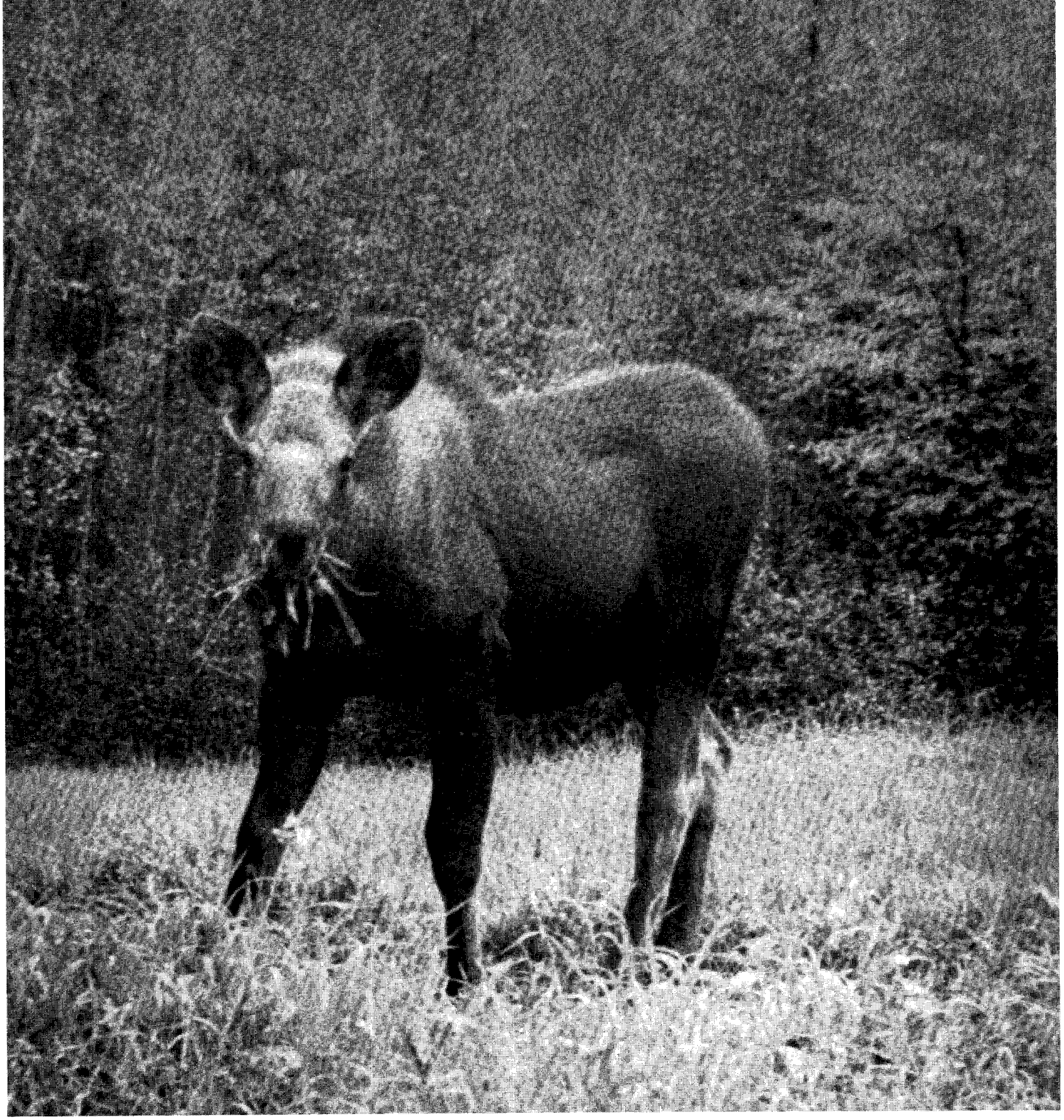


Photo: Chugiak-Eagle River Star

NATURAL ENVIRONMENT

NATURAL ENVIRONMENT

In order to assess the suitability of land for development, and to determine lands which are necessary for retaining the character of the Chugiak-Eagle River area, as well as providing for the protection of environmental resources, a review of the natural setting was undertaken.

