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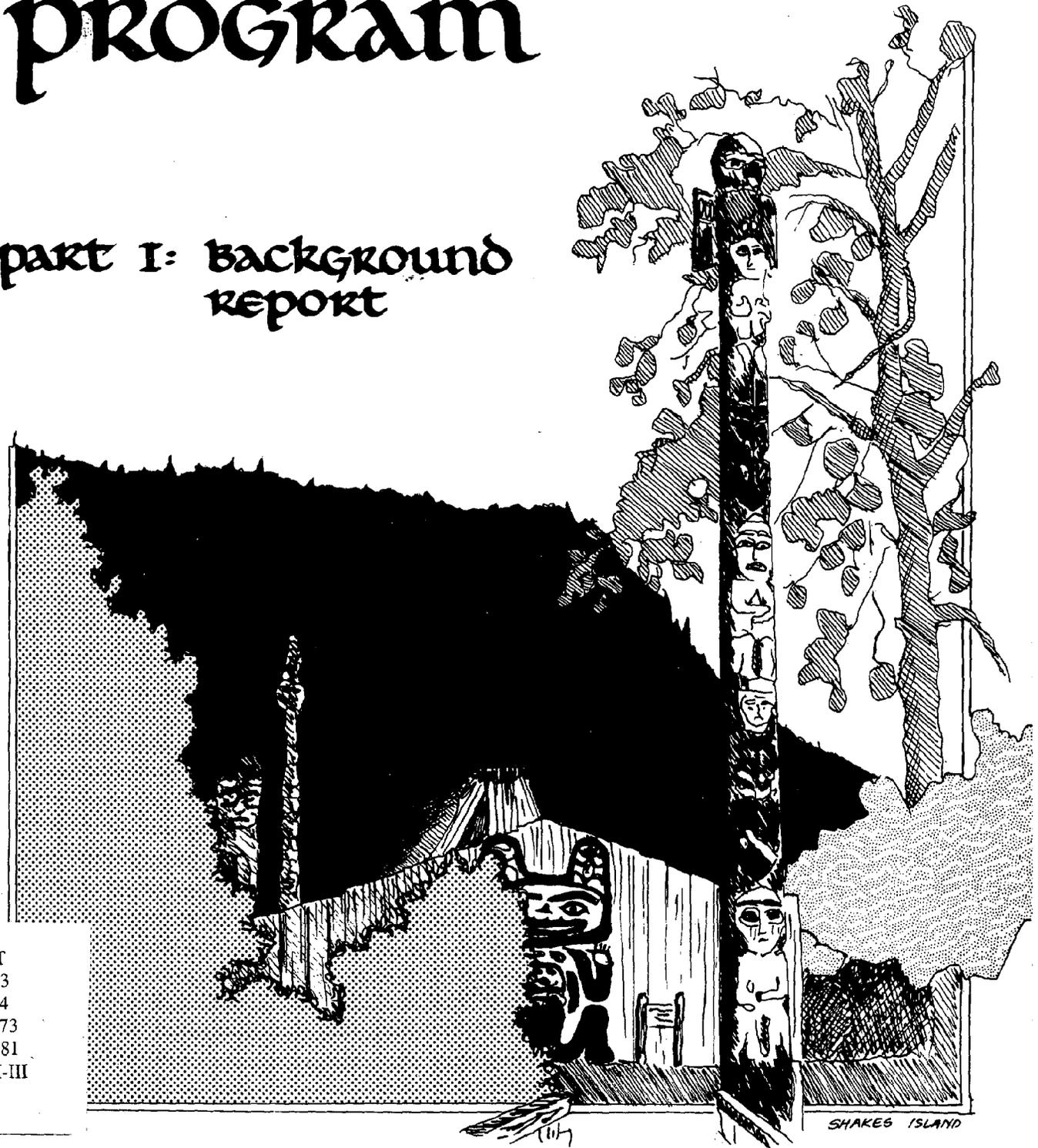
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WRANGELL COASTAL MANAGEMENT PROGRAM

PART I: BACKGROUND REPORT

Alaska Coastal Management Program

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CITY OF WRANGELL
COASTAL MANAGEMENT PROGRAM
BACKGROUND REPORT

City of Wrangell
P.O. Box 531
Wrangell, Alaska 99929

Prepared by:
Environmental Services Limited
October 1981

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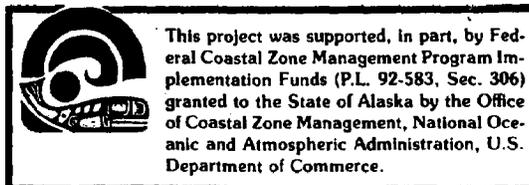


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LIST OF ABBREVIATIONS

ACMP	Alaska Coastal Management Program
ADFG	Alaska Department of Fish and Game
AEIDC	Arctic Environment Information and Data Center
AFN	Alaska Federation of Natives
AGC	Alaska Gold Company
ALP	Alaska Lumber and Pulp Company
ANCSA	Alaska Native Claims Settlement Act
APA	Alaska Power Authority
ASARCO	American Smelting and Refining Company
ASHA	Alaska State Housing Authority
AVA	Alaska Visitors Association
BIA	U.S. Department of Interior, Bureau of Indian Affairs
BLM	Bureau of Land Management
CJPA	Criminal Justice Planning Assistance
CMP	Coastal Management Program
CRA	Alaska Department of Community and Regional Affairs
CRRL	Cold Regions Research and Engineering Laboratory
CRSA	Coastal Service Resource Area
DCED	Alaska Department of Commerce and Economic Development
DEC	Alaska Department of Environmental Conservation
DNR	Alaska Department of Natural Resources
DOTPF	Alaska Department of Transportation and Public Facilities
EDA	U.S. Economic Development Administration
EPA	U.S. Environmental Protection Agency
ESL	Environmental Services Limited
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIA	Federal Insurance Administration
FWS	U.S. Fish and Wildlife Service
HUD	U.S. Department of Housing and Urban Development
MHW	Mean High Water
MLLW	Mean Low Low Water
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NPS	U.S. National Park Service
NSHC	Norton Sound Health Corporation
NWCC	Northwest Community College (University of Alaska)
OCS	Outer Continental Shelf
OHWM	Ordinary High Water Mark
PHS	Public Health Service
PLO	Public Land Order
REAA	Regional Educational Attendance Area
SBA	Small Business Administration
SCS	Soil Conservation Survey (U.S. Department of Agriculture)
SOADA	State Office of Alcohol and Drug Abuse
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

INTRODUCTION

A coastal location near the mouth of the Stikine River and the abundance of coastal resources, particularly timber and fish were major factors in Wrangell's founding, and its future is dependent on the wise use of coastal resources. This coastal management program was developed to help make the best use of Wrangell's natural and cultural resources and to tap its economic potential. This program will help the city guide the development, use and enjoyment of resources in a prudent and balanced manner and, in so doing, the program will enhance Wrangell as a viable and pleasant community in which to live.

This background report (Part I) represents the first phase in the development of Wrangell's coastal management program. The inventories and analyses contained in this document provide the basis for the coastal management plan (Part II) and implementation program (Part III) contained in Volume II of this program. In this phase, background information necessary for development of the Wrangell Coastal Management Program was collected and analyzed. ESL worked with city representatives and concerned citizens throughout this planning effort, and reviewed studies, documents and local newspaper articles to identify local issues and needs. A community planning questionnaire was prepared and distributed to further involve the residents of Wrangell in the process of accurately assessing the issues, goals and objectives of this planning effort.

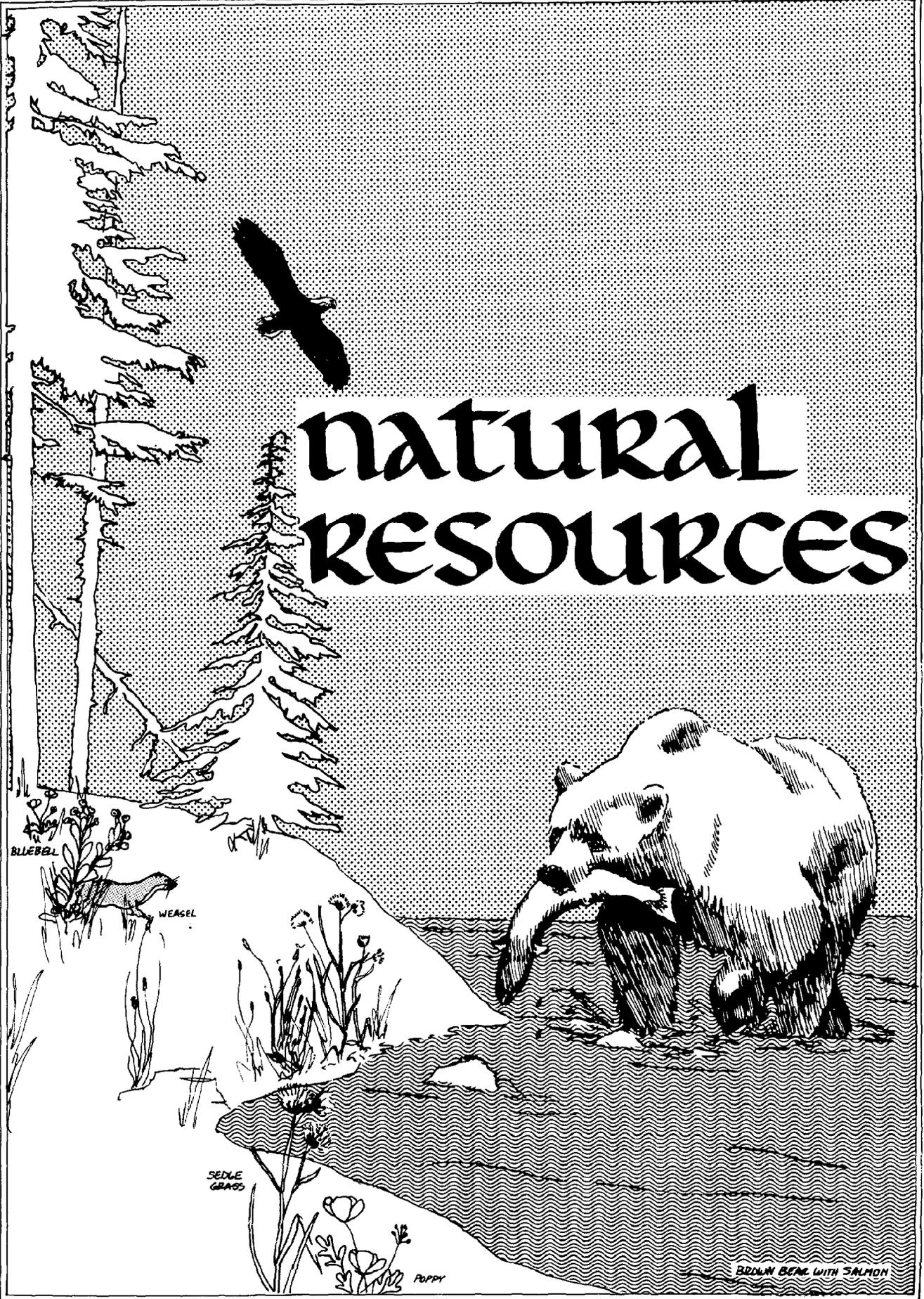
This background report is divided into three sections - natural, cultural (manmade) and economic resources. The first section identifies the area's natural resources and examines the opportunities, problems or limitations associated with their use or management. It also identifies soil conditions and hazards and evaluates the physical capability of the land to support various uses.

The analysis of natural and cultural resources included a map overlay process to assess the land's suitability for development. Natural resource information was mapped on a transparent material, and various shades of greys, from light to dark (with the dark areas having the greatest limitations for development), indicated the severity of factors limiting the potential for development. Cultural resource information such as existing land use, land ownership, transportation routes, utility service areas and other factors that determine the suitability of a site to be developed were also mapped. When all the components of the natural resource maps are viewed collectively, the different shades of individual map features combine to form a composite map. The darker shaded areas indicate the areas least suitable for development, while the lighter areas are those most physically suitable for development. The cultural resource data is then used in combination with the physical suitability maps as the basis for identifying those areas best suited for development. Composite maps of this natural resource data are shown in the land use suitability section of this report. The large scale composite maps, showing both natural and cultural resource information, are available at city hall for use by the public.

The chapter on cultural resources identifies existing conditions of the manmade environment. It reviews community facilities that need improvement or expansion and identifies land use patterns and growth trends pointing to future land use requirements.

Wrangell's industries are the community's economic backbone. They are vital to the community's existence and will have a major role in shaping its destiny. The chapter on economics identifies the existing condition and trends of Wrangell's economy and contains evaluations of the potential of the major economic components. This information provides a basis for determining probable population growth, housing needs, land use requirements and the demands likely to be placed on community utilities and services.

natural RESOURCES



BLUEBELL

WEASEL

SEDGE GRASS

POPPY

BROWN BEAR WITH SALMON

COASTAL HABITATS

"Each island, along with the mystique afforded it by man, is a world of its own, with a biological chain, fragile and delicately balanced. Obviously it does not take as much to upset this balance as it would the mainland system. Because of this, projects should be planned with a more critical eye toward preserving the very qualities of life which make island environments viable systems as well as aesthetically captivating to humans." (Washington State Shoreline Management Act)

For purposes of coastal management, the Alaska Coastal Policy Council recognizes three coastal zones - the zone of direct interaction, the zone of direct influence and the zone of indirect influence. ADFG has identified the biophysical boundaries which delineate these zones in the Wrangell area. These boundaries are determined by the extent of influence of the marine environment upon the land. Seven coastal habitat types are described that are found in one or more of these zones (Trasky, 1978).

HABITAT TYPES

Section 6 AAC 80.130 of the Alaska Coastal Management Act describes the habitats in the coastal area subject to the Alaska Coastal Management Program. These habitats are defined below and are shown in Map 1 and Map 2. Coastal habitats are to be generally managed to maintain or enhance the biological, physical and chemical characteristics of the habitat that contribute to its capacity to support life.

In general, the zone of direct interaction includes the following habitat types: offshore areas, estuaries, wetlands and tideflats, and rocky islands and seacliffs. The zone of indirect influence includes rivers, streams and lakes, and important upland habitat. Special concern areas in the Wrangell coastal zone may include any of these habitat types and will be discussed separately.

Offshore Areas

Offshore areas are defined as submerged lands and waters seaward of the coastline. Offshore areas and estuarine areas overlap substantially in the Wrangell area. All the inside passage waters near Wrangell meet the definition of estuaries; more enclosed, classic estuarine areas are discussed in the next section. Offshore areas are discussed here as the more open, higher salinity areas of the inside passage. This habitat type is inhabited by phytoplankton and other marine plants, benthic and pelagic invertebrates, benthic, pelagic and anadromous fishes, marine mammals, marine birds, and various waterfowl and

raptors. Offshore areas near Wrangell are very productive and support a variety of commercial and sport fisheries as described in the section on fisheries. The ecology of offshore areas is discussed in the section on marine life.

Estuaries

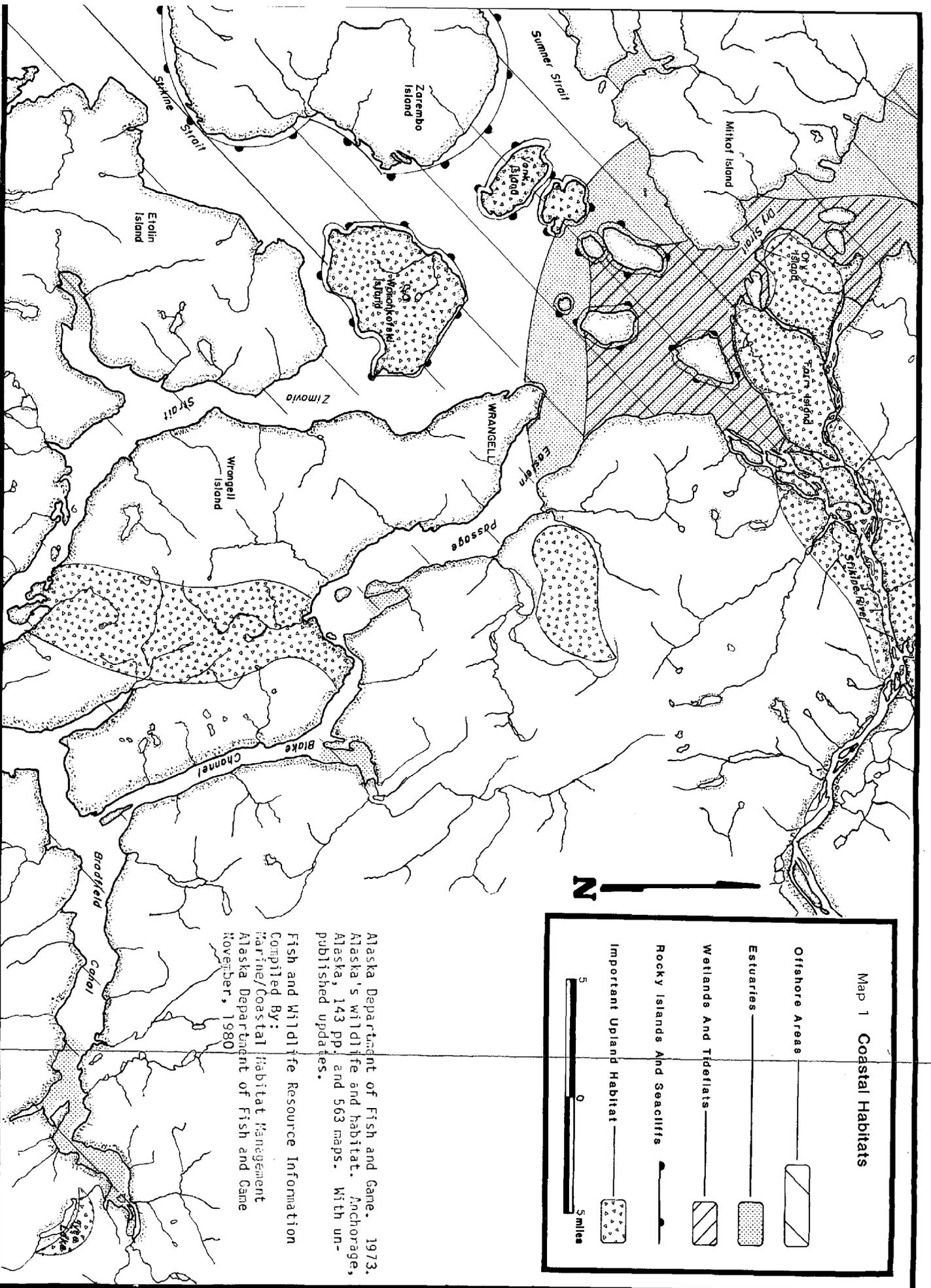
An estuary is defined as a semiclosed coastal body of water having a free connection with the sea and within which seawater is measurably diluted with freshwater derived from land drainage. Based on this definition, all the marine waters within the overall study area are estuarine in nature.

Within the larger estuarine environment there are numerous, more discrete estuaries. These include areas near the mouths of Institute Creek, Pat Creek, Thoms Creek and several others. There are also many small estuaries on neighboring islands and the mainland; Crittenden Creek and Mill Creek are important estuarine areas close to Wrangell. Crittenden Creek, Blind Slough, Madan Bay, Berg Bay and the upper end of Bradfield Canal are especially important and are mapped as special concern areas. The most important estuary in the region is the Stikine River estuary. River sediments and fresh water are transported as far as mid-Wrangell Island and greatly affect the marine ecosystems in the entire Wrangell area. The Stikine estuary is further discussed in the section on wildlife and is mapped as a special concern area for wildlife and fish habitat. The impacts of the proposed dam on the Stikine are discussed in the section on regional land status and use.

In general, estuaries are rich in nutrients and are highly productive. They are used by fish and invertebrates as nursery areas and attract larger fish, waterfowl and seabirds. Larger estuaries such as the Stikine also attract and support marine mammals. Protection of estuaries and marine wetlands is crucial to the maintenance of fisheries. Great care should be taken to avoid polluting or otherwise damaging these productive areas. Likewise, filling should not be allowed in productive estuaries.

Wetlands and Tideflats

Tideflats are areas that are alternately inundated and exposed by rising and falling tides. The range of tides at Wrangell is from 16.10 feet (mean high water) to 1.5 feet (mean low water), or an average range of 14.60 feet (Lemke, 1974). This tidal range creates extensive mudflats at the mouth of the Stikine and along the coastline, particularly on the northwest end of Wrangell Island and at the mouths of streams, where there is greater sediment deposition. Tideflats are extremely important for their rich algal growth and basal food chain organism production. They are critical habitat for a wide variety of fish, shellfish and avifauna and are used extensively by waterfowl.



Map 1 Coastal Habitats

- Offshore Areas — [diagonal lines]
- Estuaries — [dotted pattern]
- Wetlands And Tidalflats — [cross-hatched]
- Rocky Islands And Seaciffs — [solid black]
- Important Upland Habitat — [stippled]



Alaska Department of Fish and Game. 1973. Alaska's wildlife and habitat. Anchorage, Alaska, 143 pp. and 563 maps. With unpublished updates.

Fish and Wildlife Resource Information
 Compiled By:
 Marine/Coastal Habitat Management
 Alaska Department of Fish and Game
 November, 1980

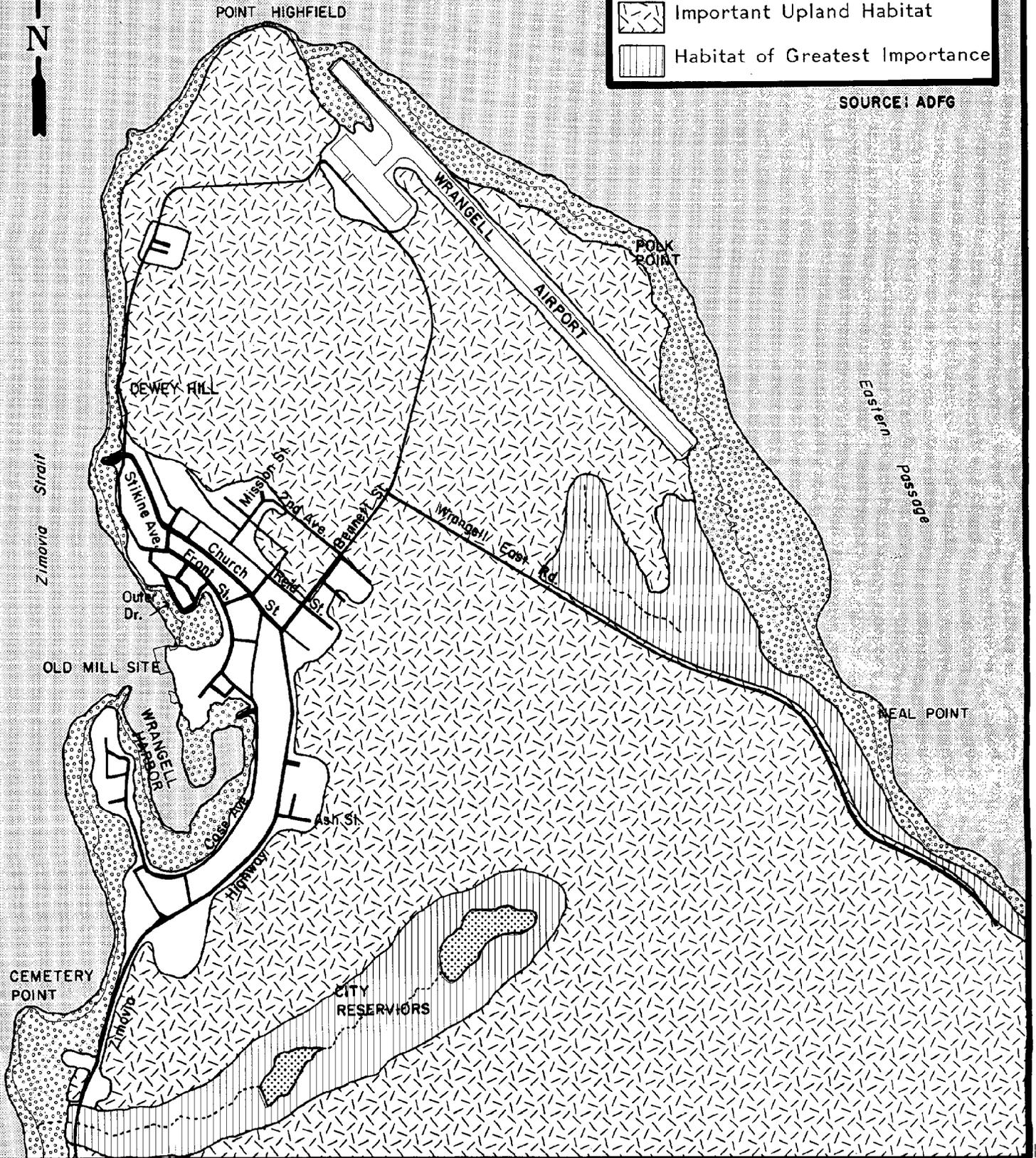
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Map 2 HABITAT CLASSIFICATION

-  Offshore Areas and Estuaries
-  Wetlands and Tideflats
-  Rivers, Streams and Lakes
-  Important Upland Habitat
-  Habitat of Greatest Importance

SOURCE: ADFG



Wetlands are defined to include both (1) freshwater environments characterized by rooted vegetation that is partially submerged, either continuously or periodically, by surface freshwater with less than 0.5 parts per thousand salt content and not exceeding three feet in depth, and (2) saltwater environments along sheltered shorelines characterized by halophytic hydrophytes and macroalgae extending from extreme low tide to an area above extreme high tide and influenced by sea spray or tidally-induced water table changes. Wetlands are associated with the small lakes on the hillside behind Wrangell, the Pat Creek area, other small lakes and estuaries in the region, and the Stikine estuary. The wetlands of the Stikine estuary are the most important wetland habitat and are critical for nesting waterfowl, making this area the best waterfowl hunting area in southeastern Alaska. The more important wetlands have been identified as special concern areas (see Map 3).

Rocky Islands and Seacliffs

This habitat type is defined as islands of volcanic or tectonic origin with rocky shores and steep faces, offshore rocks, capes and steep rocky seafronts. This habitat is important to marine birds for nesting and loafing areas, and to marine mammals for haul-out areas.

Rivers, Streams and Lakes

The Wrangell area contains several small streams and lakes. This includes over eighty-five catalogued anadromous fish streams. Areas of particular importance for fish habitat are presented in Map 6. The Stikine River is extremely important for anadromous fish spawning and as nursery habitat. Harbor seals are known to travel as far up the Stikine as Telegraph Creek (Trasky, 1978), thus the coastal zone of direct influence actually extends 160 miles upriver into Canadian territory.

Important Upland Habitat

This habitat has been defined to include (1) all wildlife concentration areas (not including areas where only wildlife presence is noted) as defined by the ADFG, and (2) an area on both sides of all anadromous fish streams. Besides providing important habitat in themselves, upland habitats protect the physical, chemical and biological quality of anadromous streams and marine waters. They also buffer downslope developments from excessive runoff, erosion and winds, and they help maintain the visual continuity of shorelines. Improper use of these uplands could severely impact important upland wildlife through the loss of critical winter habitat, as well as affect lowland aquatic and marine life, including commercial fish stocks. (Special areas of concern in the upland habitat are identified in Map 3.)

In the Wrangell area, upland habitat is primarily characterized by Sitka spruce/hemlock forest interspersed with occasional wetland or muskeg areas. Forest, muskeg and alpine upland habitats are further discussed in the wildlife section.

Wrangell Coastal Zone Special Concern Areas

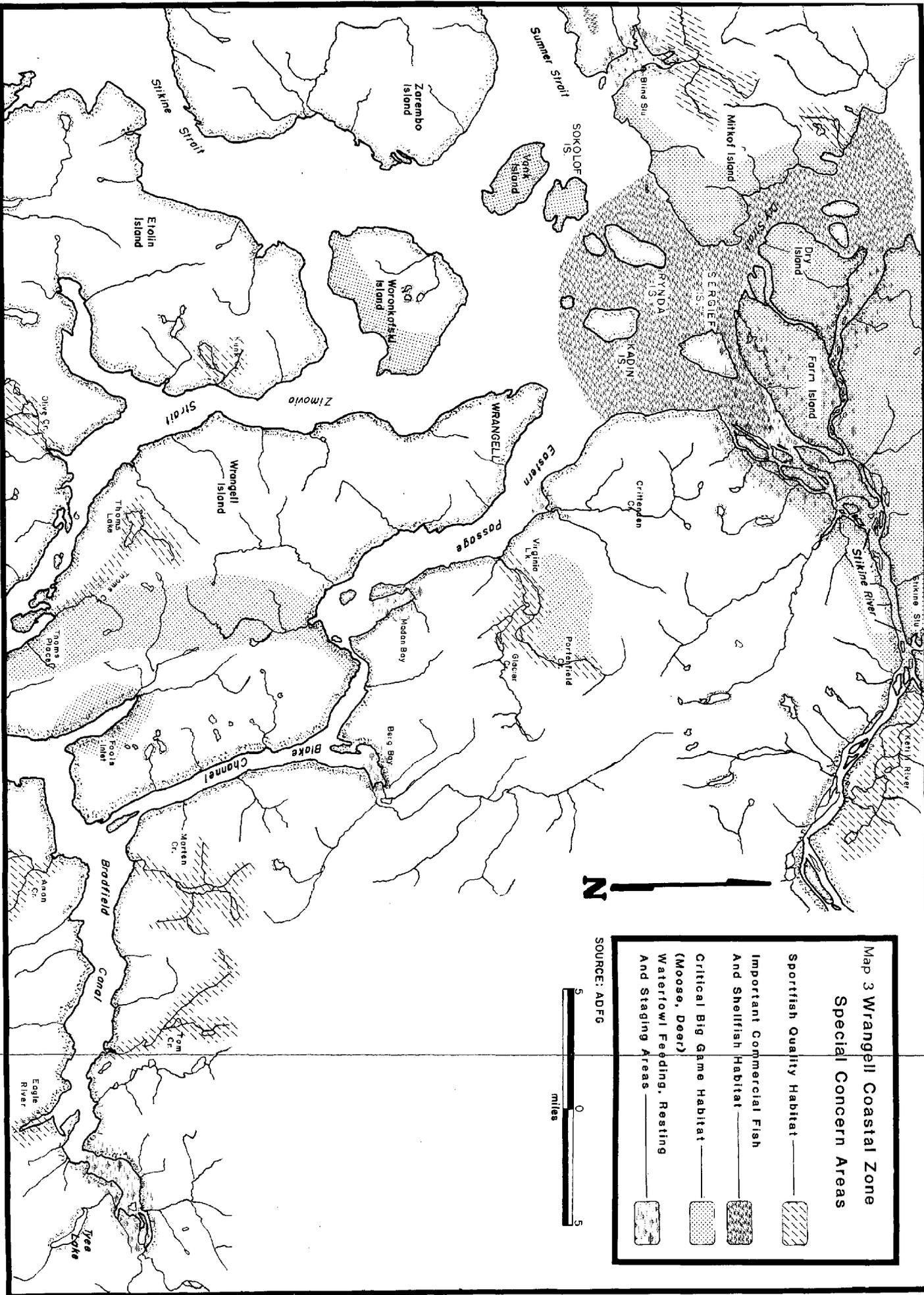
While it is recognized that all of the marine, freshwater and terrestrial habitat located within the Wrangell coastal zone study area constitute important fish and wildlife feeding, resting and rearing areas, certain locations have been identified for their concentrated use by resident and migrating fish and wildlife populations. These areas have been documented as a result of high recreational use, limited regional and local resource baseline surveys, and biological studies associated with anticipated increased land uses including timber harvest, hydroelectric power development, commercial fin and shellfish harvest and public recreational uses. Map 3 locates those areas of prime concern within the limits of the districts coastal zone management study efforts. A brief description of the importance of each area is provided in the following narrative.

Stikine River and Stikine Flats. The Stikine River traverses about 330 miles of British Columbia and southeast Alaska, terminating in a large delta approximately one and a half miles northeast of the city of Wrangell. A large portion of the river is navigable, providing an access route to the interior, a valuable recreational area and a popular tourist attraction. The river and its tributaries provide important spawning and rearing habitat for dolly varden char, rainbow and cutthroat trout, steelhead and whitefish, and for chum, pink, sockeye, coho and king salmon. Big game, including brown and black bear, moose, Sitka black-tail deer and mountain goat, depend heavily on the riparian (river valley) habitat on a seasonal basis. High concentrations of brown and black bear coincide with summer salmon migrations, and mountain goat and deer populations migrate to these lower elevations during critical winter periods.

The large delta area is a prime resting and feeding area for a wide variety of waterfowl, including trumpeter swans and other bird species. Large congregations of snow geese, Canadian geese and swans may be present from May through October. Large bald eagle concentrations are present during summer salmon migrations. This area has been incorporated into the 443,000-acre Stikine-LeConte National Wilderness Area under the Alaska Lands Bill. Management of the lands is under U.S. Forest Service jurisdiction (see section on regional land status and use).

Mitkof Island. The southeast tip of Mitkof Island displays important wildlife habitat. The shoreline fringe provides winter browse for the Sitka black-tail deer. For this reason, those critical areas outlined on Mitkof, Sokolif, Vank, Woronkofski and Wrangell Islands should be considered areas of concern, and special management consideration for all future land uses within these areas should be adopted.

Blind Slough provides high quality waterfowl resting and feeding habitat at the northeast end of Sumner Strait. This area is an effective extension of the Blind Slough sanctuary, with the Blind River drainage extending between the two tidal marsh systems. There are three eagle nest tree sites located within this drainage (USFWS, 1980). The area also receives significant deer, moose and black bear use on a seasonal basis. This area is a special management area where noncon-



Map 3 Wrangell Coastal Zone
Special Concern Areas

- Sportfish Quality Habitat _____
- Important Commercial Fish
And Shellfish Habitat _____
- Critical Big Game Habitat
(Moose, Deer) _____
- Waterfowl Feeding, Resting
And Staging Areas _____

SOURCE: ADFG



sumptive use is the primary management goal. The area is closed to black bear harvest year-round. While the Stikine River delta receives the highest waterfowl hunting pressure, Blind Slough is a very close second. Due to high numbers of trumpeter swans overwintering in this area, a portion of this area is closed to hunting.

Wrangell Island. Three areas of concern occur on Wrangell Island, each of which lies outside the jurisdictional boundaries of the City of Wrangell. Thoms Lake, Thoms Creek and Thoms Place are in a freshwater drainage that is a major sportfishing and recreational use area. Species present include dolly varden char, cutthroat and steelhead trout, and coho, sockeye, pink and chum salmon. Critical habitat for moose and deer is found along the lowlying river valleys bisecting the central portion of Wrangell Island. This area, along with Fools Inlet and the Anan Creek area, account for a high percentage of the study area sport hunting harvest, second only to the Stikine River area.

Mainland. The following have been determined to be areas of special concern on the mainland in the Wrangell area.

Waterfowl Habitats. Of the six waterfowl high use areas located within the study area, five occur within estuarine systems along the mainland. These include the Stikine River flats, Crittenden Creek and Madan Bay on the Eastern Passage, Berg Bay on Blake Channel, and the upper reaches of Bradfield Canal. The freshwater wetlands and saltwater tideflats associated with these areas provide excellent resting and feeding areas for thousands of waterfowl and shorebirds that travel the Pacific Flyway. Species commonly observed in these areas include red-throated and common loons, Canadian geese, trumpeter swans, mallard and harlequin ducks, and common and red-breasted mergansers. Numerous bald eagles nest along these inland waters, feeding on herring, salmon, waterfowl, small mammals, sea urchins and carrion found along the streams and shoreline.

Mountain Goat Critical Habitat/Deer Alpine Summer Range. The mountainous terrain located just east of Babbler Point and north of Virginia Lake has been identified as important alpine deer summer range, and important summer mountain goat habitat also lies in this general vicinity. The lower elevations along the coastline from the Stikine River to Berg Bay provide critical winter habitat for resident goat populations.

Quality Freshwater and Anadromous Fish Habitats. While nearly all streams and rivers within the study boundaries provide good habitat for such resident species as dolly varden char, rainbow, cutthroat and steelhead trout, whitefish and all five species of Pacific salmon, certain drainages have been observed to provide extremely high quality spawning and rearing conditions, resulting in significant increases in size and numbers of fish found within the drainages. These high quality drainages have been mapped to ensure that future land use proposals that might adversely affect these areas incorporate extra precautions to avoid unnecessary degradation of prime watersheds. The select drainages include Eagle River, Anan Creek, Tom Creek and

Marten Creek, all emptying into Bradfield Canal; Thoms Creek on Wrangell Island; Olive Creek and Kunk Creek on Etolin Island; Porterfield Creek, the lower reaches of Glacier Creek and Virginia Lake, which empty into Eastern Passage; Shakes Slough and the Ketili River emptying into the Stikine River; and two unnamed streams on the southeastern tip of Mitkof Island which discharge into Frederick Sound and Blind Slough. These unnamed streams are identified by their ADFG catalog numbers, 108-40-085 and 108-40-050, respectively.

MARINE LIFE

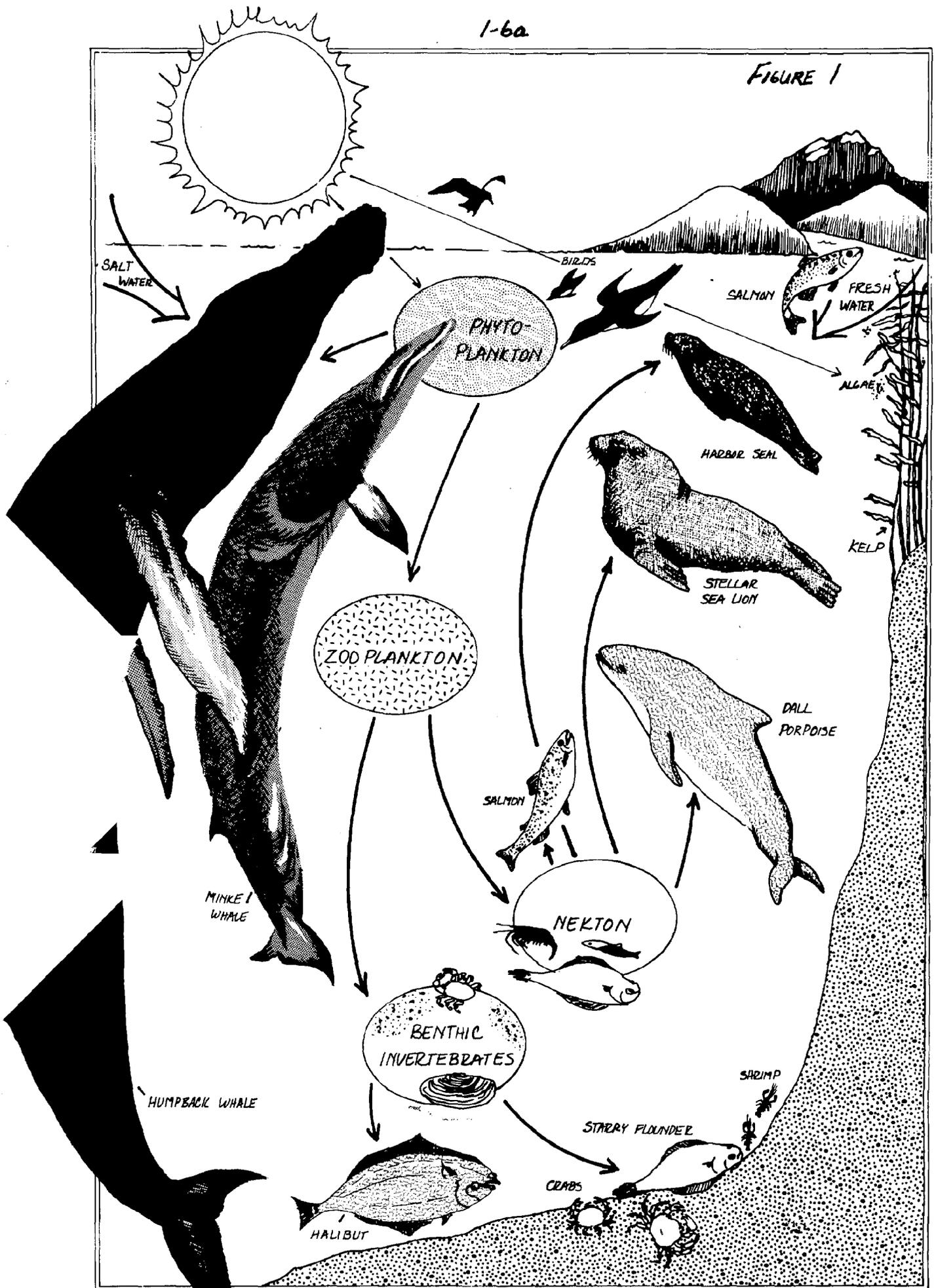
Marine food chains, like terrestrial food chains, primarily derive their energy from the sun. Solar energy is captured by the primary producers, the phytoplankton. The stored energy is then transferred along the food chain to zooplankton and then to nekton - larger mobile creatures such as fish. Nekton and zooplankton provide food for marine mammals and birds. Nekton includes all five species of Pacific salmon, crabs, shrimp and a variety of bottomfish all of which are further described in the fisheries section. Dead and decaying organic material (detritus) sinks to the sea floor and supports the "decomposer" food chain consisting of bacteria, benthic invertebrates and some benthic fishes. Figure 1 shows this food chain.

Phytoplankton in the Wrangell area and, in fact throughout the north Pacific, are predominantly diatoms. The productivity of phytoplankton - and thus zooplankton and the whole food chain - is higher where nutrients are plentiful. Such places of high productivity include enclosed inlets and fiords where wind-induced mixing occurs, upwelling areas where bottom nutrients are brought to the surface, and near river mouths and estuaries such as the Stikine where nutrients are outwashed from land sources.

Phytoplankton growth is usually seasonal. There is a large spring bloom, a series of irregular, smaller blooms through summer and fall, and a period of near-dormancy during winter. The dinoflagellate *Gonyaulax catanella* is the most important phytoplankton species in the waters around Wrangell. Brown algae, rockweed, kelp, and green and red algae are important larger marine plants. Large kelp forests of *Macrocystis* and *Nereocystis* are found in areas sheltered from excessively heavy wave action, ranging from the lower intertidal zone to subtidal areas up to ten meters deep (APA, 1979; AEIDC, 1980).

The sublittoral zone is the lowest area of the intertidal zone and has the least exposure to air. The life of this region is dominated by sponges, hydroids, sea anemones, polychaete worms, sea stars, brittle stars, sea urchins, sea cucumbers, chitons, snails, limpets, abalones and sea slugs. The midlittoral zone contains limpets, snails, mussels, cockles, butter clams, chitons, barnacles, hermit crabs and isopods. Sedges and rockweed are found in the supralittoral zone, as are snails, barnacles, mussels and isopods (APA, 1979, AEIDC, 1980). Tidepools along the Wrangell shoreline provide sheltered conditions for hermit crabs, featherduster worms, green sea anemones, snails and sea urchins.

FIGURE 1



The seven species of marine mammals most common in the Wrangell area are harbor seals, Stellar sea lions, humpback whales, minke whales, dall porpoises, harbor porpoises and killer whales (Map 4). Whitesided porpoises, blue whales and sperm whales have been seen near Wrangell Island on occasion. Sea mammals are protected from hunting by the Marine Mammal Act of 1972 (PL 92-522); the act does not apply to Native harvest of certain species, including harbor seals.

Seabirds and seabird rookeries are relatively scarce in the Wrangell area as compared with other areas of Alaska. This may be because most seabirds require a pelagic (open ocean) environment adjacent to steep cliffs or small rocky islands. A systematic census of the area has not been completed, but USFS considers it unlikely that any large colonies exist. Birds likely to be present in the area are Brandt's cormorants, pigeon guillemots, black oystercatchers, glaucous-winged gulls, marbled and ancient murrelets, Cassin's and rhinoceros auklets, and horned and tufted puffins (USFWS, 1978). Bald eagle nest sites and spring concentrations are delineated in Map 10.

The Stikine estuary has a profound influence on the marine environment around Wrangell. Freshwater dilution restricts the range of many truly marine species, especially near the surface, where it forms a freshwater layer less dense than saltwater, creating conditions favorable for more freshwater-tolerant species such as shorebirds, waterfowl, salmon fry, loons, grebes, cranes and harbor seals. Waterfowl habitat is shown in Map 10.

MARINE FISH AND SHELLFISH

Starry flounder (see Map 6), herring (Map 4), halibut and pollock are the major marine fish species used commercially in the Wrangell area (see the section on fishing in the economic chapter). Adult halibut spawn in deep water along the continental slope from November through March. Juveniles spend their first years near shore and then move offshore onto the continental shelf. Adults are found on the shelf and the continental slope from about 30 to 225 fathoms. Halibut are omnivorous, with their diet including sedentary invertebrates, crab, shrimp, sandlance and clupeoid fishes.

Starry flounder spawn in the shallower, enclosed waters around Wrangell, and large numbers of flounder inhabit the Stikine River flats. These fish are also omnivorous (they eat anything available) and feed on a variety of organisms near and on the bottom. Adults reach a size of up to twenty pounds. They are harvested with trawl nets.

