SET OF 1:60,000 SCALE TRACT MAPS ARE AVAILABLE AT THE DEPT. OF NATURAL RESOURCES, DIVISION OF OIL AND GAS, 3000 C. ST., P.O. BOX 7534, ANCHORAGE, ALASKA 99510-7534. PHONE (907) 961-2020

PROPOSED SALE AREA

288	282	281	220
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FIGURE 2B