Natural features are interrelated. Geology and climate determined the basic form of Chugiak-Eagle River which, in turn, influenced the pattern of rivers and streams and the occurrence of groundwater resources. The movement of sediments, partly by water, helped to determine soil characteristics. And, when climate, topography, the water regimen and soils are known, the patterns of plant and animal distribution become clear. Land suitability is determined by all of these factors working in combination.

I. CLIMATE

The climate of the Chugiak-Eagle River area is affected by both continental and maritime influences. It is modified by the Chugach Mountains and by the waters of Cook Inlet.

Total precipitation in the Chugiak-Eagle River area averages between 15 and 20 inches per year. The area typically receives 50 to 60 inches of snow annually and 15 to 20 inches of rain. Most rain falls in mid to late summer.

Winds in the Chugiak-Eagle River area are generally light, although strong northerly winds are sometimes experienced during the winter months. Also in winter, strong winds occasionally funnel down the Eklutna River, Peters Creek and Eagle River valleys. At such times, strong gusts of wind may be experienced. For example, construction of the Fire Lake School was temporarily halted due to strong wind gusts.

Strong southerly winds sometimes occur in late summer or fall. In addition, strong northeasterly winds from the Knik and Matanuska Valleys occasionally blow along Knik Arm and have been known to cause damage to aircraft at the Birchwood airstrip. These winds have also contributed to air quality problems in the Chugiak-Eagle River area.

A. AIR QUALITY

Air quality in the Chugiak-Eagle River area is generally good. Problems that do exist are due mainly to particulate levels. Particulates are minute particles which often occur as dust. They are a known health hazard for people with lung conditions, especially asthmatics.

In the fall, the major source of particulates in Chugiak-Eagle River is vehicle-generated dust from unpaved and paved streets. In the spring, windblown dust is a significant contributor. Fall emissions have been significantly reduced by road paving and surfacing projects. Spring emissions have been reduced by improvements in winter sanding and street clean-up.

The Eagle River Rural Road Service Board sets priorities for paving roads in the particulate problem area (see PM10 Air Quality Problem Zone map), which is a 9 square kilometer area of central Eagle River. To date, 3.4 miles of road have been paved and an additional 3.2 miles have been treated with recycled asphalt.

II. TOPOGRAPHY

Chugiak-Eagle River lies in a broad alluvial valley bordered to the west by Knik Arm and to the east by the Chugach Mountains. Mud flats extend along most of the shoreline. The terrain rises gradually to the east for about two miles. Marshes are interspersed with glacial moraines, shallow depressions, small streams and knolls.

Most of the valley has slopes of less than 15 percent. Areas of steeper slopes are primarily associated with bluffs along some of the river valleys and along the coast.

Beyond this alluvial valley, the Chugach Mountains rise abruptly to the east. The Chugach Mountains are oriented north-northeast to south-southwest and have an average elevation of 4,000 to 5,000 feet above sea level, with some peaks rising to between 8,000 and 10,000 feet.

A. SLOPE

For the purposes of assessing land suitability, slopes in the Chugiak-Eagle River area have been mapped in units of less than 5 percent, 5 to 15 percent, 15 to 25 percent, 25 to 45 percent, and greater than 45 percent. (See Table 4.)