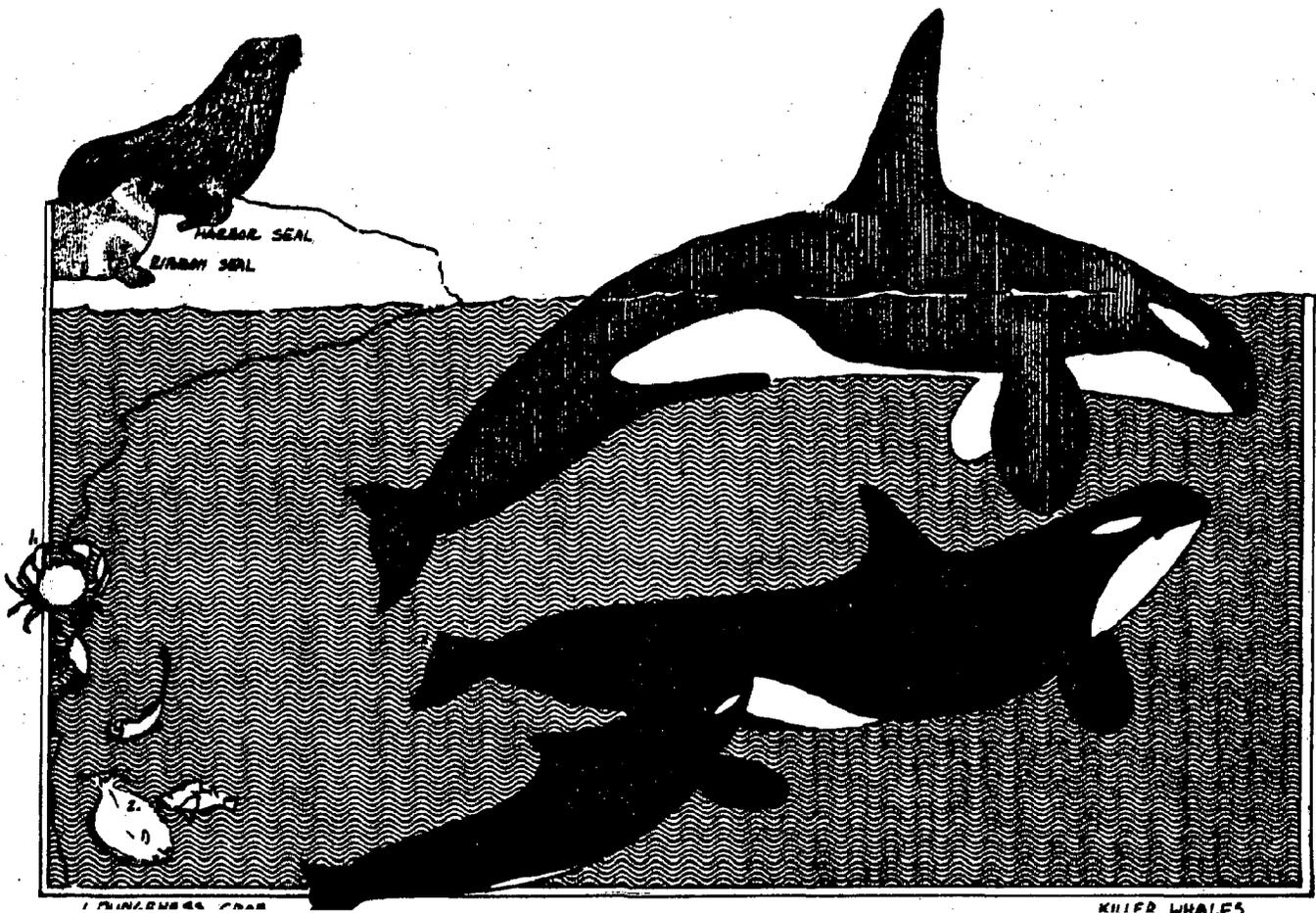
Herring are found in the waters near Wrangell, and the herring roe fishery is important commercially. Herring are also fished for as bait. Herring mature at three to four years of age. Spawning occurs during the spring, when water temperatures reach 39.5°F to 40.0°F. Roe is deposited predominantly on solid substrates, usually on marine vegetation in shallow subtidal areas. A female produces about twenty thousand eggs. Fish are harvested for roe when the eggs have developed to comprise a certain percentage (about ten percent in most areas)

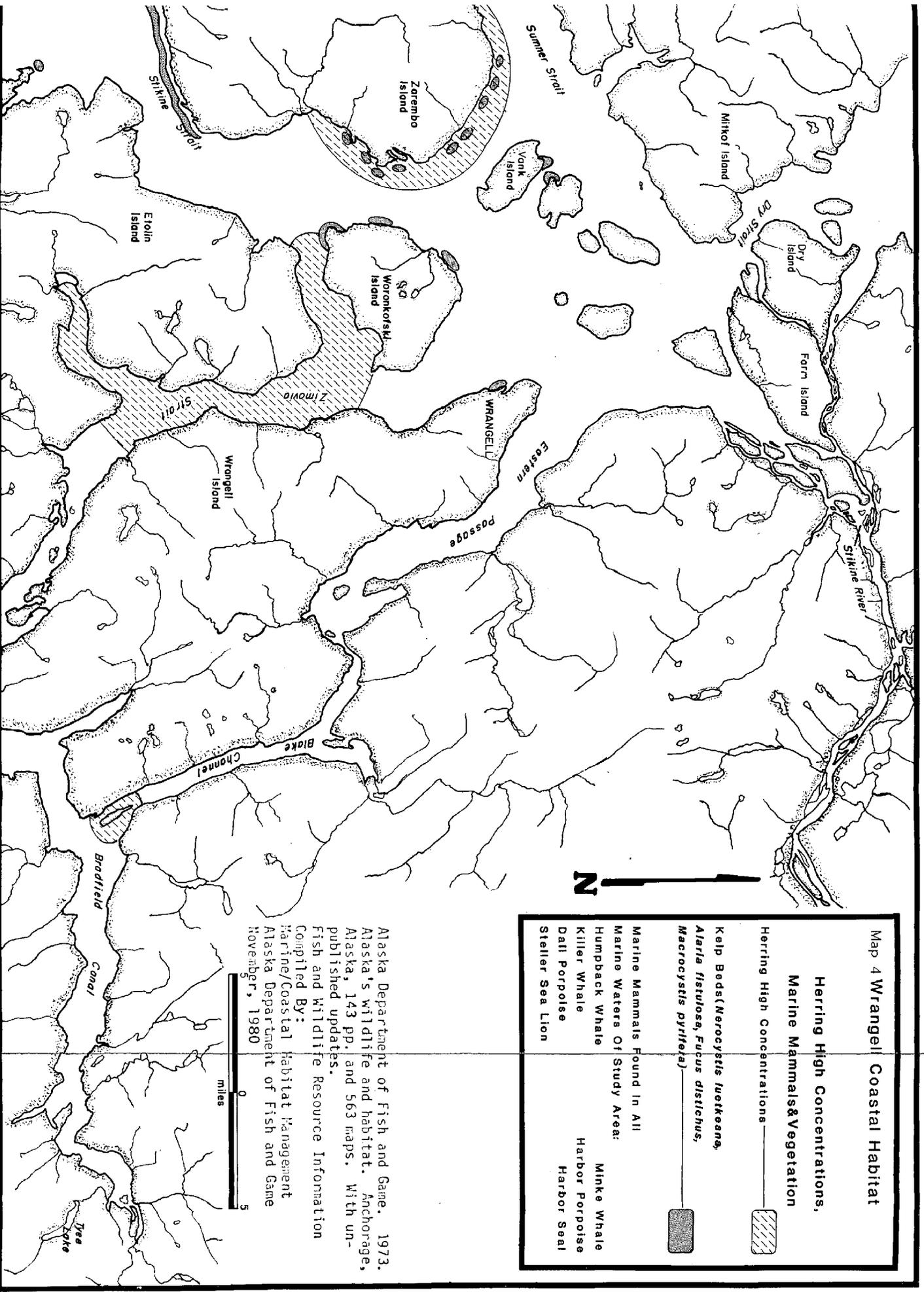
of the body weight. Within six to eight weeks after the eggs hatch, the larvae grow to about two-and-a-half-inch-long juveniles. They collect in schools and move to estuaries and bays. By fall, they are about four inches long, often forming immense schools of a million or more fish. Most schools move into deep or offshore water by fall and do not return nearshore for about two and a half years.

Pollock occupy the waters of the continental shelf and slope as well as inside passage waters near Wrangell. They are harvested with trawl nets.

In addition to finfish, several types of crustaceans reside in the waters near Wrangell. Three species of king crab are harvested in the Wrangell area (Map 5); red, brown and blue king crab comprise seventy-six, twenty-four and less than one percent of the catch, respectively. King crab reach weights of twenty-four pounds in fifteen years; commercially-caught males average eight or nine years old and weigh about seven pounds. Crabs reach maturity at four to five years of age. They migrate annually, moving from the outer continental shelf in winter to shallower waters of less than forty fathoms, where they breed. They move back to deeper water to spend summer, fall and early winter. They are omnivorous feeders.

Tanner (snow) crab (Map 5) range from the littoral zone to about 259 fathoms. They are probably the most abundant crab species in the region. Little is known of their movement and feeding habits; they may





Map 4 Wrangell Coastal Habitat

Herring High Concentrations,
Marine Mammals & Vegetation

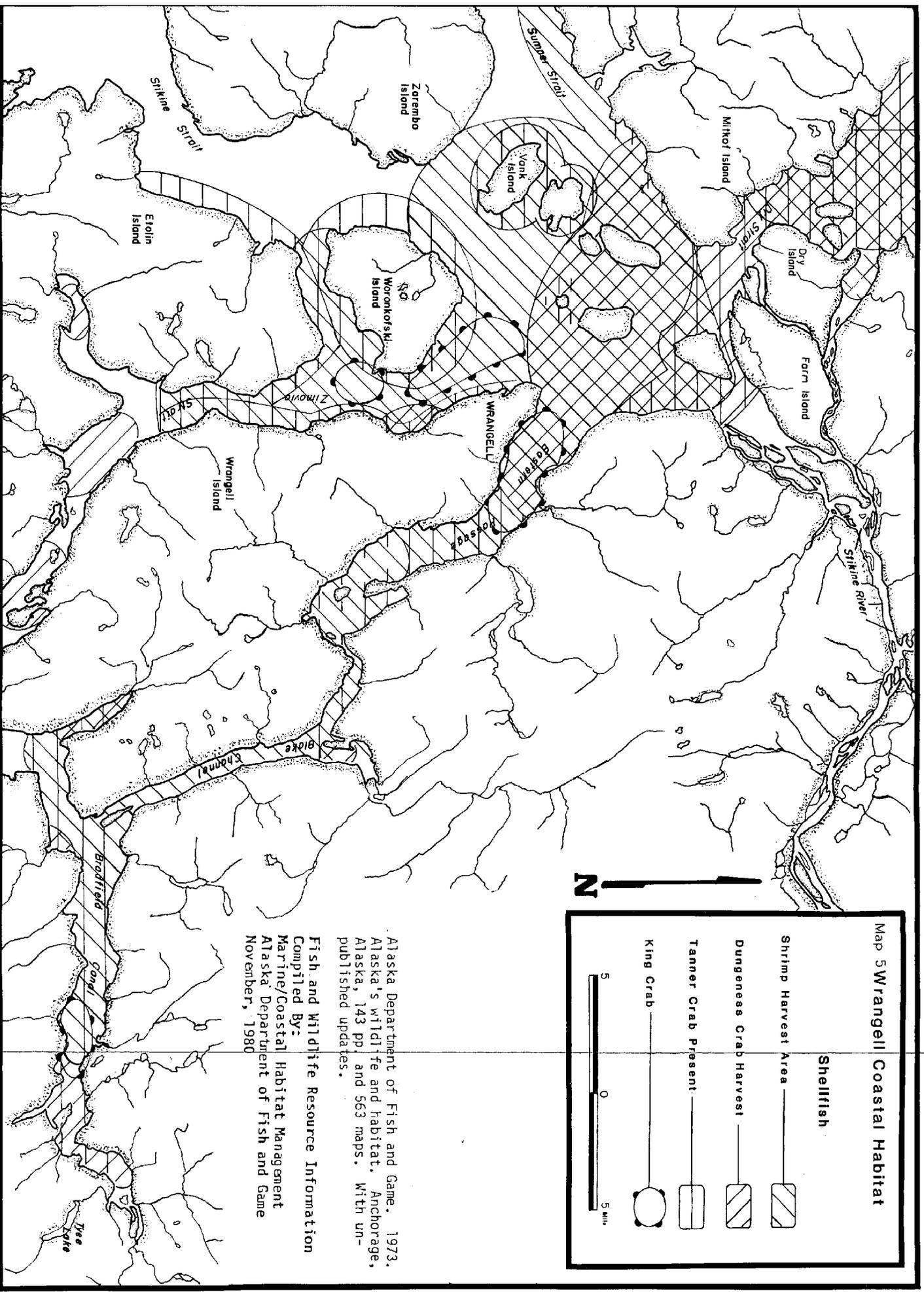
Herring High Concentrations

Kelp Beds (*Nerocystis luetkeana*,
Alaria fistulosa, *Fucus distichus*,
Macrocystis pyrifera)

Marine Mammals Found In All
Marine Waters Of Study Area:
Minke Whale
Harbor Porpoise
Humpback Whale
Killer Whale
Dall Porpoise
Steller Sea Lion

Alaska Department of Fish and Game. 1973.
Alaska's wildlife and habitat. Anchorage,
Alaska, 143 pp. and 563 maps. With un-
published updates.
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Marine/Coastal Habitat Management
Alaska Department of Fish and Game
November, 1980





Map 5 Wrangell Coastal Habitat

Shellfish

Shrimp Harvest Area 

Dungeness Crab Harvest 

Tanner Crab Present 

King Crab 

5 0 5 mi

Alaska Department of Fish and Game. 1973. Alaska's wildlife and habitat. Anchorage, Alaska, 143 pp. and 563 maps. With unpublished updates.

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return to the same area each year to breed and molt. The tanner crab fishery has developed since 1968.

Dungeness crab has been commercially processed in Petersburg since 1921 and more recently in Wrangell. These crab appear to migrate offshore during the winter months and return to the nearshore during spring and summer. They reach sexual maturity at three years and live for about eight years. Dungeness prefer sandy or muddy bottoms in saltwater, and are tolerant of low salinity in estuaries and bays (Map 5).

Five species of shrimp are fished by beam trawls and shrimp pots in the Wrangell vicinity (Map 5). Pink shrimp comprise eighty to ninety percent of the catch. Sidestripe, humpy, coonstripe and spot shrimp are harvested in smaller quantities. All are pandalid shrimp, which spawn from late September through October. The larvae drift in the plankton for two to three months and pass through six development stages before settling to the bottom as juveniles. Juveniles and adults remain benthic (bottom dwellers). Maximum age is about six years.

Other marine species in the area include several species of rockfish, sablefish, scallops, smelt and ling cod, all of which are harvested to some extent.

FISHERIES

Fresh waters in the Wrangell area support populations of all five species of Pacific salmon - pink, chum, coho, sockeye and chinook. Rainbow trout (steelhead), cutthroat trout, dolly varden char, grayling, sculpin, whitefish and threespine stickleback are also found.

Approximately seventy percent of sport fishing and all commercial fishing in the Wrangell area occurs in salt water. King (chinook) salmon are the preferred sportfish and pink salmon are the major commercial fish. Starry flounder and halibut are also harvested in significant numbers. Distribution of fisheries resources is shown in Map 6.

ANADROMOUS FISH

Anadromous fish are those that spend part of their lives in fresh and salt water, usually entering fresh water to spawn, with the fry returning to the sea. Such fish constitute a tremendous resource for the Wrangell area, both ecologically and economically.

Pink (humpback) salmon migrate to spawning streams in late July and early August. They generally spawn in August and September in the lower reaches of short coastal streams, including intertidal areas. Every two years there is a larger-than-average pink run, and in some areas odd- or even-year populations spawn in significant numbers. Fry emerge the following spring, in April and May, and immediately migrate

to estuaries. Pink salmon have the shortest life cycle of any Pacific salmon, reaching sexual maturity within fourteen to sixteen months. Pinks are the most abundant species in Southeast. They may be the least preferred salmon by sportfishermen, although chum salmon are known to share this dubious distinction.

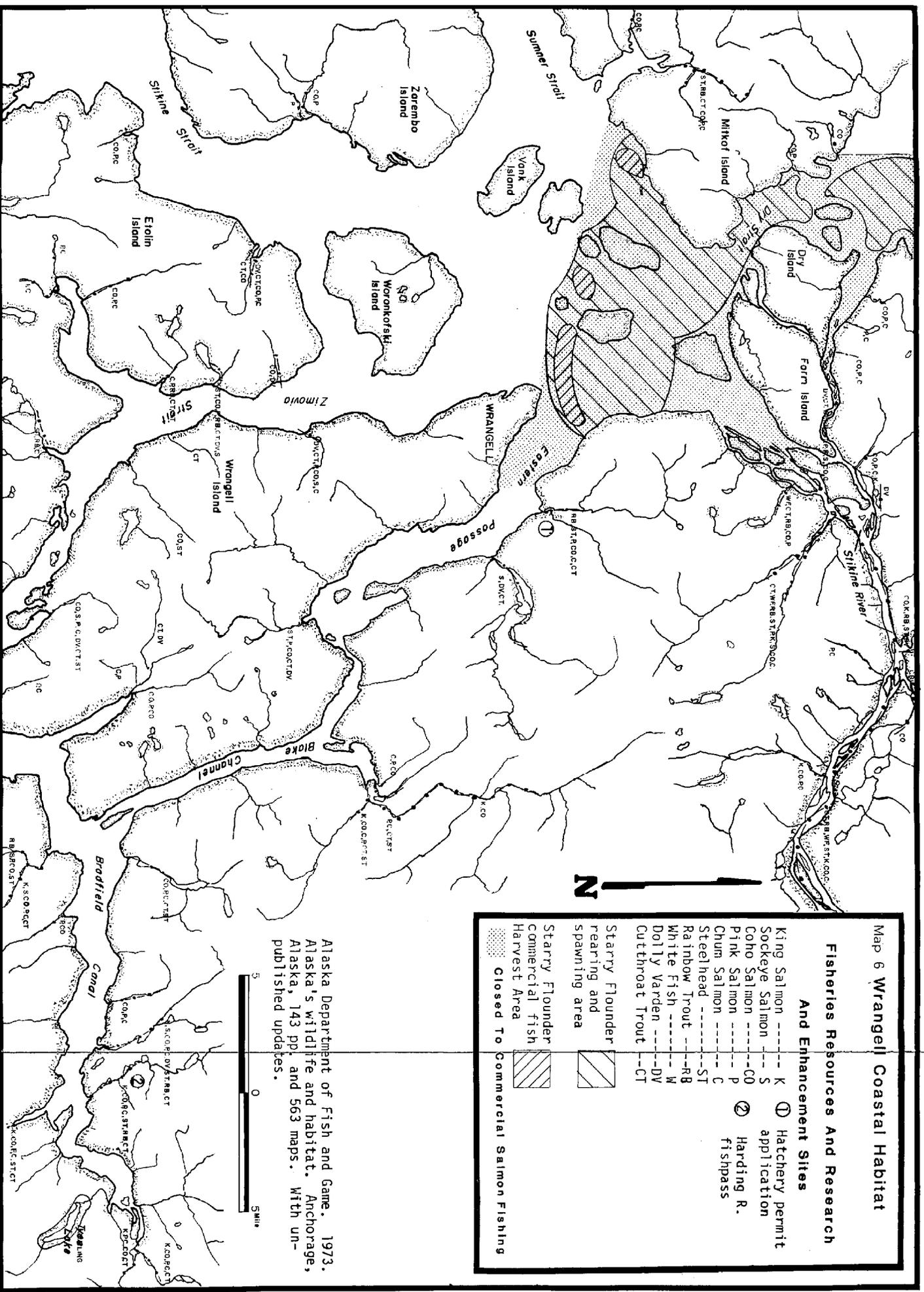
Chum (dog) salmon are second in abundance in the Wrangell area. They migrate to spawning streams from late June to early August and spawn from late July through September. Spawning habitats range from the intertidal areas of coastal streams to springwater areas of large river systems. Fry emerge from April to May and may spend about a month in fresh water, then spend several months in nearshore waters before venturing farther out to sea. Adults reach sexual maturity in two to four years. They are known as dog salmon because of their large canine-like teeth, the fact that they are often used as dog food, or both.

Silver (coho) salmon migrate to spawning streams from August through November and spawn between September and January. They generally spawn in shallow tributaries and narrow side channels. Fry generally emerge in April and May, and young salmon may spend from one to two years in fresh water, migrating to the sea in spring. Adults reach maturity after one to four years in marine waters (two to six years old).

Red (sockeye) salmon spawn from late July to early October. Spawning habitat is in or near lakes, inlet and outlet streams, and along gravel shoals. Fry emerge in April and May and generally spend one to four years in a lake before migrating to the sea. Adults mature after one to four years at sea (two to six years old). The majority of sockeye salmon are anadromous, but landlocked populations can complete their life cycle in fresh water; landlocked sockeye, also known as kokanee, may be present in the study area.

Red, pink, chum and silver salmon use the streams of Wrangell Island. Both silver and red salmon are high quality game fish, although reds are often considered to have a better taste. As previously mentioned, king (chinook) salmon are the preferred sportfish in the Wrangell area. They migrate to spawning streams from May through July. Spawning habitat consists of larger streams, generally in the main channels. Fry emerge in early spring - April to May - and may either migrate directly to the sea or remain in fresh water for one or two years. Adults become mature after one to six years in marine waters (two to eight years old). Small male chinook that are sexually mature and return to spawn after only one year in the sea are called jacks. Chinook do not spawn on Wrangell Island, but are found in the Stikine River system, most notably in Andrew Creek. Smaller populations are found in the Eagle, Harding and Bradfield river and Aaron Creek systems.

Rainbow trout occur as both anadromous (steelhead) and non-anadromous races; both may occur in the same stream. Steelhead migrate to spawning streams in both spring and fall. Steelhead runs occur in Crittenden Creek, Stikine River, Andrew Creek, Shakes Slough, Kunk Creek and Thoms Creek (Alaska Fisheries Atlas, Vol. II, 1978)



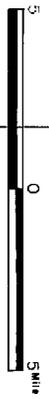
Map 6 Wrangell Coastal Habitat

Fisheries Resources And Research And Enhancement Sites

- King Salmon ----- K
- Sockeye Salmon ----- S
- Coho Salmon ----- CO
- Pink Salmon ----- P
- Chum Salmon ----- C
- Steelhead ----- ST
- Rainbow Trout ----- RT
- White Fish ----- W
- Dolly Varden ----- DV
- Cutthroat Trout ----- CT

- ① Hatchery permit application
- ② Harding R. fishpass
- ▨ Starry Flounder rearing and spawning area
- ▨ Starry Flounder commercial fish harvest area
- ▨ Closed To Commercial Salmon Fishing

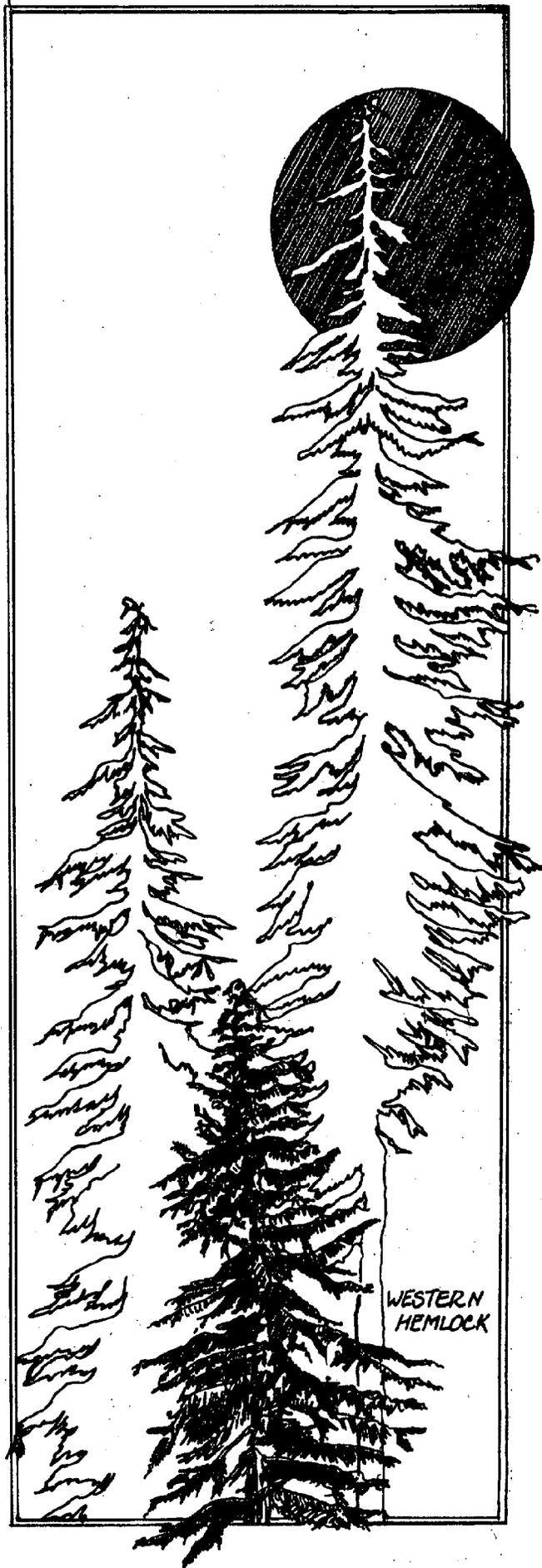
Alaska Department of Fish and Game, 1973. Alaska's wildlife and habitat. Anchorage, Alaska, 143 pp. and 563 maps. With un-published updates.



Fall-run steelhead overwinter in fresh water prior to spawning in the spring, at the same time as the most common spring-run steelhead. Steelhead spawn between March and May, usually in small- to medium-sized streams. Unlike salmon, steelhead do not necessarily die after spawning, and spent fish return to the sea. Fry emerge and develop in small, clear tributary streams for two to four years before the mid-April to mid-June migration to the sea. Steelhead are found on Wrangell Island as well as in other streams of the area.

As is the case with rainbow trout, cutthroat trout occur as both anadromous and nonanadromous races, both of which may inhabit the same stream. All cutthroat spawn from late April to early June, generally at night in clear streams. Sea-run cutthroat migrate to spawning streams beginning in July, usually peak in September and end in late October. Young anadromous cutthroat normally spend two to four years in fresh water before migrating to the sea.

Dolly varden char also occur as anadromous and nonanadromous races and both may be found in the same stream. Sea-run dolly varden overwinter in lakes and work their way to saltwater in the spring. They re-enter streams in the fall and spawn from September to November. Fry usually emerge in April or May of the following spring, and the young fish spend two to four years in fresh water before migrating to the sea.



FRESHWATER FISH

Freshwater fish in the Wrangell area consist mainly of rainbow, cutthroat trout and dolly varden char, as discussed above. Whitefish are found in the Stikine drainage. Arctic grayling were introduced into twenty-eight lakes in southeastern Alaska beginning in 1950. They were introduced by ADFG into Tyee Lake, previously barren of fish, in 1967 and 1968, but only a few fish remain in the lake. Stickleback and freshwater sculpin are also present in local freshwater streams and lakes.

SUBSISTENCE ACTIVITIES

Subsistence activities in the Wrangell area are not as extensive as in other parts of Alaska, including areas farther north in Southeast. It is always difficult to draw the line between purely subsistence uses and purely recreational uses. Subsistence activities have a recreational aspect to them since they are often enjoyable; conversely, recreational activities often provide food important to people's lifestyle. Few subsistence activities are allowed by ADFG on a permit basis; limited set-netting, prior to the commercial season, occurs in the mouth of the Stikine River, Stikine flats, Fool's Inlet and Thoms Place. One hundred permits, allowing ten red salmon per permit, are presently issued. Regulations for setnetting activities will probably undergo changes as a result of d-2 legislation, since the Stikine River mouth has been identified as an important wildlife area.

Other activities and locations that have subsistence value include waterfowl hunting on the Stikine River flats, Dry Island, Farm Island, Sergief Island, Anita Bay, Crittenden Creek and Anan Creek. Deer are hunted near Fool's Inlet, Thoms Place and Anan Creek. Shellfish are primarily harvested in Anita Bay. Most of the local subsistence activity is associated with people from Wrangell who travel to Fool's Inlet and Thoms Place.

VEGETATION

"Wrangell Island is about thirty miles long, separated from the mainland by a narrow channel or fiord, and trending in the direction of the flow of the ancient ice-sheet. Like all its neighbors, it is densely forested down to the water's edge with trees that never seem to have suffered from thirst or fire or the axe of the lumberman in all their long century lives. Beneath soft, shady clouds, with abundance of rain, they flourish in wonderful strength and beauty to a good old age, while the many warm days, half cloudy, half clear, and the little groups of pure sun-days enable them to ripen their cones and send myriads of seeds flying every autumn to insure the permanence of the forests and feed the multitude of animals" (John Muir, Travels in Alaska, 1879).

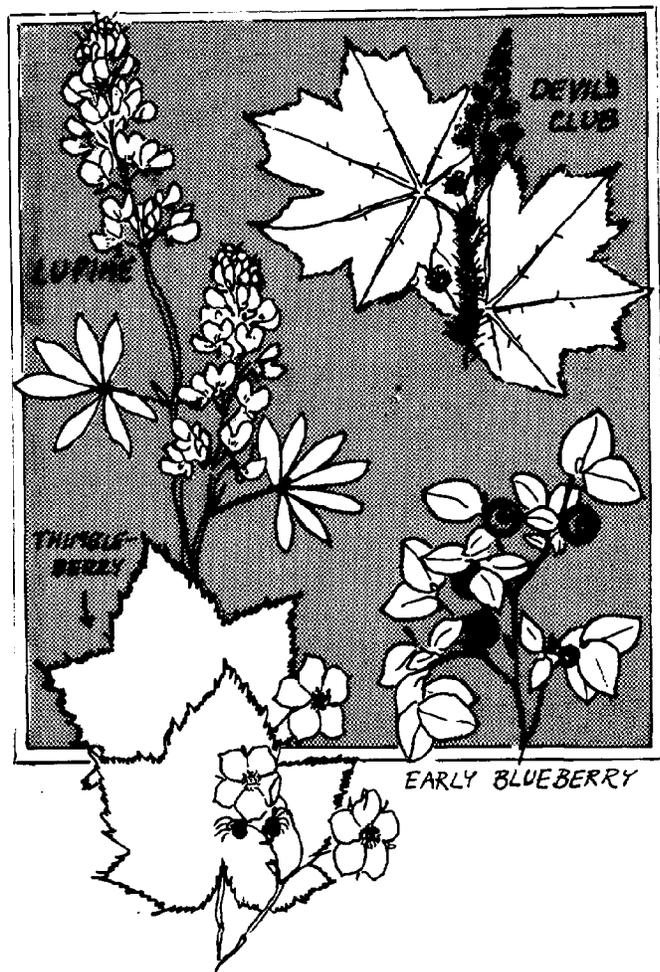
Vegetation in the Wrangell area consists primarily of coniferous forests interspersed with muskeg areas. The forests in the Wrangell area contain western hemlock, Sitka spruce, Alaska cedar, western red cedar, mountain hemlock and lodgepole pine. Lodgepole pine is usually found in muskeg areas and post-fire areas. Red alder occurs on most exposed mineral soils. Alaska cedar is a dominant species in areas with poorly drained soils at relatively high elevations. Western red cedar occurs at low elevations south of the Wrangell townsite.

Understory vegetation is quite uniform in species composition, though density and vigor vary with the ecosystem type and canopy cover. After logging or fire, shrub and forage cover is dense until the young forest begins to form a closed canopy. Under dense, even-aged stands of trees twenty-five to seventy-five years old, ground cover is largely restricted to mosses and fungi. As the stand of trees matures and more light reaches the forest floor, the undergrowth on the forest floor increases. This is an important consideration in manipulating wildlife habitat.

Dominant shrubs in the Wrangell area are blueberry, rusty menziesia, devil's club and red huckleberry. Low vegetation includes bunchberry, five-leaf bramble, single delight, gold thread and a nearly complete carpet of mosses, predominantly comprised of *Hylocomium* and *Rhytidiadelphus*. On poorly drained soils, skunk cabbage, marsh marigold and patches of shade-tolerant sphagnum also occur.

In the Wrangell area, muskeg, sometimes exceeding ten feet in depth, forms the surface cover of nearly all the flatter terrain as well as of some moderate slopes. Muskeg areas are characterized by small ponds, marshy areas and spongy ground. Vegetational growth on thicker deposits is commonly limited to stunted trees (lodgepole pine, mountain hemlock, Alaska cedar, western hemlock, red cedar and Sitka spruce), small shrubs (crowberry, labrador tea, bog rosemary, swamp laurel and juniper), or open areas supporting growths of sedges, mosses, skunk cabbage and grasses. *Scirpus* is the most common forb. Thinner muskeg deposits on steeper, better drained slopes generally support larger trees.

Tide-influenced vegetation occupies alluvial (sediment carried by streams) deposits between mid- and high-tide levels at stream mouths. These



areas provide important wildlife habitat as well as aesthetic and recreational values. Sedge-dominated ecosystems consisting of lingby sedge with some silverweed and hairgrass occur along stream channels. An intermediate zone is dominated by hairgrass and silverweed. The uppermost zone in these wetlands contains ryegrass with scattered clumps of yarrow, shooting star, black lily, buttercup and sedges. This vegetation type typically merges with the forest or muskeg communities.

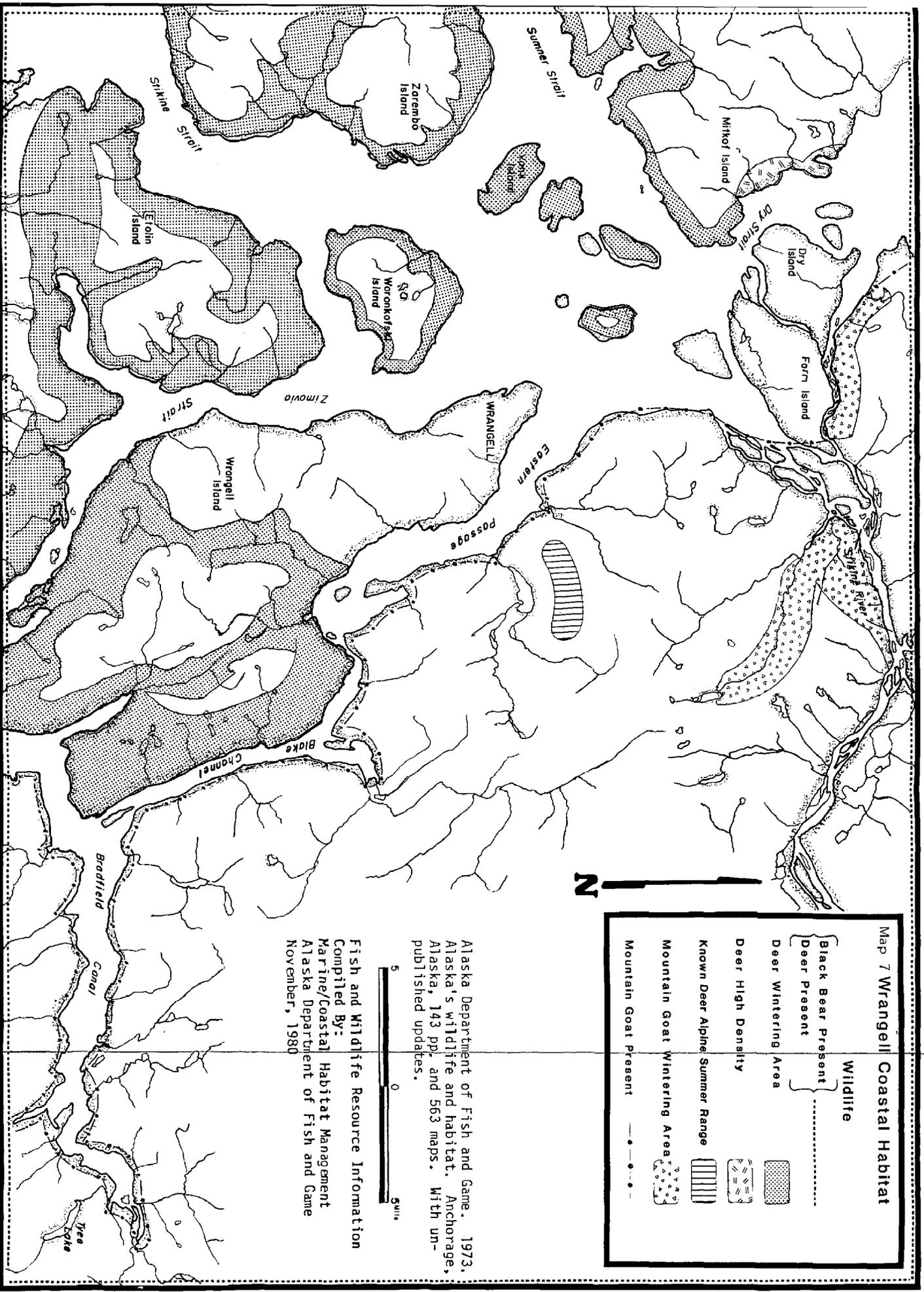
Alpine vegetation begins at about the two thousand to twenty-five hundred foot level. Some shrub-like trees (mountain hemlock, Alaska cedar) occur at this level, along with deer cabbage, mountain heather, saxifrage and lichens. A few shrubs such as mountain cranberry, roseroot, arctic willow, crowberry, salmonberry, blueberry and arctic woodworm also occur in the alpine environment.

WILDLIFE

Wildlife in the Wrangell area is representative of most of Southeast Alaska. Sitka black-tail deer, moose, mountain goat, black bear, brown bear, wolf and other furbearers (mink, marten, ermine, beaver and land otter) are the major mammal species; lynx and coyote are found occasionally. Their distribution is shown in Maps 7, 8 and 9. Waterfowl use the Stikine estuary extensively, as well as smaller wetland areas. Year-round residents include mallards, Canadian geese, harlequin ducks and red-breasted mergansers. Other residents are common loons and pelagic cormorants. Waterfowl that winter in the area include greater scaup, American and Barrow's goldeneye, bufflehead, oldsquaw, white-winged and surf scoters, common mergansers and trumpeter swans. Red-necked grebes also winter near Wrangell. Bald eagles are year-round residents, nesting along shorelines and congregating in various parts of Southeast where food is available during winter and spring. Bald eagle nesting sites, spring concentrations and waterfowl use areas are depicted on Map 10.

On a broad scale, there are six wildlife habitats in Southeast Alaska. These are depicted in Figure 2. Detailed descriptions of each habitat can be found in the Ketchikan Area Atlas (Kuklok, 1978); a summary of these descriptions is included in this section with additional information gathered from the Tyee Lake hydroelectric power study (APA, 1980) and The Soils of Wrangell Island (USFS, 1975). Marine habitat is discussed in the section on marine life.

Sport hunting is popular in the Wrangell area and is discussed in the subsistence section of this report. ADFG monitors game and fish populations and harvest numbers to determine management practices. Based on their findings, the department then sets the length of the seasons, bag limits and open areas to maintain healthy populations of fish and game that can be supported by the available habitat (optimum populations). USFWS monitors waterfowl populations in the same way and establishes similar regulations.



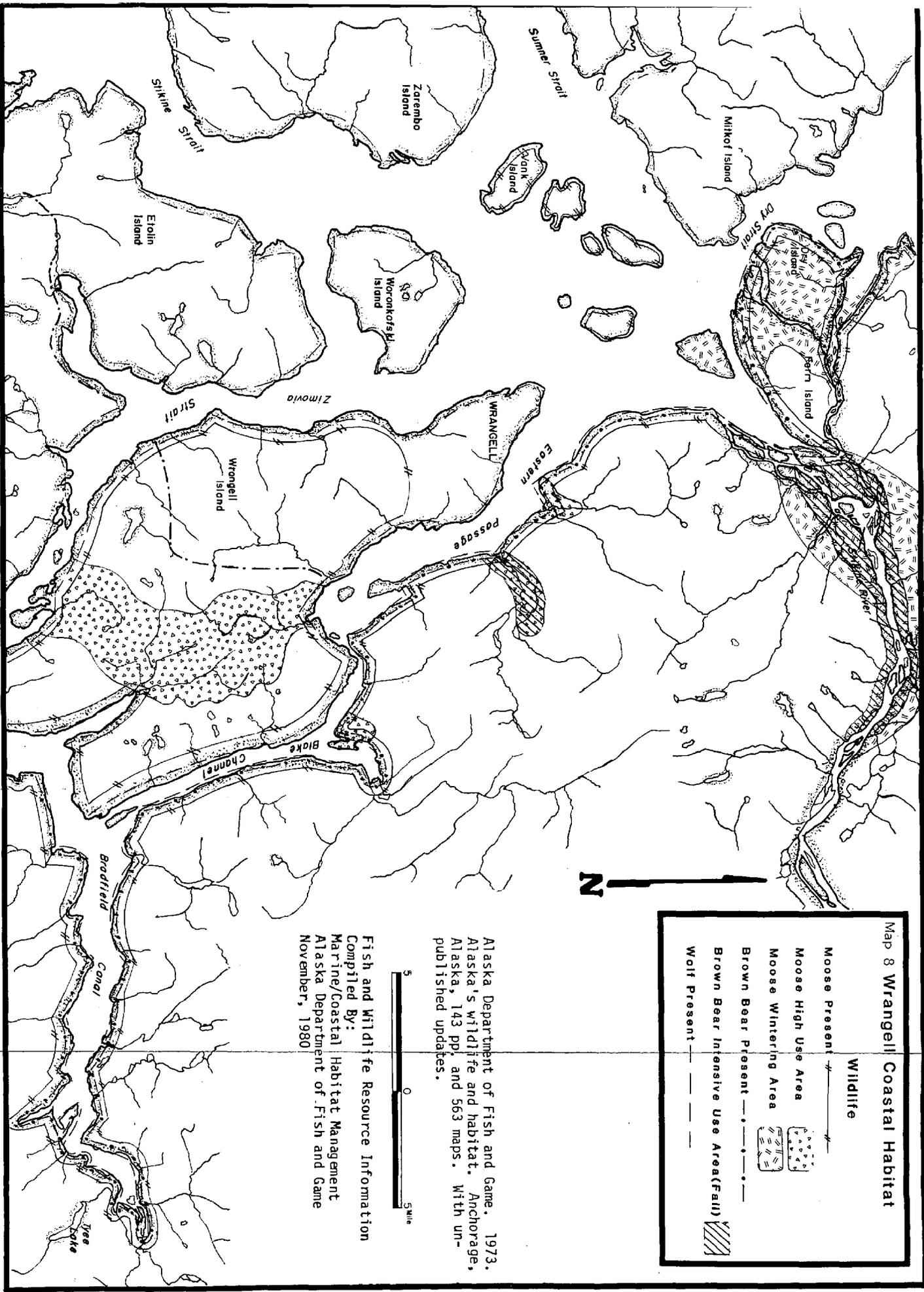
Map 7 Wrangell Coastal Habitat

Wildlife	
{ Black Bear Present Deer Present	
Deer Wintering Area	
Deer High Density	
Known Deer Alpine Summer Range	
Mountain Goat Wintering Area	
Mountain Goat Present	

Alaska Department of Fish and Game. 1973. Alaska's wildlife and habitat. Anchorage, Alaska, 143 pp., and 563 maps. With unpublished updates.



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Map 8 Wrangell Coastal Habitat

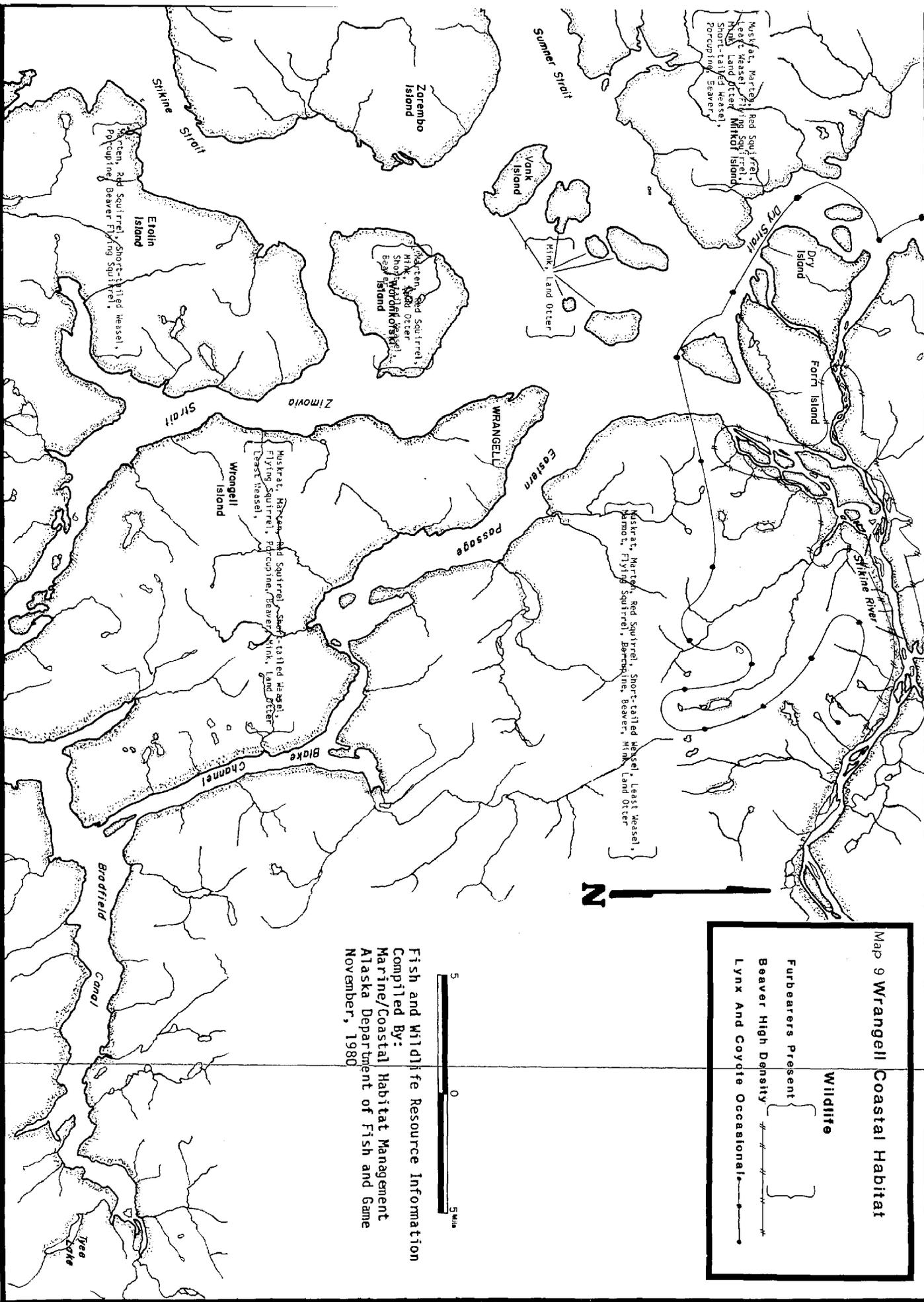
Wildlife

- Moose Present
- Moose High Use Area
- Moose Wintering Area
- Brown Bear Present
- Brown Bear Intensive Use Area(Fall)
- Wolf Present

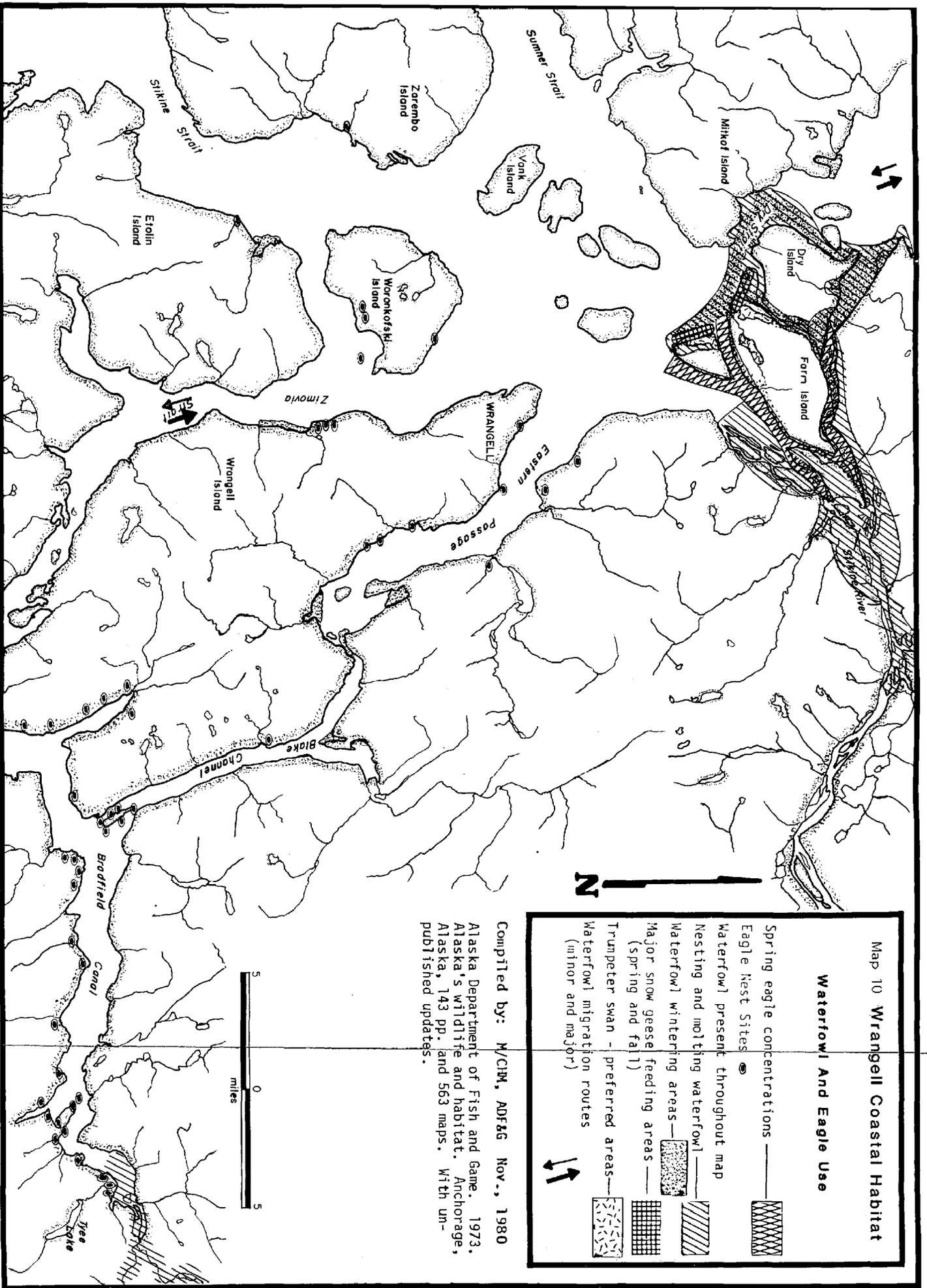
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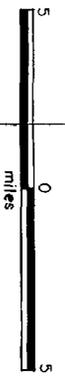


Map 10 Wrangell Coastal Habitat

Waterfowl And Eagle Use

- Spring eagle concentrations — [diagonal hatching]
- Eagle Nest Sites ●
- Waterfowl present throughout map [solid black]
- Nesting and molting waterfowl [diagonal hatching]
- Waterfowl wintering areas — [cross-hatching]
- Major snow geese feeding areas — [grid pattern]
- (spring and fall)
- Trumpeter swan - preferred areas — [diagonal hatching]
- Waterfowl migration routes (minor and major) [dashed line]

Compiled by: M/CJM, ADF&G Nov., 1980
 Alaska Department of Fish and Game. 1973.
 Alaska's wildlife and habitat. Anchorage,
 Alaska, 143 pp. and 563 maps. With un-
 published updates.



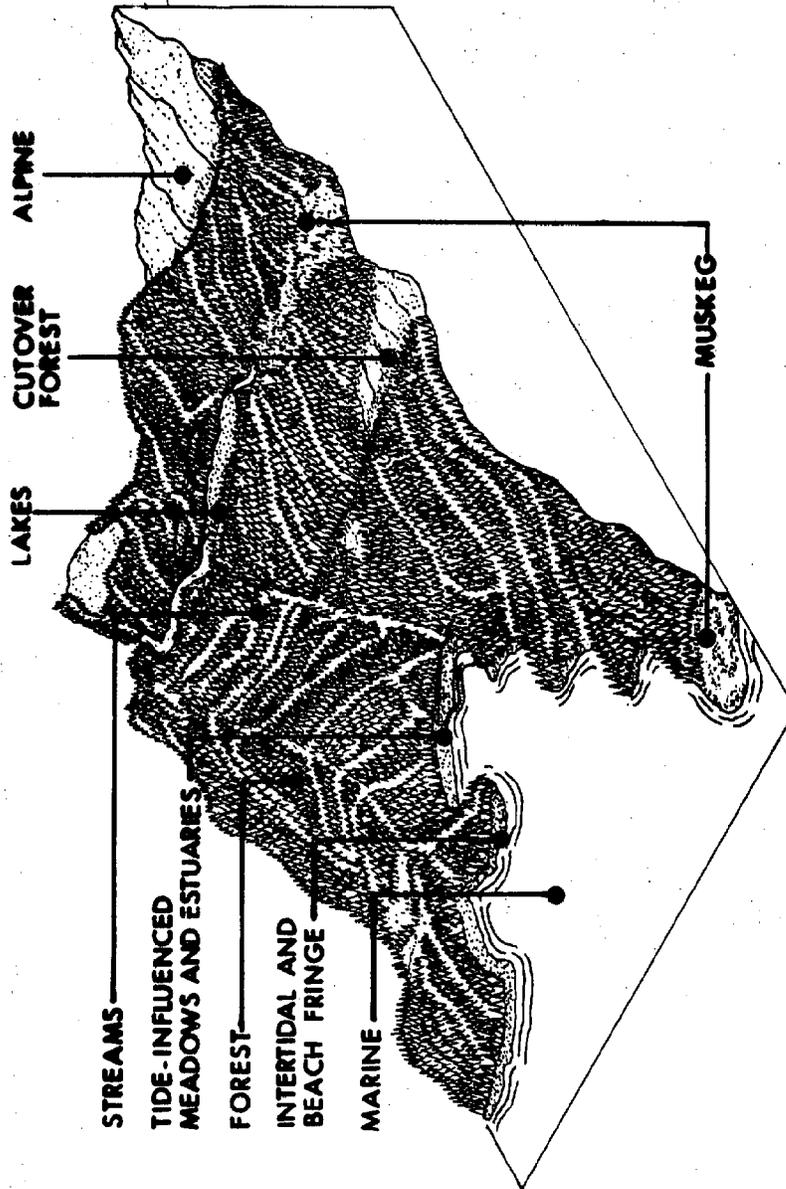


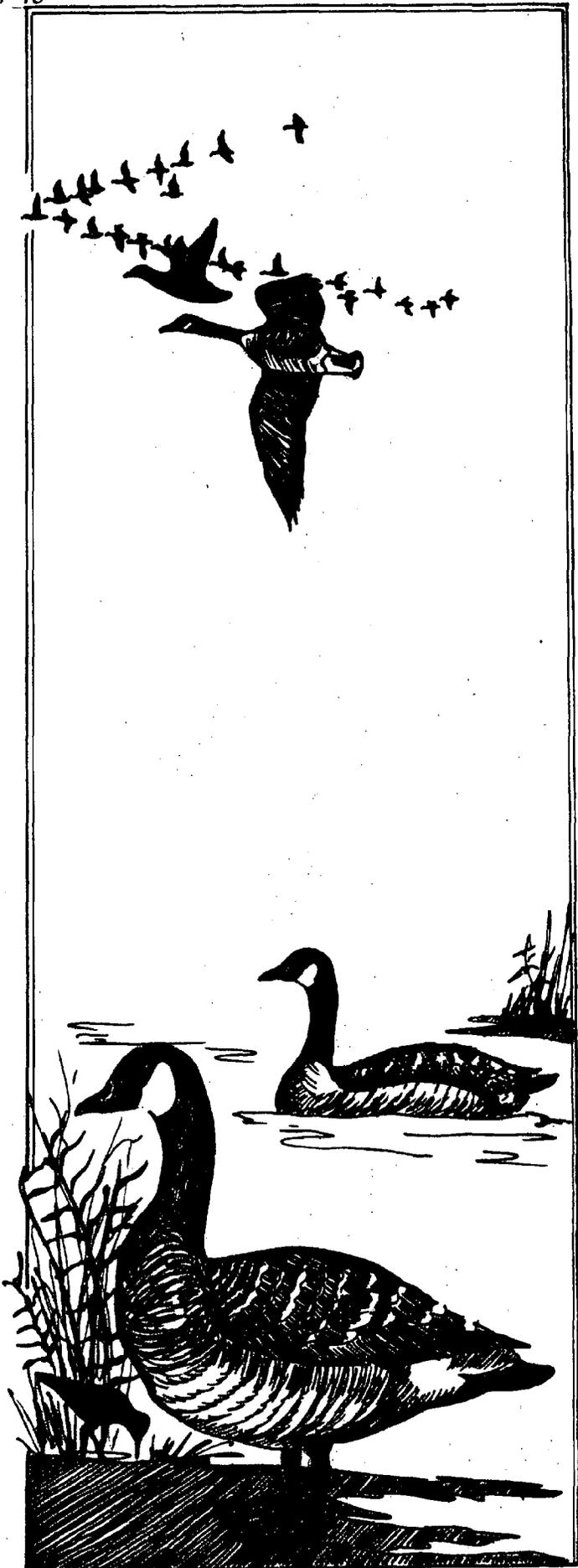
FIGURE 2

The hunting seasons in the Wrangell area are (ADFG, 1978):

- Waterfowl - September to December
- Moose - mid-September to mid-October
- Brown bear - mid-September to May
- Mountain goat - August to December
- Deer - August to November

These seasons have been established to allow an annual harvest of animals during periods of least impact to the overall population while providing quality sport hunting opportunities to hunters. Harvesting animals when they are bearing or raising young is avoided due to destructive impacts upon the population. The actual opening and closing days of the season may change from year to year. For example, if the deer population is low for some reason (a hard winter), ADFG may shorten the season in order to limit the harvest and allow the deer to increase in number. Based upon annual population estimates, hunter pressure, harvest and other variables ADFG may extend the season and allow more animals to be harvested.

People are often unhappy with governmental regulation, and hunting and fishing regulations are no exception. Poaching is a serious problem in the Wrangell area. Animals are frequently shot whenever a good opportunity presents itself, and enforcement is difficult. In addition to the obvious legal reasons against poaching, the taking of significant numbers of animals out of season makes management of animal populations very difficult. The intent of government regulation is to en-



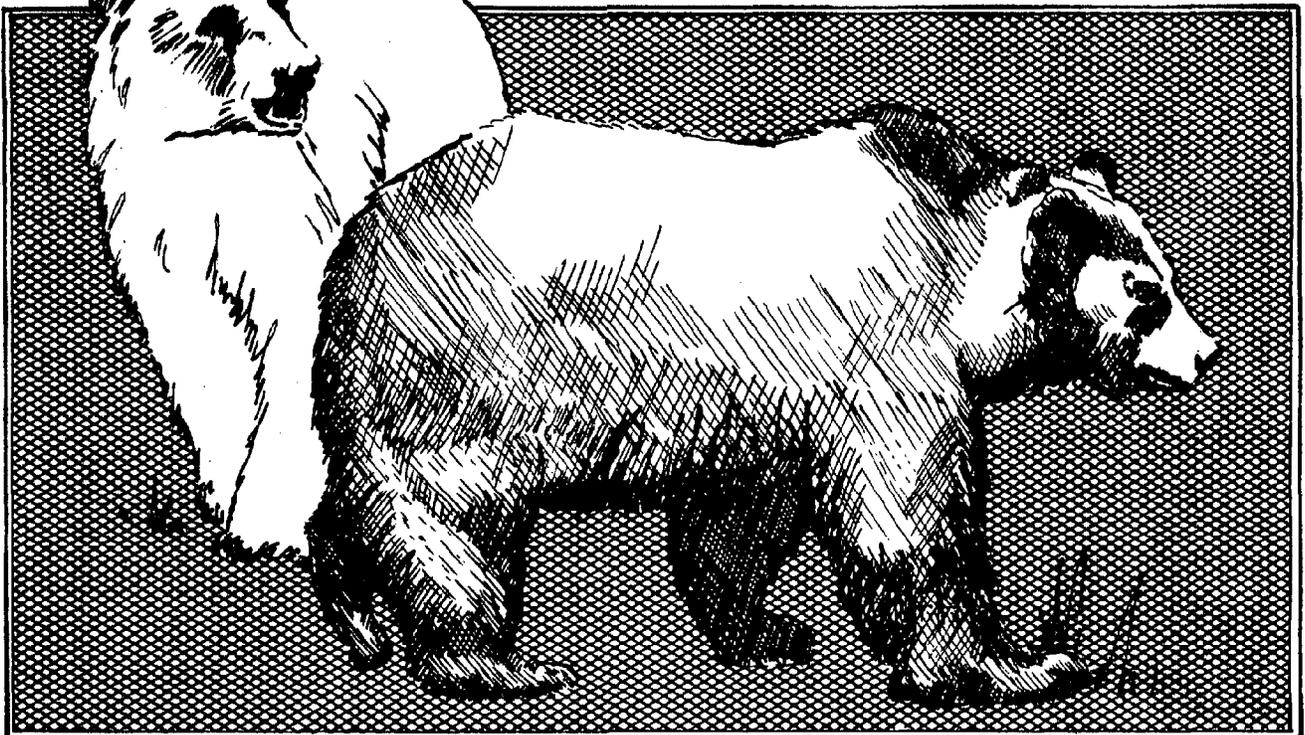
CANADIAN GESE

sure that the ecosystems remain healthy and that everyone has the best possible opportunity to harvest fish and game on a long-term sustained yield basis.

FOREST

The land in the study area is dominated by coastal Sitka spruce/western hemlock forest. Where undisturbed, this climax forest consists of different age trees. Small openings due to variation in tree size - blowdowns, among other reasons - allow the entry of sufficient light for understory vegetation to grow in scattered areas. Old-growth forests provide both refuge from deep snow accumulation in winter and some forage for deer and other animals. In the ecotones, or edges, between habitat types - for example where forest borders muskeg, beach or estuary - there is a greater abundance of plant species and more diverse wildlife during summer.

Forest mammals include Sitka black-tail deer, black bear, wolf, marten, ermine, weasel, porcupine, flying squirrel and red squirrel. Mice and voles are primarily found in ecotones. Deer require browse that may be found in the forest but is often more abundant in cutover areas or in ecotones. During winter, deep snows make the more open areas inaccessible and deer are forced to forage in old-growth forest and on the beach fringe. As spring progresses and the snow recedes, deer move into more open areas and forage in the alpine areas in late summer and fall.



Black bears are associated with old-growth forest, particularly the more open areas where berry bushes and other shrubs, streams and meadows are found. During spring and early summer they feed primarily on grasses and herbaceous vegetation. In late summer and fall they feed primarily on berries and salmon. In spring, black bears concentrate along beaches and estuarine flats. In fall, they are found along salmon spawning streams. Brown bears also use the forest to some extent, but are generally found in more open areas. They are also found near salmon spawning streams in late summer and fall. Brown bears use the beach areas during early summer and move to the high country during May to July, where they den on high mountain slopes.

Birds that breed in the forest include blue grouse, great horned owl, several species of warblers, winter wrens, ruby- and golden-crowned kinglets, thrushes, northwestern robins, fox sparrows, Lincoln's sparrows, northwestern crows, common ravens, western flycatchers, tree and barn swallows, dippers, chestnut-backed chickadees, red-crossbills, Oregon juncos, belted kingfishers and rufus hummingbirds. Migrant birds that use but do not breed in the forest include violet-green swallows, Bohemian waxwings, rusty blackbirds, pine grosbeaks, common redpolls, tree sparrows, goshawks, merlins, screech owls, pygmy owls, great gray owls and saw whet owls (APA, 1980).

CUTOVER FOREST

Cutover and cleared forest exhibit early stages of plant succession, and recently cut areas thus produce abundant shrubs, grasses and flowering plants. These early successional stages provide abundant forage for deer and moose during summer and support a variety of small mammals and seed- and berry-eating birds. With the increase in large clearcuts in Southeast, there has been a resultant increase in elderberry and blueberry. This has resulted in the appearance of migratory bandtailed pigeons in the study area and as far north as Petersburg (USFS, 1975); these birds were seldom seen before in the area.

Although there is abundant forage during certain stages of succession, it is often unavailable during winter because of deep snow. Also, cutover areas create even-age stands of timber as they mature, and the forest canopy tends to close in rapidly and shade out the forage species within fifteen to twenty years. Due to the possible negative impacts on some wildlife from these cutover practices, Governor Hammond signed a decision memorandum asking for cooperation between USFS and ADFG as well as industry support for "preserving enough old growth timber stands (those with dominant trees at least 300 years old) to provide healthy fish and wildlife populations to meet recreational and subsistence needs" (Wrangell Sentinel, July 1981). Because of the presence of mice, voles, and small birds, cutover areas are hunted during summer by great horned owls, sharp-shinned hawks, goshawks and sparrow hawks. Wolves occasionally hunt in these areas.

MUSKEG

Muskeg varies from open to partially timbered boggy areas caused by poor drainage. Cottongrass, sedges and skunk cabbage are common plants. The edge of the forest and muskeg supports a great number of wildlife species. Shorebirds, shrikes, thrushes, chickadees and ravens are found here. Muskeg covers extensive areas around Wrangell at various elevations; it is common near sea level.

ALPINE

Alpine habitats are open, windswept slopes, ridges and mountain-tops usually over two thousand feet in elevation. The lower edge of the alpine region is bordered by subalpine forest of mountain hemlock and Alaska cedar. The tree line is higher on the warmer southern slopes than on the northern side. Sitka black-tail deer enter this habitat in late summer and fall. Mountain goat, marmot, rock ptarmigan, willow ptarmigan, snow buntings and rufous hummingbirds are found in the alpine zone. Higher areas of the alpine zone (three thousand to thirty-five hundred feet) that are covered by year-round snow are outside the coastal zone of indirect influence and so is the only habitat not directly concerned or addressed by the coastal zone management process.

STREAMS AND LAKES

Streams, lakes and the land bordering them provide a variety of aquatic habitats. Aquatic plants are found in shallow waters and emergent vegetation grows along adjoining shorelines. Aquatic invertebrates that feed on aquatic vegetation and other matter are found primarily on the bottom of lakes, riffles and stream pools. A variety of resident and anadromous fish use the lakes and streams on the island (primarily trout and salmon). Beaver and muskrat are found along lakes and slower moving streams where aspen, birch and cottonwood are prevalent. Mink and otter are found in these areas as well as along the forest/beach edge. Loons and waterfowl use lakes for nesting. The riparian plant communities of shrubs such as alder and willow provide habitat for deer, moose and bear.

INTERTIDAL ZONE AND BEACH FRINGE

The intertidal zone of the shoreline that is exposed between high and low tides provides habitat for clams, mollusks, sea urchins and crustaceans, as well as the birds that feed on them (also see marine life section). Above the high tide line to the edge of the forest, there is a zone of vegetation influenced by salt spray and warmed somewhat by the moderating effect of the sea. In the Wrangell area this zone provides refuge from the deep snow and cold temperatures inland and is a source of food for deer, bear, moose and even mountain goats. Mink, marten, river otter and occasionally wolverine forage along the shoreline for marine invertebrates, and wolves prey on deer when they concen-

trate here in winter. Bald eagles nest in larger trees near the shoreline. Water pipits are resident birds on the beach.

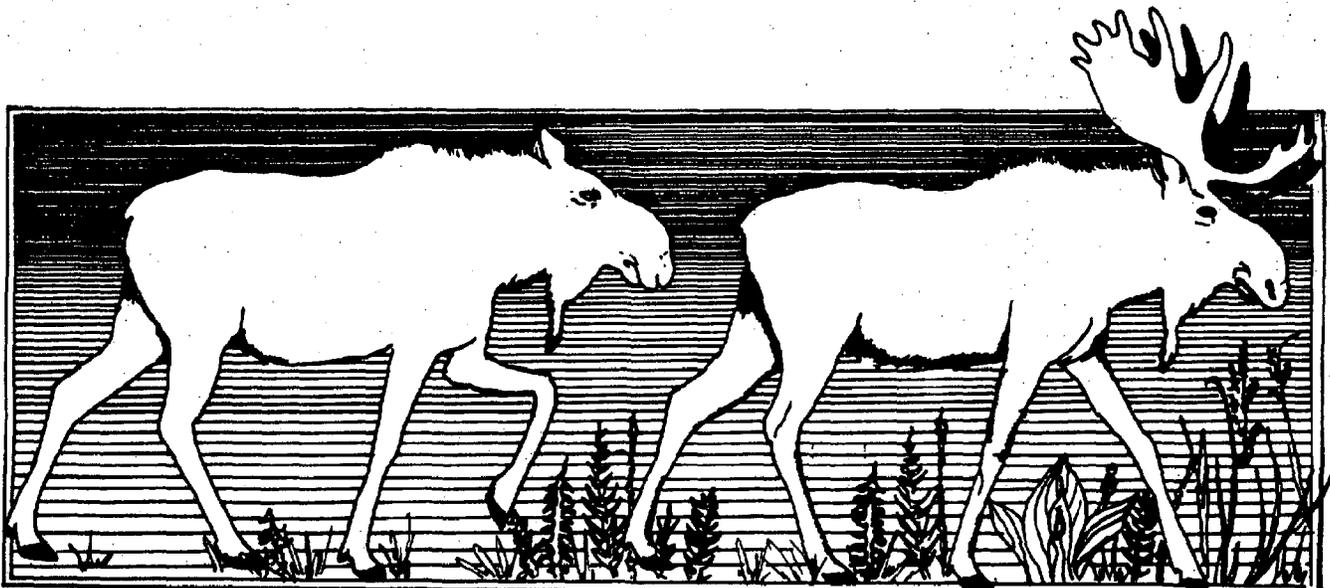
TIDE-INFLUENCED MEADOWS AND ESTUARIES

The intertidal zone at the mouths of rivers and streams is a very productive marsh habitat. These areas consist of mud flats in the intertidal zone followed by the sedge community, hairgrass/silverweed community, and then the beach ryegrass community at the upper limit of the intertidal zone. These flat, extensive marshes provide high-quality waterfowl resting and feeding habitat, nursery habitat for anadromous fish, and receive seasonal use by deer, moose and bear.

The Stikine River delta contains the most extensive and important tidal marsh habitat in the region. It and other areas such as Blind Slough, Berg Bay and Madan Bay are discussed in the section on special concern areas. Common species in these areas include red-throated and common loons, Canadian geese, trumpeter swans, mallards, harlequin ducks, and common and red-breasted mergansers. Shore birds also use the estuarine areas. Resident breeding shorebirds include semi-palmated plovers, black turnstones, common snipe, spotted sandpipers and greater yellowlegs. Regular spring and fall migrants include killdeer, lesser yellowlegs, rock sandpipers, pectoral sandpipers, least sandpipers, dunlins, short-billed dowitchers, western sandpipers and northern phalaropes. Trumpeter swans overwinter in the area, particularly in Blind Slough.

REPTILES AND AMPHIBIANS

On rare occasions, garter snakes have been found in southeastern Alaska; it is not known if they occur in the Wrangell area. Seven species of amphibians probably inhabit the study area: rough-skinned newt, northwestern salamander, long-toed salamander, boreal toad, spotted frog, wood frog and Alaskan worm salamander. Of these, wood



MOOSE

frogs, spotted frogs and boreal toads are probably the most common. Spotted frogs are found in major river valleys, while wood frogs and boreal toads are found in all habitats from tidewater to timberline (AEIDC, 1980).

INSECTS

The insect fauna is dominated by the Diptera (mosquitoes, houseflies, etc.) in both number of species and individuals. The major groups that most impact humans are the Culicoidae (mosquitoes), Tabanidae (horseflies and deerflies), Rhagionidae, Simulidae (blackflies), and Ceratopogonidae. Important economic pests include the black-headed budworm, hemlock sawfly, spruce budworm, western hemlock looper, saddleback looper, green-striped forest looper, spruce beetle, cedar bark beetle and the ambrosia beetle. Butterflies and moths in the area are not well-studied and seem to be limited in numbers and species. They are primarily found along pond and stream banks (USFS, 1978; AEIDC, 1980). This listing is not complete and should not give the impression that insects are primarily injurious to man. In natural ecosystems, insects are well adapted. They become pests when man alters or exploits the ecosystem to serve his economic needs, as in agriculture or forestry. Many more beneficial insects are found in the area than harmful ones, but they have not received the attention that forestry pests have. Aquatic insects are a diverse and little studied group, but they play a vital role in the support of freshwater fish populations, as well as in other, more subtle ecological interactions.

CLIMATE

"The climate of the islands and shores of the mainland is remarkably bland and temperate and free from extremes of either heat or cold throughout the year. It is rainy, however -- so much so that haymaking will hardly even be extensively engaged in here, whatever the future may show in the way of the development of mines, forests, and fisheries. This rainy weather, however, is of good quality, the best of the kind I ever experienced, mild in temperature, mostly gentle in its fall, filling the fountains of the rivers and keeping the whole land fresh and fruitful, while anything more delightful than the shining weather in the midst of rain, the great round sun-days of July and August, may hardly be found anywhere, north or south" (John Muir, 1879, Travels in Alaska).

Wrangell's climate is influenced by the Japanese current; consequently, the weather is milder in Wrangell than its latitude would suggest. Average temperatures from 1951 to 1975 ranged from 64°F

in July to 31.5°F in January, but temperature extremes of 92°F to -10°F have been recorded. The annual average high is 48.7°F and the average low temperature is 35.8°F.

Precipitation, as Muir noted, is ample, totalling from sixty-two to ninety-two inches annually. June is usually the driest month, with from two-and-a-half to six inches precipitation. October is the wettest period, with rainfall averaging over twelve inches and a maximum of around twenty inches (20.43 in 1961). Snowfall is usually wet or mixed with rain, with accumulations seldom greater than two feet. Total annual snowfall ranges between seven (1969-70) and 151 inches (1950-51). The annual average snowfall is near sixty-three inches. Mean monthly precipitation and temperature (1951 to 1975) is as follows:

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<u>Average Precipitation (inches)</u>											
6.11	6.32	5.28	4.81	4.12	4.09	4.68	6.14	8.28	12.82	8.49	8.02
<u>Average Temperature (degree F)</u>											
26.5	32.0	34.8	40.9	47.5	52.8	56.0	55.3	50.7	43.6	35.7	31.2

Due to the high moisture content of the soil, it is not unusual for the ground to freeze to significant depths. Between February 8 and 22, 1956, when a subsurface investigation was in progress for the sewer system, the ground was found to be frozen from two-and-a-half to four feet below the surface (Charles Pool and Associates).

Relatively low sunshine totals are typical of southeastern Alaska due to the heavy year-round precipitation and associated cloudy conditions. Fog is also common, particularly between September and December, when poor visibility often restricts aircraft flights into Wrangell and other southeastern communities. Thick ground fog also occurs during the summer months.

Prevailing winds in the Wrangell area are from the south and southeast. Wrangell is sheltered by mountains to the southeast, but it experiences occasional strong winds funneling through the channels and down the Stikine River valley (NOAA, Climate of Wrangell; Tyee Lake FERC Exhibit, Vol. II).

AIR QUALITY

Air quality in the Wrangell area is within state and federal guidelines. ALP, the major local industry, is relatively efficient and clean in terms of pollutants. The transfer of ALP operations to the Zimovia mill site will move the source of potential pollution further from the major population center. Care must be taken to ensure that future users of the old downtown mill site will operate consistent with state and federal air quality standards, particularly due to the site's proximity to relatively densely populated areas.

Dust is a problem during dry periods. Case Street and other areas are subjected to high dust levels that may accumulate to several inches over the course of the summer. This street is to be paved in the near future.

HYDROLOGY

Watersheds within the Wrangell area are generally short and precipitous. Stream flows are highly variable, with wide ranges in discharge depending on precipitation and snowmelt. The surface mineral soils are highly porous and water moves rapidly through them, over impermeable layers and into stream drainages. All soils are high in organic matter and colloidal iron. The soil is resistant to accelerated erosion as long as the thick litter layers remain in place.

Two areas are identified by the state as watersheds for domestic or industrial use. The first area, Wrangell watershed (one square mile), lies about a mile southeast of town and has been used by the community for over forty years. Two small reservoirs are located in this basin, bounded by steeply ascending mountains. A small stream flows directly north for a distance of approximately one mile down a fairly steep slope to a well-defined southwest-trending valley and into the reservoirs. It then follows the valley southwest to Zimovia Strait. The second area, Shoemaker Bay watershed, supplies water to the ALP sawmill, a portion being for domestic use. The ALP rock quarry is located downslope of the water takeout point, but future quarry expansion may require close monitoring of water quality (DNR). Additional water supplies for human consumption may possibly be obtained from Institute Creek, which drains into the north end of Shoemaker Bay.

Other drainages in the area include Pat Lake and Pat Creek, which are located at the southern end of the Wrangell city limits about eight miles south of the townsite. There are also three very small probably intermittent streams discharging into the Wrangell harbor, and a couple of others empty into Eastern Passage, in the vicinity of the Wrangell airport.

DRAINAGE

Drainage in most parts of the immediate Wrangell area is poor, as evidenced by the muskeg covering much of the landscape. In flat areas, the highly permeable muskeg becomes saturated with water, with seldom more than the surface layer (about one foot in depth) drying out; consequently, small ponds abound in these flat areas. In sloping areas, water rapidly percolates through the muskeg and permeable soils, quickly entering the streams and drainages. Rainfall is high enough to maintain muskeg vegetation even in these areas. Most soils in the area have a perched, seeping watertable that feeds the streams with an abundance of quality water. Essentially no surface runoff occurs on undisturbed mineral soils protected by a duff layer. Surface runoff does occur on landslide tracts, bared V-notch drainages, rock

outcrops, muskeg soils or mineral soils devoid of their protective surface organic mat. Any manmade alteration of the surface soil (clearing or fill) or vegetative cover (recutting) can increase surface runoff (USFS, Soils of Wrangell Island, 1975).

EROSION AND SEDIMENTATION

Serious erosion and sedimentation can result from surface runoff on landslide tracts, V-notched drainages and bared mineral soils. Erosion will continue in these instances until the soil armors itself through removal of fine material or until adequate vegetative cover is established. The latter is one of the best methods to help reduce surface erosion. This can be accomplished through grass seeding and fertilizing or through seeding or planting alder. On the steep slopes common to V-notch drainages and landslide tracts, grass seeding is sometimes unsatisfactory. In these instances, hand planting of Sitka alder may be the best method of stabilizing the slopes, renovating the site and protecting the watershed. Another significant source of stream sediments are roads, which are subject to surface runoff unless they are completely revegetated. This includes not only their running surface, but often the cutbanks and fill slopes, depending on the material used for construction. For this reason, the location, method of construction and materials used are important considerations.

Little soil material in the Wrangell area is usable for road construction. The use of most common soil materials for road fill or surfacing will result in severe sedimentation and high maintenance cost, and the resulting road would probably be impassable during wet weather. Using shot rock for the base and crushed rock for surfacing roads will produce an all-weather road with a minimum of erosion and maintenance.

The location of roads has an important effect on stream flow and water quality. Roads across steep valley sideslopes should be avoided whenever possible. Filter strips of undisturbed soil should be maintained between streams and any section of road that parallels them. It is suggested that the filter strip be at least one hundred feet wide to assure interception of runoff sediments. This distance should be increased when the intervening soils are muskegs subject to surface runoff or with increases in slope gradient. Properly spaced culverts and waterbars located to discharge into undisturbed soils, armoured fill slopes or catch basins are important sediment-reducing measures. Grass seeding and fertilizing roads that are no longer used and appear to be serious sediment producers should be considered. Grass seeding is best done in May or June, after the heavy rains and cool temperatures of early spring (USFS, Soils of Wrangell Island, 1975).

WATER QUALITY

Wrangell water is generally of good quality, although the water from the reservoirs is stained brown by decomposing organic matter. All city sewage, treated or otherwise, discharges to the sea. Sewage

treatment plant effluent discharges are via a submerged diffuser to deep water in Zimovia Strait. Overflows of raw sewage caused by surcharging (e.g. excessive volume) at pump stations 1 and 2 (Case Street) discharge into the inner harbor, resulting in some contamination. The sewage plant outfall lies seaward of a tidal flat near a public ballfield where occasional beachcombing, wading and clamming occurs. Other uses of the waterway in this vicinity are mainly limited to transient commercial and recreational boat traffic. The inner harbor is also subject to intense use by the boating public and affords considerable opportunity for water contact by children, pets and boaters. Both the appearance and the aroma of the harbor have improved since completion of the city's sewage treatment plant.

Contamination of surface water has occurred in the area surrounding the new ballfield adjacent to the elementary school. The source of the problem is woodchips that were used as fill at the site. Rainwater percolates through the fill and in so doing leeches away sulfur and other chemicals naturally contained in the chips. This has resulted in contamination of the surface water in the immediate area as well as a small creek near the ballfield that drains into Eastern Passage. A few trees near the ballfield are dying as a result of the contamination. Pollutant levels in the small stream (usually less than three feet wide) were so high that a device had to be installed to aerate the water to increase dissolved oxygen and thereby relieve the stench emitted from the creek. All life communities in the small creek are presumed to be gone, and there may have been some localized damage to the marine biological community near the mouth of the creek. As a result of this contamination, DEC representatives have indicated that it is highly unlikely that wood chips will be allowed to be used as fill in the Wrangell area in the future.

A similar type of pollution occurs when logs are stored in fresh or saltwater (log dumps). The environmental effects are the impact of organic compounds that leach from logs, the impact of bark deposits which settle to the bottom, and compaction of sediment resulting from the intertidal storage of logs. Compounds leached from logs tie up the free oxygen in natural systems (high biological oxygen demand - BOD) and can cause suffocation of plant and animal life. Leached compounds in saltwater are toxic to pink salmon fry (and presumably other developing organisms), but tend to precipitate out of solution and become less toxic. Areas with poor water circulation retain higher concentrations and are thus more severely damaged. Bark accumulating on the bottom has two effects; it may completely cover the bottom and kill the sessile (attached) organisms, and it may restrict the use of the area by organisms due to its high BOD. Bark debris decomposes slowly.

Logs stored intertidally rest on the bottom during low tide and compact the sediments. Organisms living in this habitat require relatively "soft" substrates to offset the dangers from shifting and settling logs (APA, 1980).

PHYSICAL OCEANOGRAPHY

Zimovia Strait, Eastern Passage, Dry Strait and other straits and inlets surrounding Wrangell are part of the glacially-scoured fiord system that characterizes southeastern Alaska. Most of these waterways have fairly smooth floors, with water depths of three to five hundred feet common. In contrast, Dry Strait has been filled with delta deposits near the mouth of the Stikine River and is covered by marine waters only during periods of high tide. Tides for the Wrangell area are generally as follows:

Highest tide (estimated)	19.5' - 21.50'
Mean higher high water	16.10'
Mean high water	15.20'
Half tide level	8.35'
Mean low water	1.50'
Mean lower low water	0.00'
Lowest tide (estimated)	-3.80' - -4.50'
Range	-13.30'

An underwater platform a few hundred feet wide rims the northern part of Wrangell Island (Map 11) (also see Map 25). In Wrangell harbor, the platform, if it exists, is narrow. Within the downtown public boat harbor and the inner boat harbor, the connecting channel and mooring basins have been dredged to a depth of about ten feet below MLLW.

Bathymetric contours indicate considerable shoaling in Eastern Passage between Simonof Island and the southern margin of the Stikine River delta. The shoaling is probably due to deposition of large amounts of material from the main distributary channel of the Stikine River directly to the north.

Bottom sampling (S.C. Wolf, unpublished data, 1967) shows a progressive decrease in grain size of the sediments from the southern margin of the Stikine River delta southward to at least as far as Zimovia Strait, between Woronkofski Island and Wrangell Island in the vicinity of the old Wrangell Institute parcel. This is the case since the Stikine River is about the only source of sediments in the area.

Limited information on the nature and thicknesses of offshore deposits is available in the Wrangell harbor area as a result of construction of docks and other harbor facilities. As much as eighteen feet of "soft" material was penetrated in borings in the downtown inner boat harbor when the harbor was dredged. This material, which probably represents in large part deposition of water-suspended material, is underlain in places by "hard material" that may be diamicton on top of bedrock. Such a sequence of nearshore deposits is probably typical in the Wrangell area.

Sediment-laden tidal water originating from the Stikine River is carried at least as far as the Wrangell harbor area during each tidal cycle. Soundings in the inner harbor (1939, 1948 and 1961) showed no

appreciable differences in bottom elevations. This is probably due to tidal action that keeps the sediment in suspension and flushes it out of the harbor at ebbtide. Conversely, comparison of bathymetric maps of Wrangell harbor shows that four to six feet (three to four inches per year) of sediment has accumulated from 1948 to 1965 in the deeper part of the harbor between the breakwater and Shake's Island. The deeper water off the harbor accumulated sediment at the rate of about one inch per year (Lemke, 1974).

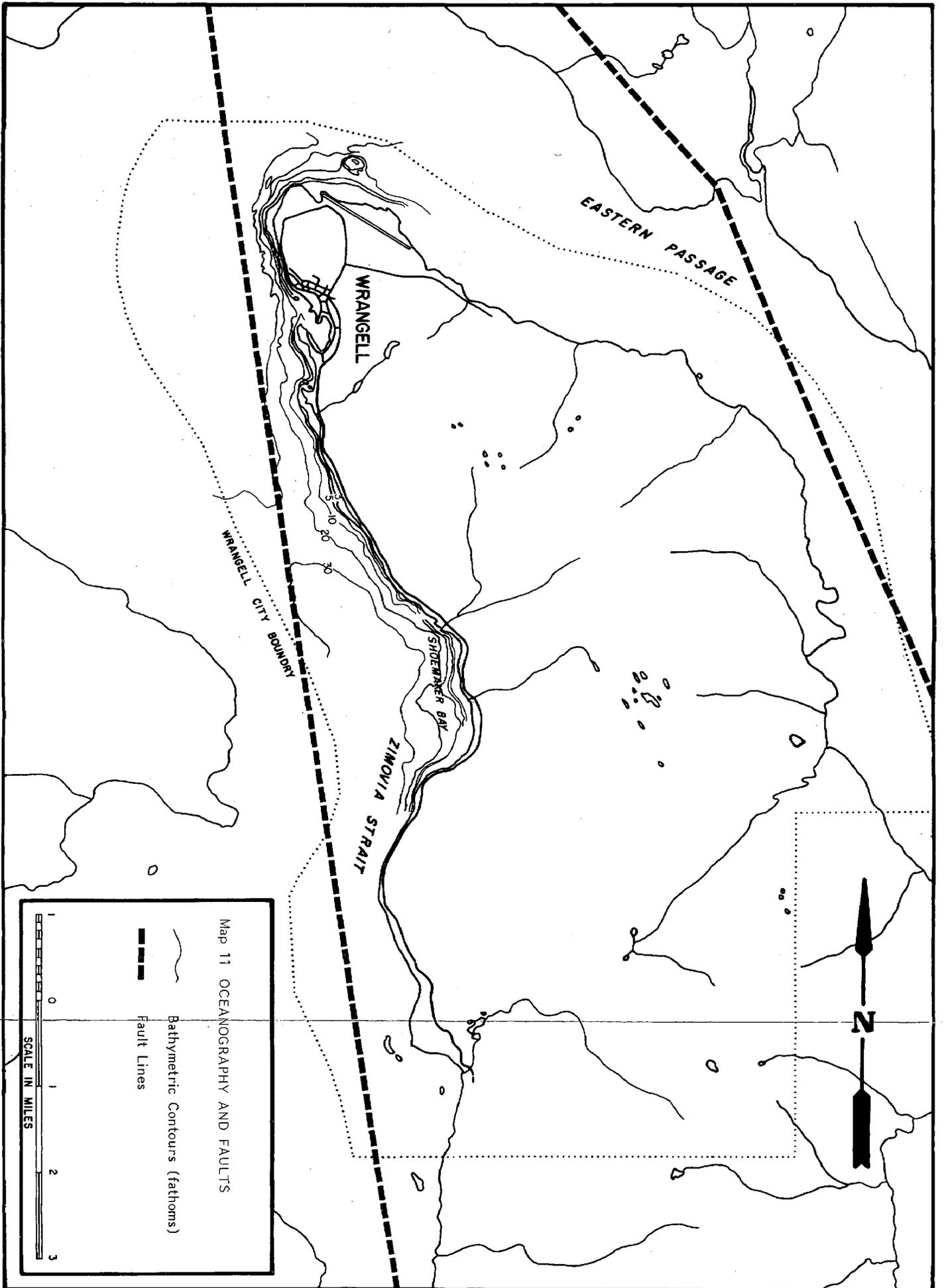
The intertidal delta deposits at the mouth of the Stikine River have been advancing at a relatively fast rate. Historical records indicate that the delta southeast of Mitkof Island has advanced at least one and a third miles in the ninety-four years between 1793 and 1886-87 at an annual rate of between 75 and 105 feet. In comparison with data from 1936, these figures show a continued advance at a less rapid rate than expected for part of north Wrangell Island where, sedimentation is retarded by tidal currents. Hydrographic charts from 1963 and 1972 show that the delta has advanced at an average rate of fifty to sixty feet per year north of Wrangell during the eighty-six years prior to 1972.

Assuming a minimum average delta advance of fifty feet per year, it would take about fifty-five years (from 1981) for Eastern Passage to be filled with sediment between the front of the delta and Simonof Island. Between Simonof Island and the northern part of Wrangell Island, the water is so shallow that the area could be filled with sediments during the same period. Erosion of the front of the delta by tidal action, however, may greatly retard blocking of the channel as the channel becomes narrower. As the margin of the delta extends southward, increasingly greater quantities of suspended sediment will be carried into Wrangell harbor, possibly requiring progressively more dredging. The level of sedimentation will depend on the extent to which tidal currents flush the suspended particles back out to Zimovia Strait (Lemke, 1974). Damming of the Stikine River would substantially reduce its sediment load below the dam, thereby slowing down the above sedimentation process.

GEOLOGY

STRUCTURE

Southeastern Alaska lies along the boundary between the North Pacific Tectonic Plate and the North American Tectonic Plate; the forces generated by the movements of these plates have shaped much of the topography and geology of the Wrangell area. Tectonic plate boundaries are characteristically areas of high volcanic, seismic and mountain-forming activities; the "Rim of Fire" stretching around the Pacific from Japan to California to the South Pacific is actually the boundary of the North Pacific Plate. There are two major fault systems in the southeastern Alaska region, the Denali and the Fairweather-Queen Charlotte Islands fault systems. The Fairweather-Queen Charlotte system is the most active and most directly affects the Wrangell vicinity. The occurrence of linear fiords with similar directional alignments may indicate additional geologically recent faulting activity (Lemke, 1974).



Map 11 OCEANOGRAPHY AND FAULTS

Bathymetric Contours (fathoms)

Fault Lines



TOPOGRAPHY

Wrangell is situated on the northern third of Wrangell Island, which is about thirty miles long, as much as fourteen miles wide, and has characteristically rugged and mountainous terrain. Some of the higher peaks reach between twenty-five and twenty-eight hundred feet. In contrast, the topography within the Wrangell townsite is much more subdued; with two exceptions, nearly all the townsite area is below 150 feet in elevation. The two higher areas are Dewey Mountain, which slightly exceeds four hundred feet, and a hill near Point Highfield, which rises to just over three hundred feet. Southeast of the townsite the land rises steeply to an elevation of about fifteen hundred feet. Maps 14 and 17 A, 17B and 17C show the degree of slope in the north end of the island and along the Zimovia Highway.

SURFICIAL DEPOSITS

The Wrangell area is generally underlain by shallow bedrock, covered to various depths by sandy loam, peat, mixed silt and peat, impermeable dry loam and, in many areas, muskeg. Highly organic soils (peat, etc.) typically overlie residual soils, which in turn overlie weathered bedrock and then bedrock. Pockets of marine clay and glacial till occasionally exist between the surficial organic soils and the underlying bedrock. In any one place, one or more of the soil types may be absent above bedrock, but the order of deposition should be as described above. Residual soils are those which have been weathered from bedrock in-place. Characteristically, these soils still show the joints and bedding planes of the parent bedrock. Clay-like residual soils are a problem throughout the world because of their planar structure; the strata of these soils are inherently weak along the bedding planes. The residual soils in Wrangell are primarily composed of sand-sized slaty particles and not clays. These soils should not cause major concern for homesite developers.

In general, soils have thick surface organic mats, ranging from six to twelve inches on the mineral soils to several feet on the organic soils. This surface organic mat, containing most of the plant roots and soil nutrients, protects the soil from surface erosion. Removal of this mat greatly reduces a soil's storehouse of nutrients and exposes the underlying material to erosion. Many mineral soils are stable in place, but will change to a fluid when rubbed, squeezed or worked (thixotropy). This greatly limits their suitability for structural or recreational uses and increases their potential for mass wasting. Other characteristics include very strong acidity, low fertility, friable consistency (easily broken up), weak structure, rapid permeability, perpetual moistness and almost no surface runoff (except on alpine and muskeg soils) (USFS Wrangell Island Soil Survey, 1975).

Except for scattered locations, the soil of Wrangell is not well drained. Sewage disposal by septic tank is therefore often unsatisfactory, although septic tanks with leaching fields and sand filters can be used satisfactorily in some areas.

The surficial deposits in the Wrangell area have been delineated on Map 12 by the following soil types on the basis of their time of deposition, mode of origin and grain size: elevated fine-grained marine deposits (Qem), elevated beach deposits (Qeb), muskeg deposits (Qm) and late shore deposits (Qs). Manmade fill (mf) is also mapped as a separate unit. Such information is only available for the townsite within the city limits. The USFS has done a soil survey that covers most of the island outside of the city limits.

The almost continuous muskeg cover in the mapped area makes it difficult to determine the nature and extent of the underlying surficial units. In general, muskeg is mapped if it is an estimated three or more feet thick. Although this method is inexact, subsurface data obtained from test holes drilled in connection with sewer line, street and highway construction generally agrees with the estimates (Lemke, 1974).

Elevated Fine-grained Marine Deposits (Qem)

These deposits are marine sediments derived from glacial run-off and streams that flowed into fiords and inlets, with sediments subsequently elevated above sea level. They probably underlie fairly large parts of the lower, flatter-lying terrain of the mapped area, but in most places they are overlain by elevated beach deposits (Qeb) or muskeg (Qm) of mappable thickness. They commonly rest directly on bedrock, but in places may overlie till. The deposits extend from sea level to a height of at least 150 feet.

The deposits are generally dark bluish-gray and are composed chiefly of varying amounts of clay, silt and sand-size particles. Thicknesses of ten to fifteen feet are common and in a few places may be as much as thirty feet. In most places the deposits are indistinctly bedded, moderately dense and relatively impervious. Natural water content may be near or slightly more than the liquid limit. The soil has a relatively moderate suitability for development. It would, however, be subject to strong ground shaking in the event of an earthquake (see section on hazards).

Elevated Beach Deposits (Qeb)

The deposits are believed to represent the near-shore faces of the elevated marine deposits. In areas of flatter terrain, they generally overlie the elevated fine-grained marine deposits, but on somewhat steeper slopes they commonly directly overlie bedrock. They are overlain nearly everywhere by muskeg. The deposits have been found in the mapped area up to an elevation of approximately 180 feet. Because of the nearly continuous muskeg cover, knowledge of the extent, character and thickness of the deposits is based almost entirely upon test holes drilled in connection with construction activities and upon a few manmade cuts. This soil type provides a reasonably good base for construction.

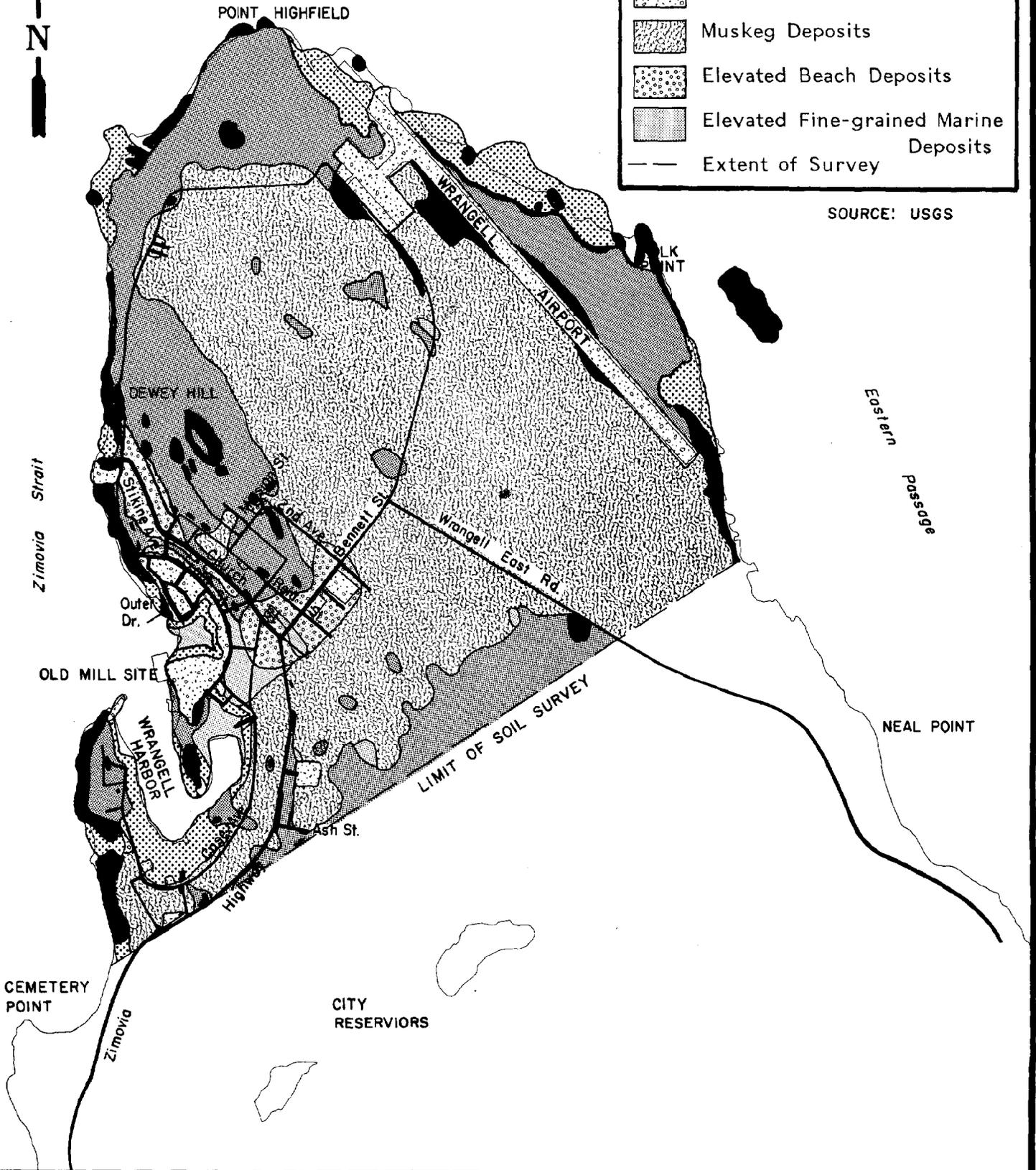
1600 0 1600 feet



Map 12 SOILS

-  Exposed Bedrock
-  Covered Bedrock
-  Late Shore Deposits
-  Man Emplaced Fill
-  Muskeg Deposits
-  Elevated Beach Deposits
-  Elevated Fine-grained Marine Deposits
-  Extent of Survey

SOURCE: USGS



Muskeg (Qm)

Muskeg is defined as organic-rich deposits consisting of peat and other decaying vegetation commonly found in swamps and bogs. Muskeg provides the surface cover for nearly all of the flatter terrain in the Wrangell area, as well as on some moderate slopes.