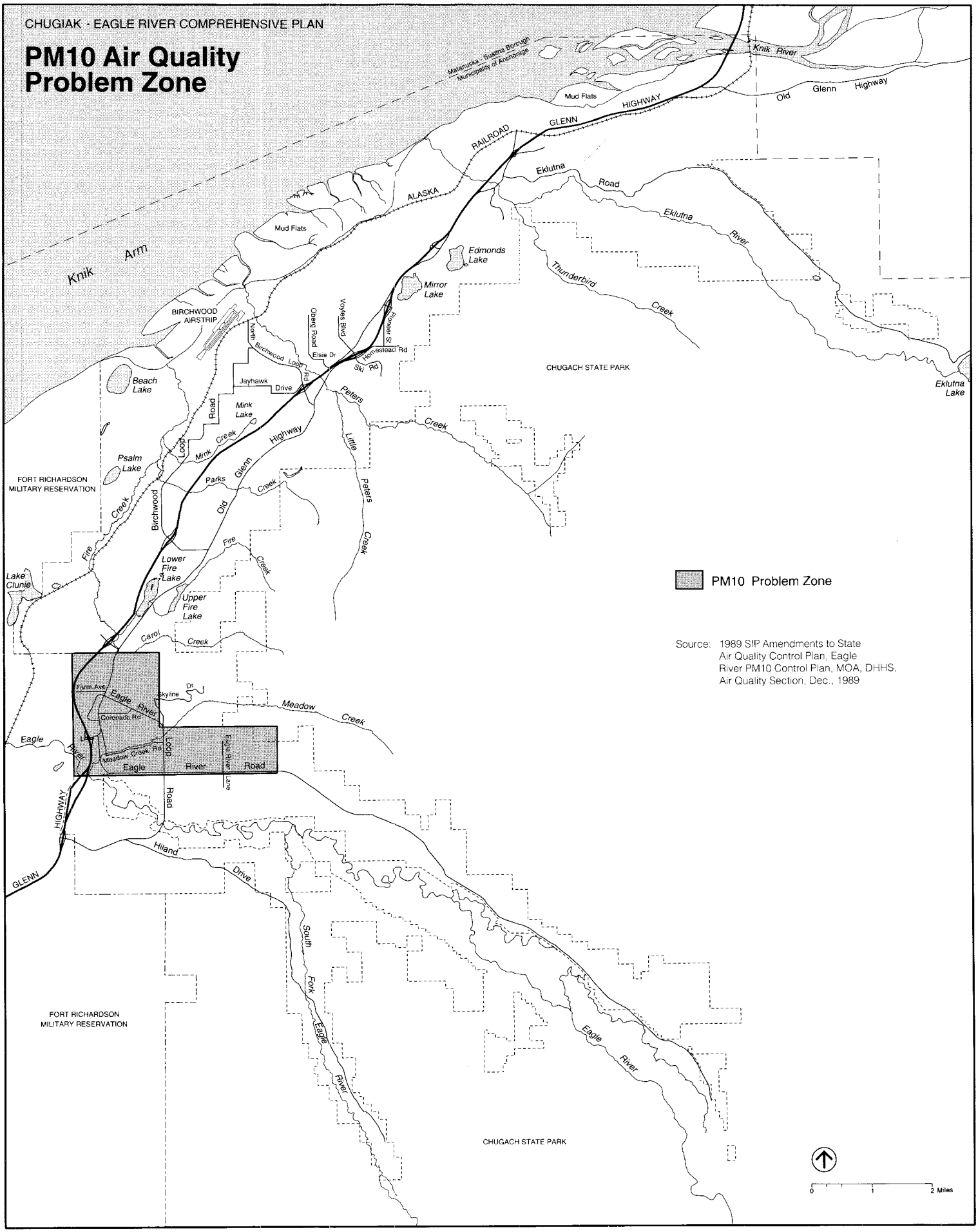
TABLE 4

SLOPE CHARACTERISTICS
CHUGIAK-EAGLE RIVER AREA

Degree of Slope	Steepness	General Location
Less than 5%	Flat	Low altitude alluvial surfaces and former lake bottoms.
5% - 15%	Gentle slopes	Alluvial fans and terraces and in some stream bottoms.
15% - 25%	Moderate slopes	Moraine ridges, landslide deposits, hummocky terrain.
25% - 40%	Steep slopes	Valley walls and mountainsides.
Over 40%	Very steep	Escarpments on high valley walls and mountainsides.

CHUGIAK - EAGLE RIVER COMPREHENSIVE PLAN

PM10 Air Quality Problem Zone



Source: 1989 SIP Amendments to State Air Quality Control Plan, Eagle River PM10 Control Plan, MOA, DHHS, Air Quality Section, Dec., 1989

In Chugiak-Eagle River, the grade of a residential street and the slope of a septic system may not exceed 15 percent. Septic systems may not be sited on slopes of greater than 25 percent. A slope of 17 percent approaches the limit that an ordinary loaded vehicle can climb for any sustained period.

III. SURFICIAL GEOLOGY

Surficial materials in the Chugiak-Eagle River area are primarily in the form of bedrock (underlying rock) and deposits left by glaciers and streams.

A. BEDROCK

There are two major bedrock types in the Chugiak-Eagle River area. The first is a relatively soft sedimentary rock which is typically found beneath lowland areas west of the Chugach Mountains. The second is harder metamorphic and igneous rock found in the Chugach Mountains.

1. Earthquakes

Where bedrock is present at the surface or at a shallow depth, areas are generally less prone to ground failure during earthquakes and are subject to lower intensity and shorter periods of shaking. Where unconsolidated deposits are thicker, as in the Eagle River Valley and along the coast, ground failure is more likely, as is higher earthquake intensity and longer periods of shaking.

The potential for damage or ground failure as a result of earthquakes varies in the Chugiak-Eagle River area. However, no areas are believed to be highly susceptible to ground failure.

An area with greater potential for more serious damage parallels the Glenn Highway in a broad band to the base of the mountains. This is presumed to be the pathway of the suspected Knik Fault Zone. The Border Ranges Fault also passes through the Chugiak-Eagle River area.

B. SURFICIAL MATERIALS

Surficial materials include those which were left by the movement of glaciers and streams, or were induced by gravity. The most common glacial deposits are moraines which typically consist of accumulations of earth and stones. Estuarine deposits were left by moving water, such as those along the edge of Knik Arm; pond and bog deposits; and glacial lake deposits, found in Eagle River Valley. Deposits caused by gravity are called mass wasting.

1. Mass Wasting

Mass wasting includes landslides, rock falls, mudflows and avalanches and is a potential problem in some areas of Chugiak-Eagle River. There is no known mass wasting potential in areas surrounding the Birchwood airport or around Eklutna village. Areas of moderate to high mass wasting potential occur along Eagle River, Fire Creek, Peters Creek and Eklutna River.

Areas of highest known mass wasting potential are generally isolated locations throughout the Chugach Mountains. Known landslide areas also include mudslide areas, sloughing along coastal bluffs and streams, and upland colluvial slides.

Snow avalanche paths are most commonly found on mountainsides in South Fork and Eagle River Valley. Other paths occur along the mountain faces up to Eklutna Valley. Many snow avalanche paths also have a high rockslide potential.

C. SOILS

As rock is moved, it gradually disintegrates into smaller and smaller particles. This loose surface material in which plants normally grow is called soil. Directly or indirectly, soil supports all terrestrial life.

The largest single soil unit in the Chugiak-Eagle River area is Homestead silt loam. Smaller areas are covered by other types of silt loam, such as Chena and Kasilof, especially around Eklutna village, the Birchwood airport, around North Birchwood, the northern portions of Chugiak, and the Artillery Road area in Eagle River. Silt loams are generally considered to be buildable soils.

Other soil units, such as Torpedo Lake, Starichkof peat, and Cryaquents, are wet and are generally associated with wetlands scattered throughout the area. However, larger concentrations of wet soils occur between Clunie Lake and Beach Lake, along Mink Creek and along Eagle River.

Both air quality and water quality are impacted by soil erosion. Soil particulates which are eroded by the wind contribute to high particulate levels. On the other hand, soil particles eroded by water contribute to high sediment levels found in some waters.

D. PERMAFROST

Permafrost is actually frozen ground. It cannot be reliably detected from surface features, making subsurface investigation for permafrost essential when evaluating specific sites for major projects. Isolated pockets of permafrost are scattered throughout the Chugiak-Eagle River area. For example, it was found at the North Eagle River interchange.

IV. HYDROLOGY

A. STREAMS AND LAKES

Streams in the Chugiak-Eagle River area generally flow to the west and northwest. Eagle River, which flows for about 25 miles from Eagle Glacier, is the major stream in the area. Its main tributaries are North Fork, South Fork and Meadow Creek.

Several other streams drain the western slopes of the Chugach Mountains and adjoining lowlands. North from Eagle River, the most significant streams include Fire Creek and its tributaries, Carol Creek, Geneva Creek, Mink Creek and Parks Creek; Peters Creek and its tributary, Little Peters Creek; and the Eklutna River and its tributary, Thunderbird Creek.

The largest lake in the area is Eklutna Lake, located near the head of the Eklutna Valley. Several other lakes are scattered throughout the lowland area. They include Edmonds, Mirror, Beach, Psalm, Upper Fire, Lower Fire, Schroeder, Meadow and Clunie Lakes.

Streams and lakes contribute to wildlife habitat and to a diversity of vegetation types. In addition, vegetation alongside streams offers important values for water quality, proper drainage and wildlife protection.

1. Flooding

Periods of flooding due to high water flow or diversions of normal flow resulting from ice blockage (glaciation) present localized problems in the Chugiak-Eagle River area. In the historic past, areas adjacent to Meadow Creek, Mink Creek and Peters Creek have experienced flooding, particularly in the broad lowlands adjacent to the downstream portion of Peters Creek.