The thickness of muskeg in the area ranges widely, but is commonly five to ten feet in depth. Test holes (State of Alaska Department of Highways, 1969) drilled along the Airport (Bennett) Road and the Wrangell East Road showed that the average thickness of muskeg in that area is six feet; the maximum thickness penetrated was twelve feet. Test borings eastward from Zimovia Highway paralleling Hemlock Street contained muskeg to nine feet thick but considerably less in most places. Muskeg upslope from the Zimovia Highway between Cedar and Hemlock Streets is three and a half to twelve feet thick, averaging about eight feet deep.

In road and street construction in the Wrangell area, muskeg has been treated in two different ways: (1) removal of all or most of the muskeg from the road alignment, and (2) placement of roadbed material directly on the undisturbed muskeg in those places where the road grade is a minimum of 2.5 feet above the existing ground elevation. Complete removal of the muskeg results in an immediately strong, stable roadway with uniform conditions and minimum maintenance. This method generally is used for reconstruction of streets and for roads with an expected high traffic volume. A roadbed placed over muskeg possesses the undesirable aspects of nonuniform subsidence, poor stability and high maintenance (State of Alaska Department of Highways, 1966, 1969); but the initial construction cost may be considerably less using the second method. The second method was recommended by the State of Alaska Department of Highways for roads having a low traffic volume, such as Wrangell East Road. It was further recommended that, when fill is placed directly on muskeg, it should consist largely of granular materials. Where paving is planned within three years of construction, rapid consolidation and reasonable stability can be achieved by overloading the muskeg sufficiently to compact it immediately to the point of ultimate settlement for the proposed final design load. This could be done by use of a "rolling surcharge" (State of Alaska Department of Highways, 1969). Using this method, it is estimated that settlement of the underlying muskeg will be forty to sixty percent of its original thickness.

As Wrangell continues to expand into areas underlain by relatively thick muskeg deposits, more and more fill is being used to construct firm pads for parking and other purposes. The fill generally consists of crushed bedrock placed directly on the muskeg and is usually two or three feet thick. Rock pieces, commonly as much as one foot in size, are used as a base and are compacted by rolling; finer crushed rock is added as a topping.

In construction of residential buildings in muskeg areas, piling is generally driven through the muskeg into the underlying surficial deposits or to bedrock. Although the presence of muskeg adds to the construction cost, it does not render the land unusable for building purposes.

Each expanse of muskeg and its underlying substrate has unique drainage, compaction and density characteristics; this is evidenced by the wide variety of vegetation patterns exhibited on a seemingly uniform muskeg surface. In general, the Wrangell vicinity has two main types of muskeg - sedge muskeg and sphagnum muskeg (peat). In Wrangell, the sedge muskeg often underlies the sphagnum; sedge muskeg contains a greater quantity of fibrous material and is therefore capable of heavier loading than sphagnum. USFS guidelines recommend that sphagnum muskeg over eight feet in depth or sedge muskeg over fifteen feet in depth be completely avoided in the placement of overlay road construction, piling foundations or "floating" foundations of fill placed on Tytar or Mirifam fabric sheets. Locations in which the open ponding of a high water table occurs over an area underlain by any sort of muskeg layer that exceeds ten feet to firm substrate are classified as requiring bridges for Forest Service roads. Such areas also have very high frost susceptibility and are poorly suited for development.

Late Shore Deposits (Qs)

Most of the deposits mapped as late shore deposits (Qs) occur between higher high water and lower low water. Along the west shore of the mapped area, they consist chiefly of sand, gravel, cobbles and boulders. Along the north and northeast shores, they consist mostly of clay and silt-size material. Point Highfield is the approximate dividing line between the coarse-grained beach deposits and the fine-grained water-suspended deposits, although there is some overlap of the two size fractions. These deposits, when composed of coarse material and sand, are generally well suited for development.

Fill (mf)

There are essentially two types of man-emplaced fill obtained locally in the Wrangell area: (1) fairly thick fills consisting chiefly of surficial deposits emplaced along the shore to elevate low-lying areas above high tide; and (2) fills consisting mostly of crushed bedrock pads laid down to obtain firm bases for roads and streets, for the airport runway and apron, and for parking areas surrounding buildings.

Considerable fill has been used in constructing roads and streets in the Wrangell area. For newer roads such as Bennett Street and the Wrangell East Road, where the fill is often placed on the original ground surface, the amount of fill is determined largely by the frost susceptibility of the original surface material. Thus, minimum overlays of fill generally range from thirteen inches, where surface material has a moderate frost susceptibility, to minimum overlays of fifty-one inches of fill on some city streets where fill has been emplaced on muskeg (State of Alaska Department of Highways, 1963). Crushed bedrock from nearby quarries constitutes most of the fill for recently constructed roads. Where the roads are excavated through bedrock, the bedrock in the cut is generally suitable for common embankment fill. Silty deposits such as elevated fine-grained marine deposits (Qeb) generally

are not used for fill because of their fine texture, high frost susceptibility and high natural moisture content. Sand and gravel, used as selected material and for aggregate on some streets and roads, have been barged in from a source near the mouth of the Stikine River or obtained from pits along the Zimovia Highway about six miles south of the Wrangell townsite.

One of the thickest surficial fill deposits is located in the former intertidal area between Front Street and Outer Drive, where the City Hall building and a supermarket are located. In most places, the surface of this fill is eight to ten feet above high water, and the fill may be as much as fifteen feet thick near its outer margin. Inasmuch as the fill was obtained mostly from the dredged area of the city's inner boat harbor, it probably consists chiefly of intermixed clay, silt, sand and some gravel-size material. Crushed bedrock, laid down as a topping, forms approximately the upper one foot of the fill, and angular pieces of bedrock-derived riprap one to two feet long have been emplaced along the outer edge to deter wave erosion. As judged from bedrock outcrops near the outer margin of the fill and from old photographs and hydrographic charts, in most locations the fill has been placed directly on bedrock.

A second large fill was emplaced to elevate a low-lying area along the shore west of Shakes Street where the lumber mill is located. Less is known about the composition of this fill. In most places the fill probably is not as thick as the one previously described. Old hydrographic field sheets (1882) show two areas that were above high tide before emplacement of the fill. It seems likely that fill was emplaced in the intertidal areas between these two areas to form a fairly level surface. As indicated from surface material, at least some and perhaps a large part of this fill consists of sawdust and larger wood fragments from the lumber mill. This fill was also probably emplaced directly on bedrock.

The largest and thickest extent of manmade fill underlies the Wrangell airport runway and parking apron. As much as twenty-five feet of fill was emplaced near the northwest end of the runway and a maximum of about twenty feet was emplaced at the southeast end.

BEDROCK

The Wrangell area is underlain by bedrock composed of metamorphic rocks intruded by igneous rocks. The metamorphic rocks (schists, phyllites, slate and foliated graywacke) are part of the Wrangell-Revil-lagigedo formation that extends for many miles north and south. The igneous rocks are part of the coast range batholith that forms the Coast Range Mountains on the mainland. The metamorphic rocks are highly fractured and not durable; the igneous rocks are massive, hard, durable and only slightly fractured.

The bedrock in the area has been crushed and used for road, street and airport construction, for pads around buildings and other facilities in muskeg areas, and as riprap.

MINERALS

The Wrangell area is underlain by partially metamorphosed sedimentary and igneous schists and phyllites of Mesozoic age. To the east, on the mainland, these units are known to contain significant deposits of stratiform lead, zinc, silver, fluorite and possibly molybdenum in the Groundhog and Glacier basins (Map 13). Much exploratory activity has taken place in the area during the last several years, and well over one thousand claims were staked on Kupreanof, Zarembo and Woronkofski Islands in 1978. These are believed to be raw prospects containing lead, zinc, copper, gold and silver similar to those being evaluated on Admiralty Island (such as the Greens Creek occurrence). The age and lithologies of rocks where most of the activity is occurring markedly differs from those on Wrangell Island. Specifically, there are two known mineral deposits within the Wrangell area. Tungsten-rich placer deposits are found on Pat Creek near Trout Lake; some activity occurred there in the late 1960's. Several claims were staked for iron, gold and chromium in a contact-metamorphosed mineralized zone on a six-hundred-foot-high knob approximately two miles due east of Chichagof Peak. These claims are presently inactive. One interesting mineral occurrence lies on the north side of Eastern Passage near Rothsay Point, where museum quality garnets were mined by the Alaska Garnet Company intermittently for thirty years. So called "Fort Wrangell" garnets can be found in museums all over the world.

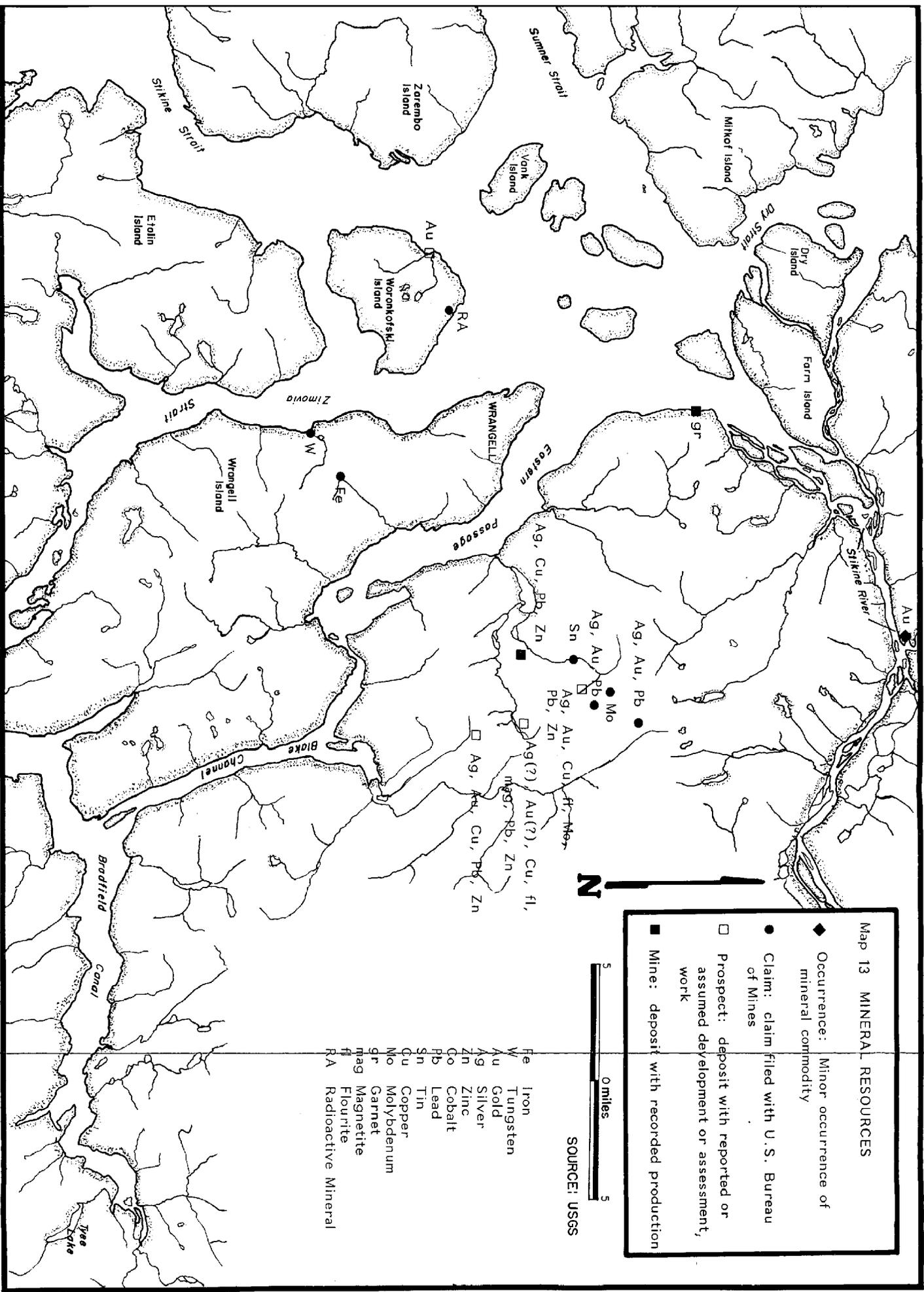
Materials

Wrangell is similar to most other southeastern communities in that good, developed sources of mineral materials (e.g., sand and gravel) are few in number. Sand and gravel are nonexistent except for tideland sources. The economic feasibility of the use of any material source is dependent on its proximity to the jobsite. Transportation costs often render a material source undesirable where haul distance exceeds more than a few miles. Several sites, each oriented to a different part of town, are therefore used to limit haul distance. Material sites such as quarries are shown on the land use maps 26A, 26B, 26C and 26D. Some of the most important quarries are described below.

The seventy-three acre Rainbow Falls site contains two quarries. Each quarry has been continuously under contract to various local contractors for several years. The site has a central location, yet is screened from Zimovia Highway by nearly a quarter mile of dense forest.

Further south along the highway, at approximately 6.5 mile, is the ALP quarry, so named because it is across the road from the Alaska Lumber and Pulp sawmill. This site is contained in a designated watershed and mining operations must therefore be closely controlled.

Another quarry is located a few miles farther south along the Zimovia Highway (see land use). The Wrangell east highway quarry is situated on the north end of town. This site has provided rock for highway and airport construction. A quarry is also located upland from Cemetery Point.



Map 13 MINERAL RESOURCES

- ◆ Occurrence: Minor occurrence of mineral commodity
- Claim: claim filed with U. S. Bureau of Mines
- Prospect: deposit with reported or assumed development or assessment, work
- Mine: deposit with recorded production



SOURCE: USGS

- Fe Iron
- W Tungsten
- Au Gold
- Ag Silver
- Zn Zinc
- Co Cobalt
- Pb Lead
- Sn Tin
- Cu Copper
- Mo Molybdenum
- gr Garnet
- mag Magnetite
- fl Fluorite
- RA Radioactive Mineral

HAZARDS

LANDSLIDES

Various forms of mass wasting, including land, mud and debris slides, and slumping are fairly common on Wrangell Island (Figure 3). Most landslides are a manifestation of natural mass wasting and slope reduction associated with steep slopes, high water levels in the soil and open areas. Landslide potential can be increased by clearing steep slopes of stabilizing vegetation such as trees, which can occur due to blowdowns or timber harvesting. Other causes of landslides are shown in Figure 4. Douglas Swanston, a landslide expert with USFS, noted that all of the steep slopes adjacent to the water on the west side of Wrangell Island are naturally prone to landslides. Landslides are the dominant form of erosion in the area.

Any slopes steeper than sixty percent are extremely prone to landslides. Slopes over thirty-six percent are also highly slide prone. Slopes between twenty-five and thirty-six percent have a high landslide potential. There is also danger in relatively gently sloping areas with steep areas above them, as slides originating upland can bury areas below. Steep slopes are shown on Map 14 (also see Maps 17B, 17C and 17D).

Methods of building on slopes is shown in Figure 5. Development should be located away from the base of steep slopes, particularly if they have been cleared (logged). The base of stream channels in steep areas are also hazardous. If slopes are logged in existing or potential residential areas, a buffer strip of trees at least one hundred feet in depth should be retained upland from the developing area to stop or at least mitigate the impact of debris from slides.

Three separate mudslides occurred during October 1979 south of the Wrangell townsite, upland from Cemetery Point near the Baker trailer court and Bakke apartments. The slides apparently originated in a steep blowdown area adjacent to an area that had been clearcut. Provoked by record rainfall (4.29 inches in twenty-four hours), without treeroot systems to hold the soil together, the steep slope failed. The slides covered about fifteen acres and deposited debris and watery mud over a five to six acre area at the base of the mountain - stopping less than two hundred feet short of several homes. A small local water supply reservoir was buried by debris. There was also some damage to structures and at least one vehicle. Debris flow closed the Zimovia Highway for several hours. Although the slide area has been replanted, there is reported to be considerable danger that further mass wasting may occur.

EARTHQUAKES

There are no recorded earthquake epicenters in the Wrangell area, and only two epicenters, with magnitudes of 5.0 or less, have been recorded within one hundred miles. About twenty-five earthquakes having epicenters elsewhere may have been felt at Wrangell. Several

microearthquakes have been recorded in recent years within 175 miles northwest and north of Wrangell, but only a few were recorded in the immediate vicinity. It is not clear whether the microearthquakes are related to faulting or to glacier movement.

According to the geologic survey open-file report by Richard Lemke (USGS, 1974), an accurate evaluation of the potential for earthquakes in the Wrangell area must await a longer record of seismic events and a better knowledge of the tectonic framework of the area. According to Lemke, the placing of the Wrangell area in seismic zone three as shown on the U.S. Army Corps of Engineers map seems reasonable based on present knowledge. Theoretically, earthquakes of a magnitude greater than 6.0 on the Richter scale could occur in this zone, which might result in major damage to structures. Judged solely from the seismic record, few earthquakes with epicenters in or near the Wrangell area are anticipated. The high earthquake activity of southeastern Alaska as a whole, where earthquakes of magnitude eight and greater have occurred, makes it prudent to assign a higher risk factor than is indicated solely from the local seismic records. It has been dramatically demonstrated in the past that damaging earthquakes can occur in areas where only minor local seismic activity was previously exhibited, particularly where the local geologic structure is not well known. It also should be emphasized that large earthquakes of magnitude 8.0 or greater can be expected to occur from time to time along the Fairweather-Queen Charlotte Islands fault system. These earthquakes may be sufficiently strong at Wrangell to cause damage either directly or indirectly from shaking.

Possible Effects from Earthquakes

If the Wrangell area is shaken strongly by an earthquake, it seems likely that the harbor facilities and other manmade structures in low-lying parts of the city will be the most heavily damaged. This is due to the nature of the geologic formations on which the structures are built and on the proximity of the structures to the sea. Any non-engineered loose fills that consist of surficial deposits along the shore are expected to be subject to comparatively strong shaking; they also may be subject to settlement or ground fracturing. The beach deposits along the shoreline are also expected to be subject to comparatively strong shaking and, where fairly thick, to differential settlement, ground fracturing, landsliding and possibly liquefaction (soil becoming liquid). Large-scale underwater sliding appears unlikely on the steeper offshore slopes, such as in the vicinity of Shustak Point (Point Shekesti), because of the thinness of sediments; where the underwater slopes are gentler, however, and where there are greater accumulations of fine-grained sediments (such as offshore from the old lumber mill site), moderate to large-scale sliding may occur. The potential for sliding, with resultant damage to docks and other facilities, could be particularly high if the deposits were subject to liquefaction.

Effects in Upland Areas. Earthquake effects probably would be considerably fewer and generally less severe for the area upslope from the harbor. Most of the effects would result directly from shaking.

1-34a

FIGURE 3

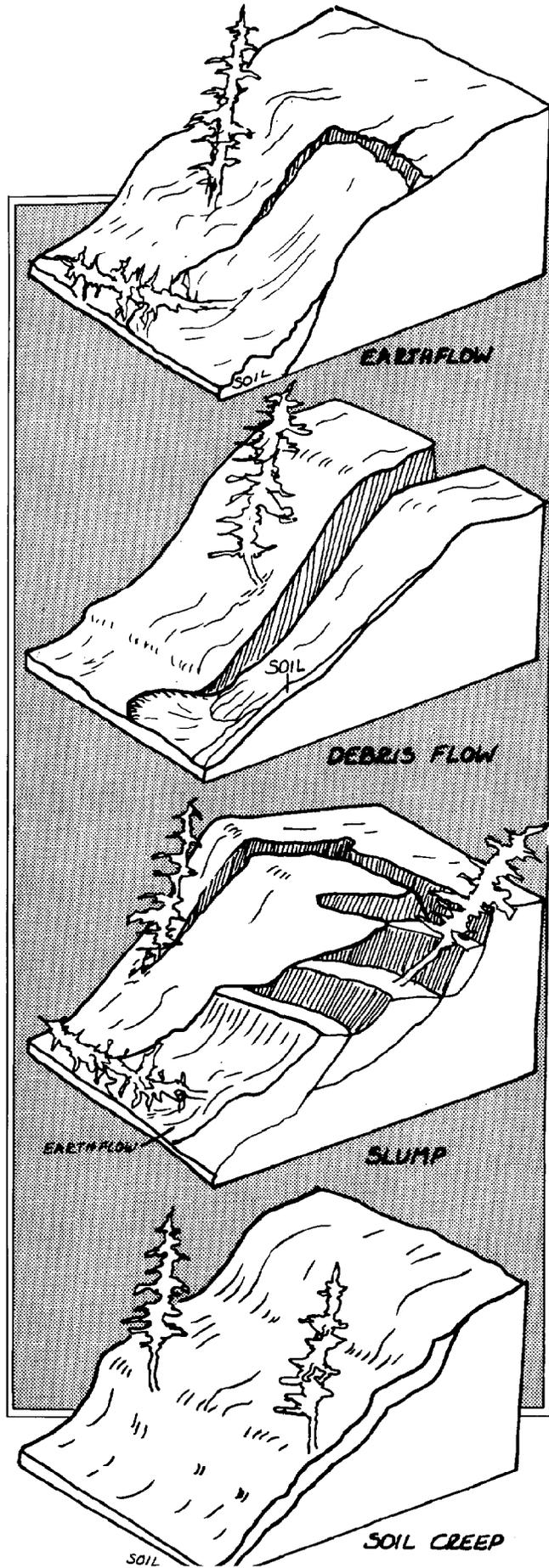
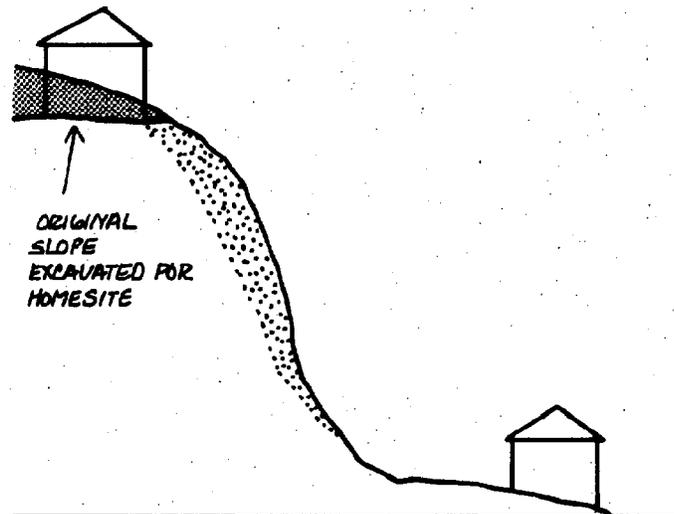
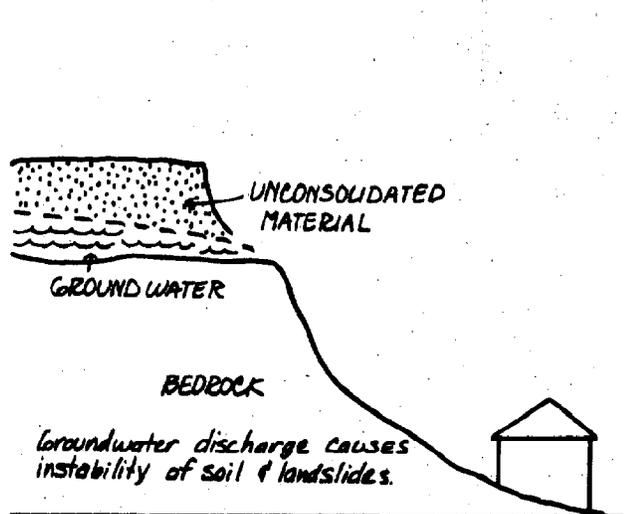
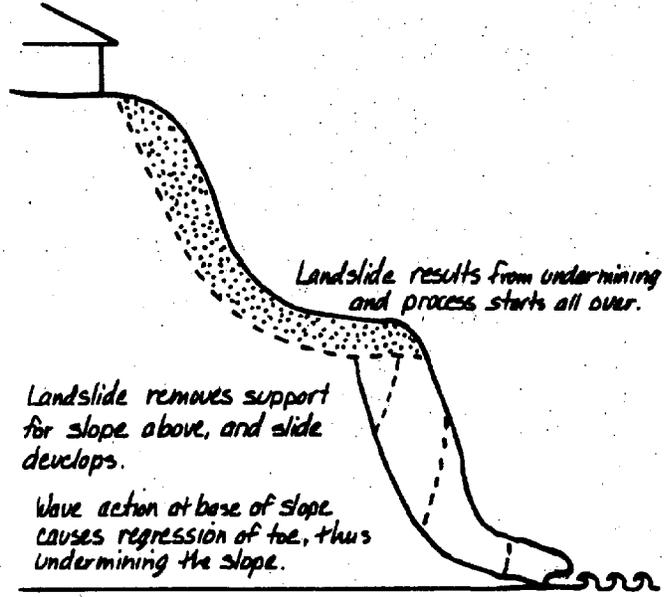
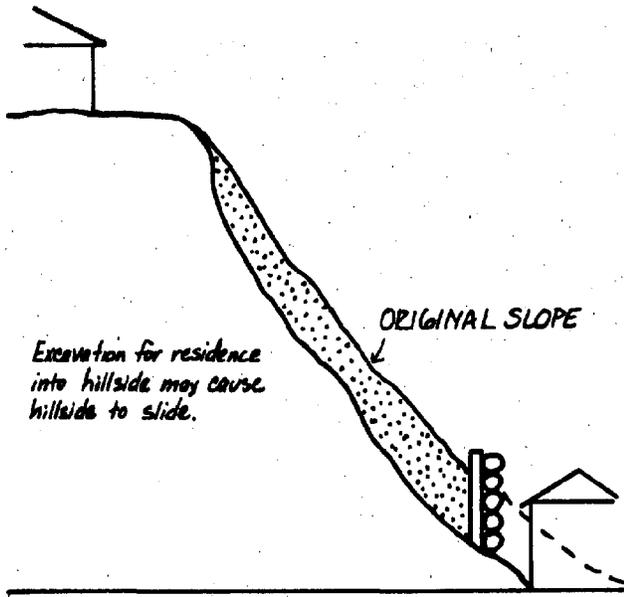
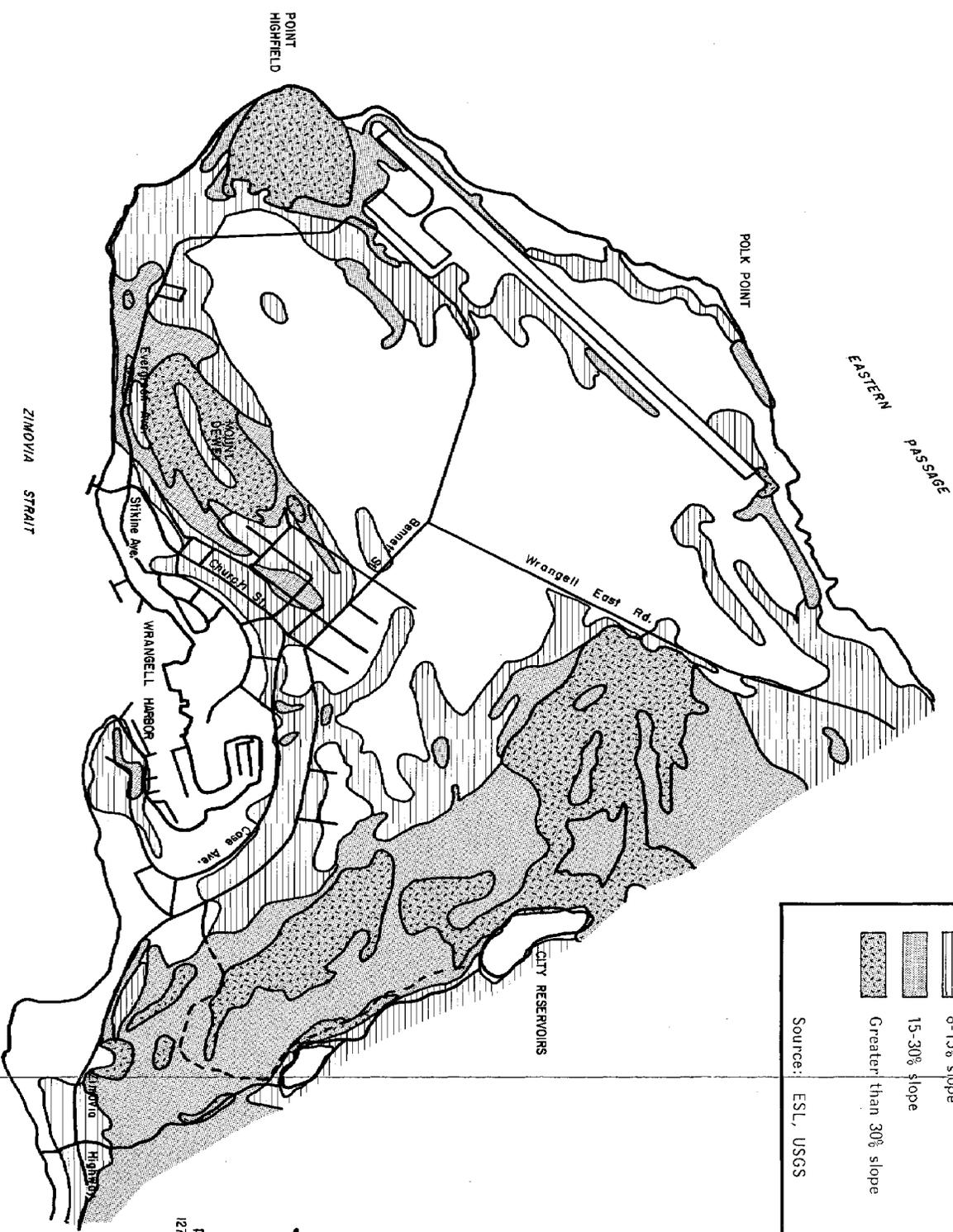


FIGURE 4





Map 14 SLOPES

- 0-8% slope
- 8-15% slope
- 15-30% slope
- Greater than 30% slope

Source: ESL, USGS

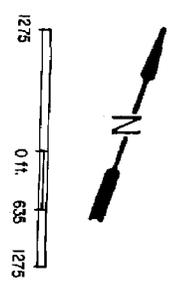
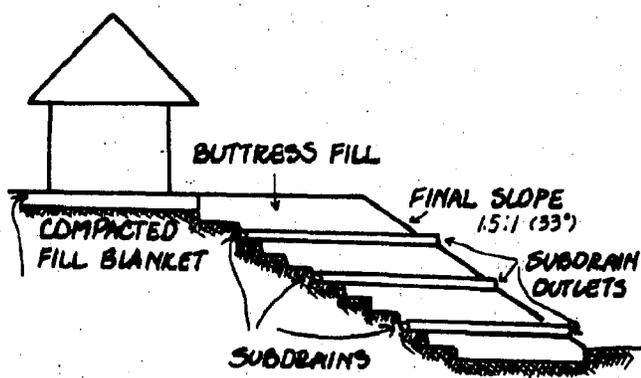
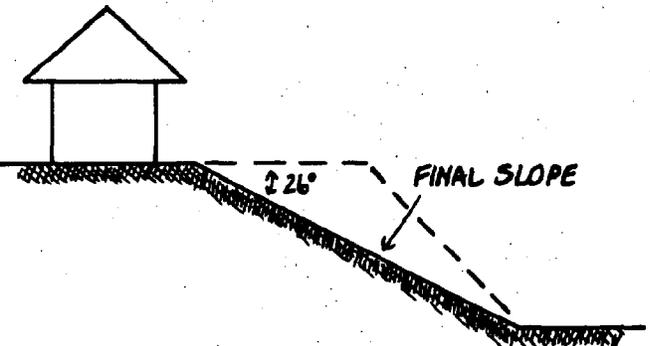
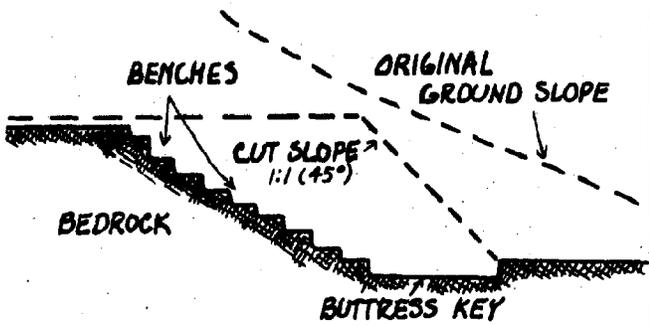
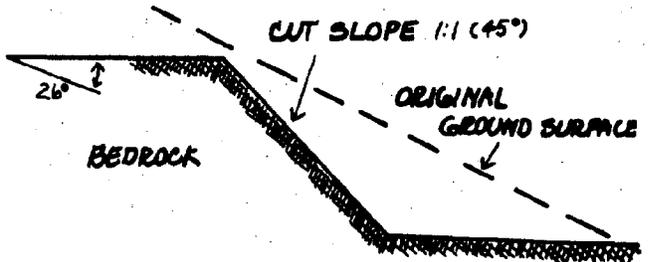
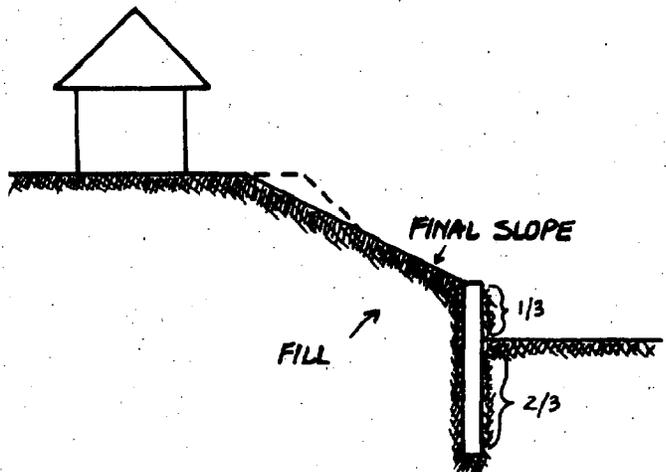


FIGURE 5

SLOPE STABILIZATION
RETAINING WALL METHOD



SLOPE STABILIZATION
BUTTRESS METHOD



The muskeg deposits, because of their very low rigidity, can be expected to shake strongly during a large earthquake except for areas that are too thin to increase (amplify) the ground motions in the underlying materials. Likewise, large lateral deformation of the deposits can be expected, which might be particularly damaging to buildings or other structures built on muskeg slopes. Comparatively strong shaking of elevated beach deposits and elevated fine-grained marine deposits also can be expected (see Map 12), except where they are too thin to amplify ground motions of underlying materials. Little or no landsliding is expected other than possibly along the steep southwest side of Dewey Hill, where fractured bedrock stands in near-vertical slopes. Rockslides of considerable size are a possibility here. It is highly unlikely that tsunami or other abnormal waves would attain sufficient runup heights to reach this part of the city.

Few earthquake effects would be expected at the Wrangell airport. The effects of shaking would expectably be less on this engineered fill than for nonengineered fills. The runway and airport aprons probably are too high above sea level to be affected by tsunami or other types of abnormal waves, other than possibly some wave-produced erosion along the base at the ends of the runway.

Effect on Stikine River Delta. The Stikine River delta directly north of Wrangell Island would undoubtedly be the most severely affected by an earthquake in the Wrangell vicinity. Although the delta is presently of little concern since there is no development there, extremely careful consideration should be given regarding potential effects if a bridge or causeway connecting Wrangell with the mainland were planned across this area. The deposits forming this part of the delta are believed to be particularly subject to strong shaking in comparison to deposits in other areas. They would probably be subject to compaction, with resultant differential settlement, as well as to liquefaction and water-sediment ejection. The front of the delta would be particularly subject to landsliding and submarine sliding, especially if shaking were sufficiently strong to cause liquefaction of the deposits. Damage from tsunami waves and other abnormal waves, such as slide-induced waves, could be high, even from those waves with low runups, because of the low relief of the area.

Effects on Reservoirs. A strong earthquake might have some effect on the water supply of Wrangell. The biggest danger would be the possibility of failure of the reservoir dams caused by debris flows or rockslides. Reservoir capacity could also be severely diminished by filling of the reservoir with slide material. A temporary increase in turbidity and change in taste of the water could also be expected (Lemke, 1974).

Tsunami

These seismic sea waves, generated by sudden earthquakes on the ocean bottom, travel at speeds of 425 to 600 miles per hour in open water (less in shallow areas). Wave runup onto the shore can range from almost unperceptible to heights of more than one hundred feet.

An earthquake of 7.0 on the Richter scale is likely to produce a noticeable tsunami, and one of 8.0 or greater can produce a disastrous one (Wiegel, 1964). The earthquakes in southeastern Alaska generally are not the type that generate these waves. It is therefore unlikely that a tsunami would be generated close enough to Wrangell to effect the island. Tsunami waves arriving from a distant source would be greatly weakened in traveling through the inlets to Wrangell. Effects from a tsunami on Wrangell Island would depend in part upon the arrival of the tsunami in relation to the phase of the tide. A tsunami at high tide could cause devastating damage to the harbors and lowlying areas of town (Lemke, 1974).

Seiches

Seiches are standing waves generated by wind, atmospheric pressure or earthquakes. There is little chance that seiches could be generated in the open water surrounding Wrangell Island.

Submarine Slides

Submarine slides generate waves that can be destructive. The Wrangell area has a fairly high potential for damage from underwater slide-induced waves in the event of a moderately strong earthquake. The front of the Stikine River delta has the greatest potential for submarine slides. The northern tip of Wrangell Island probably would be in the path of any slide-generated waves from that source, but other than the airport, there is little that would be affected. If development occurs at Neal Point, it should be designed with the possibility of slide-induced waves in mind. The Wrangell harbor would, to a large extent, be protected from waves originating north and northeast of Point Highfield. It would be much more exposed to waves generated northwest of the point, but they probably would not have the force to do much damage (Lemke, 1974).

FLOODING

There is potential for small streams in the Wrangell area to flood, induce erosion and cause structural damage. The record rainfall that provoked the mudslides south of town also caused flood waters to cover much of the cemetery and ballpark on Cemetery Point. Similar flooding could be expected on most streams on the island. Appropriate setbacks should therefore be required for all inhabited structures. There is a remote possibility that a slide terminating at one of the reservoirs and/or excessive precipitation could cause the overtopping or collapse of the dams that contain the reservoirs. The torrent generated by such an event would obviously cause considerable damage downstream.

The location of Wrangell Island away from the open coast of the Gulf of Alaska protects the city from severe coastal storms. Wrangell has no history of any serious waterfront flooding. The Thanksgiving Day storm of 1968, considered to be the major storm of the last decade,

produced no unusual flooding hazards, although instances of wind damage were reported. Winds were generally from the southeast, resulting in negligible effects from high waves and storm surge.

The storm of October 26, 1976, caused some waterfront damage. The storm was considered less severe by residents than the 1968 Thanksgiving Day storm. The winds, however, were predominantly from the southwest, and the storm was of unusual duration. The southwesterly winds acting over a relatively long fetch of open water resulted in a combination of high tide and large waves that eroded fill and exposed residences built over the water to wave and log damage. The fill upon which the city dock and barge ramp facilities are built was severely damaged by this storm. About five or six horizontal feet of fill were lost during the storm; the lost fill has been replaced. The small boat harbor located approximately five miles south of the city, in Shoemaker Bay, was also damaged. Fill was lost from the end of the L-shaped levee forming the harbor.

Although waterfront flooding has not proved to be a problem in Wrangell, damage from wave action combined with high water can be expected, (Federal Emergency Management Agency, Flood Insurance Study, 1981). A study conducted by the U.S. Army Corps of Engineers in 1977 evaluated the possible extent of flooding in Wrangell and found that only a few shoreline areas would be affected by the 100-year flood (Maps 15 and 16) (also see Maps 17b, 17C and 17D). A 100-year flood is defined as the event that will occur once in one hundred years on the average, or one that has a one percent chance of occurrence in any given year. The Corps found that a flood of this magnitude, combined with highest tides and strong winds, would result in wave runup from seven to eight feet, inundating the new fill area near the city dock, the barge ramp, part of Outer Drive, the ferry dock area and a few nearby houses on the water side of Stikine Avenue south of the dock, and a few areas of Shustak Point, including a portion of Peninsula Street.

Other hazards identified in association with coastal flooding are erosion and damage to wooden pilings and breakwaters. Wave action against exposed shorelines, particularly when stray logs are smashed against structures, can cause substantial damage. Most severe coastal storms are also accompanied by high winds, which can be more damaging than flooding.

Flood protection along Zimovia Strait and Eastern Passage has been achieved by riprapping fill areas or exposed land formations and by providing for adequate setbacks for residential and commercial structures. Major structures such as the Wrangell dock and wharf have been constructed at an elevation of 15.8 feet. Protection for the small boat harbor is provided by a rubble mound breakwater constructed by the U.S. Army Corps of Engineers in 1926. The approximate low point elevation of this structure is 18.8 feet. The breakwater is well armored and shows no signs of damage over its fifty year life. From the small boat harbor southward, residences are intermittently spaced and generally built above the high-water mark. A seawall protects Stikine Street. Normal wear has deteriorated this structure, and cracks in the

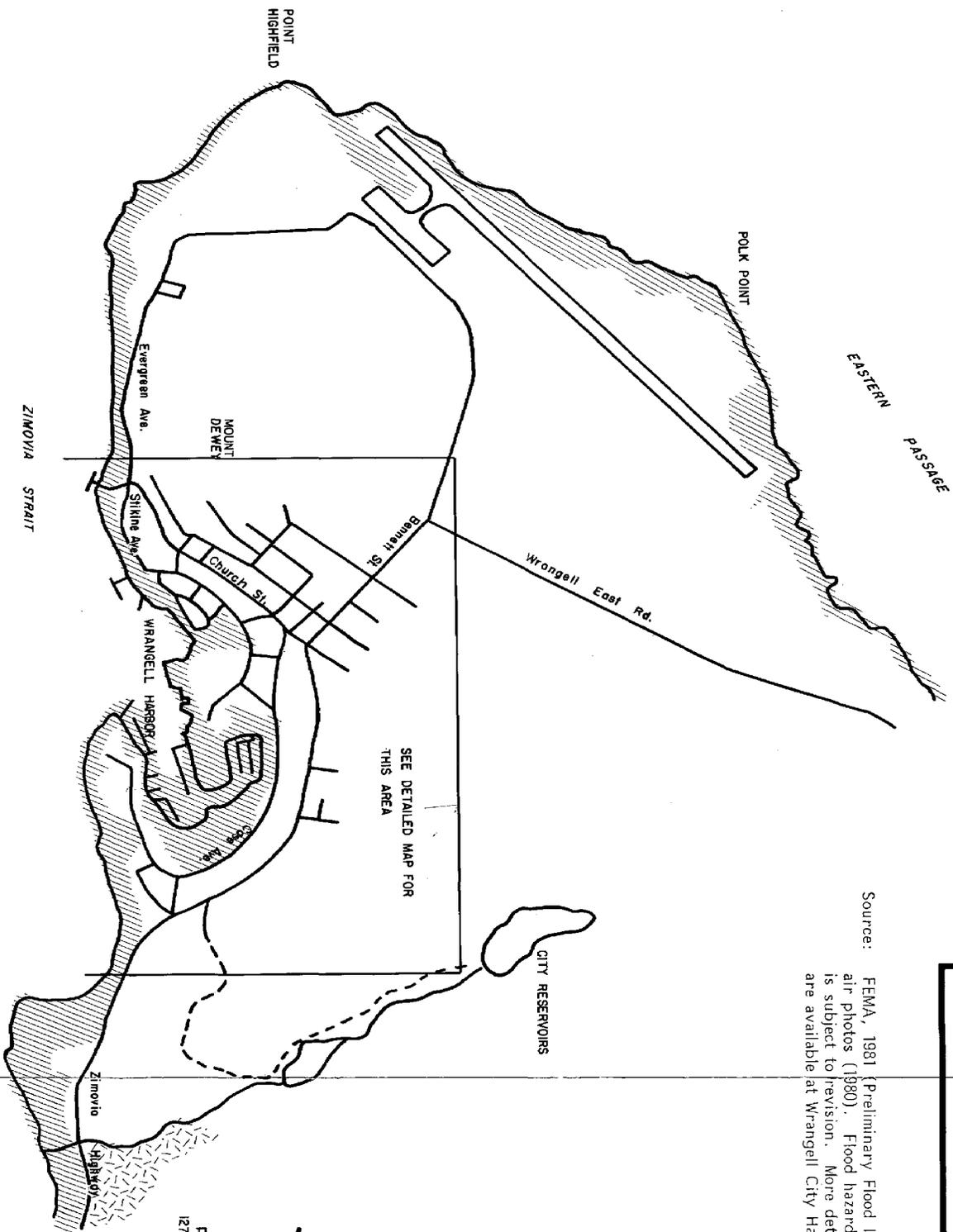
concrete are evident. Residences north of the seawall are built over the water on timber piling and take the full force of storms. Farther north, below Airport Road, are scattered old and new single-family homes. In several cases, the residences are very near the highest estimated tide elevation of 11.3 feet. The airport is located on the north end of the island. It is well constructed with substantial armoring and is over 25.8 feet above sea level (Flood Insurance Study, 1981). The effect of the aforementioned coastal protection measures on the 100- and 500-year floods is not known. The best measure for minimizing flood hazards is to set structures back from the shoreline out of the reach of storm or earthquake-generated waves.

LAND USE SUITABILITY

The development of Wrangell has always been constrained by the mountainous terrain and large areas of soggy muskeg. In recent years, most of the well drained lands have been developed and new developments, such as the elementary school, have required extensive fill. In other areas, development has occurred on or near steep slopes that may pose hazards such as landslides. In planning for future land use in Wrangell, it is important to identify those areas most suited for future development and to encourage development in these areas. It is also important to identify and avoid those areas least suitable for development - flood hazard areas, steep slopes and poorly drained lands.

A series of "composite suitability" maps have been prepared for Wrangell based on soils information (where available), slope and flood hazard information. These critical physical elements, which determine the lands capability to support various uses, were mapped at a large scale (1" = 400') inch equals 400 feet) and overlaid with one another to determine the extent of known limitations for development. Maps 17A, 17B, 17C, and 17D are reduced composites of these maps. The greater the limitation, the darker the pattern that was used to depict it. On the map of the north end of the island, areas with severe limitations such as flood prone areas and steep slopes over thirty percent show up as a dark shade. Likewise, areas with several limitations such as poor soil conditions and moderately steep slopes show up as dark areas (poor areas for development) when the patterns depicting individual limitations are laid over each other. On the three maps for areas along Zimovia Highway, slopes are shown by the various gray shades and flood hazard areas are shown with diagonal lines. There is no mapped soil information in this area.

The areas that show up as light areas are most physically suitable and economical to develop. Generally, the darker the area the greater the development and maintenance costs, and those areas that show up as dark areas generally should not be developed. More intensive land use such as industrial and commercial development should occur on the most suitable lands.

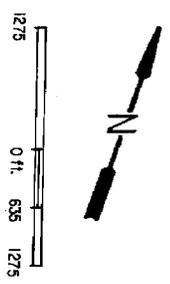


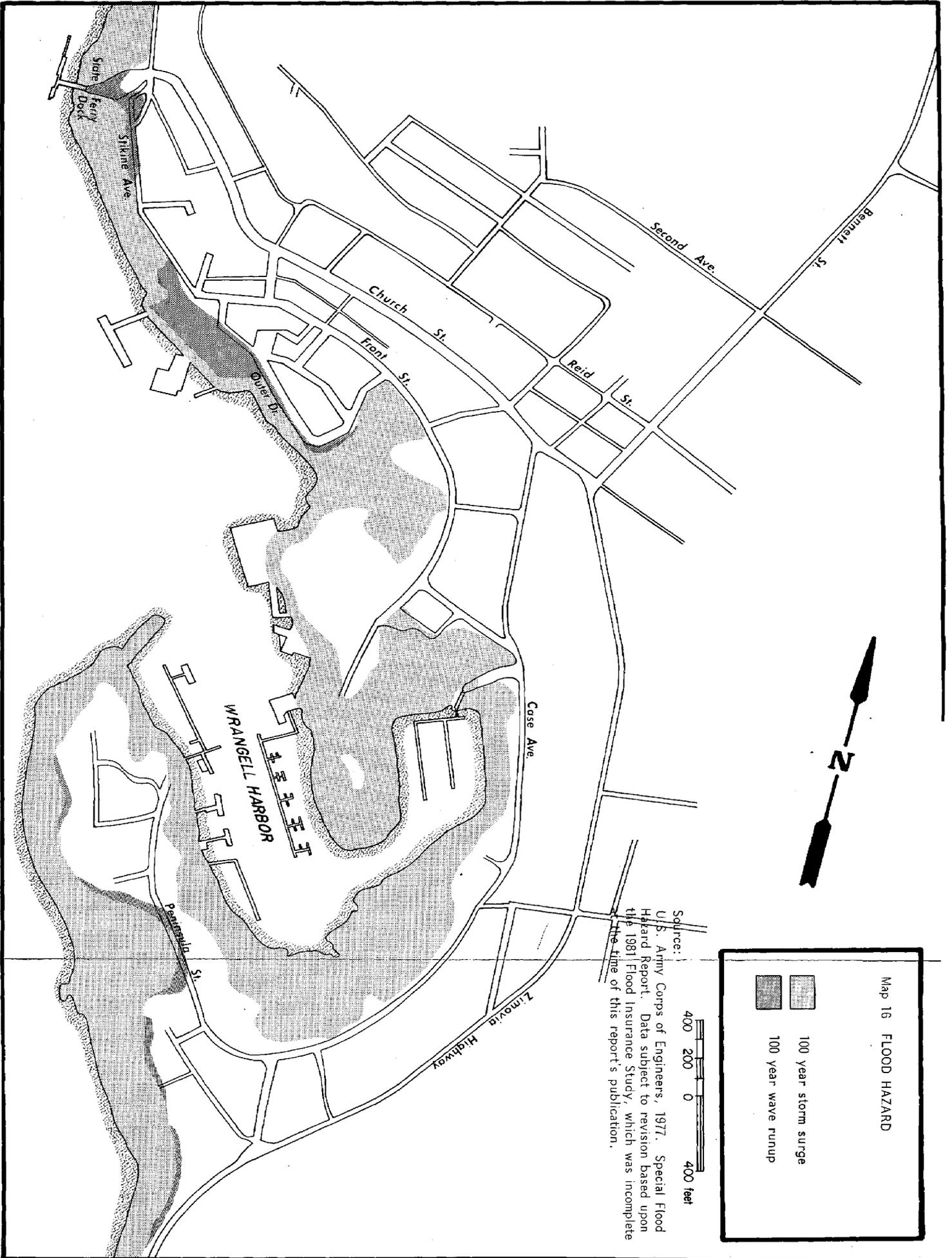
Map 15 HAZARD AREAS

-  Flood Hazard Areas
-  Slide Hazard Areas

Source: FEMA, 1981 (Preliminary Flood Insurance Rate Map) and air photos (1980). Flood hazard information shown here is subject to revision. More detailed flood hazard maps are available at Wrangell City Hall.

SEE DETAILED MAP FOR THIS AREA



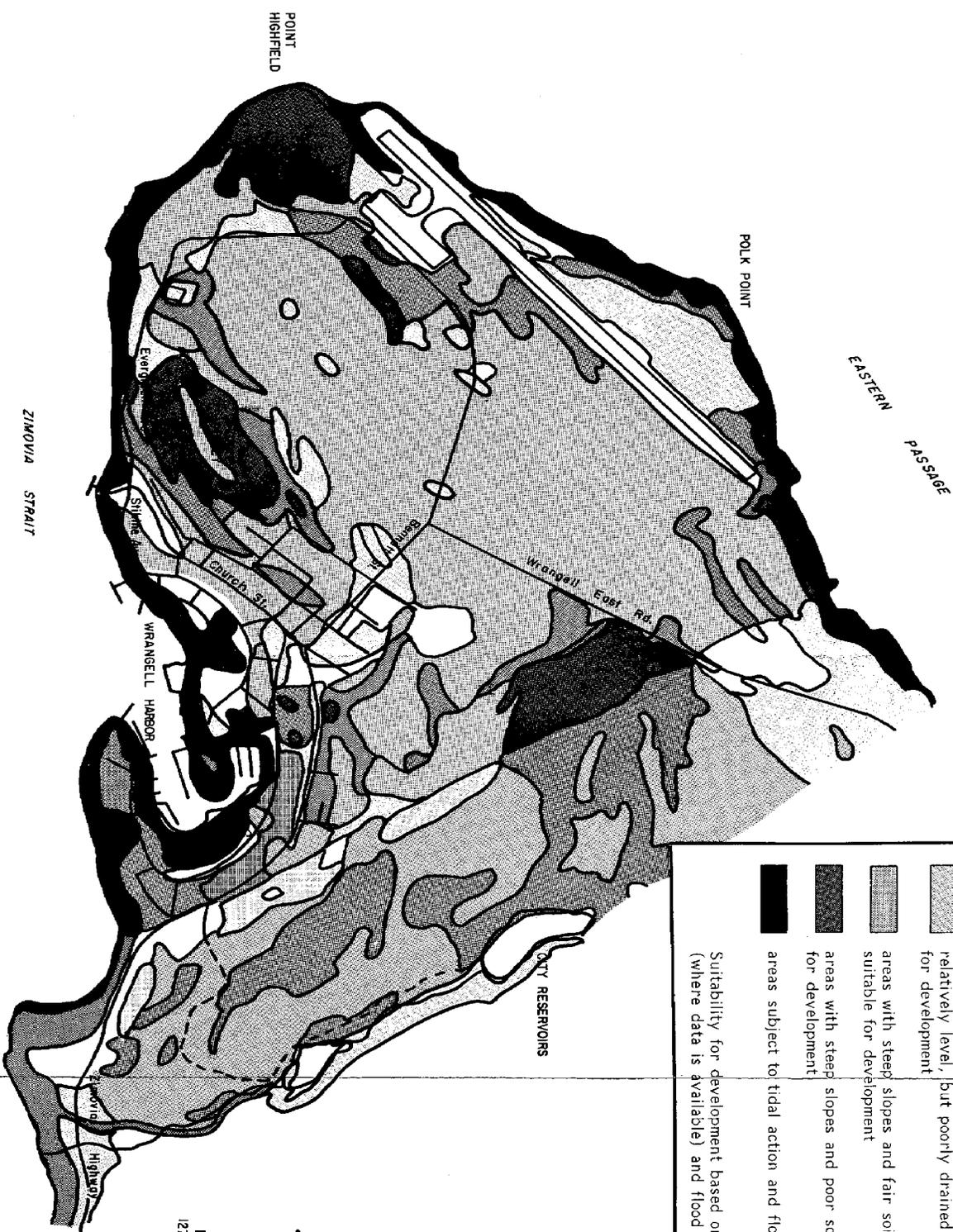


Map 16 FLOOD HAZARD

-  100 year storm surge
-  100 year wave runoff

400 200 0 400 feet

Source:
 U.S. Army Corps of Engineers, 1977. Special Flood Hazard Report. Data subject to revision based upon the 1981 Flood Insurance Study, which was incomplete at the time of this report's publication.



Map 17A LAND SUITABILITY

- flat, well-drained areas - suitable for development
- relatively level, fairly well-drained areas - suitable for most development
- relatively level, but poorly drained areas - fill required for development
- areas with steep slopes and fair soils - marginally suitable for development
- areas with steep slopes and poor soil - unsuitable for development
- areas subject to tidal action and flooding - undevelopable

Suitability for development based on slope, soil limitations (where data is available) and flood hazard potential.

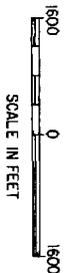
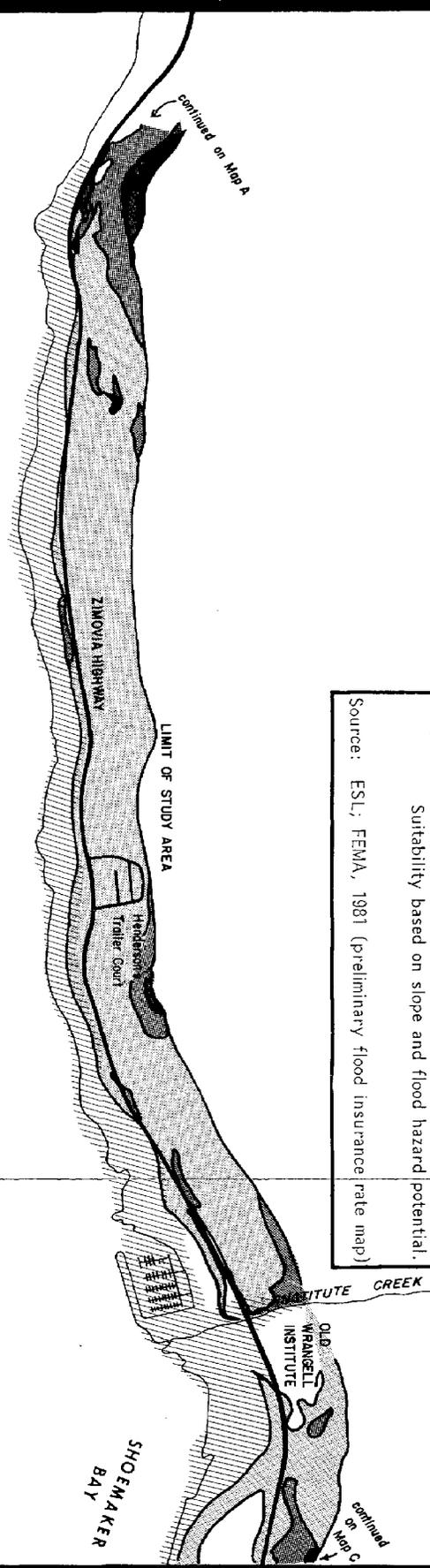
Source: ESL, USGS

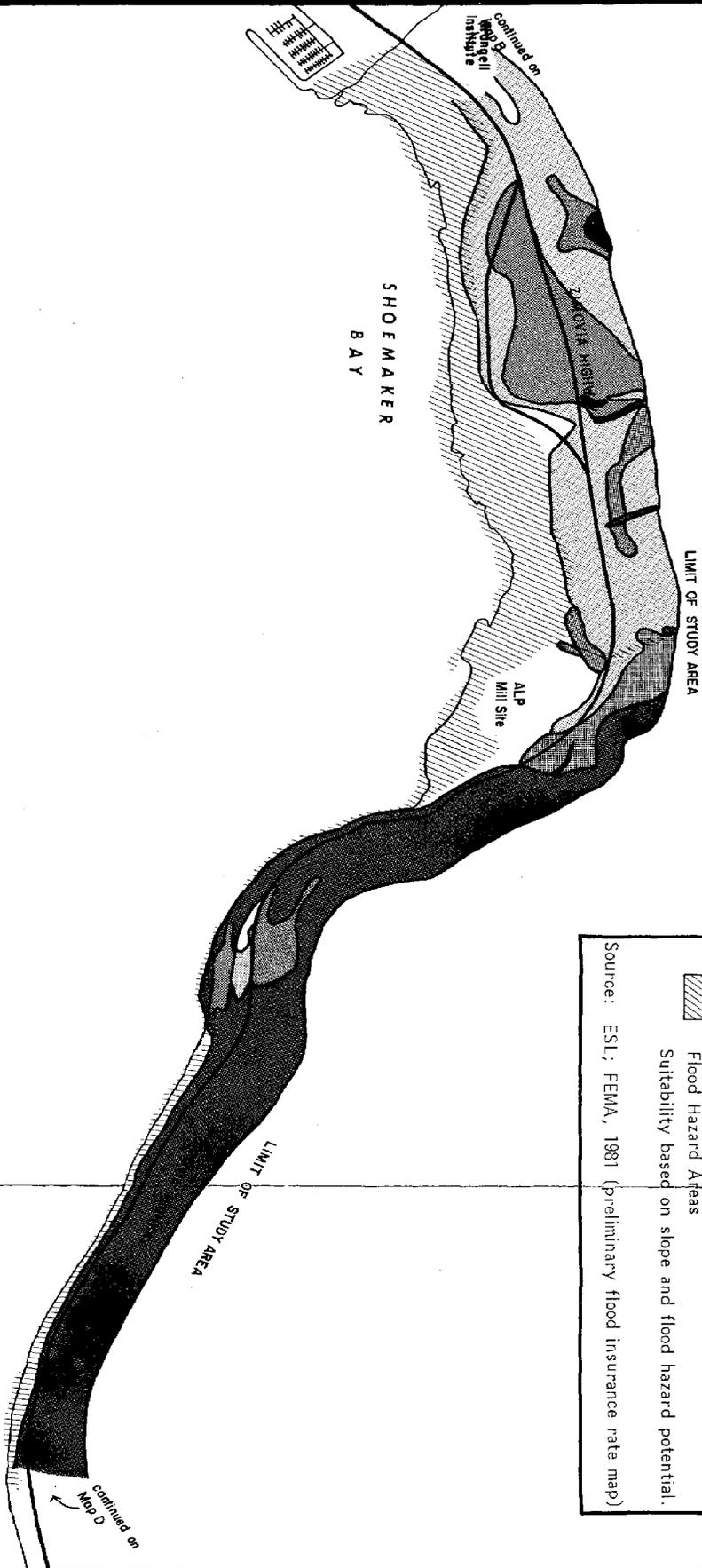
Map 17B SLOPE AND LAND SUITABILITY

Source: ESL, FEMA, 1981 (preliminary flood insurance rate map)

	Slope 0-8%, suitable for development
	Slope 8-15%, fair for development
	Slope 15-30%, marginal for development
	Slope greater than 30%, poor for development
	Flood Hazard Areas

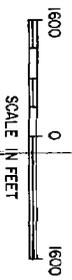
Suitability based on slope and flood hazard potential.

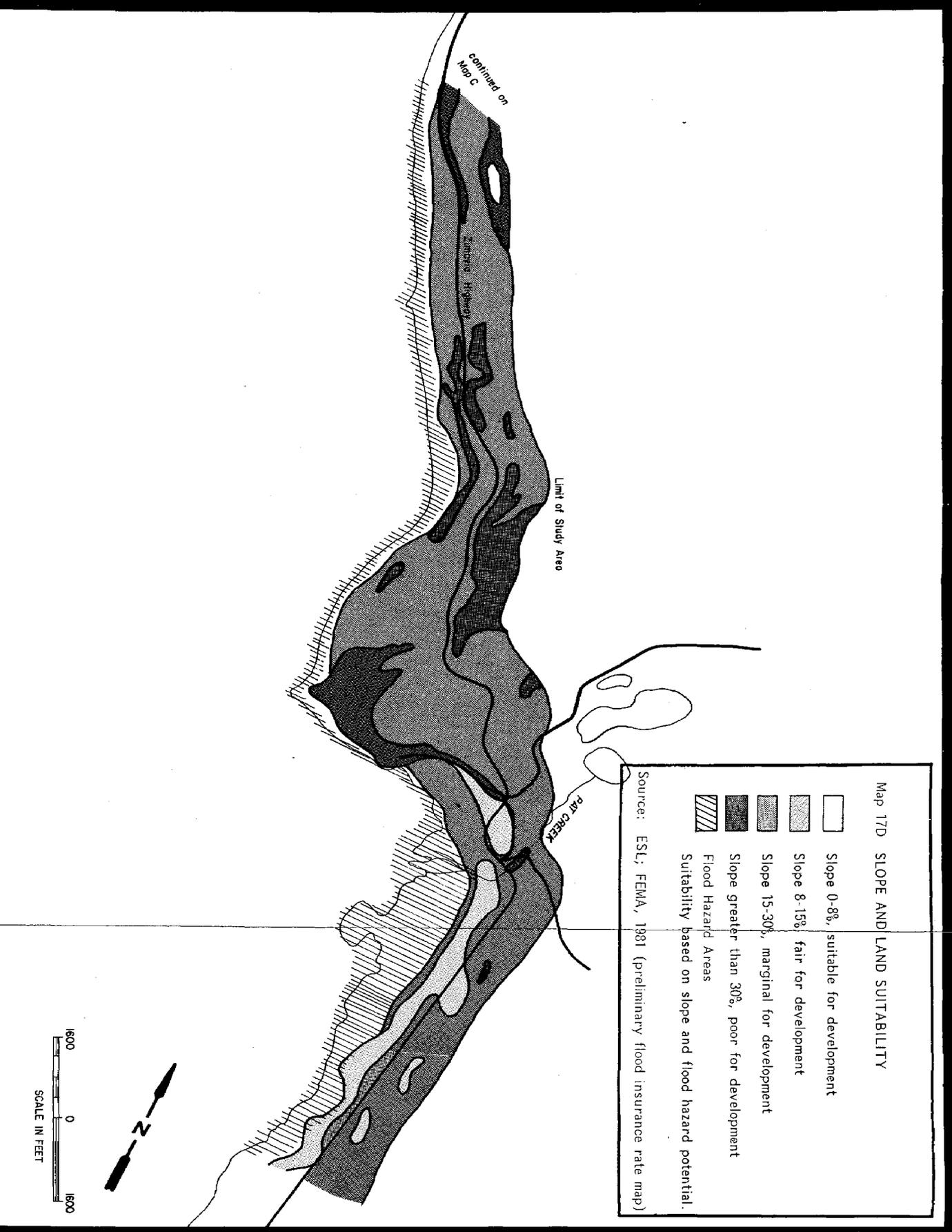




Map 17C SLOPE AND LAND SUITABILITY

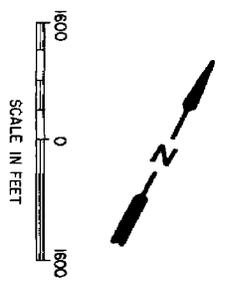
-  Slope 0-8%, suitable for development
 -  Slope 8-15%, fair for development
 -  Slope 15-30%, marginal for development
 -  Slope greater than 30%, poor for development
 -  Flood Hazard Areas
- Suitability based on slope and flood hazard potential.
 Source: ESL; FEMA, 1981 (preliminary flood insurance rate map)





Map 17D SLOPE AND LAND SUITABILITY

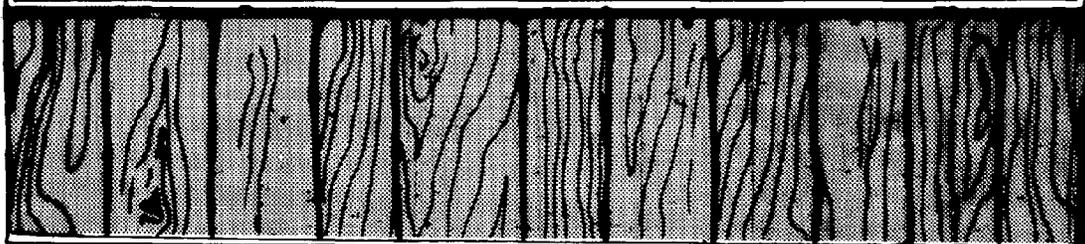
-  Slope 0-8%, suitable for development
 -  Slope 8-15%, fair for development
 -  Slope 15-30%, marginal for development
 -  Slope greater than 30%, poor for development
 -  Flood Hazard Areas
- Suitability based on slope and flood hazard potential.
- Source: ESL, FEMA, 1981 (preliminary flood insurance rate map)



This physical land suitability information served as a basis for developing the land use plan. This information was combined with such data as existing land use, land ownership, and access to services and utilities to determine the overall suitability of areas to accommodate various types of development. The coastal management plan contained in Volume II encourages development desired by the community in the most physically suitable areas.



CULTURAL RESOURCES



HISTORY AND HISTORIC SITES

Wrangell's recorded history is filled with exciting adventure and brings to mind many historic places and people. Wrangell is the second-oldest nonnative settlement in Southeast Alaska and has been claimed at different times by both the Russians and the English.

The prehistory of the area is unknown. The identity of the predecessors of the Tlingit in this area, their means of subsistence and settlement patterns remain a mystery. These early settlers left behind stone carvings of figures, including some depicting supernatural and rather macabre beings. The carvings, called petroglyphs, were believed to have been carved by shamans.

At the time of European exploration - the beginning of the historic period - the entire Stikine region was settled by the Tlingit. Information collected from native residents on traditional use of the area indicates that hunting, fishing and trapping were activities of major importance along the Wrangell Narrows, at the upper end of Bradfield Canal and on the Harding and Eagle rivers. In addition to permanent villages, several forts, burial sites, camps and other Tlingit sites are reported in the general vicinity (Goldschmidt and Haas 1949; Sealaska Corporation, 1975). The limited number of archaeological surveys completed in the area by the USDA-Forest Service and Sealaska Corporation tends to confirm these reports, though many areas remain unsurveyed (Arndt, 1979).

The first European explorer to pass through the area was Captain George Vancouver of the British Royal Navy. Although Vancouver missed the Stikine delta, he and his crew were the first to sail around the Wrangell area. Other explorers passed through the area, but it wasn't until around 1811 that the Russian American Company began trading operations with the native Tlingits near the site of present-day Wrangell. In 1834, Captain Zarembo established Redoubt St. Dionysius, near the present-day site of the Marine Bar, to protect Russian trading interests against the British Hudson's Bay Company. The British interests were in maintaining a trade route into the interior of British Columbia; the Stikine was the only route in this region that provided such access. Because the Stikine River was used as a major trade and transportation route into the interior of the territory, the settlement at Wrangell developed and grew.

A skirmish in 1834 between the British ship "Dryad" and Russians at the fort resulted when the ship attempted to sail up the Stikine, which the Russians claimed. The Tlingits further protested the British going upriver, claiming ancient trade rights with the interior natives. The British backed down, but the incident resulted in negotiations that in 1839 culminated with Russia leasing to Britain, for a ten-year period, the coastline as far north as Redoubt St. Dionysius. In 1840, the British took command of Redoubt St. Dionysius and renamed it Fort Stikine. The British renewed the lease until October 18, 1867, when the entire Russian-American territory was sold to the United States. The fort was renamed Fort Wrangell in honor of Baron Von Wrangell,

manager of the Russian American Company at Sitka. A new fort was built between 1868 and 1870 near the site of today's post office.

In 1861, a gold discovery on the Stikine River (near Telegraph Creek) brought hundreds to Wrangell, replacing furs as the reason for trade and travel up the Stikine. This was a very short-lived gold rush, although a few miners, known as '61 men, settled along the river.

Gold was discovered in 1874 in the Cassiar region of the Canadian interior, an area easily accessible by the Stikine. Wrangell became a frontier boom town, with thousands of miners, hopeful miners and their gold rush entourages coming from Seattle, San Francisco and Victoria to converge on the settlement enroute to the gold fields. Gambling halls, dance halls and ramshackle shacks abounded. While on an extended visit in 1879, the famed naturalist John Muir reported, "...The Wrangell village was a rough place It was a lawless draggole of wooden huts and houses, built in crooked lines, wrangling around the boggy shore of the island for a mile or so in the general form of the letter S, without the slightest subordination to the points of the compass or to building laws of any kind...." He further found that "...Most of the permanent residents of Wrangell were engaged in trade. Some little trade was carried on in fish and furs, but most of the quickening business of the place was derived from the Cassiar gold-mines, some two hundred and fifty or three hundred miles inland, by way of the Stickeen River and Dease Lake. Two stern-wheel steamers plied on the river between Wrangell and Telegraph Creek at the head of navigation, a hundred and fifty miles from Wrangell, carrying freight and passengers and connecting with pack-trains for the mines...."

With this new onslaught of people came the first missionaries. Manny McFarland came to Wrangell in 1877 as a Presbyterian missionary, establishing the first school. In 1878, Rev. S. Hall Young and Manny founded the First Presbyterian Church, the oldest protestant church in Alaska. Father John Alta established St. Roses Church in 1879 as the first Roman Catholic Church in Alaska.

The Cassiar mines were exhausted in the 1880's and trade up the Stikine dwindled. In the late 1880's and the 1890's, Wrangell's current economic base was established. The Aberdeen salmon packing cannery opened at the mouth of the Stikine in 1887, and in 1889 it reorganized as Glacier Packing Company at Point Highfield, the present site of the Wrangell airport. The Wilson and Sylvester sawmill commenced operations in late 1880 and is said to be the first mill in Alaska. This mill burned in 1918 and the old ALP mill on the Wrangell harbor was constructed on the same site.

With the discovery of gold at Klondike Creek in the Yukon in the late 1890's, a new and much larger gold rush began from Seattle and San Francisco. The Stikine provided a route to the Yukon via Teslin Lake and the Hootlalinqua River, and Wrangell was again a gold rush town. Clarence Andrews, in his book Wrangell and the Gold of the Cassiar, reported:

"The strange scenes of the old gold days were reenacted in Wrangell. The dance halls reopened. Soapy Smith and his gang looked in and visited the saloons with their shell games and faro-cases. The hurrying crowd camped for a while on the old parade ground of the fort, and turned the open places into a tent city."

The route over Chilkoot Pass near Skagway to the Yukon was more direct and Wrangell's third gold rush was short-lived. The unique spirit of these boom days is relived in the new Tent City Festival held in late January or early February.

With the end of the gold rush, Wrangell settled down. It was a community of about fifteen hundred when it was incorporated as a city in 1903. In the previous year, 1902, the Wrangell Sentinel began publishing what is now Alaska's oldest continuously-published newspaper. The city was a major port-of-call for ships sailing the inside passage of the Alexander Archipelago. Despite the creation of a fire department by the new city council, a disastrous fire in 1906 destroyed the business district and numerous residences. In response to water supply problems that compounded the fire hazard, a dam and reservoir were completed in 1915. In 1906, the original public school building was built and remains today as the city museum on Church Street.

The local economy was expanded in 1932 when the BIA constructed the Wrangell Institute, a boarding school for native youngsters, on a hundred-acre site at Shoemaker Bay. The institute was closed in 1975 as federal and state education policies shifted.

In 1952, fire again destroyed much of downtown Wrangell on the harbor side - an area consisting of many buildings erected on pilings over the water. Historic buildings and cultural artifacts were destroyed, including many buildings dating back to 1906 and totem poles belonging to native families. These totems portrayed the family history of the Tlingits and, before the fire, were scattered throughout the city. Most remaining totems today are clustered on Shakes Island. The Kiksadi Totem is on Front Street across from the City Market; another totem in front of the Baptist Church fell in 1978 and remains on the ground. The Stikine native organization recently began to work on restoration of these beautiful but rapidly deteriorating artifacts.

Wrangell is dominated today by two industries - fish and timber processing - that were established nearly a hundred years ago. The city is also becoming aware of its gold rush history and its Russian and native heritage, and it is using these to promote a new tourist industry. The city maintains a close relationship with the resources of the Stikine River, an important recreational asset. Though to a lesser extent than in previous years, the river remains a transportation route to the interior.

HISTORIC AND ARCHAEOLOGIC SITES

Historic and archaeological sites in the Wrangell area are identified on Maps 18 and 33. The relevance of most sites is explained within the context of the preceding text on the history of the city and region. There are as many as sixty different sites in Wrangell that have historic value by unique design, heritage or architectural integrity. While many of these sites could be eligible for the National Register of Historic Places, they are not as yet listed (Wrangell Sentinel, June 1981).

Shakes Island (Site 1) - Chief Shakes Community House, built in the 1930's, is the chief's old house. It contains many native artifacts, including four carved houseposts believed to be two hundred years old. The many totems on the island are exact reproductions of older totems from the area. The island is on the National Register of Historic Places.

Totems (see map) - In addition to those mentioned on Shakes Island, other totems may be found in the townsite. These include the Kiksadi totem at the corner of Front and Episcopal Street, one next to city hall, the post office, in front of the library, near the fuel docks on Shustak Point and a fallen totem at the Baptist Church.

Shakes Gravesite (Site 2) - Shakes gravesite is located on Case Avenue upland from the harbor.

Petroglyphs (see map) - These ancient stone carvings are found at various shoreline locations, most notably at the northern tip of Wrangell Island off the old airport road (Evergreen Avenue). They are accessible by a boardwalk, and are visible at low tide. Considerable debris, especially broken glass, surrounds the petroglyphs as this was the site of an old wharf. Other Petroglyphs have been moved to the museum and library lawn; the latter were excavated when the sewer was built.

Native Fishing and Hunting Campsites - Numerous possible sites are located at the mouths of prominent streams, including Tye Creek, Tye Lake, Tom Creek, Marten Creek, Pat Creek (Map 33, Site 7) and numerous larger unnamed creeks. Old Tlingit village sites are located at Kallchallar along Eastern Passage (Map 33, Site 3), on Point Shekesti (Shustak) overlooking the Wrangell Harbor (Site 4), and at Shoemaker Bay (Site 5). The Zimovia burial site is located on an island in Zimovia Strait near Pat Creek (Site 6).

Lost Valley Building (Site 8) - The Lost Valley building is near the ferry dock. It is one of the oldest buildings in Wrangell, but is in disrepair.

City Wharf (Site 9) - The warehouse and old city wharf is one of the city's oldest waterfront buildings. It is scheduled for demolition.

Wrangell Museum (Site 10) - The Wrangell Museum is located in the old schoolhouse. It was built in 1900 and added to the National Register of Historic Places in 1978.

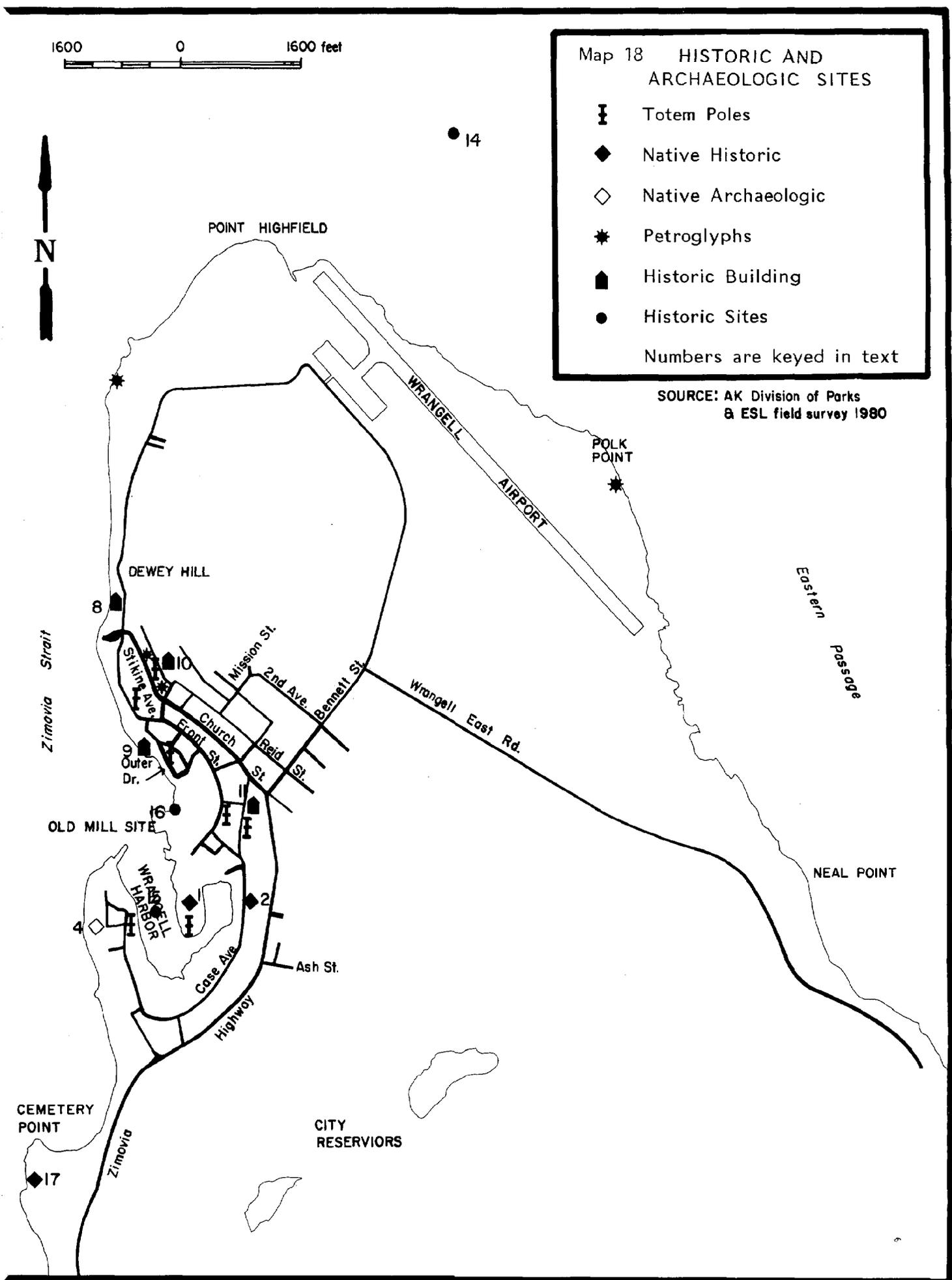
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Map 18 HISTORIC AND ARCHAEOLOGIC SITES

- ☪ Totem Poles
- ◆ Native Historic
- ◇ Native Archaeologic
- ★ Petroglyphs
- Historic Building
- Historic Sites

Numbers are keyed in text

SOURCE: AK Division of Parks & ESL field survey 1980



Episcopal Church (Site 11) - The Episcopal Church was built in 1903. This is the oldest church building in Wrangell and has a marble alter and native carvings.

Wrangell Institute (Map 33, Site 12) - The institute was built in 1932 and closed in 1975. These buildings are owned by Sealaska, Inc.

Cabin and Garden Site - This site is located thirteen miles south of the downtown Wrangell, near Pat Creek.

Dead Man's (Simonof) Island (Site 14) - Dead Man's (Simonof) Island is in the Eastern Passage just offshore of the airport. It is the gravesite of Chinese workers who worked in the fish plants of Wrangell in the late 1800's.

Wrangell Harbor (Site 15) - Wrangell was settled as a result of the harbor's existence.

Redoubt St. Dionysius (Site 16) - This is the original site of the Russian fort, later renamed Fort Stikine by the British.

Native Cemetery (Site 17) - The burial site is located on Cemetery Point behind the ballfield.

Bigelow Museum (Site 18) - The museum is located on the old airport road just north of the ferry dock. It is a private museum with artifacts from Wrangell's past.

The Salvation Army Church on Front Street is another building that private groups would like to have registered and restored. It is one of the oldest buildings in Wrangell and has a colorful history.

REGIONAL LAND STATUS AND USE

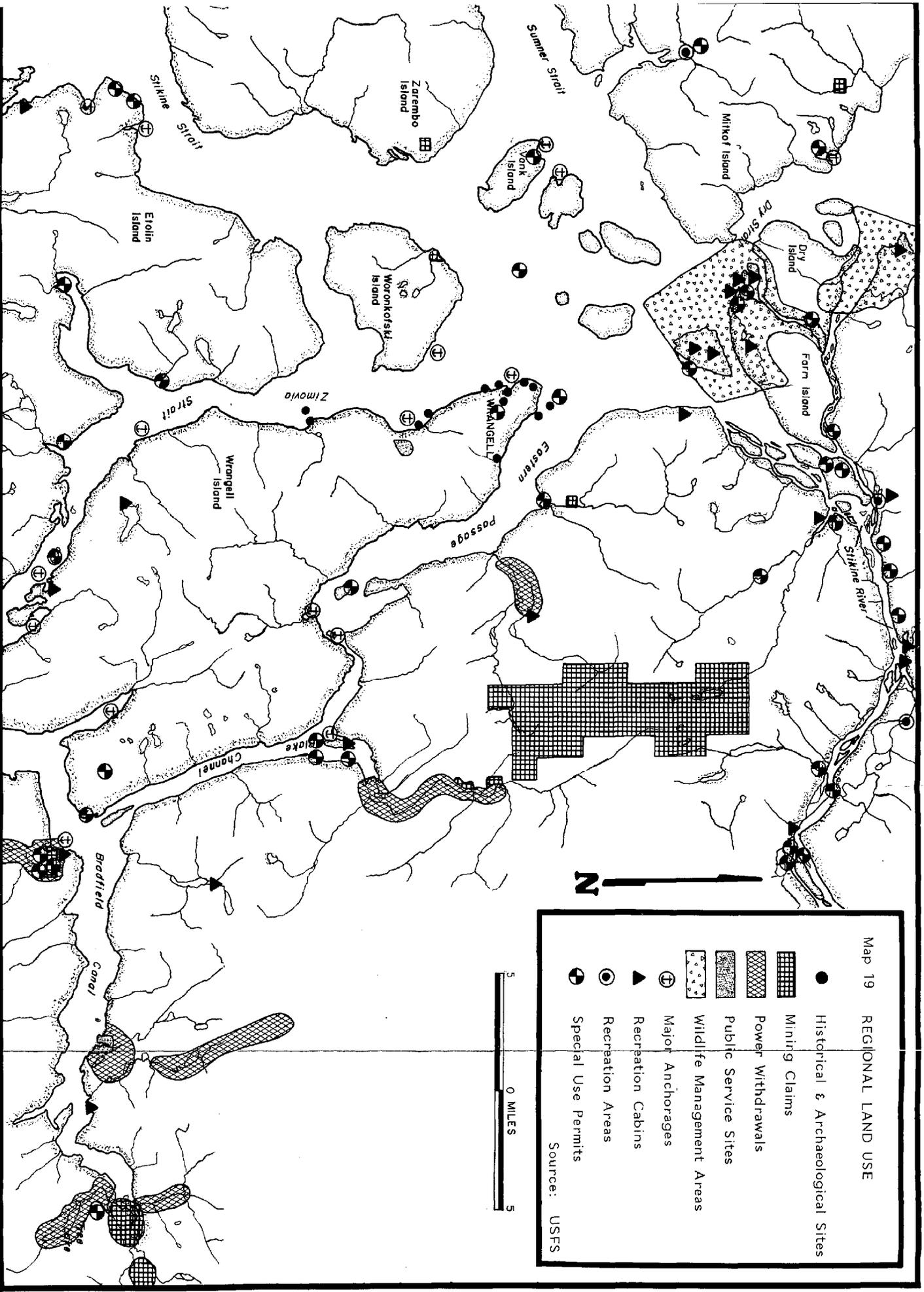
Wrangell is situated in the heart of the Tongass National Forest. The state has patent (title) to some land near the Wrangell townsite and has also selected some land from the national forest in the surrounding area that will likely be transferred to state ownership. Most private and city-owned land is located at the northern tip of Wrangell Island and along Zimovia Strait north of Pat Creek. Regional land use is depicted in Map 19.

MANAGEMENT OF NATIONAL FOREST LAND

As previously mentioned, most of the land surrounding Wrangell is part of the Tongass National Forest and is managed by the USFS. The Tongass Land Management Plan provides management guidelines for Tongass National Forest resources and outlines the intended uses of each area. The plan does not define specific environmental conditions

that are to be maintained or created in areas where fish, wildlife, recreation, timber or other development projects are planned. More specific standards dealing with these topics will be developed at local forest service offices and periodically added to the plan. To accomplish this, each management area will be studied and resources identified and analyzed through an interdisciplinary team planning process. Detailed resource information for the southern two-thirds of Wrangell Island was gathered in 1980 as part of one of these planning efforts. Plans are also being developed for the management of the Stikine-LeConte wilderness area. Eventually, when the data is complete, alternative sets of management objectives will be developed and evaluated through a process that includes interagency and public participation. When management objectives are established and potential projects identified, the interdisciplinary team will formulate detailed guidelines to serve as "ground rules" for project planning and implementation. In the interim, timber management on national forest land on Wrangell Island entails salvaging blowdown timber as it occurs and the sale of approximately four million board feet of standing timber per year. Management for Pat Creek, Thoms Lake and Blake Channel areas will continue to emphasize dispersed and semiconcentrated recreation, with access by roads, trails and saltwater. Fish and wildlife habitat improvement and recreation development projects will be initiated as specific needs are identified.

The national forest land surrounding Wrangell Island will be managed for uses ranging from wilderness to intensive resource use (Map 20). The Alaska National Interest Lands Conservation Act, passed by the U.S. Congress in December 1980, designated the Stikine-LeConte area as wilderness. The lower Stikine River, which has long served as Wrangell's playground and corridor to the Canadian interior, is contained in the Stikine-LeConte wilderness area. The LeConte Glacier-Horn Cliffs area was included in the wilderness designation because of its spectacular scenic qualities and because it contains the southernmost tidewater glacier on the continent. There are no roads in the area, water access is difficult and there are no safe anchorages. As previously noted, USFS is in the process of developing a management plan for the 443,000-acre wilderness area. The Tongass plan recognizes that scenic, recreational, transportation, fish and wildlife values are paramount in the Stikine valley. Specific final management guidelines will be developed following public review. While specific management guidelines for the area are not finished, no changes are expected for traditional recreational (hunting and fishing) and transportation (power boats and float planes) uses. Management emphasis is on protecting the wilderness character of the area while providing for the use and enjoyment of its resources. Eight to ten special use cabins are located along the river. The USFS no longer issues special use permits for private cabins near the river, though platform permits are available. Regulations allow platforms to remain in place year-round, but structures erected on the platforms must be removed or taken down after sixty days. These regulations may be altered depending on interpretation of the Alaska lands legislation. USFS provides public cabins at a minimal cost. About twenty-five illegal structures have been removed from the riverbanks by USFS.

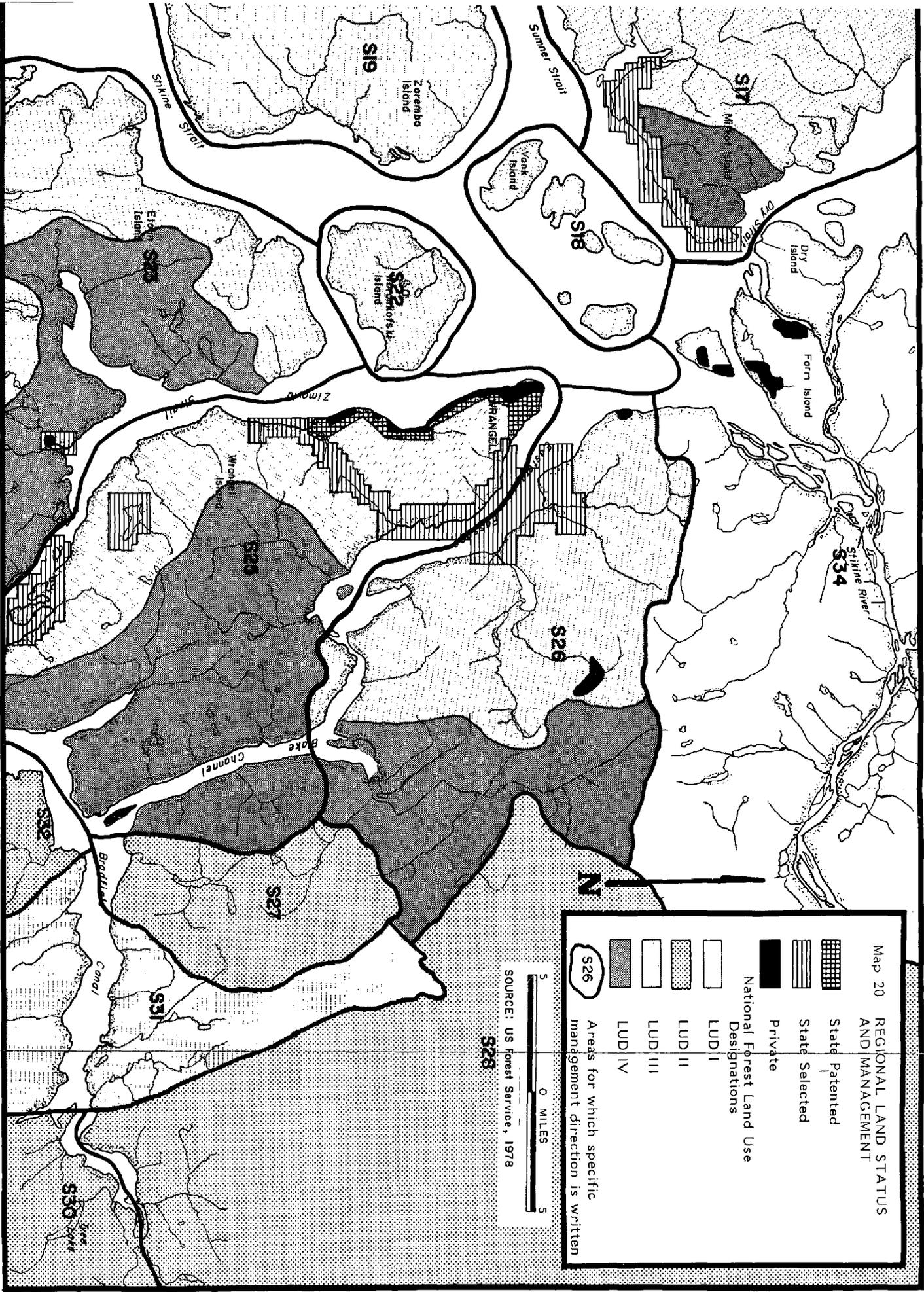


Map 19 REGIONAL LAND USE

- Historical & Archaeological Sites
- Mining Claims
- ▨ Power Withdrawals
- ▩ Public Service Sites
- ▧ Wildlife Management Areas
- ⊕ Major Anchorage
- ▲ Recreation Cabins
- ⊙ Recreation Areas
- ⊕ Special Use Permits

Source: USFS





Land use in the remainder of the national forest near Wrangell includes timber harvesting, recreation, mining and mineral exploration, hunting and fishing.

The Tongass National Forest Land Use Designations (LUD's) for the Wrangell area are as follows (see Map 20):

LUD I. This land is contained in the National Wilderness Preservation System. This designation may permit established air and boat access. Hunting and fishing, mineral exploration activities, recreational use and scientific study are permitted.

LUD II. This land is to be managed in a roadless state to retain its wildland character, but wildlife and fish habitat improvement and primitive recreational facility development would be permitted.

LUD III. This land will be managed for a variety of uses. The emphasis is on managing for uses and activities in a compatible and complementary manner to provide the greatest combination of benefits. These areas have either high use or high amenity values in conjunction with high commodity values. Allowances in calculated potential timber yield have been made to meet multiple objectives. These lands may include concentrated recreational developments.

LUD IV. Opportunities will be provided for intensive resource use and development where emphasis is primarily on commodity or market resources. Allowances in calculated potential timber yield have been made to provide for protection of physical and biological productivity (USFS, 1978).

Damming the Stikine

British Columbia Hydro and Power Authority (BC Hydro), which is responsible for providing power to the province, has been studying five sites to determine the possibility of constructing hydroelectric dams on the Stikine (140 and 160 miles upriver of the Canadian border) and Iskut rivers (50 to 80 miles from the border). Field studies for the current proposal began in 1978 and it is expected that it will be at least 1982 before BC Hydro is ready to apply for a provincial water license. Construction can begin only after review of the water license application and license approval by the British Columbia Utilities Commission and provincial cabinet. If all goes well, dam construction probably will not occur until 1985 at the earliest, and the project would likely not be completed until the early 1990's. U.S. and Canadian citizens are concerned that sport and commercial fishing, trapping and hunting might be harmed by the dams. There is concern that salmon spawning beds and rearing areas will be destroyed and that the excellent waterfowl and marine life habitat in the ten mile wide Stikine delta will be altered or destroyed by altered water flows and the reduction of

sediment from upriver necessary to maintain the highly productive mudflats (the mudflats are among the most productive waterfowl habitats in the state). There is also concern that moose and other mammal habitats could be damaged or destroyed.