2. Drainage

Drainage which is of an insufficient volume to constitute a stream follows natural pathways and channels to the receiving waters. As development took place in the Chugiak-Eagle River area, many natural drainageways were blocked, filled, or re-channeled. These actions have contributed to existing drainage problems. Another contributing factor has been improper design and construction of subdivision improvements, as well as a lack of maintenance of those improvements.

Proper drainage planning can decrease the cost of constructing expensive improvements and help improve the water quality. It is felt that drainage problems will cause increasing problems for homes and water quality in the Chugiak-Eagle River area in the future unless such drainage planning is undertaken.

3. Water Quality

Few Chugiak-Eagle River streams are presently monitored for water quality. Peters Creek and Little Peters Creek were sampled in four locations, but fecal coliform counts were typically low. Conductivity and turbidity results for Little Peters Creek were similar to those found in pristine streams. Meadow Creek was sampled both above and below areas of denser development. The downstream site recorded higher fecal coliform counts in all samples. No problems were found with Carol Creek or Fire Creek. However, problems were encountered in Eagle River, which was sampled at seventeen different sites. The State fecal coliform standard was exceeded at five of those sites.

Lakes have also been monitored for water quality in the Chugiak-Eagle River area. Edmonds Lake was found to have the best bacteriological quality in the entire Anchorage area. Lower Fire Lake showed a possible problem derived from on-site septic systems. In addition, the level of dissolved oxygen indicates that decaying vegetation may be consuming oxygen in Meadow Lake. Comparatively low bacteria levels were found at Mirror Lake.

B. GROUNDWATER

Groundwater is water in the zone of saturation under the surface where openings in rocks are filled with water. The upper surface of this zone of saturation forms the water table. It is into this zone that water wells are drilled. Many Chugiak-Eagle River homes depend on groundwater for their water supply.

Groundwater quality has been evaluated at 29 wells throughout the Chugiak-Eagle River area. Sampling has shown that on-site septic systems can pose problems, especially when they have been approved for lots under one acre in size, as is the case in some of the older subdivisions. Water quality problems derived from high nitrate levels have also been found in some wells.

C. WETLANDS

There are many wetlands within the Chugiak-Eagle River area. Most are located along the main drainages of Eagle River, Peters Creek and Fire Creek and in the lowlands between the Glenn Highway and Knik Arm.

General wetland types in the area include:

- Fen-type open bogs;
- Patterned ground-type open bogs;
- Old river terrace wetlands, including old sloughs;
- Scattered forested bogs and swamps;
- Riparian corridor wetlands along drainages;
- Freshwater emergent marshes around many lake borders; and
- Inter-tidal marshes, especially where freshwater streams form estuaries.

Most old river terrace wetlands and wetlands along stream corridors have very high flood control, water quality and habitat functions. Open bogs provide medium to high wildlife habitat, especially in the spring and summer.

V. VEGETATION AND WILDLIFE

A. VEGETATION

Natural vegetation in the Chugiak-Eagle River area can be classed into several types, including coniferous, deciduous, mixed, forested bog, shrub, open bog and alpine tundra. The coniferous, deciduous and mixed vegetation types are generally found in drier, upland sites, while forested bog, shrub and open bog types are associated with wetland sites.

Local vegetation types are defined as follows:

- Coniferous - Consists of a predominant stand of white spruce, usually with an understory of wild rose, alder and willow;
- Deciduous - Primarily birch, black cottonwood, quaking aspen, and several species of alder and willow;
- Mixed - Made up of white or black spruce, birch, poplar, alder and cottonwood. Understory species include wild rose, grasses, devil's club and ferns;
- Shrub - Consists of alder and other shrub thickets, and scattered trees. Associated are devil's club, red-osier dogwood, willows and blueberries;
- Forested Bog - Typically black spruce growing in poorly drained wetlands;
- Open Bog - Consists of sphagnum moss and low shrubs, with sedges, rushes and cottongrass. Common species are bog rosemary, labrador tea, shrub willows and bog cranberries; and
- Alpine Tundra - Found at high elevations and consists of both herbaceous and shrubby, low mat plants.