Studies being conducted for BC Hydro are intended to identify possible harmful environmental effects of the proposed hydro development. Consultants will attempt to determine the physical effects of flow and sedimentation in the river, dependent fisheries and wildlife habitat. Identified problems will be addressed by both Alaska and the province prior to any decision to construct the proposed dams. Tentative results from studies that have been conducted thus far show that the proposed dams will not block spawning salmon (studies in Washington State might be looked to for examples of the effect of dams on migrating adult and juvenile salmon). Fisheries studies tentatively indicate that the proposed project would most adversely impact juvenile king salmon, as young king salmon (fry) use areas such as side channels that could dry up or flood due to variations in river flow. Changes in water temperature could also affect young salmon. The value of the Alaskan catch of Stikine-reared salmon is about one million dollars annually. Future studies will evaluate the impact of the project on Southeast Alaska communities, analyze the Stikine delta and continue to attempt to determine how fisheries and wildlife may be affected by the proposed hydro projects.

The dam projects have received criticism on both sides of the border. Some Canadians, including a substantial portion of the B.C. parliament, consider the dams to be an environmental threat or question the need for the project other than to export power to the United States. Others note that the Stikine is one of the few remaining free-flowing rivers in British Columbia and wish to keep it as such. BC Hydro officials contend the power from the proposed dams would help meet increased demands of British Columbia industries, which may exhaust currently available energy supplies in the 1990's. The sentiment of some people on the U.S. side of the border is expressed in the following excerpt from a Wrangell Sentinel editorial.

"The Stikine is an international river, directly affecting lives and livelihoods on both sides of the border. The cornerstone of Wrangell's history, the Stikine plays an important role in the fisheries and in providing varied recreation to many residents hereif Alaska and the United States are to have a solid basis for deciding their stance on BC Hydro's dam proposals, agencies on this side of the border must be involved in studying the issues and the possible impacts on U.S. resources."

A state and federal interagency task force was established to gather data on the Stikine River system and possible effects the dam could have on the Stikine and Iskut. The task force will coordinate field studies by state and federal agencies (studies will include water

flow and temperature, sedimentation, channelization, flooding, salmon spawning areas, and waterfowl habitat), coordinate the review of Canadian data and formulate recommendations upon which agency positions may be based. In the event that the dams are built, the task force will attempt to influence the operation of the dams in order to minimize adverse impacts on resources.

STATE LAND

The state has title to land in and near the Wrangell city limits (Map 21). Considerably more land has been nominated for selection by the state from the Tongass National Forest as part of the state's entitlement of federal land in Alaska. Of the 2,949 acres of state patented and/or tentatively approved land (i.e., by the federal government for conveyance to the state) within the Wrangell city limits, 306 acres (eleven percent) are selected for future ownership by the city, 443 acres (fifteen percent) are under management by the DOTPF for the airport, 478 acres (sixteen percent) are identified as public interest land and 1,718 acres (fifty-eight percent) are part of the state's land disposal bank.

State Selections

Some of the state's most notable selections from the Tongass National Forest are as follows. If these selections are approved, they will eventually be transferred to state ownership.

1. Crittenden Creek Area - Approximately 3,255 acres were originally nominated for selection (1966) near Crittenden Creek, which is about four miles east of Wrangell across Eastern Passage. The creek drains several small valleys and has a total mainstream length of approximately thirty miles. The Crittenden Creek valley provides one of the few mountain passes in the area feasible for use as a rail or road route to the upper reaches of the Stikine River and the connections to the continental highway system. The site contains an attractive combination of fairly flat land adjacent to deep water. The site was originally considered as a possible terminus for a railroad to the Canadian interior (ADNR, 1966 request for selection). A revised nomination for selection (the original selection was rejected), smaller in size, was made to provide for a possible deep water port, industrial and residential development. The site contains a federal power site (potential hydroelectric site) withdrawal at Virginia Lake/Mill Creek. Virginia Lake is also considered as a possible source of potable water for Wrangell in the event that community needs exceed supplies on Wrangell Island.

2. Back Channel - This area was nominated by the state for selection for residential and recreational use. The area is adjacent to existing development and has potential for community expansion. The area could be serviced by the Wrangell East Road.

3. Pat Creek Area - Pat Creek is contained in a northeast trending glacial-carved valley about ten miles south of the Wrangell town-

site. The gently rolling valley floor is intermixed forest and muskeg ascending to moderate-to-steep hills covered with dense forest. There is a clearcut area and a road that runs across the island in the southwest portion of the parcel. There is evidence of landslides on the southeast valley wall; heavy precipitation could result in minor flooding and additional slides. A fault runs the length of the valley, but no recent movement has been recorded. There are very limited material resources (gravel) in the area (also see Local Land Use - South Wrangell).

4. South of Pat Creek - This area was nominated for possible future residential development. A logging road connects the area with the Zimovia Highway. The selection contains areas of steep slopes and large patches of muskeg. There is some sentiment by local residents that development in this area is unnecessary and unwise due to the distance from population centers and because undesired strip development would probably occur.

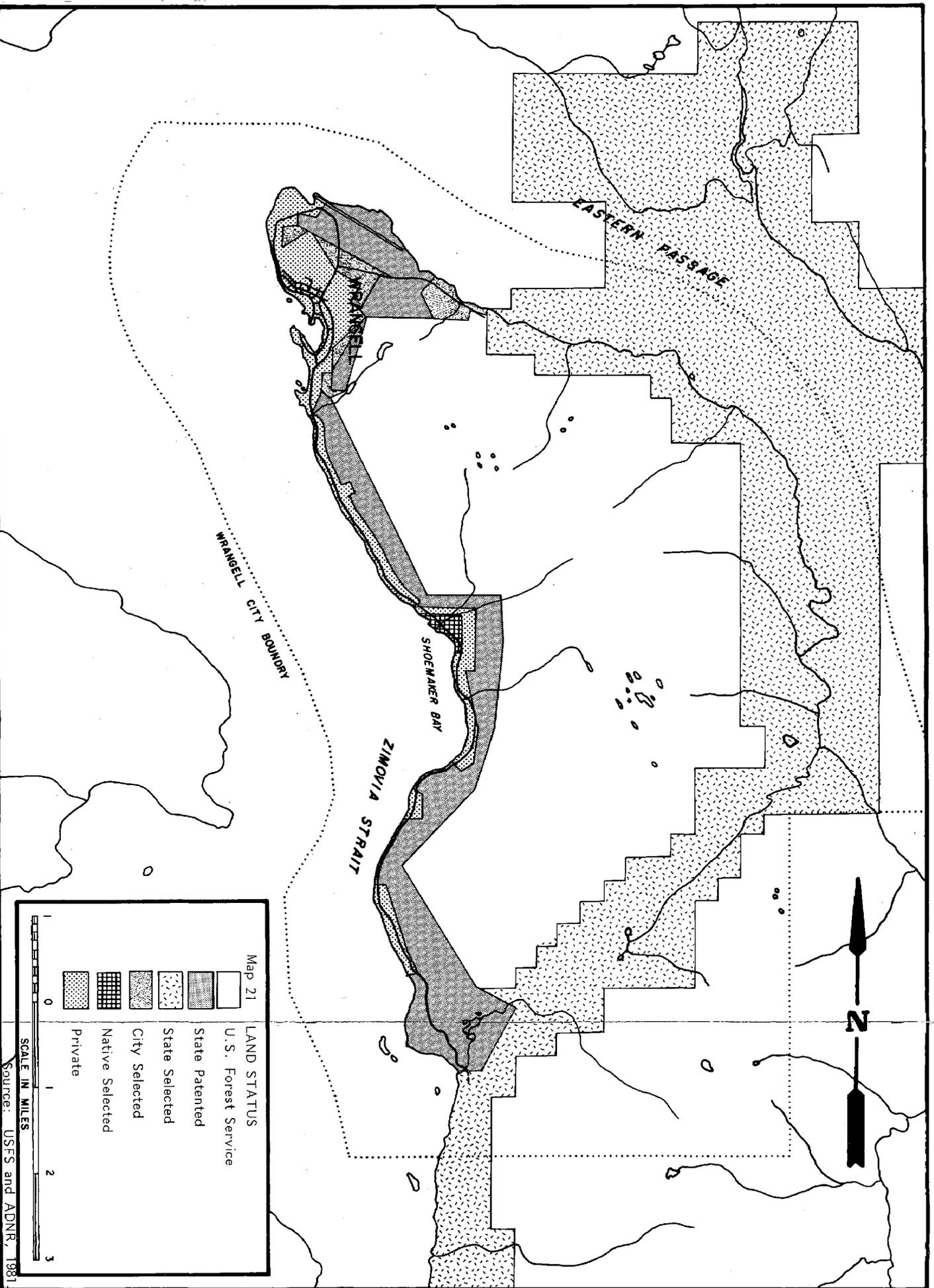
5. Zimovia Islets - These islets were nominated for selection primarily to provide for public recreation. A few private cabins are located on the islets, but further construction of private cabins was recommended against when the land was nominated. There is interest in public recreation cabins. The area from Zimovia Islets to Thoms Place is identified by the Southeast Alaska Conservation Coalition as one of forty-five areas of concern in the southeast. The area receives local and regional recreational use, including fishing, crabbing, canoeing and hiking. Parts of this area have also been listed as a critical waterfowl habitat (see the wildlife section and Map 20).

6. Thoms Lake Area - This parcel contains roughly 7,685 acres that were nominated for use as dispersed recreational sites and possibly as a commercial resort. The Thoms Lake system is one of Wrangell's most highly valued recreational areas. Recreational uses include sport-fishing, deer hunting, canoeing, camping, hiking and boating. There is boat access to the area and a forest service road may be constructed that would come within a mile of the lake. There is concern that public recreation in Zimovia Strait and the Thoms Lake system would be jeopardized by private or commercial recreational development. Wrangell residents at the state selection hearings favored the protection of the area from logging and oppose private use, including cabins. There is support for public access and facilities (see Map 20).

7. Olive Cove - About 525 acres were selected in the Olive Cove area for use as dispersed recreational cabin sites. Concentration of private use around Olive Cove has local support (see Map 20).

Possible Disposals

Land in the Olive Cove and Thoms Place areas is being considered by the state for disposal to the public in the fall of 1982 or spring of 1983. Approximately four hundred acres may be disposed of by lottery and homesite methods. Parcels would probably range in size from two acres on the shoreline to five acres in upland areas. Care should be taken to ensure that disposals do not conflict with traditional recrea-



tional use and wildlife values of the area. The state is also considering disposing of land for residential use in the Pat Creek drainage in the next several years (e.g., 1983).

Pending Selections

The U.S. Secretary of the Interior has requested that communities identify small or isolated parcels of federal land that may be needed to meet community needs. On March 24, 1981, the Wrangell City Council recommended that the following selections be made by the state to meet community needs:

Federal land in the area of the post office building, including the parcel extending from the breakwater to the post office sidewalk, and from the small "triangle" in front of the Stikine Inn to the access road to Church Street.

That area was suggested by council members for future commercial development, with the "triangle" proposed as a possible future site for the A-frame visitors information center.

The council also recommended acquisition of the access road area running along the north side of the post office to Church Street, with the hope of making it a two-lane street in the future.

The 913-acre city watershed area, including the area around both reservoir ponds was also nominated.

The planning and zoning commission has suggested the city also recommend a transportation corridor running across to the back channel, a route already partially developed (Wrangell Sentinel, March 1981)

Public Interest Land

Under legislation passed in 1979, state land with public interest values for recreation, material sites, watersheds, wildlife and timber, among others, is to be retained by the state for these uses. State land that is not identified for public use is placed in the Land Disposal Bank, from which state land disposals to the public are offered. Public interest land in the Wrangell area is as follows.

Public Recreation. Both the city council and the Alaska Division of Parks identified several areas valuable for public recreation. Three of the areas are state-owned - Boat Island, Pat Creek and a lot in the south Wrangell subdivision. Boat Island, near the outlet of Pat Creek off of "Barney's Point", is used for public recreation and has a considerable amount of local lore concerning its history. Pat Creek is managed by the Division of Parks as a campground and is the only such

facility near town. Lot 14 in South Wrangell Subdivision (USS 3709) has been previously classified public recreation. This lot has historically been used for public recreation (ski slope) and also allows for access to adjacent state land. Other recreation areas lie within the state-selected lands, including the Thoms Lake selection, which may be developed as a park and resort.

Material Sites. Lands identified as sites for state-furnished material sites (quarries) are essential for future DOTPF construction needs and supply a major proportion of the private sector needs. Material sites are identified in the geology section and are shown on Map 19.

Watersheds. Municipal Watershed. Forty acres of state land is included within the city's watershed. The remainder of this watershed is part of the Tongass National Forest.

Shoemaker Bay Watershed. Approximately 360 acres of state land lies within this watershed, serving industrial and domestic needs in the area.

Eastern Passage Area Drainages. Three potential public water source areas along Eastern Passage have been identified. It is assumed that if settlement occurs in this area or if Wrangell's demand for water increases one of the three would suffice (DNR).

LOCAL LAND USE

Land use patterns within the Wrangell city limits are primarily determined by topography, soil conditions, access, land ownership and water-oriented industrial uses. The most concentrated development is located in the Wrangell townsite, which occupies part of the gentle terrain of the northern end of the island. The Wrangell airport is situated northeast of the townsite on the northern tip of the island. While there is considerable relatively flat vacant land remaining on the northern end of the island, flat land in the Wrangell area usually consists of waterlogged muskeg from two to over ten feet in depth. This poses considerable limitations for development and substantially increases development costs (see section on geology). Development immediately south of the Wrangell townsite is confined to the shoreline fringe by steeply sloping hills. The relatively wide strip of buildable land along Shoemaker Bay accommodates the most intense development south of the Wrangell townsite. The relatively gentle terrain in the vicinity of Pat Creek, near the city's southern boundary, has potential for development, although its distance from the city center limits viability for most uses.

The shoreline within the city limits typically consists of silty tidelands with bedrock outcrops, scattered rocks up to the size of boulders, with occasional sand deposits and driftwood along the high

tide line. Few areas are exposed at high tide. Dense forest abutts the shoreline fringe in most undeveloped areas.

The interior of Wrangell Island contained within the Wrangell city limits is predominately heavily forested mountainous terrain (with the exception of clearcuts and muskeg patches). Access is limited to logging and forest service roads (see section on transportation), and most of the area is contained in the Tongass National Forest (see section on regional land use and status). Timber management and harvesting are the predominate land uses, though some recreational use occurs along the road system. There has been some mineral exploration, but relatively little mining activity (see chapter on economy).

The remainder of this section examines land use in areas that are, or are most likely to be, developed. This includes the northern tip of the island, the Wrangell townsite and the strip of development to the south along Zimovia Highway.

WRANGELL TOWNSITE

The Wrangell townsite forms a crescent shape along Zimovia Strait at the north end of the island. The core of the community is situated on the gentle terrain between Mount Dewey, at the northern end of the townsite, and the steep hills to the south. Commercial development is concentrated along Front Street, which extends from the city dock south to the old ALP downtown mill site. Industrial development is concentrated along the harbor adjacent to the old mill site. Residential development predominates along the shore and in the uplands adjoining the commercial and waterfront industrial areas. Map 22 shows existing land use and structural conditions in the Wrangell townsite. Table 1 provides data on structural conditions. The structures are generally in good condition, with the exception of a few individual homes and clusters of houses in the older parts of town. Map 23 shows the major land ownership in the townsite. Map 24 shows the 1981 zoning for the townsite. Revisions to the zones are proposed in the second volume of this document, coastal management plan.

As the 1968 Wrangell Comprehensive Development Plan noted, the city's convenience for shopping, schools and other community services, plus the fact that this is the only area where public water and sewer services are presently available, will continue to make this the most attractive area for development in the future. This is essentially true today, though the new ALP mill will draw more people to the Shoemaker Bay area and the eventual availability of city-selected land (see section on city selections) will attract more development outside the old townsite.

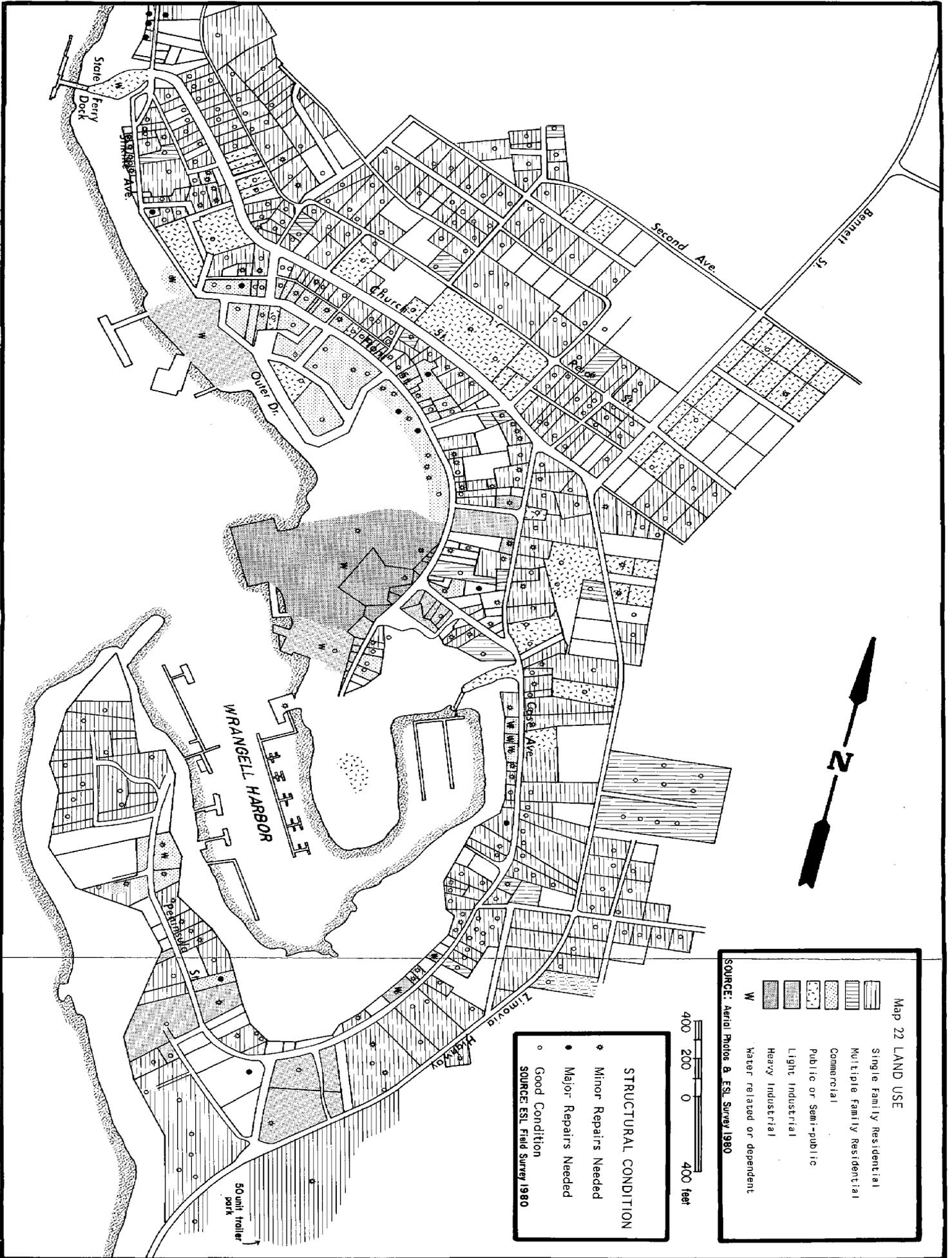
Business District

Wrangell's business district has been concentrated along Front Street for about one hundred years. In the early days, this area had two outstanding locational advantages in that it was near both Fort

Wrangell (a site now occupied by the Federal Building) and the main commercial wharf. The establishment of a sawmill to the south of the commercial area in the 1890's and the subsequent enlargement of the mill discouraged commercial uses from being established to the south, while the post office site and the dock area impede contiguous commercial expansion to the north (Wrangell Comprehensive Development Plan, 1968). The business district is centrally located to conveniently serve the community. The concentration of commercial development provides a healthy downtown atmosphere, reduces the "running around" often entailed in shopping and provides a focal point for tourists. Development of commercial structures along Front Street on the fill area a few years ago met the short-term needs for commercial space. The downtown business core is, however, reaching its capacity. There is potential for expansion of water-related commercial development in the underutilized Outer Drive area on the water side of the business district and infilling on vacant lots along Front Street up to, and perhaps beyond, Episcopal Street. Much of the tideland fill along Outer Drive is consumed by streets and structures that are not water-dependent or related and are not oriented to the water. There is also a possibility of gradually locating compatible commercial development between the ferry dock and the current commercial district (see the section on Old Town in Volume II of this program).

TABLE 1
Wrangell Townsite

	Structural Condition			Total
	Well Maintained	Minor Repairs Needed	Major Repairs Needed	
Single Family Houses	235/80%	57/19%	2/1%	294/75%
Multi-family Houses	10/62.5%	6/37.5%		16/5%
Commercial	26/57%	16/35%	4/8%	46/12%
Industrial	5/31%	11/69%		16/4%
Public/ Semi-public	16/89%	3/16%		19/5%
TOTAL	292/75%	93/23%	6/2%	391%



Map 22 LAND USE

- Single Family Residential
- Multiple Family Residential
- Commercial
- Public or Semi-public
- Light Industrial
- Heavy Industrial
- Water related or dependent

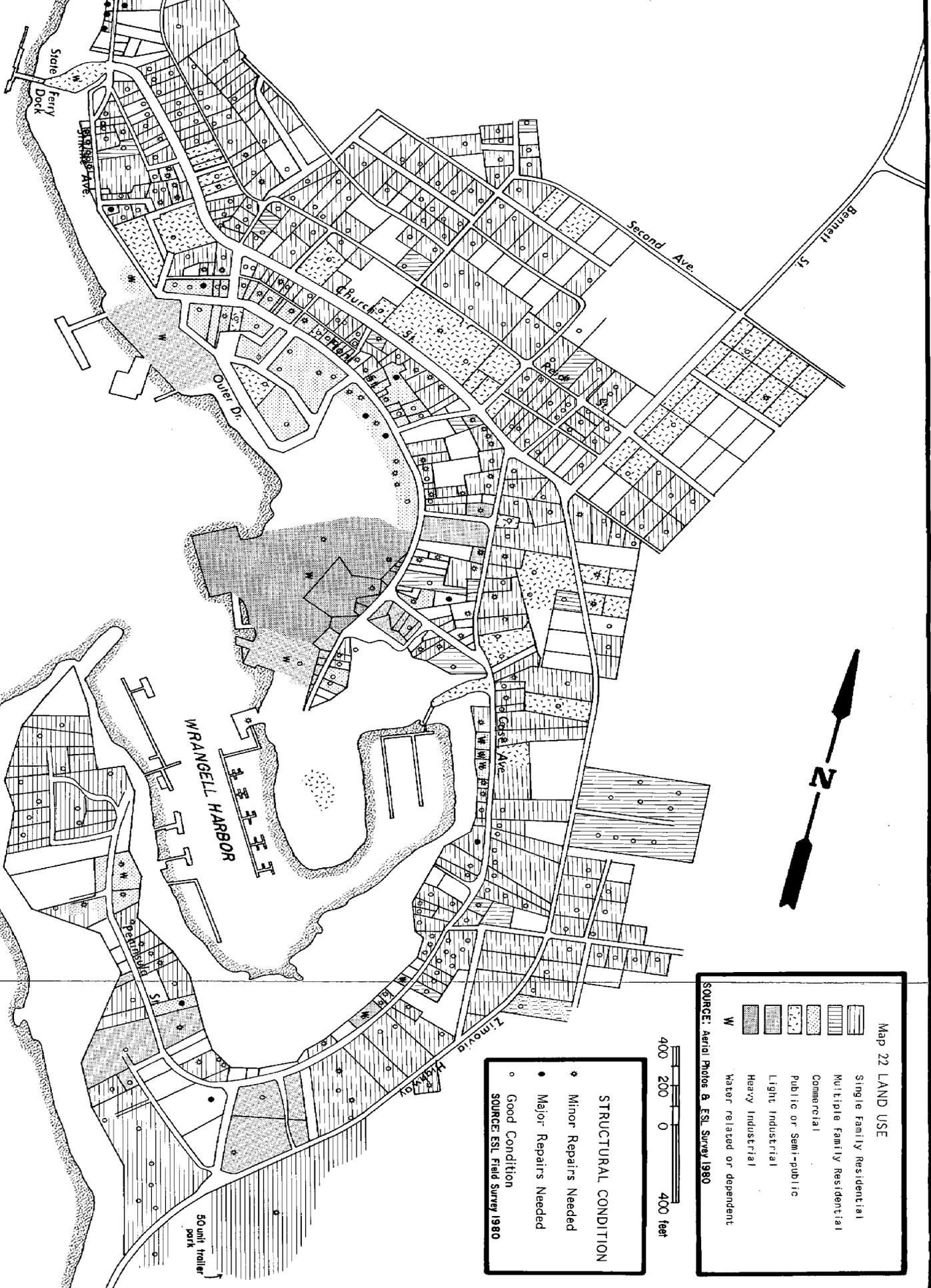
SOURCE: Aerial Photos & ESL Survey 1980

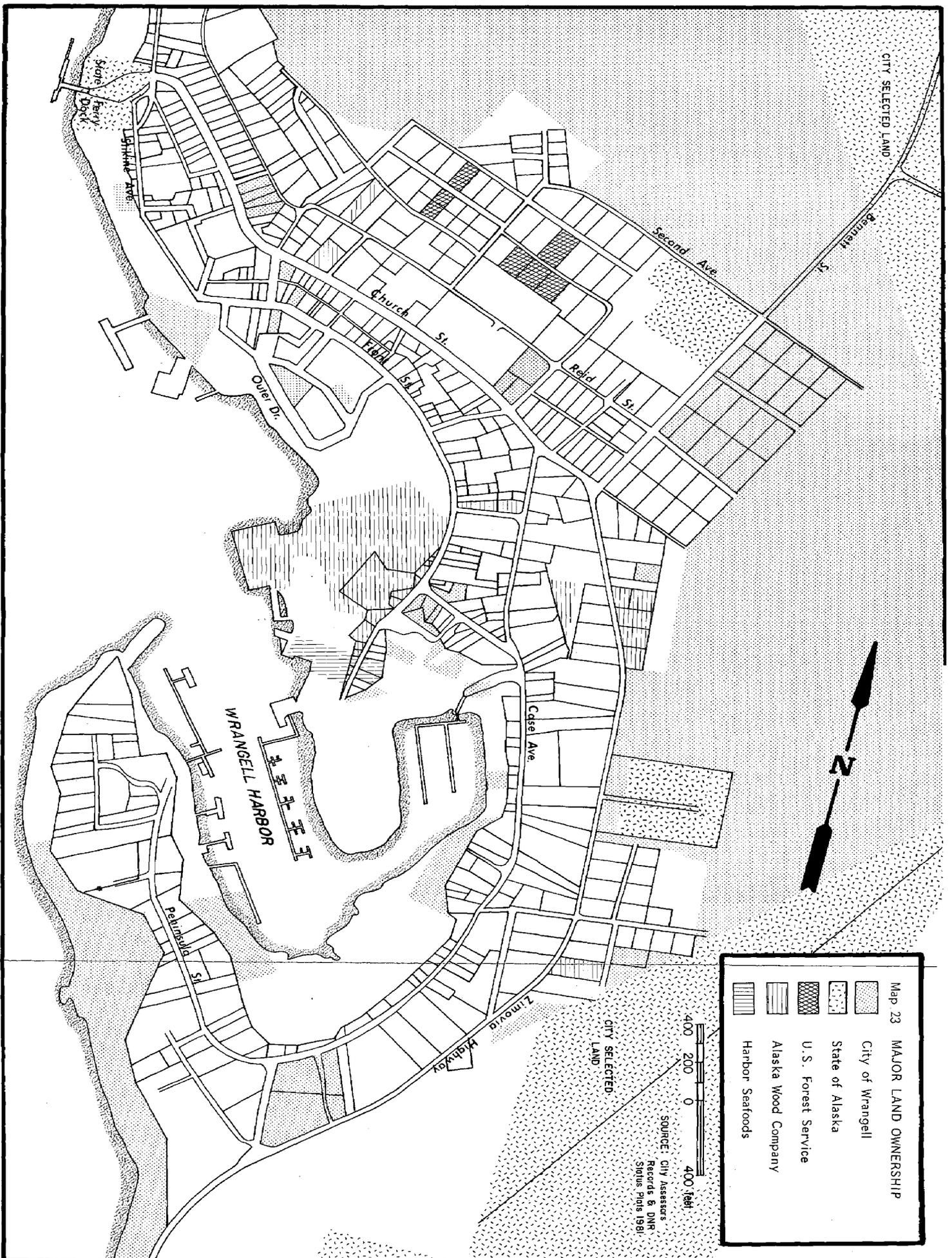
400 200 0 400 feet

STRUCTURAL CONDITION

- Minor Repairs Needed
- Major Repairs Needed
- Good Condition

SOURCE: ESL Field Survey 1980



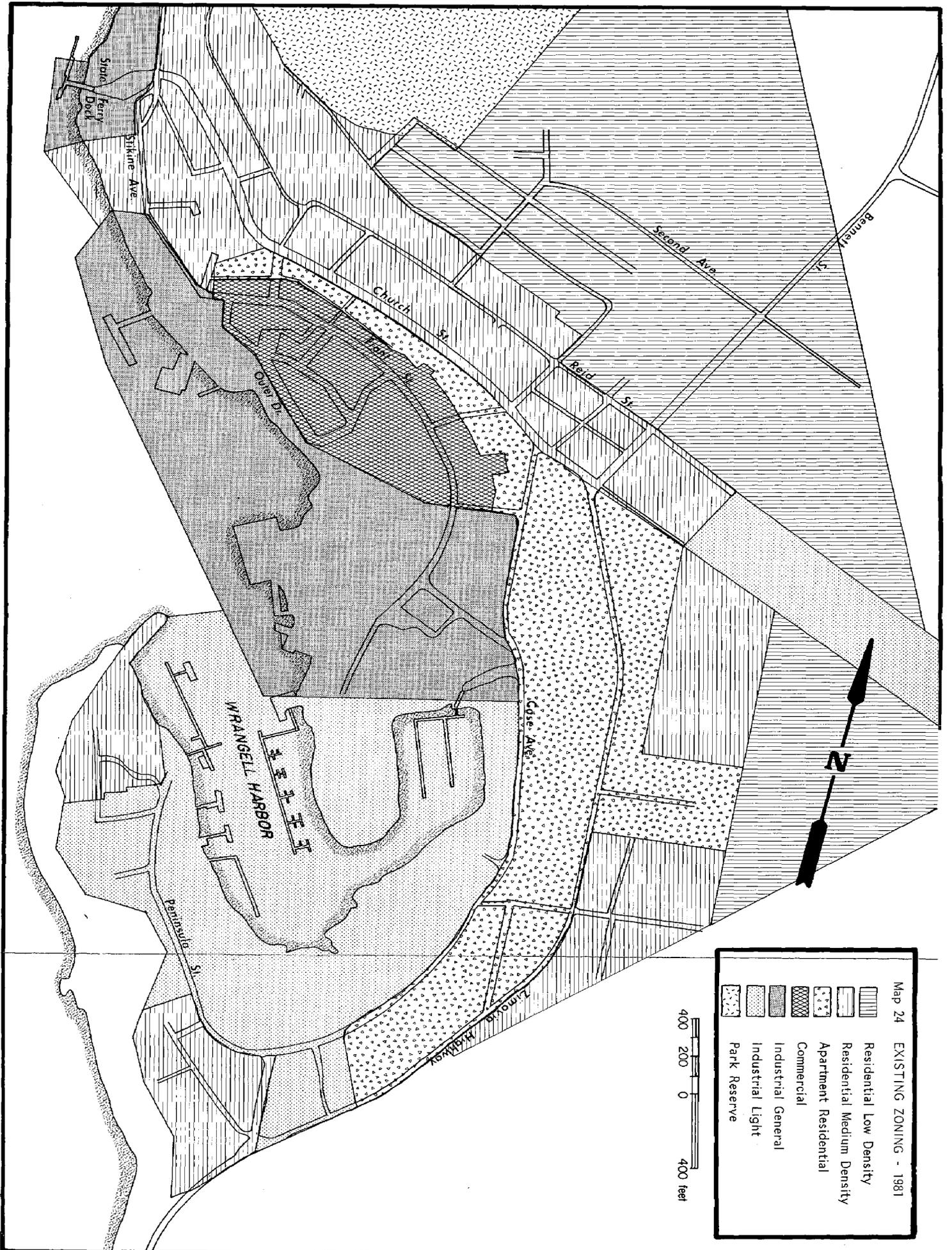


Map 23 MAJOR LAND OWNERSHIP

-  City Selected Land
-  City of Wrangell
-  State of Alaska
-  U.S. Forest Service
-  Alaska Wood Company
-  Harbor Seafoods

SOURCE: City Assessors
Records & DNR
Status Plans 1981





Map 24 EXISTING ZONING - 1981

-  Residential Low Density
-  Residential Medium Density
-  Apartment Residential
-  Commercial
-  Industrial General
-  Industrial Light
-  Park Reserve



While filling of tideland is generally not a recommended practice, it is a means, although expensive, of providing more space for necessary and appropriate water-oriented development when the demand arises. Most of the area from the city dock to Harbor Seafoods, adjacent to the old mill site, has been filled. The 1968 Wrangell Comprehensive Development Plan suggested that additional commercial development space could be provided by extending the present fill southward, behind the structures built on pilings over the relatively unproductive tidelands.

Wrangell will likely experience some growth in the commercial sector of the economy due to increased tourism. In the long term, mineral development in the area could require considerable expansion of commercial development. Such growth can be accommodated by infilling along Front Street or other designated commercial areas (see land use plan in Volume II).

Residential Areas

Residential development in the townsite is concentrated on the uplands above the business district, along Case Avenue, Zimovia Highway and on Shustak Point. Residential development outside of the townsite is concentrated on the major roads on relatively large lots - usually one-third to one and one-half acres - as a function of access, topography and the lack of public sewer and water service. Early development in Wrangell was centered in the area between present day Zimovia Highway/Church Street and the shoreline. Consequently, most of the narrow streets, haphazard development and deteriorating structures are located in that area. In the oldest residential areas, development reflects development patterns from around the turn of the century. Development is compact and lots are divided to conform with the placement of structures, not necessarily to make best use of the land. A few interior lots have no access.

Residential growth in recent years has been expanding in the uplands above the business district. The relatively wide streets in the residential areas upland from Zimovia Highway/Church Street contrasts with older residential areas. Much of the later development followed a gridiron pattern that was common at the time. In the hilly terrain that characterizes the uplands of the townsite, development patterns that do not take topography into account do not take best advantage of available land. Some platted streets are unbuildable and, on paper, buildable land is inaccessible and therefore wasted. Further expansion of residential development in the uplands will have to diverge from existing platting to make best use of the land. Undeveloped areas (areas with several vacant lots) should be replatted, as should land selected by the city from the state (see section on city selections).

The junior and senior high schools, as well as several churches, are located along Church Street. The elementary school complex, hospital and the proposed senior citizen housing project are located along Bennett Street (airport road). Residential development could beneficially intensify in the area, as soil conditions permit, to take advantage of the area's proximity to the school and hospital.

Shustak Point (Point Shekesti) contains fairly secluded residential areas as well as bustling harbor and light industrial activity. Only a few lots are available for development. This somewhat precarious blend of uses is generally harmonious; there have been some conflicts, however, in regard to the compatibility of residential uses and existing and proposed light industrial uses, including fuel storage. Inadequate parking space in part of the harbor area results in some congestion. The eastern side of Shustak Point partially encloses the Wrangell harbor. This side of the point contains most of the light industrial development on the point, with several docks extending into the harbor providing moorage for over sixty boats. Two fuel distributors and fuel docks are located about two-thirds of the way down the point. The western side of Shustak Point is predominantly residential, with little space for additional development. The shoreline consists of silt deposits, rock and gravel among bedrock outcrops. The harbor side of Shustak Point is mostly silt with scattered rocks. There is some rip-rapping on both sides of the point.

Areas for further residential development are proposed in the coastal management plan, the second volume of this program. The local land management section of the implementation program, also contained in Volume II, provides examples as to how the proposed residential areas might be gradually developed (also see the section on housing).

Industrial Development

Industrial development in Wrangell consists of timber and seafood processing and other activities that require, for the most part, a shoreline location. Consequently, most industrial development in the Wrangell townsite is located along the harbor south of the business district, near the city dock, and on Shustak Point. The bulk of this industrial area consists of fill over the natural tidelands. The area south of the commercial district contains the old ALP mill site (the first mill located here around 1890) and two seafood processing plants. The propane distributor, warehouses and storage areas are also located in the immediate area. Warehouses and boat houses intermixed with houses rim the inner harbor.

ALP is consolidating its Wrangell operations at the Zimovia Highway site on Shoemaker Bay. The expansive downtown site will be available for redevelopment. There is a possibility that the ALP subsidiary, Harbor Seafoods, which is adjacent to the old downtown mill site, may expand. If this is the case, Harbor Seafoods would probably only use a small portion of the site. The site may also be used for storage during the construction of the Tye Lake Hydroelectric Project. The removal of the mill from the downtown site will add substantially to the area available for industrial development. Care should be taken, however, to ensure that any development that takes place on the site is reasonably compatible with the surrounding residential and commercial areas. Of particular concern are any problems associated with traffic congestion, parking, and air and water pollution.

Access to the industrial areas is restricted by narrow streets that provide little space for truck traffic, parking, loading and offloading. This access is particularly poor on Shakes Street adjacent to the old ALP mill site, where the street is only eight to ten feet wide. This narrow street also provides access to Shakes Island, the small boat harbor, commercial fishing float and other harbor facilities (Wrangell OEDP, 1978). Expansion of industry in the townsite is also limited by the capacity of the city water supply. Large water users may face shortages during dry or freezing periods. If it becomes evident that increased water supply is necessary to adequately serve an industrial user or the community, the city will probably build another reservoir to meet the need.

In addition to industrial development at and near the old mill site, light industrial development is situated around the harbor and at the city dock. The shoreline around the inner harbor accommodates boat shops, net storage sheds, boathouses and two fuel docks that principally serve the commercial and recreational fishing boats. The open storage fill area near the city dock is a likely spot for water-dependent warehousing and storage. Such uses should not unduly degrade the character of this marine entryway to the community.

Warehousing and storage occupy a considerable amount of space on or upland from the waterfront, particularly along the inner harbor. Since Wrangell has a good potential for supporting mineral development and logging in the area, it is probable that there will be an increased need for storage space and warehouses. While waterfront locations will be required for offloading freight, storage should be accommodated in suitable upland sites whenever possible. Likewise, since there is a shortage of industrial space in the traditional industrial areas and there are few locations suitable for water dependent uses, it is imperative that nonwater-dependent or related development have adequate space to locate elsewhere so as not to compete with those uses that require a waterfront location. The coastal management plan in Volume II of this document proposes areas to be designated for upland and waterfront industrial development.

Areas that have been considered for future industrial expansion include sites at Neal and Polk Points, an area upland from the airport and an area along Bennett Street, all on the northern end of Wrangell Island. The use of the sites near the airport (Polk and Neal Points) would be restricted somewhat to ensure that they would not interfere with the safe operation of the airport. Two areas across Eastern Passage from Wrangell, near the mouths of Crittenden and Mill Creeks also have potential for large industrial development. In addition, there is considerable room for industrial growth in the industrial area at Shoemaker Bay, and there is some potential for industrial development in the vicinity of Pats Creek. These areas are addressed in the land use plan in Volume II of this program.

Port and Harbor Facilities

Wrangell was built around its port and harbor, and the harbor and waterfront remain the city's most valuable assets. Major harbor facili-

ties from north to south are the state ferry dock, new city dock, old city dock, barge ramp and dolphins, old mill dock, the inner harbor (four public floats, two oil docks, boat houses and other facilities), the old seaplane ramp (near Shoemaker Bay), Shoemaker Bay small boat harbor and the six-mile ALP dock. Map 25 shows the Wrangell harbor area.

The ferry dock is owned and operated by DOTPF. The dock is used by the Alaska Marine Highway System ferries and is one of the few ferry docks on the mainline system that is within easy walking distance of the center of a city. The facility is served by easy road access via Church Street, and the parking area was expanded in 1980.

The new city pier is at the edge of the fill area along Front Street. The 280-foot-long pier was knocked out of commission when the "Princess Patricia" collided with it as she was pulling into the dock in May 1980. The damaged section is repaired and the dock was extended 320 feet to accommodate a six-hundred-foot vessel or two vessels of a smaller size. The extension was necessary to allow for docking of larger vessels and to provide dock space for cruise ships and freighters at the same time.

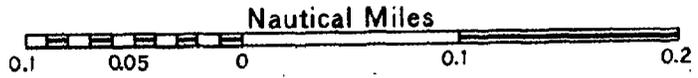
The need for expansion of the dock (made possible in part by a state grant) is based on anticipation of increased tour boat traffic and the use of Wrangell harbor for loading timber from private (primarily native) lands aboard freighters. Natives may build their own docks closer to the timber harvest areas to reduce substantial log towing costs, which could reduce the transshipment activities in Wrangell. The appeal of the Wrangell harbor is due not only to the facilities, but moreso to the reputation of local longshoremen as being exceptionally efficient. The old city wharf is immediately adjacent to the new dock and is being used by the "Island Trader," Etolin Transfer Company's primary vessel engaged in trade with various camps and communities in the Wrangell area.

The new city dock, old dock and barge ramp are all served by a staging area or fill south of Front Street. This area is essentially an outdoor parking and storage area with no facilities. Users have identified a need for a warehouse on this site. The barge ramp and accompanying mooring dolphins are at the south end of the fill area.

The old ALP mill and dock are vacant and ALP has not indicated how it will use the old mill site and docking facility. All ALP shipping operations have been transferred to the new Shoemaker Bay millsite.

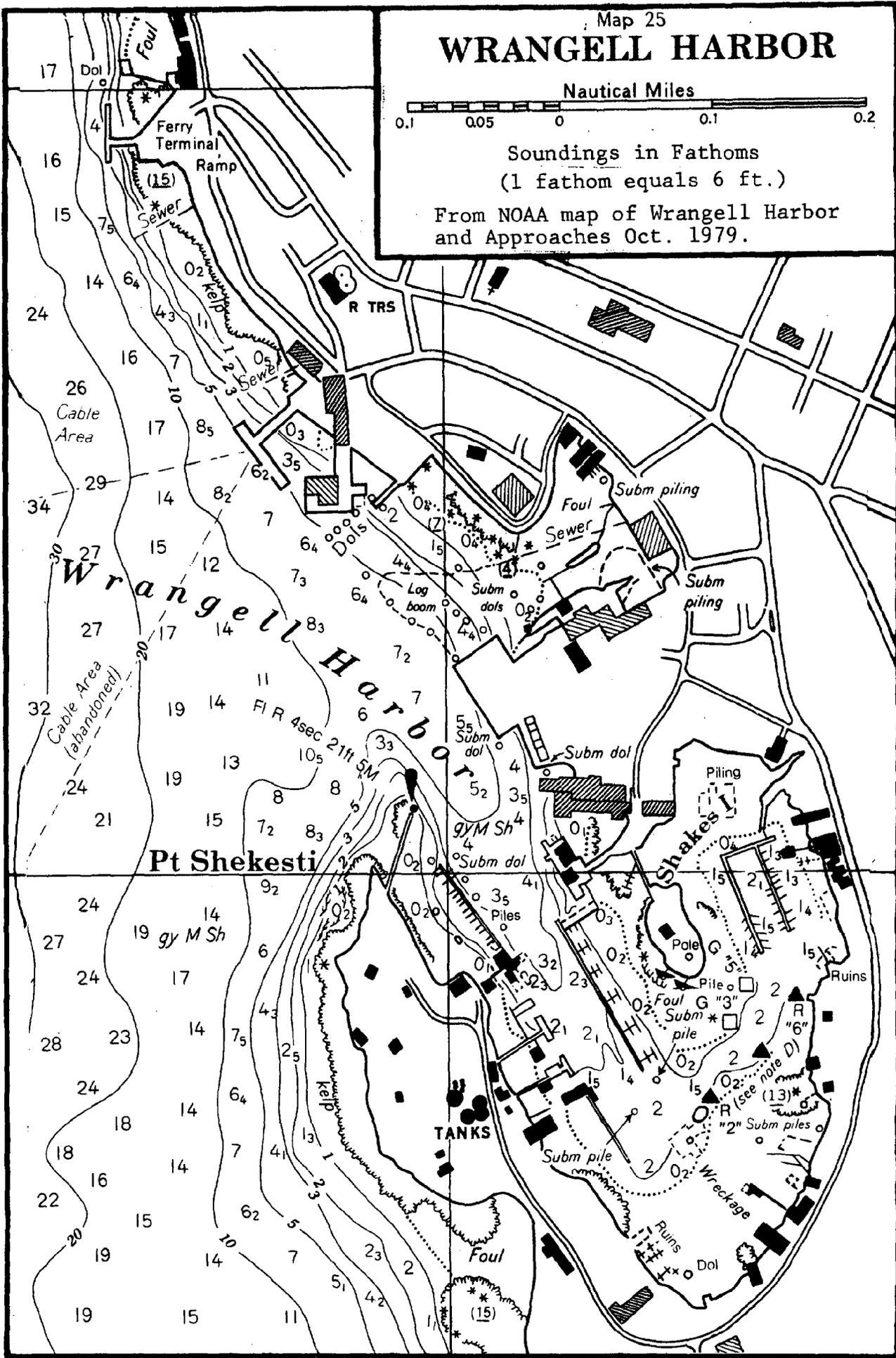
The most active area in Wrangell harbor is the small boat harbor. There are four public floats (Reliance, Inner Harbor, Standard Oil and Fish and Game) that provide docking space for over two hundred vessels (see section on transportation). The Reliance float also contains the city floatplane dock. The harbormaster's office and Reliance Shrimp Company are both located on the wharf above the float. Other harbor facilities include two fuel distributors, six marine equipment and engine repair services, two boat repair shops and one marine machine shop.

Map 25
WRANGELL HARBOR



Soundings in Fathoms
(1 fathom equals 6 ft.)

From NOAA map of Wrangell Harbor
and Approaches Oct. 1979.



The U.S. Army Corps of Engineers is responsible for maintenance of the Wrangell harbor at ten feet (at mean low water), with the last dredging done in the 1950's. A three-hundred-foot-long breakwater off Shustak Point provides protection from rough water in Zimovia Strait.

The city has received a \$400,000 state appropriation to rehabilitate, and possibly expand, the capacity of the inner harbor float system. One of the critical needs identified for the inner harbor is for more docking space for larger vessels. The harbor project includes 10,694 square feet of new floats, 29 float piles, a new electrical system, dredging and maintenance items. The rehabilitation work was completed in 1981.

The recently constructed Shoemaker Bay harbor four miles south of the Wrangell townsite has approximately 257 spaces and most of the 110 vessels docked there are pleasure craft. Many boat owners, particularly commercial operators, prefer the old Wrangell harbor due to its facilities for repair and fuel services and its proximity to town and the fish processing plant.

During summer months, when as many as five hundred boats are docked at Wrangell, overall capacity of the two harbors is inadequate. Many of these are transient vessels, some of which spend a good part of the summer at Wrangell. Wrangell harbor is the preferred harbor of many boat owners and may be overcrowded while dockage space is available at Shoemaker Bay. The city has made space available to develop fuel supply, marine service and a harbor master's office upland from the small boat harbor. This may help to draw some boat owners away from the heavily used Wrangell harbor.

The new ALP mill at Shoemaker Bay has a docking facility for lumber ships. Other private facilities for dockage or mooring along the coast outside of the above-mentioned sites is virtually nonexistent; the substantial tidal fluctuation and occasional storms make construction of private docking facilities along exposed sections of the coast impractical.

A small seaplane float with a two floatplane capacity was recently placed at Shoemaker Bay. An old seaplane landing site north of the small boat harbor is no longer in use.

Desired port and harbor improvements include rebuilding the gridiron in the in-town harbor, development of a small boat launch and pullout ramp at Shoemaker Bay, float replacement and electrical upgrading at the Fish and Game and Chevron floats, a floatplane pullout at Shoemaker Bay and dredging to maintain and enlarge the downtown harbor.