In addition to natural vegetation, trees and shrubs are planted throughout residential and commercial areas. Each tree is linked to every other tree and forms a network called "the urban forest." The term "forest" is intentional as it refers to the urban/suburban areas as a whole—trees, buildings, people—as a living system. This living system helps to screen incompatible land uses, mitigate noise control, to clean and cool the air, provide windbreaks in the winter, and to generally beautify the area.

B. FISHERIES

Little is known about the present abundance and distribution of fish in Chugiak-Eagle River creeks. Grayling, rainbow trout, Dolly Varden, sculpin and stickleback are the main resident fish. They have little commercial value, but they do support a popular recreational fishery. There are no significant fish populations in any streams, except for coho salmon in Eagle River, mainly because of the lack of fish habitat.

Historically, all streams in the area had salmon runs, but this is no longer the case. Salmon eggs cannot tolerate high levels of siltation or low streamflow. Where inadequate drainage conditions and soil erosion have caused in siltation problems, a corresponding loss of salmon habitat has resulted.

Recently, king salmon smolt were released into the North Fork of Eagle River and they are expected to be available for fishermen in the summer of 1992. Some habitat loss may accompany this fisheries program due to trampling of vegetation, soil erosion, bank erosion, parking lot development, and sanitation and litter problems. These concerns are being addressed by the development of a sports fishing management plan.

C. WILDLIFE

The Chugiak-Eagle River area is rich in wildlife. (See Critical Habitat Areas map.) Wildlife productivity in the Eklutna Flats is particularly impressive. A portion of the Palmer Hay Flats is also within Chugiak-Eagle River. Together, these two areas provide habitat for around one-quarter of all the Canada geese in the Cook Inlet area.

Large fur-bearing mammals such as black bear, brown bear, goat, moose and Dall sheep are found in the Chugach Mountains. The area also supports small fur bearers such as coyote, red fox, lynx, squirrel, wolf and wolverine. In addition to game animals, there are populations of smaller mammals such as beaver, muskrat, marten, mink, weasel, snowshoe hare, arctic ground squirrel, porcupine, hoary marmot and, possibly, land otter.

A large moose population is found year-round in the Eagle River, Peters Creek and Eklutna River drainages. During the winter months, an even larger population of moose is dispersed throughout the area as the animals descend from the snow covered uplands to more plentiful browse in the lowlands.

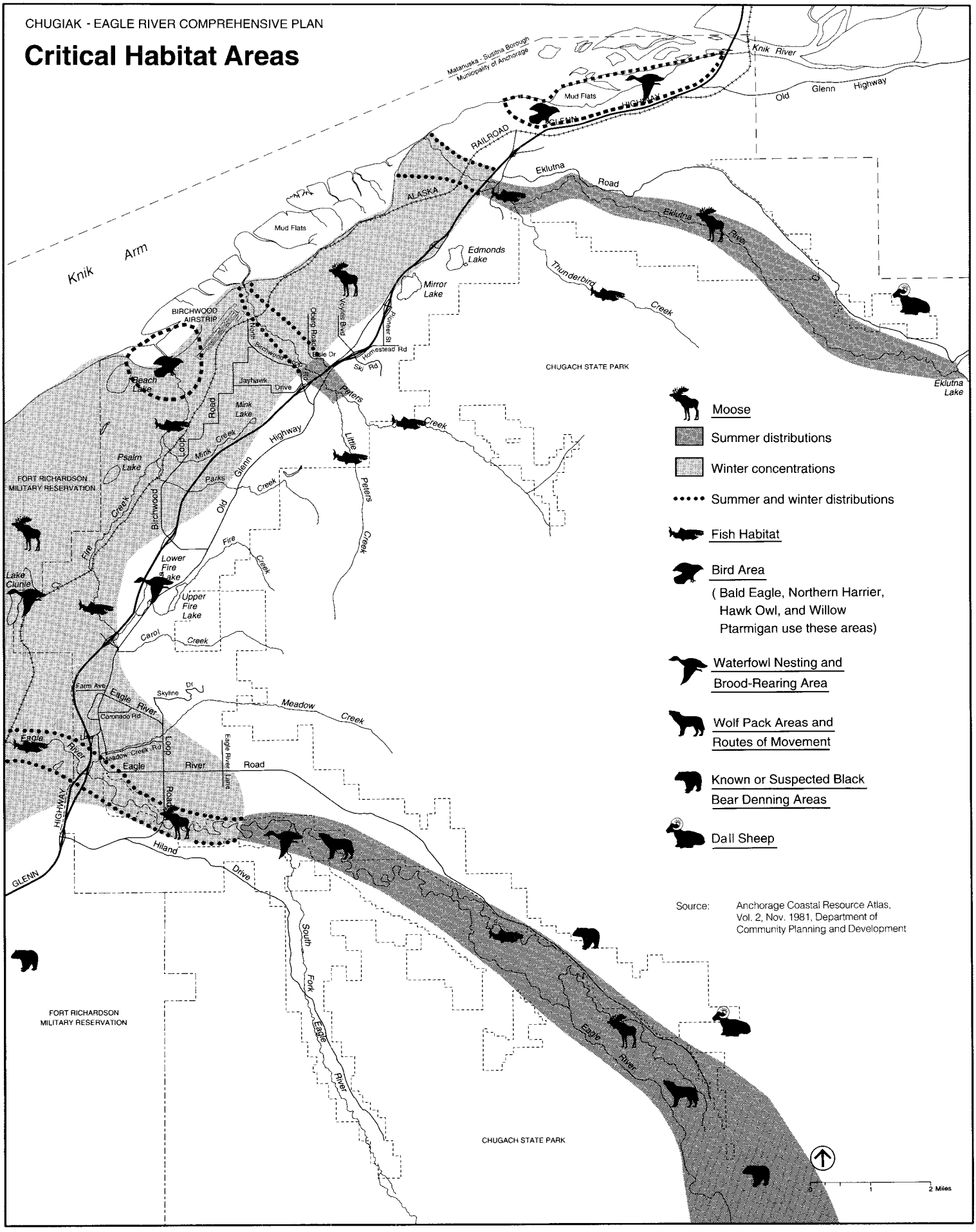
Common lake birds include common loons, mallards, red-necked grebes, goldeneyes, scaup and green-winged teal. Shovelers, pintails, widgeons and Canada geese also nest in the area. Waterfowl that are hunted include ducks, sea ducks, Canada geese, brant, white-fronted geese, snow geese, cranes and snipe. The deltas of Fire Creek and Eklutna River are important areas of bird concentration during migration. In addition, bald eagle, northern harrier, northern hawk owl and willow ptarmigan are sometimes found in an area at the mouth of Fire Creek.

VI. LAND SUITABILITY MAPPING

Information on the natural features of Chugiak-Eagle River was analyzed to determine the impact of those features on the suitability of the land for development (see Vacant Land Suitability map).