NORTH END OF WRANGELL ISLAND

In addition to the Wrangell townsite, the north end of the island contains the airport, city landfill, DOTPF garage, a concentration of

homes and a few commercial establishments primarily associated with the airport. Relatively gentle terrain and some marginally adequate soil conditions (relatively good for the area) hold promise for further development in this area. Land use and structural conditions in this area are depicted on Map 26A. Existing zoning for the city outside of the townsite is shown on Map 27.

The residential area north of the townsite along Evergreen Avenue is close to the main population center, on the shoreline, heavily forested, and has limited topographic barriers to development. There is more room for development further upland in some areas. Petroglyphs (prehistoric rock carvings) are located along the shoreline; access is by boardwalk from Evergreen Avenue.

The airport occupies much of the northeast side of the north tip of the island. As much as thirty feet of muskeg had to be removed and replaced by fill where the runway is located. Approaches to the runway from either direction are over water. Development at the airport includes several hangers, a fire station and the Alaska Airlines facility. The DOTPF garage is located nearby along the road to the airport (Bennett Street). There are two rock quarries adjacent to the airport.

The Wrangell East Road provides access across the north end of the island to Neal Point. A quarry and outdoor firing range are located off this road. The Neal Point area on the eastern side of the island has been considered a possible site for industrial/port development. The gentle to steep and rough terrain is, for the most part, covered with dense forest. Steep slopes descend to a fairly flat shoreline. Unusually large (for north Wrangell Island) patches of grass and moss stretch between bedrock outcrops. This scenic area has considerable potential for recreational use, as well as industrial development. Intensive or careless use, however, could result in the destruction of the grass covered areas that add to the site's character.

Most of the interior of the north end is covered with large expanses of thick muskeg, which all but precludes economical development. There are some forested areas on marginal soils that could support development (see section on geology).

SOUTH WRANGELL

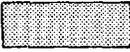
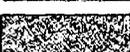
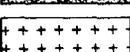
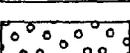
Land use south of the Wrangell townsite is confined by steep hills that ascend from the narrow shoreline fringe. The most concentrated development occurs around Shoemaker Bay, where the developable area is considerably wider. The remainder of the development is primarily located along the Zimovia Highway, which follows the shoreline to Pat Creek. Maps 26B, 26C and 26D show land use and structural conditions in south Wrangell along the Zimovia Highway.

The Cemetery Point area at the south end of the Wrangell townsite is fairly heavily developed. The point on the water side of the highway contains the cemetery, an old native burial site, a ballpark, a park

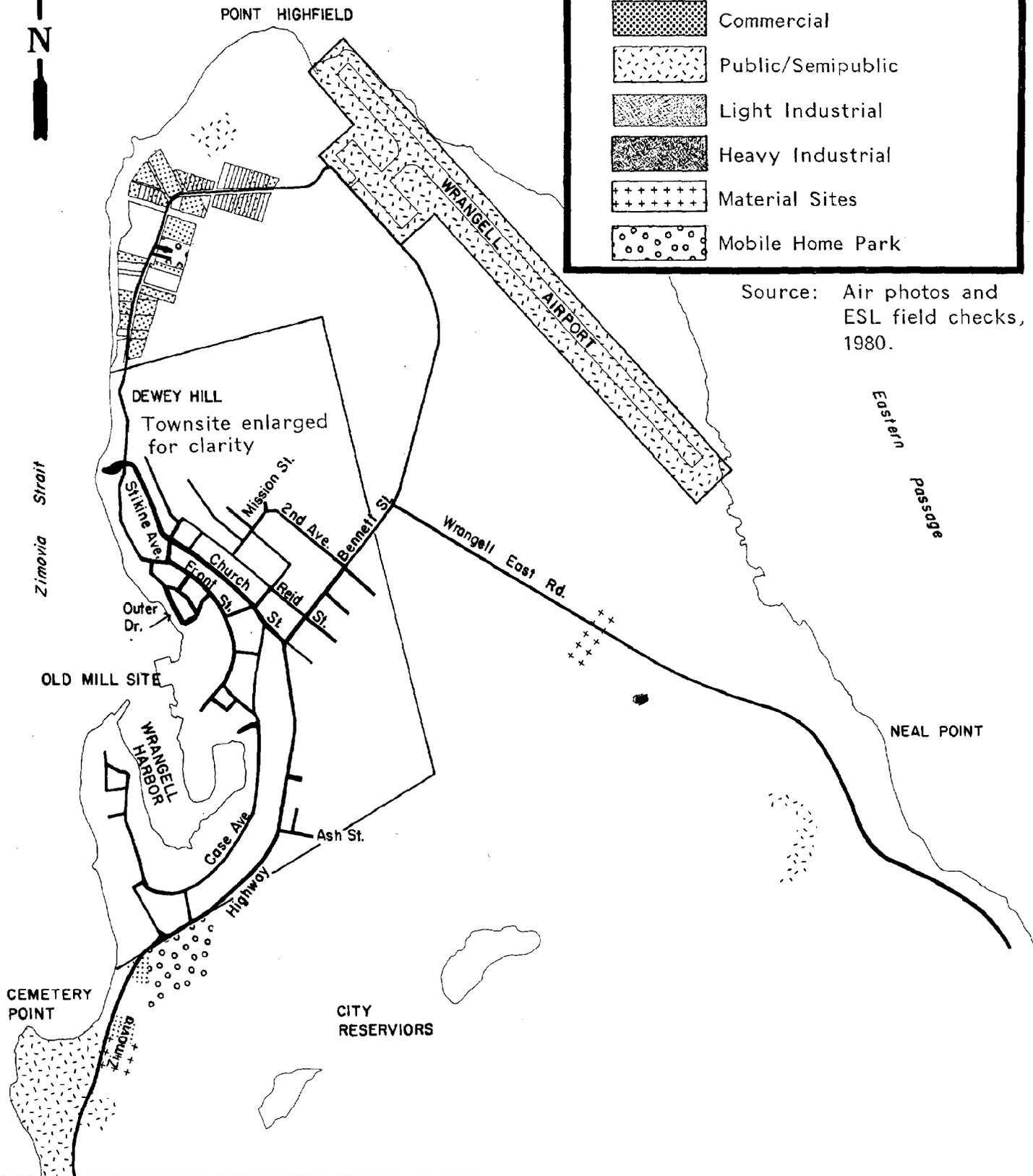
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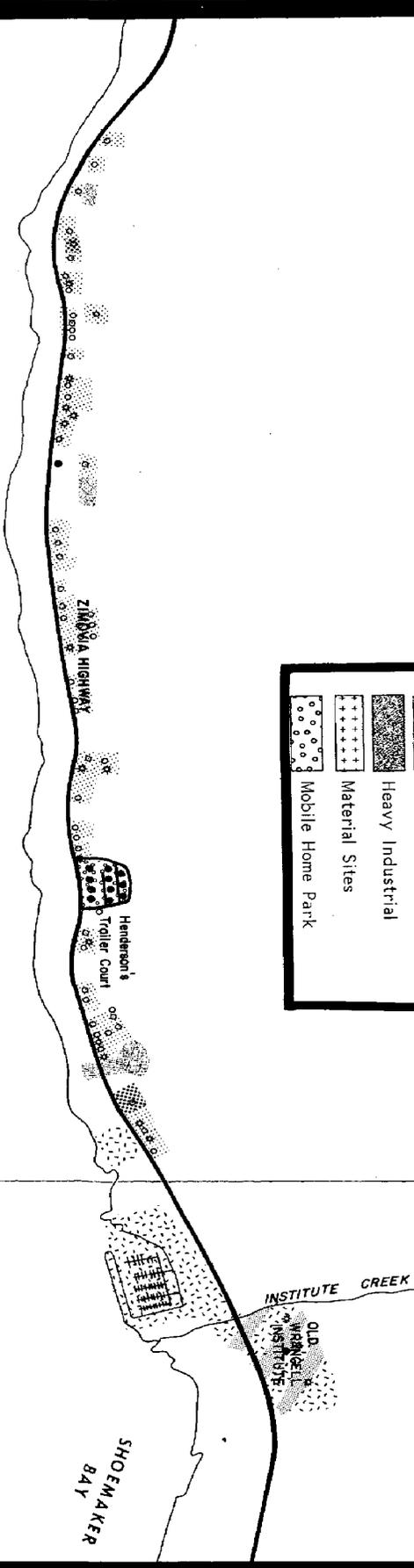


Map 26A LAND USE

-  Single-Family Residential
-  Multi-Family Residential
-  Commercial
-  Public/Semipublic
-  Light Industrial
-  Heavy Industrial
-  Material Sites
-  Mobile Home Park

Source: Air photos and ESL field checks, 1980.





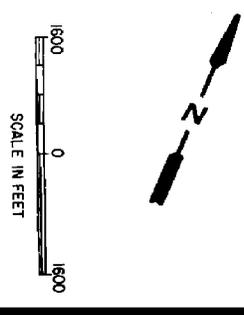
Map 26B LAND USE

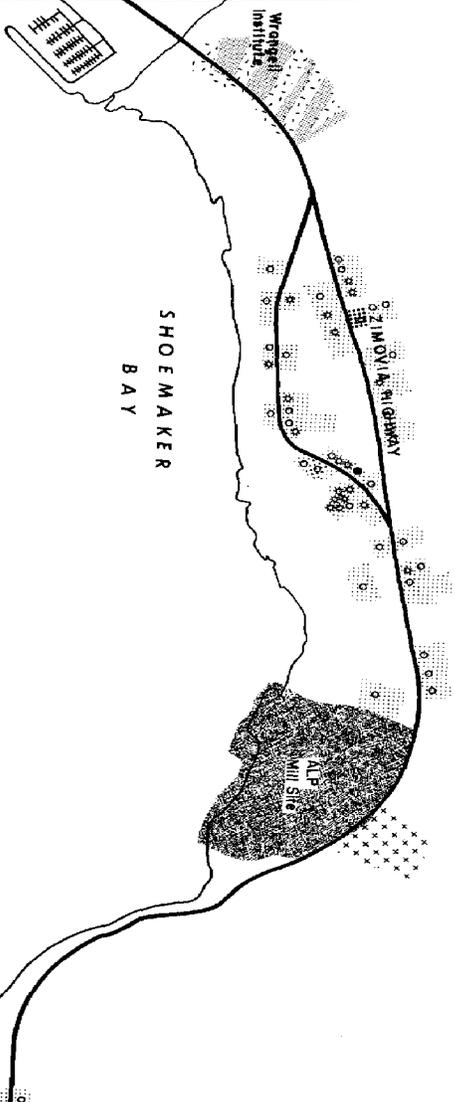
- Single-Family Residential
- Multi-Family Residential
- Commercial
- Public/Semipublic
- Light Industrial
- Heavy Industrial
- Material Sites
- Mobile Home Park

STRUCTURAL CONDITION

- Good Condition
- * Minor Repairs Needed
- Major Repairs Needed

Source: Air photos and ESL field checks, 1980.





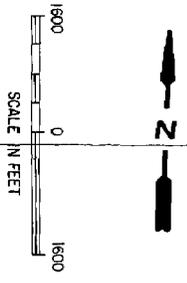
Map 26C LAND USE

-  Single-Family Residential
-  Multi-Family Residential
-  Commercial
-  Public/Semipublic
-  Light Industrial
-  Heavy Industrial
-  Material Sites
-  Mobile Home Park

STRUCTURAL CONDITION

- Good Condition
- ◊ Minor Repairs Needed
- Major Repairs Needed

Source: Air photos and ESL field checks, 1980.



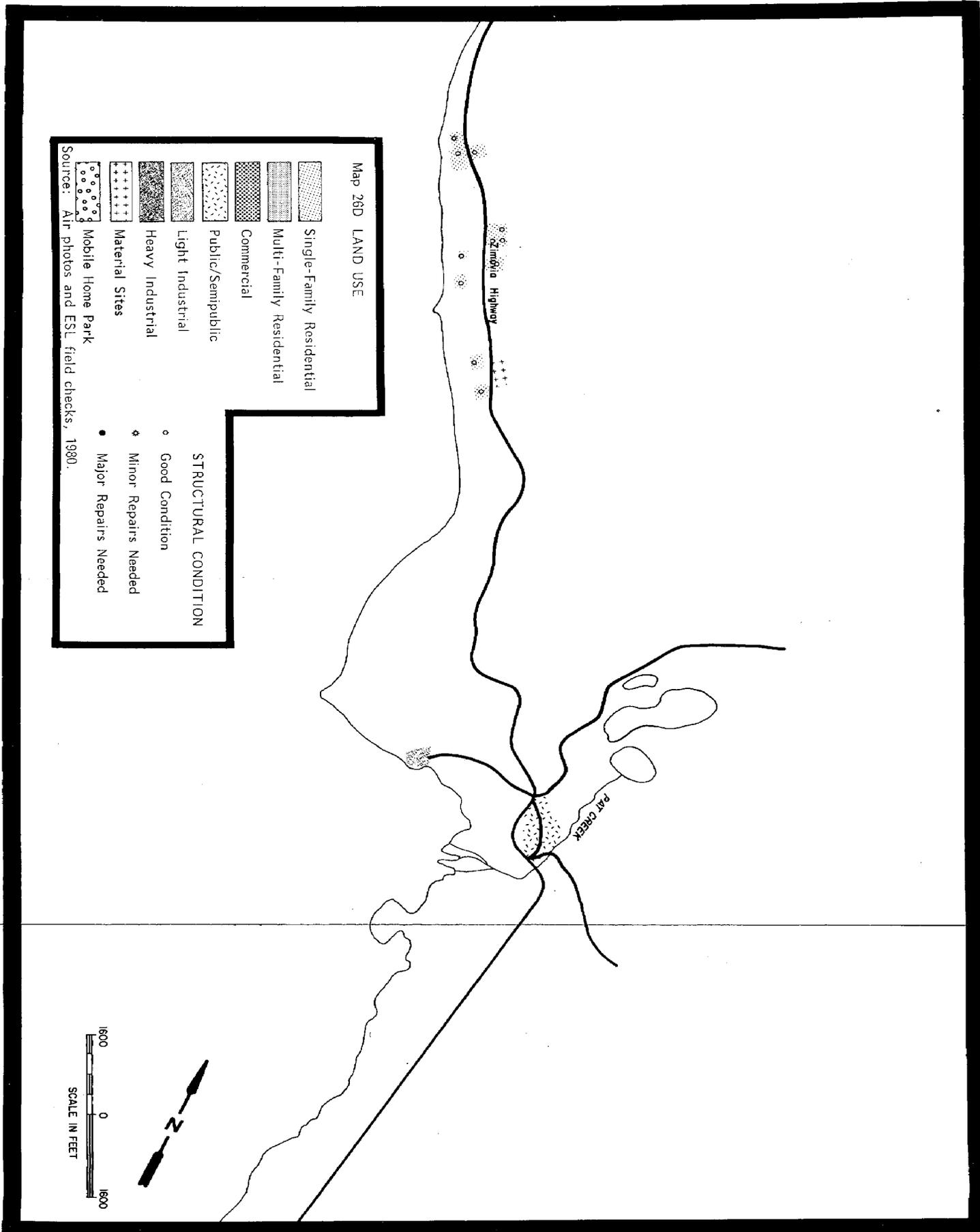
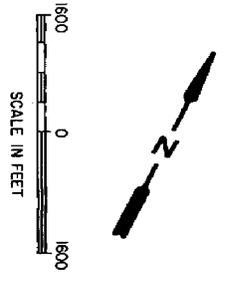
Map 26D LAND USE

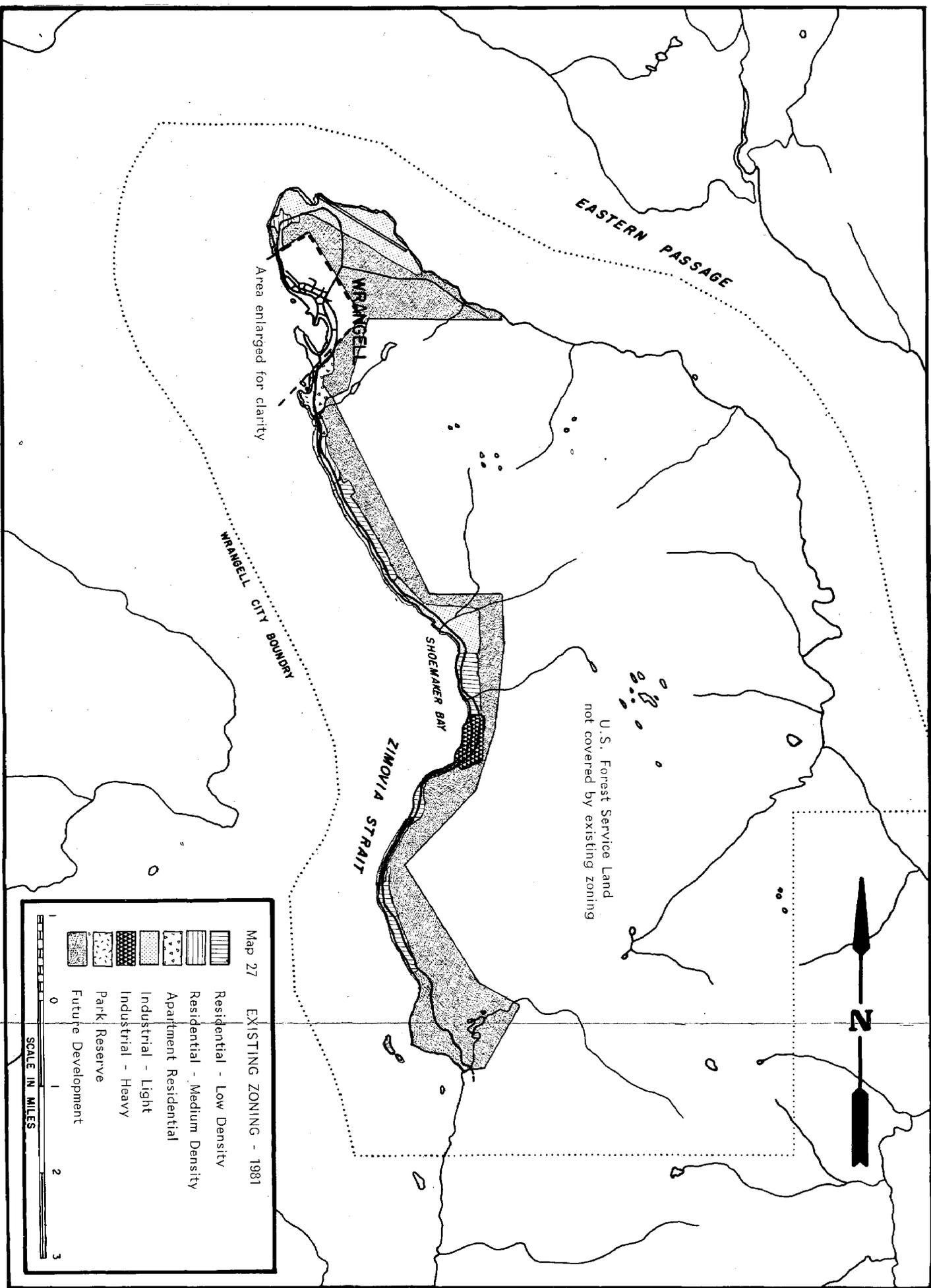
-  Single-Family Residential
-  Multi-Family Residential
-  Commercial
-  Public/Semipublic
-  Light Industrial
-  Heavy Industrial
-  Material Sites
-  Mobile Home Park

STRUCTURAL CONDITION

- Good Condition
- ◊ Minor Repairs Needed
- Major Repairs Needed

Source: Air photos and ESL field checks, 1980.





Area enlarged for clarity

WRANGELL CITY BOUNDARY

EASTERN PASSAGE

ZIMOVIA STRAIT

SHOEMAKER BAY

U.S. Forest Service Land
not covered by existing zoning



Map 27 EXISTING ZONING - 1981

[Pattern]	Residential - Low Density
[Pattern]	Residential - Medium Density
[Pattern]	Apartment Residential
[Pattern]	Industrial - Light
[Pattern]	Industrial - Heavy
[Pattern]	Park Reserve
[Pattern]	Future Development

SCALE IN MILES

0 1 2 3

and a campground. A radio station and tower is to be constructed in the space between the ballpark outfield and the water. The upland side of the point contains a quarry, the city sewage treatment plant and a few trailers. The new cemetery will also be located in this area. A cluster of residential development, including an apartment building, is located just south of the sewage treatment plant. A substantial mudslide occurred in October 1979 (see section on hazards) and, according to a study of the area by a consultant, there is a serious danger of further slides in the area that was logged in the 1960's. This logged area extends in the uplands as far south as Henderson trailer court (mile 3.5 Zimovia Highway).

The city's watershed lies upland from Cemetery Point. Two reservoirs are contained in a narrow basin between steep hillsides. A dam for a third reservoir may be constructed between the two reservoirs to increase the community water supply (see section on services). A substantial tree blowdown occurred in this drainage in the fall of 1978. A new road may be constructed to provide access for loggers and in so doing provide access to land selected by the city from the state. This road should be designed and layed out such that it facilitates the best use of surrounding land.

From Cemetery Point to Shoemaker Bay, development is situated on the upland side of the Zimovia Highway. The unobstructed view along this section of shoreline is appreciated by users of the highway, particularly visitors. Development along the uplands consists of houses, trailers and infrequent commercial development.

Beyond Cemetery Point, houses are located on large (from one-half to four acres), densely wooded lots as far south as Henderson's trailer court. A body shop is located along this section of highway. There is room in the area for more development, though lots must be large enough to accommodate individual sewage disposal systems unless a community sewage system is put into operation. Development upslope from existing development must be sited to avoid sewage or drainage problems that could adversely affect downslope development.

Henderson's trailer court, which contains about seventeen trailers, is the largest residential cluster in the area. Water supplies for this development were contaminated in 1980 by a faulty sewage disposal system. There are about a half dozen houses in the quarter mile between Henderson's trailer court and a junkyard. The sloping junkyard is screened from the highway, but is visible from the water. Junked vehicles or other unsightly items should not be allowed to be stored on the water side of the highway.

The Roadhouse, a lodging and dining establishment, is separated from the junkyard by dense woods. Located on a small bluff above the highway, the site affords a good view of Zimovia Strait and Shoemaker Bay. An old seaplane landing area, no longer used, is located just past the Roadhouse at the northern end of Shoemaker Bay. This site has been filled and riprapped. Grass covers the areas that are not paved.

The Shoemaker Bay area contains the most intensive development outside of the Wrangell townsite. The land surrounding Shoemaker Bay contains the old Wrangell Institute, the ALP sawmill and considerable residential development. A recreational complex is to be developed by the city on a seven-acre parcel adjacent to the institute parcel and on the fill upland from the small boat harbor at the north end of the bay. When developing the parcel, care must be taken not to use prime shoreline locations for nonwater-related development in violation of the state coastal management act. Any development near the shoreline should be sited such that views of Zimovia Strait are not unduly obstructed. This recreational development will serve the community for many years and should be directed at fulfilling long-term community needs and desires. The small boat harbor was recently constructed to provide sheltered moorage for over two hundred of Wrangell's smaller boats. The harbor, which was dredged from the tidelands, is protected by riprapped breakwaters (see section on harbor facilities).

The old Wrangell Institute, a native boarding school from 1932 to 1975, was recently obtained by Cook Inlet Region, Inc. as part of its native land claims settlement. It may be traded to Sealaska Corporation for use as a logging training center. Hydaburg is, however, also vying for the training center. Less than twenty acres of the 140-acre site are developed. There are a few large structures that held classrooms and several residential rental units on the site, including a sixplex, a duplex and a house. Most of the main structures on the site have high heating and maintenance costs. As of January 1981, the owners had no definite plans for the site and were open to proposals. The uplands could conceivably be incorporated in the proposed city recreational complex or developed as a residential area.

The area between the ALP mill site and the old Wrangell Institute site contains a gun shop and numerous homes, including a cluster of trailers. Development is oriented to the Zimovia Highway and the south Wrangell Highway, which loops through a residential area and rejoins the Zimovia Highway. There are several vacant wooded lots, usually less than one acre, along the south Wrangell Highway. Additional residential development is expected here and elsewhere in the Shoemaker Bay area due to the proximity of the ALP mill. Since the downtown mill's workforce was, for the most part, transferred to the new mill, some people may find it more convenient to locate near it, especially when the proposed recreational complex is completed at the northern end of the bay. A centrally located convenience store to serve the residential area, users of the small boat harbor and the recreation area would help to make the area even more appealing.

The shoreline at the southern end of Shoemaker Bay is occupied by the ALP sawmill, dock and log storage area. The old mill was demolished in 1980 and the new mill, which also replaces the downtown mill, went into operation in late 1981. The expansive ALP mill site is largely riprapped fill. There is considerable room for expansion of the facility if necessary. A quarry is located upland from the ALP site adjacent to the Zimovia Highway.

The pavement ends and the road hugs the shoreline near the base of Chichagof Mountain, which rises abruptly from the water as one goes south from Shoemaker Bay. With the exception of a small, relatively flat shoreline area occupied by a few structures, this side of the mountain, which shows evidence of small landslides, is generally too steep to build on. There is not enough land on the water side of the road for a house site.

The terrain becomes gentler along the shoreline on the southern side of the mountain. At this point the highway passes through a sparsely developed subdivision (twenty-two lots averaging less than one and a half acres). Beyond this subdivision, the highway returns to the shoreline, providing excellent views between the trees of Zimovia Strait and the islands beyond. There is a pullout near the water adjacent to a steep slope at the southern end of this stretch of the coastline. Two subdivisions abutt each other just south of this precipitous area. The two subdivisions, a total of fifty-three lots averaging about one and a half acres, have a smattering of houses. A quarry is located on the upland side of the highway near the southern end of the subdivisions.

A large section of uplands beyond a dense buffer of trees has been clearcut. A wide swath with second growth vegetation extends the length of the subdivision. A second clearcut is located next to the highway, near a pullout about five hundred feet farther down the highway. At this point the highway goes inland around a knoll on Barney's Point toward Pat Creek. This undeveloped point has long been considered a prime area for low-impact recreation. The beach at the tip of the point appears to be exposed except at the highest of tides. Boat Island lies a few hundred feet off the tip of this point. A short access road on the southern side of the knoll leads to an ALP log crane and dock at the southeast corner of Barney's Point near the mouth of Pat Creek. The crane and working area are on fill.

The Zimovia Highway descends from the knoll to Pat Creek valley and state highway maintenance ends. Logging roads extend east into the interior of the island through the Pat Creek valley. Another gravel road, extending past the city limits, parallels the shoreline through dense tree cover a few hundred feet inland.

Pat Creek valley, which has been considered a potential location for industrial, commercial and perhaps residential development, is used for recreation. Until facilities are built at Shoemaker Bay, the state wayside adjacent to Pat Creek provides the only camping area within the city limits other than the campground at Cemetery Point. Pat Lake is a short distance by access road from the main highway. There is considerable tree cover intermixed with large muskeg patches on the gently sloping land near the lake. Marsh grasses blanket the lake shoreline. The shores of Pat Lake provide a scenic picnic spot, marred to some degree by a large clearcut that is visible from the site. Some people would like to have a public winter/summer shelter constructed near the lake, perhaps at one of the pullouts along the road. A shelter would particularly benefit cross-country skiers who frequent the area when snow conditions permit. There is a quarry about a quarter mile

inland from Pat Lake, near the road that winds past the lake and into the mountains.

Some people in the community have expressed interest in eventually having a road constructed through the valley to the other side of the island (a logging road does extend across the island in this area). In the event that some economic development prompted the development of such a road, there would probably be pressure for more intense development in the area.

During the state's process of nominating land for state selection from national forest, some people encouraged the nomination of land south of Pat Creek for commercial and residential development. The idea was rejected primarily to discourage needless strip development so far from the population center.

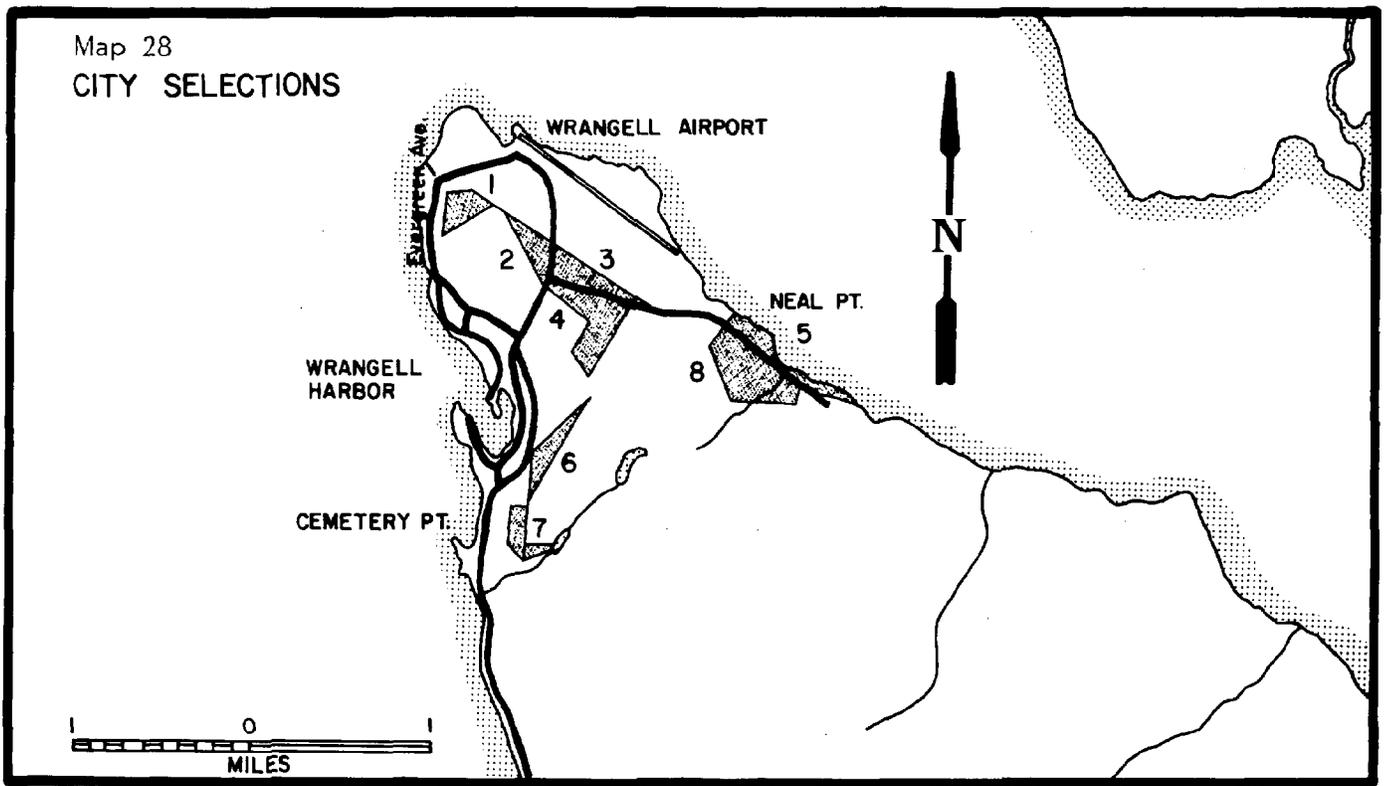
CITY LAND SELECTIONS

The city selected approximately 306 acres of former state mental health trust land surrounding Wrangell (see Map 28). Wrangell was not eligible for municipal entitlement, which allowed municipalities to select and obtain a percentage of eligible state land within their jurisdiction (Wrangell did not have any eligible land within its boundaries). Instead, Wrangell was allowed to select ten percent of the former mental health trust land within the city limits. This was permitted by a state statute that allows the state to grant land for municipal expansion. The selections will be reviewed by state agencies and altered if necessary to reflect state concerns and interests. When this step is completed a proposed reclassification will be advertised for public review and comment. The land will then be reclassified and title subsequently transferred to the city. This process could be completed in late 1981 or 1982.

Land selected by the city is as follows:

1. Forty acres behind Stough's trailer court and Mt. Dewey.
2. Twenty acres on the north side of the airport road, from the intersection of the east road to the north end.
3. Thirty-nine acres on the south and east side of the airport road and Wrangell East Road, beginning at their intersection.
4. Forty acres surrounding the designated school lands on the town side of Wrangell East Road and the hospital side of Bennett Street (airport road).
5. Forty-two acres of beach land adjacent to the Wrangell East Road, extending south from the end of the airport reserve property.

Map 28
CITY SELECTIONS



SOURCE: AK DNR

6. A thirty-one acre parcel upland from the Zimovia Highway, which includes a proposed access route to the city reservoir.
7. Twenty-one acres southwest of the above parcel.
8. Seventy-three acres, including the public firing range on the town side of the Wrangell East Road and surrounding area.

Annexation

The city of Wrangell is considering the possibility of annexing portions of the mainland and Wrangell Island. Among the areas being considered for annexation is the area from Crittenden Creek to Berg Bay, including part of the mineral rich Groundhog Basin. The Mill Creek-Virginia Lake area (also on the mainland) is considered a prime candidate for annexation. There is also a possibility that annexation of a substantial portion of Wrangell Island, perhaps including the Thoms Lake area, might be attempted. The mainland areas have great potential for industrial development related to mineral extraction. These areas also contain important recreational areas and potential water supplies for the community (e.g., Virginia Lake).

POPULATION

Wrangell has increased its population has increased quite steadily since the early 1900's. A surge in population growth occurred during the 1960's and 1970's, due largely to the expansion of the wood processing industry. The 1970 population figure is misleading, however, since it includes the area that was later annexed by the city. As many as seven hundred people may have been added to the population figures that year because of the larger census area. The 1970 and 1981 census figures cover approximately the same area and therefore serve as a suitable basis for determining population growth. The 1980 U.S. Census Figure of 2,184 was contested by the city and a consultant was hired to perform a thorough count using accepted procedures. The city considers these 1981 figures to be accurate. Table 2 shows the community's population growth through this century.

Population growth was substantially higher during most of the period between 1970 and 1981 than is reflected in the 1.4 percent average annual rate of increase. This is because a number of people have moved from Wrangell over the last few years (1979-81) with the closing of the YACC program (over twenty jobs lost) and the reduction in employment at the ALP mill (over forty fewer jobs).

While there will be fluctuations in population due to people coming to work on a temporary basis on construction projects and other rela-

tively short-term projects, one can expect an annual growth rate of about one percent for the next several years. New industrial development could, however, cause a significant increase in population.

TABLE 2
Wrangell Population 1900-1981

<u>Year</u>	<u>Population</u>	<u>Annual Growth Rate (%)</u>
1900	868	-
1910	743	-1.5
1920	821	1.0
1929	948	1.6
1939	1162	2.1
1959	1263	0.8
1960	1315	0.4
1970	2029 (expanded area)	5.4
1981	2345	1.4

Source: U.S. Census except the 1981 contracted census.

HOUSING

One must have patience to find a house to buy or rent in Wrangell, though house prices and rent are quite reasonable. The local real estate office may get fifteen calls a week in summer from people looking for rentals and about five calls a week in the winter. Rentals are most often not available.

Housing has been increasingly difficult to obtain in the last few years. In July 1978 there were six houses, five apartments, eight mobile homes and sixteen units at the Alaska Housing Project vacant (Wrangell OEDP, 1978). In the fall of 1980 only one house was for sale and there were no rentals, including mobile homes. There were no vacant mobile home spaces in the five trailer courts in the area and only ten lots were available for construction. The housing starts in Wrangell have been reasonably stable, as shown in Table 3.

The local real estate broker estimates that there is twenty to thirty percent less available housing in Wrangell than in most comparable communities. The shortage of housing has manifested itself in a proliferation of mobile homes, particularly in south Wrangell. Because of the housing shortage and lack of space for mobile homes, ALP was forced to have eighteen mobile homes placed on its property to house employees.

There are several reasons for Wrangell's housing shortage. Interest rates for new-house construction are high and the low return on investment is a deterrent to rental construction; there is a lack of available suitable land for development even if these were not major hindrances. Except for native programs, money for upgrading older houses is difficult to obtain.

TABLE 3
Housing Starts

1970	-	3	1976	-	14
1971	-	5	1977	-	9
1972	-	6	1978	-	5
1973	-	8	1979	-	6
1974	-	16			
1975	-	9			

Source: HUD, Anchorage

Though there are not many homes available for rent or sale, prices are reasonable for those that do come on the market. Rental prices are among the lowest in the state; for example, two bedroom apartments average from \$200 to \$325 per month, with one bedroom apartments ranging from \$150 to \$250. One and two bedroom houses start at about \$225 a month. Selling prices for homes are also reasonable for the Alaskan market. One or two bedroom houses sell for as little as \$30,000 to \$40,000. Three bedroom houses sell for \$40,000 to \$80,000 dollars, with the average being \$60,000 to \$80,000. A few houses are valued from \$120,000 to \$150,000.

Wrangell's housing stock contains a typical cross-section of housing types and price ranges. In addition to traditional single- and multi-family structures, there is a fifty-two unit HUD housing project. The low- and middle-income apartments are usually full and there is often a waiting list of about fifteen persons, as during summer 1980. Wrangell has five trailer courts with a total of one hundred and two spaces. All spaces are usually full.

Land has been made available and funding is pending (September 1981) for a senior citizen apartment complex. According to preliminary plans, the structure is to contain twenty-four one-bedroom apartments, community rooms, manager's apartment and storage area. These plans may be altered somewhat to reduce the project costs to within funding limits. If all goes well, the project should be completed in 1982. People sixty years or older will then be eligible to reside in pleasant quarters located close to downtown, across the street from the hospital (at the corner of Bennett and Second Avenue). About seventy-five of

Wrangell's 180 senior citizens have expressed interest in moving into the apartments; an impartial community board may be formed to decide who needs housing the most. If HUD subsidy program is approved, apartment rents would not exceed twenty-five percent of the tenants' income regardless of the actual rent cost per unit. In addition to providing senior citizens with comfortable, well-located housing, the housing project will ease the tight housing market as senior citizens move from apartments or homes into the new housing project.

Wrangell's housing is in generally good condition. Most structures in need of minor-to-major repairs are located between Church Street/Zimovia highway and the water (see Map 22). Several rehabilitation projects are underway. The Wrangell Cooperative Association was awarded a federal grant of \$238,000 in 1980 for renovation of native-owned homes in Wrangell. The money is for structural improvements (foundations, roofs, floors, etc.) to twenty-six Wrangell homes, of which about a third belong to senior citizens. The Home Improvement Program which provides weatherization and renovation assistance for eligible natives, is another means of upgrading homes belonging to Native senior citizens. A home weatherization program is also offered through Rural CAP, a federal program that provides funds for home weatherization for anyone who meets income eligibility standards.

For a community of Wrangell's size and demand characteristics, there are a considerable number of hotel rooms available. The Roadhouse has ten double rooms with a bar and restaurant; the Stikine Inn has sixteen double rooms, with a bar and restaurant; and the Thunderbird Motel has thirty-seven double rooms.

Wrangell has been growing slowly in recent years. Pre-1980 census population growth figures estimated annual population increases for the last few years to be between one and two percent. The 1981 census contracted by the city shows a 1.4 percent annual increase over the last eleven years. In the absence of major development that would spur growth in the community, little population growth (about one percent annually) is expected over the next several years. There should therefore be only minor increases in the long-term demand for housing.

The Tye Lake hydroelectric project will hire people that already live in Wrangell, and work camps near the job site will accommodate most workers from outside the area. Daily transportation will be provided between Wrangell and the job site. The project will last over two and perhaps three years. Since provisions for families will not be available at the work camps, it is anticipated that some families will attempt to reside in Wrangell. Likewise, some single workers would rather live in Wrangell than a camp. People such as these, temporarily working in Wrangell, will find it difficult, if not impossible, to secure accommodations in Wrangell, and some may have to resort to bringing in mobile homes. Rather than have more mobile homes scattered around, the city should make provisions for a well designed mobile home park to accommodate temporary and permanent residents.

The Wrangell housing stock should be expanded and improved in the next few years. For example, about twenty-four senior citizens' homes and apartments, some of which may have been recently rehabilitated, will go on the market when the senior citizen housing project goes into operation in the next couple of years, although this project may be completed too late to ease the housing shortage during the Tye project, in addition, several marginal houses will be brought up to standard through the previously mentioned rehabilitation programs. It can also be expected that a few people that lost their jobs at the mill will eventually leave Wrangell, thus freeing up some housing. Many of these former ALP employees will, however, probably be hired to work on the Tye project and remain in Wrangell.

To further improve the housing situation, the public can identify and pursue programs for rehabilitation and perhaps construction of houses. Additionally, the city can make a suitable amount of city-owned land, near sewer and water lines, available for residential development at a reasonable price. Some land may be made available for residential development when the city obtains title to the former mental health land it selected from the state (see section on local land use). This land, along with possible state land disposals, could help ease the severe land shortage for private development.

TRANSPORTATION

MARINE

Waterborne transportation was an important - perhaps the most important - reason for the early growth of Wrangell. When John Muir visited Wrangell in 1879, he reported "two sternwheel steamers plied on the river (Stikine) between Wrangell and Telegraph Creek." Wrangell has served as the gateway to the Stikine and has been a center of both river and coastal marine traffic since those early years. Wrangell is on the mainline route of the Alaska Marine Highway and is visited by a number of cruise ships (Map 29). It is also a major log exporting center, is served by frequent scheduled barge service, and is the main port for river traffic up the Stikine. Boats for trade and pleasure are nearly as common in Wrangell as private automobiles in more land-oriented communities of North America.

The Alaska Marine Highway ferries provide regular service for passengers, autos and freight to other southeastern communities and to the continental road system at Haines, Skagway, Prince Rupert and Seattle. Four ferries generally run the mainline route, with six or more mainline stops weekly in each direction during the summer and two to three stops a week in each direction in the winter. In 1982, one ferry will be taken from Seattle-Southeast run to the Prince Rupert-Southeast run. This shorter run will allow the ferry to accommodate about twice as many people.

The Wrangell ferry dock is owned and operated by DOTPF and is located north of downtown at the junction of Stikine Avenue and Second

Street. Second and Church streets were reconstructed to facilitate traffic movement to the ferry dock around the city center. The existing ferry dock is considered adequate for the city's present and future needs.

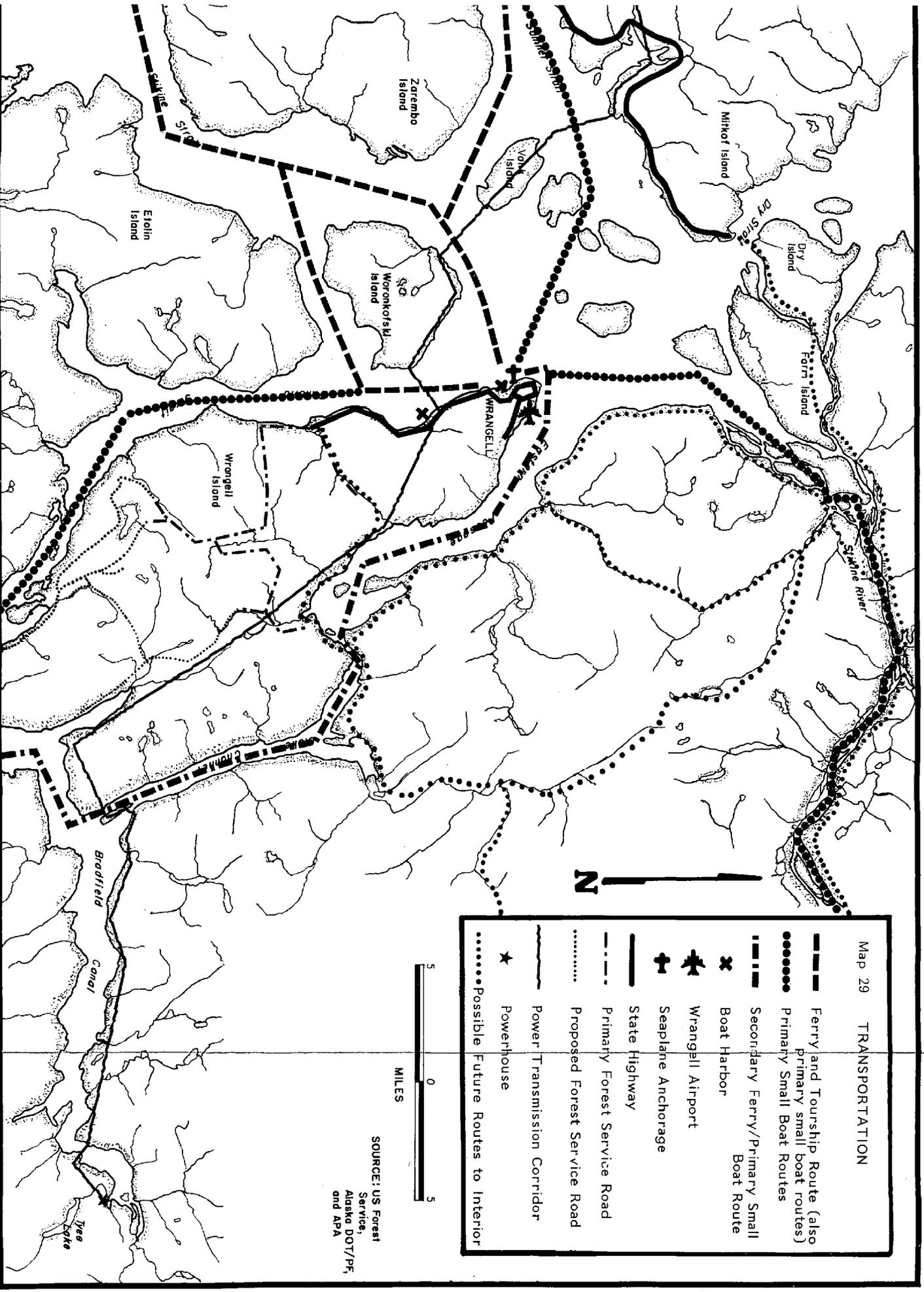
Ferry traffic shows extreme seasonal variations, with the highest demand in June, July and August, when ferry traffic in the region far exceeds airline travel. It is estimated that some seventy-five to eighty-five percent of this peak season traffic is by non-Alaskans, indicating a large volume of tourists during the peak travel season (DOTPF, Southeast Alaska Transportation Plan, 1980). Figures on ferry use for Wrangell are shown in Table 4.

TABLE 4
Marine Highway Use at Wrangell

Marine Highway	Qtr	1977	1978	1979	1980
Disembarked Passengers	1	1,458	1,411	1,442	1,498
	2	1,838	1,813	2,040	2,494
	3	2,196	3,110	3,008	3,273
	4	<u>1,448</u>	<u>1,221</u>	<u>1,399</u>	<u>1,316</u>
ANNUAL TOTAL		<u>6,940</u>	<u>7,555</u>	<u>7,889</u>	<u>8,581</u>

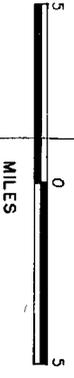
Source: Alaska Marine Highway, figures for embarking passengers are very similar

The popularity of the marine highway system has been rising rapidly, particularly during the summer tourist season, when many trips run at or near capacity. Capacity for vehicles is the primary limitation, as passenger capacity is usually available. The Southeastern Alaska Transportation Study recognized a number of problems with the system, including inadequate capacity, poor scheduling and lack of frequency as primary concerns. Residents of Wrangell cite similar problems with the service. With rapidly rising costs for air traffic and a limited highway system, the marine highway system will remain an important component of southeast Alaska's transportation system. The 1980 Southeastern Alaska Transportation Plan advocated "that regional demand for surface transportation between communities in Southeastern Alaska be met by improving services provided by the Alaska Marine Highway system. Recent public and community comment in response to a Preliminary Transportation Plan, presented in October 1978, identified a desire by area residents to improve the existing ferry system and to continue ferry service to the Seattle area particularly during the winter months."