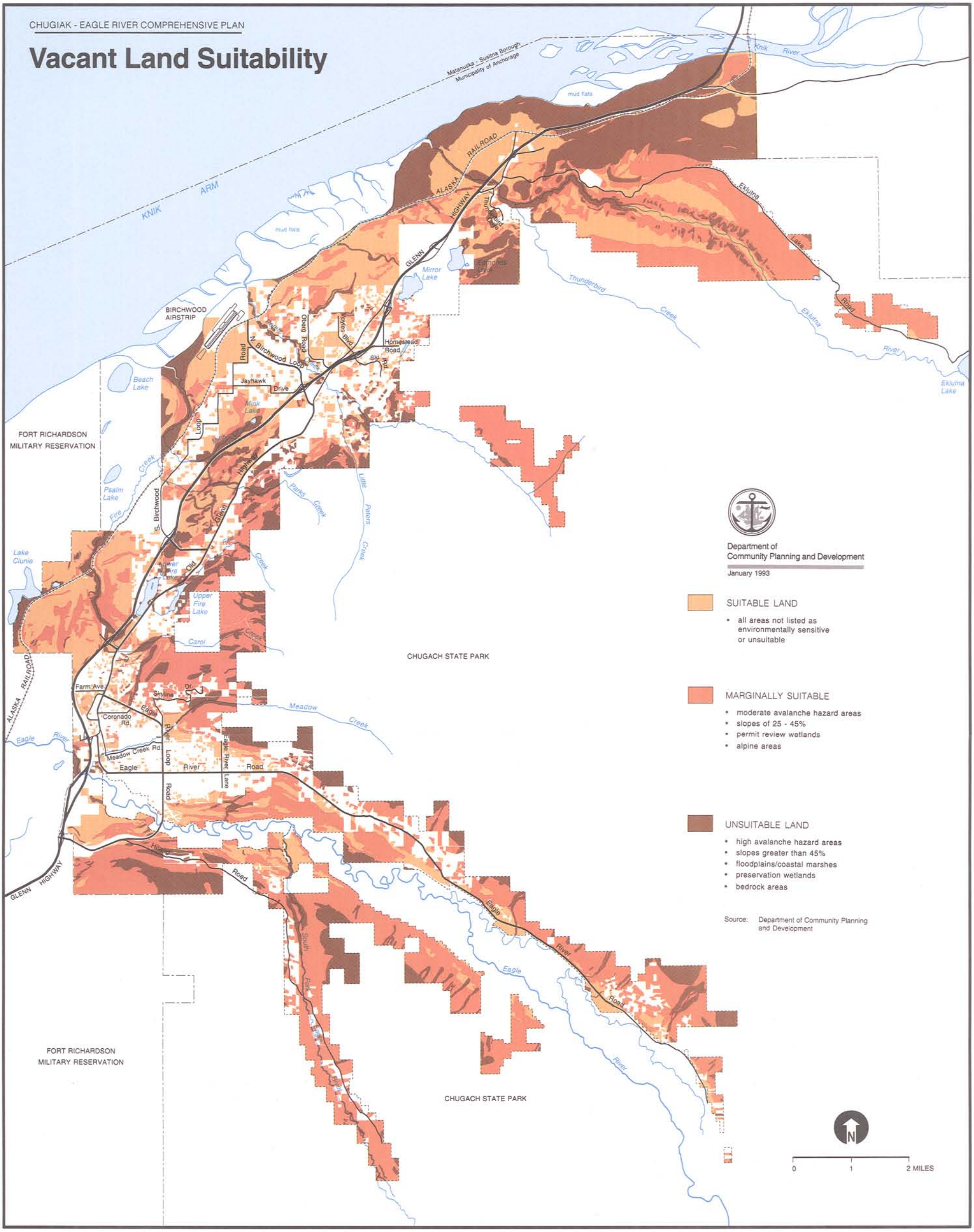
CHUGIAK - EAGLE RIVER COMPREHENSIVE PLAN

Critical Habitat Areas



CHUGIAK - EAGLE RIVER COMPREHENSIVE PLAN

Vacant Land Suitability



Lands considered unsuitable for development include bedrock areas, preservation wetlands, floodplains and coastal marshes, areas with slopes of greater than 45 percent, and high hazard avalanche areas.

Lands considered to be marginally suitable include alpine areas, conservation (permit-review) and developable wetlands, areas with slopes of 25 to 45 percent, and moderate avalanche hazard areas. Development on these lands must be undertaken with appropriate safeguards.

Lands suitable for development are all the other vacant upland areas not listed as marginally suitable or unsuitable.

The different natural features used as a basis for determining land suitability were mapped and the acreages calculated. Of the total amount of vacant land in the area (28,880 acres), 32 percent is considered suitable, 42 percent marginally suitable, and 26 percent unsuitable.

TABLE 5

VACANT LAND SUITABILITY BY SUB-AREA
CHUGIAK-EAGLE RIVER AREA
1991

Sub-Area	Suitable (acres)	Marginal (acres)	Unsuitable (acres)	Total (acres)
Birchwood	2,264	701	599	3,564
Chugiak	830	798	817	2,445
Eagle River	256	907	337	1,500
Eklutna	2,664	2,985	3,365	9,014
Eagle River Valley	969	2,292	683	3,944
Peters Creek	1,542	1,311	597	3,450
South Fork	656	3,286	1,021	4,963
TOTAL	**9,181**	**12,280**	**7,419**	**28,880**

Source: Department of Community Planning and Development.

There are wide variations in the proportions of suitable, marginally suitable and unsuitable land among the various sub-areas. For example, 63 percent of the vacant land in Birchwood is suitable and only 17 percent is unsuitable. In South Fork, on the other hand, 66 percent of the vacant land is marginal, with only 13 percent considered suitable.

Eklutna has the largest amount of vacant land and the largest amount of suitable land.

Future land demand was calculated based on population and employment projections. Land uses were then allocated among each of the sub-areas, as discussed in the Guidelines for Growth chapter. In allocating land use in accordance with land demand, only suitable vacant lands were considered.