Map 29 TRANSPORTATION

- Ferry and Tourship Route (also Primary small boat routes)
- Primary Small Boat Routes
- Secondary Ferry/Primary Small Boat Route
- ✕ Boat Harbor
- ✈ Wrangell Airport
- ✚ Seaplane Anchorage
- State Highway
- - - Primary Forest Service Road
- Proposed Forest Service Road
- Power Transmission Corridor
- ★ Powerhouse
- Possible Future Routes to Interior



SOURCE: US Forest Service, Alaska DOT/PF, and APA

The transportation plan proposes the following changes in summer service. "To optimize fleet capacity during the period of peak demand it is recommended that the entire mainline fleet be eventually scheduled and routed between Prince Rupert and Skagway during the summer months. The change in summer service is proposed to be phased over several years to provide time for modifications at the Prince Rupert terminal and allow ferry users time to adjust to the changes in service. Seattle service would then be phased back in the fall, emphasized in the winter, and phased out as demand builds in the spring."

The implications of these plans for Wrangell are uncertain. Since the proposed changes in schedule (such as deletion of Seattle service) are based on the increase in ferry travel from Prince Rupert north, it seems that the number of users of the system would not decrease. The loss of summer service to Seattle, however, could cause an inconvenience for local residents and, more significantly, to local trucking firms that use the ferry (Lynden Transport Inc., 1981).

Construction of a highway to the interior via Aaron Creek or the Stikine could substantially alter Wrangell's position by providing a new link to the continental highway system and an alternate southern terminus for the ferry system. The implications are uncertain, but are further examined in the discussion of regional highways.

A second major component of the marine transportation system are the cruise ships that stop at Wrangell. As no trips presently originate in Wrangell, nor are they likely to in the future, these trips do not provide a transportation service to residents. Rather, the tour traffic represents a major element of the tourist economy. Tour ship traffic to Wrangell has fluctuated in past years. Wrangell has not been established as a regular port of call for most larger cruise ships, at least to the extent that Ketchikan, Sitka, Juneau and Skagway have (see section on tourism and economy). Table 5 shows the number of calls by cruise ships in the last few years.

The city dock, designed for use by these cruise ships, was damaged by the "Princess Patricia" in 1980. It has since been repaired. Expansion of the new dock facilities and their convenient downtown location is expected to facilitate cruise ship use of Wrangell.

Most freight transportation to Wrangell is provided by barge service or by trucking firms using the Alaska Marine Highway. Foss Alaska Line provides weekly barge service from Seattle, Boyer Towing Company provides biweekly barge service from Seattle, and Etolin Transfer operates the "Island Trader" on a weekly schedule. The barge services use the barge dock and staging area located just north of city hall, while Etolin Transfer uses the old city dock. (Details on the barge facilities are found in the land use section under port and harbor facilities.) Lynden Transport, Inc. uses the Alaska Marine Highway system to transport trailers through Southeast, with an average of two trips north from Seattle and two south from Anchorage per week, and more service as demand warrants.

TABLE 5
Major Cruise Ship Calls at Wrangell

	1976	1977	1978	1979	1980*	1981+
Princess Patricia	16	16	19	12	18	22
Vera Cruz	18	2	17	12	0	
Renaissance	--	--	--	--	--	15
TOTAL	34	18	36	24	18	27

*1980 Cruise Ships used Ferry Dock

+Predicted

Source: City Dock Records - Wrangell City Hall

As previously mentioned, Wrangell harbor is a major center for the export of timber and timber products. Most ships that use the harbor are loaded with raw logs from native and private lands in the Wrangell area or processed timber from the ALP mill. About ten logging ships per year use the city dock, while ships loading timber from the mill use the downtown or Shoemaker Bay milldocks. Nearly all of these ships are bound for Japan or Korea.

The increase in timber cutting on native lands has increased the shipment of round logs through the city's port facilities, which could lead to conflicts between tour boats and freighters for use of the new city dock. The expansion of the dock to 680 feet is expected to help alleviate these conflicts. Overall figures for use of Wrangell harbor by larger vessels appear in Table 6.

Small boats are used for commercial and recreational activities. Some fifty commercial vessels use Wrangell as their home port, of which most are fishing boats. Wrangell has two small boat harbors - Wrangell harbor and the new harbor at Shoemaker Bay. Wrangell harbor provides berthing space for approximately 261 boats (1979 harbormaster records), well above the harbor's estimated capacity of 204 boats. The Shoemaker Bay harbor has space for about 257 boats. Figures on the sizes and numbers of vessels docked at Wrangell harbor are shown in Table 7. (Also see Harbor Facilities)

TABLE 6
Wrangell Harbor Traffic 1977-1980

	1977	1978	1979	1980
Scheduled Barges	70	74	72	36*
Unscheduled Barges	NA	1	1	1*
Freighters using city facilities	NA	6	3	2*
Freighters using mill dock	26	19	20	13*
Passenger Ships	18	36	24	18
Island Trader	46	43	46	21
Other		3	4	

*Through June 1980

Source: City Harbor Records - July 1980

TABLE 7
Size of Boats Docked at Wrangell Harbor and Shoemaker Bay
1979

	Wrangell Harbor	Shoemaker Bay
10-20 feet	98	41
21-30 feet	70	35
31-40 feet	55	17
41-50 feet	16	10
51-60 feet	7	6
over 60 feet	11	1
Unknown	<u>12</u>	<u>2</u>
TOTAL	261	110

Source: Harbormaster

AIR TRANSPORTATION

Wrangell has a modern airport with daily jet service, and is the base for two air charter services. Seaplanes use the float in the downtown Wrangell harbor. Air travel is the primary means of commercial travel to and from Wrangell.

The Wrangell airport, built in 1969, is owned and operated by DOTPF. At present, the airport has a six-thousand-foot-long east/west asphalt runway. In 1980, the runway was resurfaced to correct a hydroplaning problem that large jets such as Alaska Airlines B-727 had in even light rain. A major renovation of the surface is planned for 1981 or 1982, and is the only major project currently planned for the airport. The landing aids at the airport include runway lights, a rotating beacon, visual approach slope indicator lights on both approaches and runway end identifier lights (strobe lights). Radio aids to navigation include a nondirectional radio beacon and distance measuring equipment that enable instrument landings for ILS equipped aircraft when weather conditions are below visual minimums - conditions often found in Southeast Alaska. No new navigation or lighting systems are proposed by FAA at present. The paved apron at the airport is over one thousand feet long and four hundred feet wide. Facilities at the airport include a small Alaska Airlines terminal with attached air freight facility, four privately-owned hangers, a state fire station and a small aircraft parking area. Tie-downs must be provided by the aircraft owners. The nearest FAA Flight Service Stations, which provide weather briefings, traffic advisories and monitor flight plans, are at Ketchikan, Juneau and Sitka. The Southeastern Alaska Transportation Plan (June 1980) stated that an additional Flight Service Station is needed in the Wrangell/Petersburg area, particularly for small aircraft. The FAA's current plans, however, call for consolidation of these stations over the next decade (Robert Baldwin, personal communication).

Alaska Airlines provides jet passenger, freight and mail service twice daily. The flights include a northbound flight from Seattle and Ketchikan, continuing on to Petersburg, Sitka (seasonal) and Juneau, and a southbound flight from Juneau and Petersburg to Ketchikan and Seattle. Connecting service at Juneau links Wrangell to the remainder of Alaska (Fairbanks, Anchorage), and Seattle serves as a gateway to the Continental U.S. Table 8 shows a three-year summary of Alaska Airlines traffic.

Alaska Airlines recently requested a cutback in service, which would have eliminated weekend service to both Wrangell and Petersburg, but the Civil Aeronautics Board denied the request. Rapidly rising fuel costs, fewer passengers throughout the airline industry and the need for substantial subsidies to operate such routes prompted the request.

Deregulation of the airline industry has resulted in proposals by several Southeast Alaskan air taxi companies to consider scheduled air taxi service to Wrangell, particularly from Ketchikan. Charter services at Wrangell airport are operated by Stikine Air and Wrangell Air Service. Stikine Air operates a Cessna 185 amphibious aircraft and a

Cessna 207. Service is provided to lumber camps and sightseeing tours and charters to Petersburg, Ketchikan and elsewhere. Wrangell Air Service operates two Cessna 185 amphibious aircraft. This air service primarily caters to lumber camps in the area. Temsco Helicopters operates a charter and contract service out of Wrangell, Petersburg and Ketchikan, providing service to lumber camps, USFS and remote areas throughout the region.

TABLE 8
Passenger Traffic

Alaska Airlines	Qtr	1977	1978	1979	1980
Enplaned Passengers (departures)	1	1,594	1,914	1,499	
	2	2,153	2,164	2,470	
	3	2,907	2,681	3,027	
	4	<u>1,991</u>	<u>1,901</u>	<u>1,899</u>	
ANNUAL TOTAL		8,645	8,663	8,895	

Source: Alaska Airlines

There were a total of fifteen thousand flights to and from Wrangell airport in fiscal year 1979 (FAA figures). FAA's forecast predicts eighteen thousand aircraft movements in 1982 and twenty-eight thousand in 1991. No major capital improvements will be required to meet these projected increases in traffic.

U.S. Customs Service is available to aircraft landing at Wrangell. Ninety-nine percent of the people that use this service arrive on private aircraft entering the U.S. from Canada. Most of these flights from Canada are during July, August and September.

Prior to the state's construction of the Wrangell airport in 1969, floatplanes were a major mode of transportation to and from Wrangell. Floatplanes are still common in the Wrangell area, but they are primarily used for local flights to logging camps and recreational areas. The existing floatplane float is on Reliance dock in the Wrangell harbor. It is expected to be replaced by a larger facility during the spring of 1981. The plans for the new facility call for four transient tie-ups and three overnight berths at the same location as the existing float. The present float is used primarily by privately-owned aircraft or charters from Ketchikan and Petersburg. Stikine Air Service and Wrangell Air Service amphibious aircraft operate out of the Wrangell airport. Some traffic conflicts are reported between float planes and boat traffic in

the harbor, particularly when southeast winds create a bad chop on open water and aircraft actually land and take off in the harbor or harbor entrance.

WRANGELL ISLAND ROAD SYSTEM

The Wrangell Island road network includes city streets, 15.7 miles of state roads and numerous USFS logging roads, some of which are open to the public. DOTPF maintains the primary road network on Wrangell Island (see Table 9). All state highways are maintained year-round except Wrangell East Road, which does not receive winter maintenance.

TABLE 9
State Highway - Wrangell

Highway	Length	Paved
Zimovia	10.3 miles	6.0 miles
Church Street	0.6	0.6
Evergreen (North Wrangell)	1.1	0.0
Shoemaker	0.7	0.0
Airport (Bennett Street)	1.2	1.2
Wrangell East	<u>1.8</u>	<u>0.0</u>
TOTAL	15.7 miles	7.8 miles

Recent DOTPF projects in Wrangell included repaving of Church Street from the ferry dock to Zimovia Highway, addition of a sidewalk along Zimovia Highway south from Bennett Street, and expansion of the ferry dock parking area. Initial planning is underway for paving and widening Stikine and Evergreen Avenues north from the ferry terminal to the airport. The project will be designed this year and construction is expected during 1982. The paving of 4.4 miles of Zimovia Highway from the ALP mill to Pat Creek was proposed a few years ago, but federal highway monies to fund the project were not available. With the exception of these two stretches of highway, the state highway system is in good shape and adequate for the city's needs.

Most streets and roads maintained by the city are within the Wrangell townsite. The city recently began providing snow removal

service in the annexed area on dedicated right-of-way, with the exception of state maintained roads. The city also provides limited maintenance on the road to the reservoir.

A new road has been proposed to provide access to the blowdown area adjacent to the city reservoirs (Map 30), but construction has been delayed by USFS. The road will eventually be transferred to city ownership and will provide access to lands selected by the city from the state.

The City of Wrangell prepared a master street and drainage plan for the townsite area in June 1976. This plan divided streets into three categories - arterials, collectors and local streets - and suggested improvements and their costs. Arterial streets - Zimovia Highway and Bennett Street (airport road) - are the main thoroughfares through the city. Collectors are defined as the secondary road network, which provides circulation through the city and connections to the arterial network. Collector streets identified by the city are labeled on Map 30. All other city streets serve residential areas and are not intended for moving traffic through the city. An orderly system for defining street improvement priorities, including major maintenance, is needed.

The two worst problem areas in the city street networks are Case and Stikine Avenues. Case Avenue is narrow (ten to twenty feet wide) and unpaved, with considerable traffic and a mix of residential, commercial and harbor-related land uses. The avenue is dusty when dry, poorly drained in wet weather, and beset by serious encroachment problems into its narrow right-of-way. The city recently received \$1.2 million from the state to be used for paving Case Avenue from Front Street to Zimovia Highway near the power plant. A sidewalk will also be built along Case Avenue. Agreement has not been reached on whether or not the city should resolve the right-of-way problems first or proceed with paving and other improvements in the existing, insufficient right-of-way. Fire access and traffic are also problems on Case Avenue that the city council may attempt to alleviate by construction of a connection to the Zimovia Highway at Ash Street. This project heads the city's priority list for 1981 funding under the state local service roads and trails program.

Stikine Avenue would also be paved from the ferry terminal to Front Street as part of the state program. Stikine Avenue from Front Street (at the Stikine Inn) to the ferry dock is currently a narrow (ten foot right-of-way), dusty road with considerable vehicle and pedestrian traffic. The 1976 plan designates this narrow street as a local street, although it functions more as a collector street. It has been made into a one-way street in a northerly direction in an attempt to lessen traffic. Other priority street projects identified in the city's local service roads and trails list are an access road to the new cemetery at mile 1.7 Zimovia Highway, improvements on McKinnon Street, Episcopal Street and Church Street, paving of Zimovia Highway from mile 6.5 to Pat's Creek, with a bike trail and lighting at key locations, and paving of Evergreen Avenue from the ferry terminal to the airport.

Other transportation problems include congestion, parking and drainage on Peninsula Street, parking and congestion (especially pedestrians) on Shakes Street and lack of parking space in the Front Street area, although there are two public parking areas available to serve Front Street users. Sidewalks are needed in many areas of the townsite, particularly along Case Avenue. The boardwalk from Evergreen Avenue to the petroglyphs is in need of repair. Potential problems include increased auto traffic from the Wrangell townsite to the new ALP mill and the impact of the proposed Ash Street connection on Case Avenue traffic.

The remainder of the roads on Wrangell Island are either constructed by USFS or are logging roads built by timber contractors. The primary access roads into the forest also enable recreational use of the forest. Use of some sections of forest roads is restricted during times of heavy logging truck traffic or to protect the timber contractors' equipment. Primary forest access roads on Wrangell Island are the Pat Lake/Pat Creek road and the gradually expanding road system in the south Wrangell Island timber sale area. The Pat Lake road begins at Pat Creek on the Zimovia Highway and continues past the lake, up the valley, over a low divide, and down to recent timber cuts near Eastern Passage. This is the route proposed by DOTPF for a highway from Wrangell to the interior (see following section). This road provides access to state-selected lands along Eastern Passage.

The south Wrangell Island road network begins where the state maintenance of Zimovia Highway ends. This road continues along the shoreline (inland at least 250 feet) for about two miles, leaves the city limits, ascends through a drainage to a six hundred foot high divide and then enters a broad valley. A logging camp is located near where the road leaves the shore of Zimovia Strait, about two and a half miles from Pat Creek. There is a fork in the road about nine miles from Pat Creek. One fork curves through the mountains and then forks again into two dead end roads. One of the dead ends overlooks the Eastern Passage narrows and the other heads toward Fool's Inlet. The other main fork extends in the direction of Thoms Lake and splits into two short dead ends near Thoms Lake. USFS conducted considerable planning for extension of this road system and tentative plans call for a road within a half mile of Thoms Lake and almost to Thoms Place. These roads would eventually be linked to the road to Fool's Inlet, providing a thirty-four mile loop public road system. Total tentative plans call for an arterial road system of about fifty miles, with eventual access to Southeast Cove, Fool's Inlet, Eastern Passage and state-selected lands at both Thoms Lake and Thoms Place.

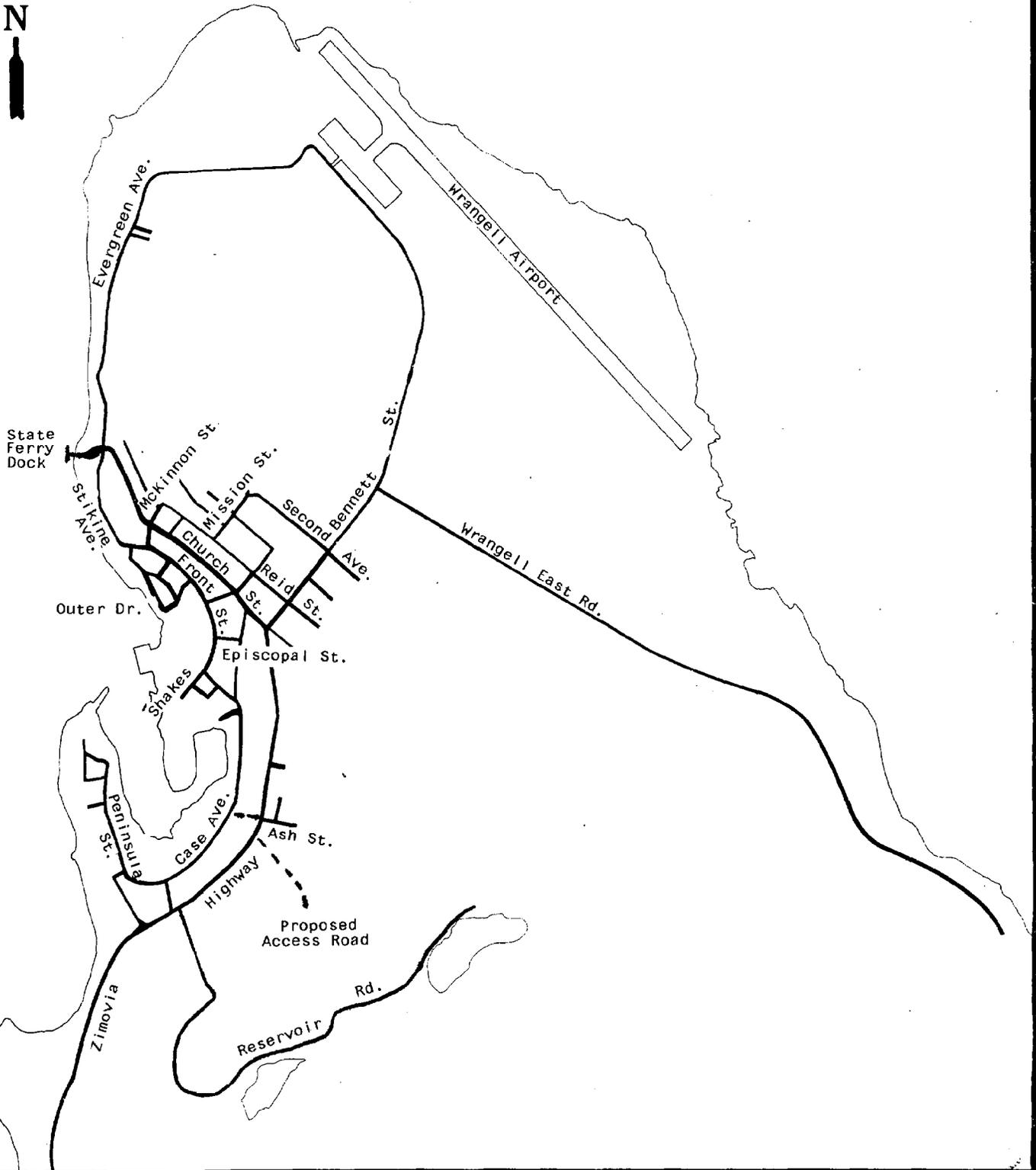
REGIONAL HIGHWAYS

With the exception of logging roads, there are no roads leading outside the Wrangell city limits, though surface transportation links (highways or railroads) to the interior of British Columbia have been considered for many years.

"December 11, 1930: Motor enthusiasts of Wrangell may one day find it convenient to drive their own car to Seattle and

1600 0 1600 feet

Map 30
WRANGELL ROAD SYSTEM
Arterial and Collector Streets Labeled



points south and east via the Stikine Highway, judging by the map received this week.... The map received by The Sentinel shows a projected road from Wrangell to Telegraph Creek via the Stikine River...Major Malcolm Elliott, of the Alaska Road Commission, predicts that in five years, or ten at the most, the States and Alaska will be connected by an automobile highway" (Wrangell Sentinel, "The Way We Were December 11, 1930," December 10, 1980).

A report to the U.S. Congress in 1961 advocated a highway link via the Stikine and Iskut Rivers (Transportation Requirements for the Growth of Northwest North America, Battelle Memorial Institute, 1961), and the 1968 Wrangell Comprehensive Development Plan predicted that such a highway would connect Wrangell with the continental highway system (Wrangell Comprehensive Development Plan, 1968). In 1974, the Alaska State Legislature commissioned a route feasibility study between Wrangell and the Canadian border. This preliminary study examined four alternatives and concluded that a route through the lower portion of Aaron Creek, then traversing east and up the west fork of the Katete River, is the shortest (forty-six miles) and least expensive route (\$32,880,000 for the Alaskan segment, 1974 dollars) (Route Feasibility Study, Wrangell to Canadian Border Project F93932, Alaska Department of Highways, 1974). Though it has been the preferred alternative for many years, this alternative also avoids the lower Stikine River altogether.

The use of the lower Stikine as a highway corridor has been subject to considerable debate by local, state and federal governments as well as by area residents. The Alaska Department of Commerce and Economic Development has suggested the Stikine River valley for a potential transportation corridor (road or railroad) and port, nominating it as an Area Meriting Special Attention within the Alaska coastal management program. Future use of the Stikine for overland transportation will be extremely limited or prohibited outright as a result of the area's designation as wilderness in the Alaska National Interests Lands Conservation Act signed into law in December 1980. In 1979, the Tongass Land Management Plan designated the area as wilderness and reported in its environmental impact statement that the option of a road up the Stikine was closed.

The Southeastern Alaska Transportation Study presented an opportunity for public discussion of the issue of a road to the interior. In A Preliminary Transportation Plan, released in October 1978, the idea of a Stikine Road was given considerable attention. The proposal called for construction of a two-lane paved road from Petersburg to the Cassiar Highway in British Columbia at an estimated cost of \$270.2 million. This included \$64.6 million for the Petersburg-to-Canadian-border segment, \$68.7 million for a forty-two mile Wrangell connection, and \$136.9 million for the Canadian segment. The plan also called for the termination of ferry service south of Prince Rupert as a result of increased land access to the marine highway system. Public meetings on this plan in Wrangell revealed very little support for a Stikine highway; people strongly favored construction of a highway via Aaron

Creek, as proposed in 1974. The Chamber of Commerce and Wrangell City Council have continued to support the Aaron Creek highway concept, but support from DOTPF has been minimal. The Southeastern Alaska Transportation Plan stated "General opposition surfaced to the development of new roads in the region with the exception of community support expressed by Wrangell residents and the city council of Wrangell. Wrangell supports a mid-region highway connection to Wrangell via a route traversing Aaron's Creek, the West Fork of the Katate River and the Iskut River valley in Canada" (DOTPF, 1980). DOTPF plans to update its 1974 cost estimates for the alternatives, but otherwise has not been actively involved in bringing a highway into reality (Andy Hughes, DOTPF, personal communication). In 1979, the commissioner of DOTPF reported that the highway "is a fairly low priority" (Bob Ward, quoted in Wrangell Sentinel, July 1979). Rather, DOTPF has directed efforts at improving the Alaska Marine Highway. Unless public support or legislative direction changes, active planning by DOTPF for a Stikine or Aaron's Creek highway is unlikely. The current state financial surplus could allow the state to consider construction of the highway, but a major problem remains in coordinating the state's plans with Canadian efforts.

The Province of British Columbia's Department of Transportation has only briefly addressed the Canadian segment of the Stikine-Iskut highway. In 1972, the province completed the construction of the Cassiar highway, which extends from Kitwanga on the Yellowhead Highway (Prince Rupert to Prince George) to Watson Lake on the Alaska Highway. A road from Wrangell could connect with this five hundred-mile-long, all-weather gravel highway, most likely near Bob Quinn or Echo Lake in British Columbia, over eighty-five miles from the U.S. border.

The Cassiar highway is linked by a thirty-nine mile long provincial highway to Stewart, a deepwater port in the province. British Columbia officials indicate that this highway system and port at Stewart provide sufficient access for present development and mining activity in the region; consequently, they could not justify expenditure of funds to construct their segment of the proposed highway from Wrangell. New mineral development or, more likely, major hydro projects on the Stikine or Iskut Rivers could increase the province's interest in the Stikine-Iskut highway (B.C. Highways, personal communication). Future planning and development efforts within the province should relate to an international planning effort as required in the Alaska Lands Bill.

Section 1113 of the recent Alaska lands act (Public Law 96-487), passed by the U.S. Congress in December 1980, requires that:

"within five years from the date of enactment of this Act, the President shall consult with the Government of Canada and shall submit a report to the Congress containing his findings and recommendations concerning the need, if any, to provide for such access in the Stikine River region. Such

report shall include, among other things, an analysis of the need for access and the social, environmental and economic impacts which may result from various forms of access including, but not limited to, a road along the Stikine and Iskut Rivers, or other alternative routes, should such access be permitted."

The outcome of this international dialogue will probably be a definitive decision on the need and route for any highway in the Stikine region to Wrangell.

Any other highways or roads off Wrangell Island do not have any impact on the coastal management study area. The only other state highway in the region is the Mitkof Highway on Mitkof Island, extending from Petersburg to Dry Strait. Unless a link is constructed with the proposed Stikine highway, any extension of this highway from Mitkof Island to the Stikine region or Wrangell is highly unlikely. The remainder of land transportation in the area is provided by logging roads, which link inland logging operations with coastal access points and which would not be integrated into any road system serving Wrangell.

OTHER TRANSPORTATION

There is no public transportation system in Wrangell, but there is a taxi service and a National Car rental office in town. A private bus company offers sightseeing tours of Wrangell and transportation to the Roadhouse Restaurant. School bus service is provided for children in outlying areas of the city.

Since Wrangell has never been directly connected to the continental highway system, the city was originally laid out for pedestrians, as evidenced by the core area of town. Many residents live within walking distance of schools, stores, churches, the ferry terminal and their place of work. Many workers at the old downtown ALP mill will be inconvenienced by the mill's consolidation at Shoemaker Bay. The addition of commuters on Zimovia Highway should not cause any significant traffic problems, but future land use planning should take into account the impact of such dispersed development on traffic patterns and existing land use patterns. The rapidly rising cost of fuel makes these considerations a matter of economic necessity. Another important pedestrian group to consider are tourists, particularly those from cruise ships, who for the most part can only visit sites and shops within walking distance of the city dock.

Most snowmobile use in Wrangell is for recreation. The city has designated certain side streets as snowmobile routes, and snowmobile use has been prohibited in downtown Wrangell and on state highways.

Zimovia Highway provides a smooth and scenic bicycle route south to Shoemaker Bay during good weather. Many rough city streets, such as Case Avenue, make for very poor bicycling routes.

UTILITIES

SEWAGE DISPOSAL

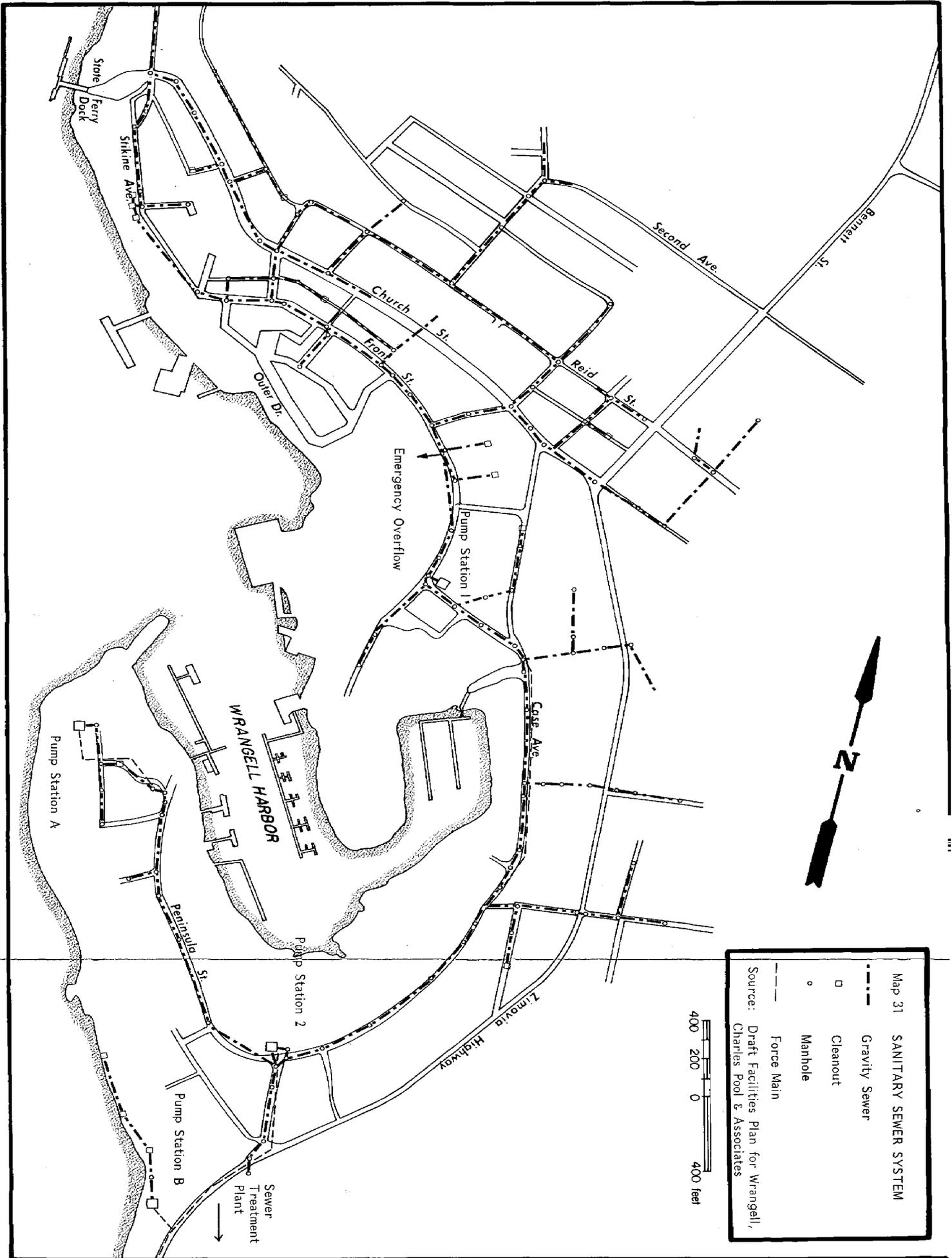
The city operates the recently constructed (1978) sewage collection and treatment system. Service is limited to the Wrangell townsite area (Map 31). As of May 1980, there were 615 connections on the system. Before construction of the current collection and treatment system, Wrangell's sewer lines collected wastes and discharged them directly into the water from seven separate outfalls.

The sewage treatment plant, originally designed to provide secondary wastewater treatment, will soon be modified to perform only partial primary treatment as a result of a July 1981 court order allowing such a change. The city council authorized the plant modifications at its July 28, 1981 meeting, which will reduce the treatment to screening of solid waste and periodic incineration of the waste. The ruling resulted from the city's opposition to what they considered unjust technical standards of "treatment for treatment's sake" imposed by EPA. Water quality will now be the determining factor as to the level to which wastewater should be treated. DEC will be responsible for monitoring water quality in Zimovia Strait, where sewage is discharged. The modifications could result in a twenty to thirty thousand dollar savings in the annual sewer utility budget and a two to four dollar savings on monthly residential bills.

The sewage plant is located on the upland side of the Zimovia Highway near Cemetery Point. The effluent is discharged via a submerged diffuser in the deep water of Zimovia Strait. The plant is designed to be able to treat the sewage generated by thirty-five hundred people.

The sewer system underwent a thorough examination in 1980. Various methods were employed for finding leaks or other problems in the system, including smoke testing, television testing (cameras were run through the lines to give engineers a look at the system) and other field studies. The Facilities Plan for Wastewater Collection System Rehabilitation (Charles Pool and Associates, Inc., 1980) details the results of this analysis and provides recommendations for alleviating problems. Significant infiltration and inflow of water into the sewer system was detected; an assortment of roof drains, leaking manholes, abandoned service connections and defective mains leak water into the sewer lines. The report notes that the lines "in the poorest structural condition are those beneath Second, McKinnon and Church streets, Mission Street between Reid and First, St. Michael Street above Church Street, Weber Avenue and Grief Street. The old Case Avenue line is badly settled, causing accumulation of sediments and reduced flow capacity."

The recommended rehabilitation program would reduce inflow of water into the system by about eighty percent and would cost approximately \$225,000 to accomplish. The city's share of the federally-funded project would be about \$31,000. The rehabilitation would primarily entail grouting, repairing and, in some instances, replacing leaking



Map 31 SANITARY SEWER SYSTEM

- Gravity Sewer
- Cleanout
- Manhole
- Force Main

Source: Draft Facilities Plan for Wrangell, Charles Pool & Associates



sewer mains. Some of the work could be performed by city crews. Since the city is no longer processing wastes, however, there is less need for dealing with the infiltration problem.

Sewage disposal outside of the townsite is accomplished by small package treatment plants (at the old Wrangell Institute), septic tanks with sand filters, or by illegal direct outfall to salt water. Due to poor soil drainages and shallow bedrock, lot sizes in unsewered areas should generally be about twenty thousand square feet in size. DEC field representatives are not aware of any problems with leechates from on-site sewage disposal systems creating pollution problems. Care should be taken not to drill wells in areas downslope from septic tanks or in the vicinity of fissures in the bedrock that could result in contamination of surface and ground water. State regulations require that on-site sewage systems be located one hundred feet from surface water and private wells.

The city recently commissioned a feasibility study for extension of a sewer line along Stikine and Evergreen Avenues from the ferry dock to Stough's Trailer Park. This project could be constructed in conjunction with the state's plans to pave the road. The city also intends to have the sewer and water lines extended to serve a few lots on the downtown dock fill and a sewer extended on Shakes Street from Harbor Seafoods to the end of the street. Wood stave water mains on Shakes Street would also be replaced. Map 32 shows the basins that could be served by gravity systems.

WATER

Wrangell's water supply is obtained from two reservoirs situated in a basin in the mountains immediately south of the townsite. Water is transported from the reservoirs through a ten-inch line to the chlorination facilities and then to the distribution system serving the entire townsite. Map 32 shows the water system service area, the limit of a gravity feed system and other aspects of the water and sewage systems.

Several years ago, the City of Wrangell successfully applied for both a grant and loan from the Farmers Home Administration. With these funds, the dam at reservoir #1 was replaced, the dam at reservoir #2 was upgraded, a new 10-inch water main leading from the reservoirs was installed and a 180,000 gallon storage tank was added. These improvements sufficiently increased the capacity of the reservoirs to carry the city through a minimum of sixty days of dry or freezing weather, almost three times the pre-improvement level. Water lines have also been greatly extended to cover the main core, commercial and residential districts.

Although these improvements have vastly improved the water supply, the distribution system remains in need of a thorough overhaul. Wood stave pipes make up a part of the distribution system, many of which are in very poor condition. Line failures and leaks have often caused the loss of production days in the city's industries. The weakness of the city's distribution system was especially noticeable during

the construction phase of the improvements to the reservoirs and storage facilities when, on several occasions, variations in the water pressure caused the lines to burst. Because there is inadequate cover over the wood stave pipes in several areas of the city, freezing spells can cause additional hardships.

The city's major industries, particularly the seafood processing plants, are heavy users of water and, because the community's continued prosperity is heavily dependent on the efficient operation of its industries, the upgrading of those portions of the distribution system which serve industrial and commercial users must take top priority (Wrangell OEDP, 1978).

Constructing a third dam between the existing reservoirs to increase water supplies has been considered to increase storage capacity. Additional water supplies for human consumption might possibly be secured from a creek near the Wrangell Institute, four miles south of the city. In the event that Wrangell needs more water, an abundant supply of high quality water is available from Virginia Lake, eight miles from the city across the Eastern Passage. Pat's Lake, eight miles south of the city, is not considered a suitable reservoir, as the topography does not permit development of the large storage reservoir necessary for sustaining an adequate rate of supply. There has been no extensive study to determine the availability of an adequate supply of water from large wells, as the area is underlain by rock. It is estimated that wells would be expensive to drill and generally not very productive (Comprehensive Sewerage Report, 1972).

The water supply system from the sewage treatment plant south beyond Bakkes apartments on the Zimovia Highway was destroyed during the 1980 mudslide. About seventeen families in the area presently use surface water or water hauled in by a city tank truck. The city is considering the possibility of extending city water service to these residents. If city water lines are not extended, a local water system will be constructed.

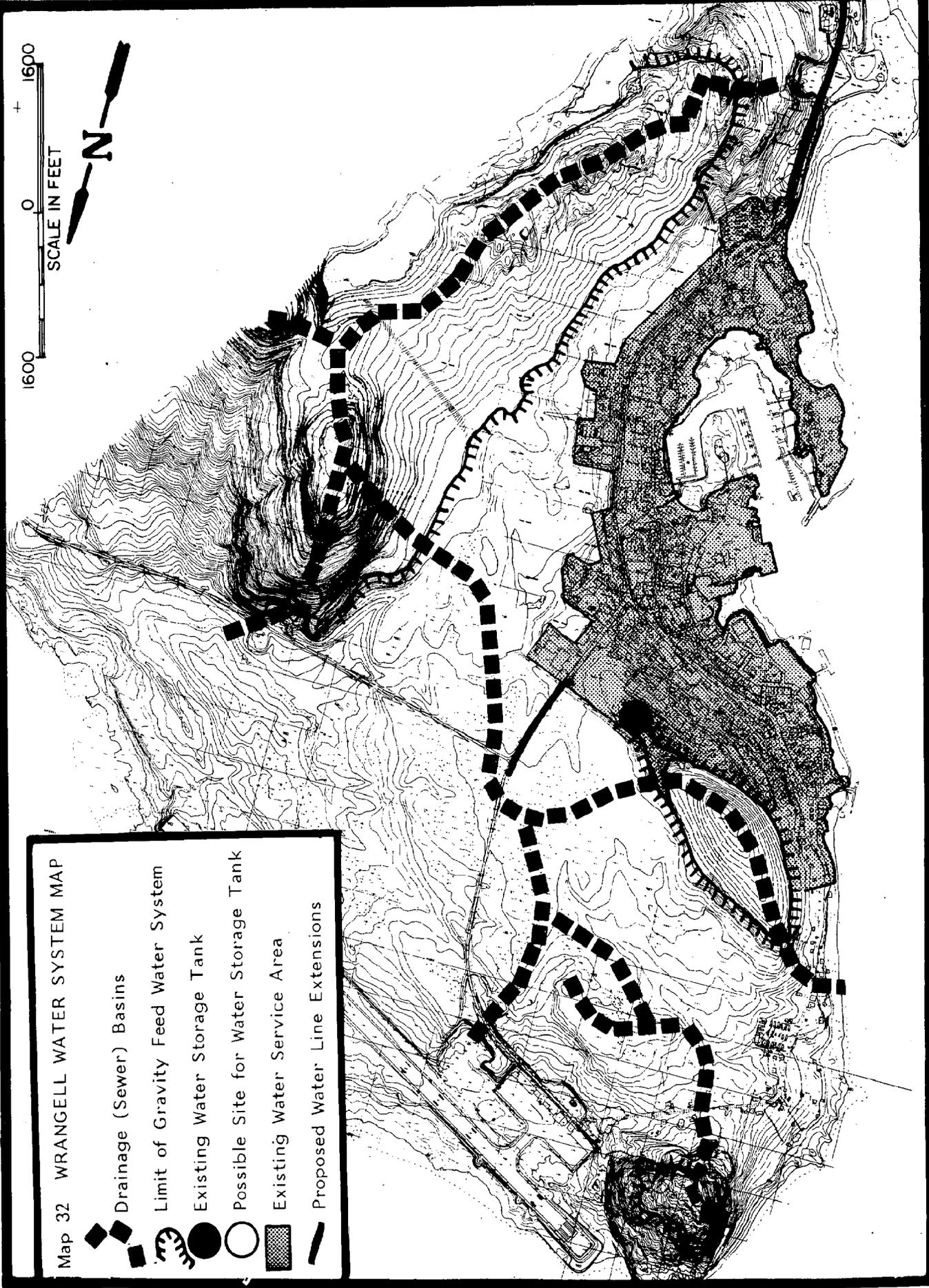
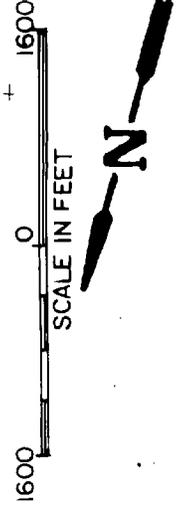
Outside the Wrangell townsite, water for domestic use is obtained from surface water (small impoundments and streams), wells and rain-water collection systems. The surface streams are considered by the DEC to be unfit for human consumption unless they are treated, which they are not. The wells scattered north and south of town provide reasonably good sources of water. An impoundment in the Shoemaker Bay watershed supplies water for the ALP sawmill site and some domestic use (see section on hydrology).

SOLID WASTE

The Wrangell landfill is situated on the northern tip of Wrangell Island (Point Highfield) on city-owned land. It has been operating at this location for over twenty years and is contained in a small, discrete drainage. Contamination of minor surface drainage is possible and should be avoided. Shallow bedrock appears to preclude the contamination of groundwater (the presence of groundwater in bedrock fissures

Map 32 WRANGELL WATER SYSTEM MAP

-  Drainage (Sewer) Basins
-  Limit of Gravity Feed Water System
-  Existing Water Storage Tank
-  Possible Site for Water Storage Tank
-  Existing Water Service Area
-  Proposed Water Line Extensions



is unknown). Solid waste collection is provided by the city and is financed by user fees and the city's general fund.

The landfill site is small and, in order to reduce the solid waste volume, open burning is practiced. This is of concern because this type of burning is usually not hot enough to efficiently destroy waste. Whenever possible, major burning should occur on breezy or windy days to disperse the smoke.

Due to a lack of available soil to cover the refuse, numerous birds linger about the site. Since the landfill is near the airport runway, constructed in 1969, the FAA indicated that the birds constitute a hazard that must be alleviated. At present (1980), the attendant at the site attempts to discourage the birds from frequenting the site by using noise makers and occasionally firearms as part of an FAA-approved program.

As of January 1981, the city is cooperating with DEC to find a solution to the solid waste disposal problem at a reasonable cost to the community. The possibility of an enclosed incineration device is being investigated. While the use of an incinerator would be relatively expensive, it would greatly lengthen the useful life of the site by reducing the volume of burn residue that must be disposed of.

ENERGY

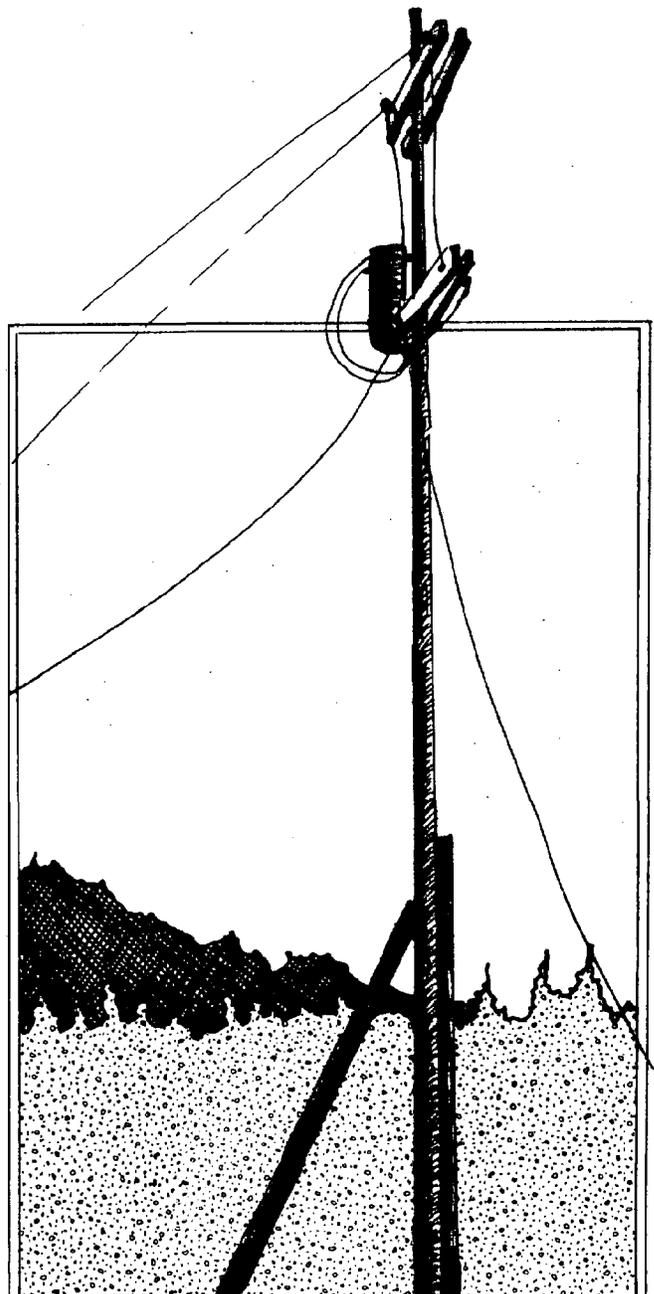
The City of Wrangell manages the Wrangell Electric Utility, which provides electrical power for the study area. The utility operates a series of diesel generators with an installed capacity of 7,825 kilowatts. ALP operates a steam generator fueled by sawdust and wood waste and has sold from three to sixty-seven thousand kilowatt hours per month to the city. This excess power is generally generated at night, when there is little electrical use at the mill. During the day, ALP relies on city power to meet its needs. This system serves the townsite and all other development on the road system.

The peak power demand on system capacity was three thousand kilowatts in January 1978 (Klein and Jaybusch). Wrangell was estimated to have an energy demand of 14,800 million watt-hours in 1980 (Rutherford Associates). ALP is the utility's largest customer; when the new ALP facility at Shoemaker Bay is opened it will require more electrical power than the downtown plant utilized (about 780 kilowatts). The Wrangell city council recently approved an agreement whereby ALP will purchase a minimum of 2.6 million kilowatts of power over a two and a half year period. In return, the city will add a transformer at the power plant and modify an existing transmission line to the new ALP site. The estimated cost of \$27,000 to \$30,000 to the electric utility will be offset by the purchase of energy by ALP or pro-rated reimbursements from ALP if they fail to purchase the agreed upon minimum.

The cost of diesel fuel has greatly increased in recent years and will continue to do so. The cities of Wrangell and Petersburg formed the Thomas Bay Power Commission in an attempt to provide relatively

low-cost hydroelectric power for their communities. In conjunction with APA and consultants, the commission is in the process of performing the engineering, economic and environmental studies that are a prerequisite to the construction of a proposed thirty megawatt hydroelectric generating facility. This facility would be located at Tye Lake, about forty miles southeast of Wrangell on the mainland just south of Bradfield Canal. As proposed, Tye Lake would be tapped at the 1,330 foot level by a forty-eight hundred foot tunnel which extends to the 1300 foot elevation. A 2,050 foot penstock would then convey lake water to the underground powerhouse near the mouth of Tye Creek. This ten-foot diameter, eighty-seven foot long conduit would supply an average thirteen hundred foot hydraulic head for the Pelton (impulse type) impellers of the generator sets. Phase one of this project envisions two ten-megawatt turbo-generator sets in the powerhouse, with provisions for the emplacement of a third, ten megawatt turbo-generator in phase two. The two generators of phase one would provide about 8.9 million watts of firm capacity for distribution to Wrangell and Petersburg. The addition of another ten megawatt generator in the second phase is not expected to increase the firm capacity level of phase one, but rather to provide additional peaking capacity. Tye power would be distributed through a 115 kilovolt transmission line stretching eighty-one miles north to Petersburg and Wrangell (Rutherford Associates). Feasibility studies are examining the possibility of additional links into this power system; a tie-in from Petersburg to Kake is seriously being considered as an outlet for surplus power. A "southeastern energy grid" linking the Tye power supply with the Swan Lake hydro-power project of Ketchikan and the Snettisham Dam of Juneau has also been proposed by the APA.

The Tye project has received its license and thus permission to proceed for phase one of the project in the fall of 1981. Construction will proceed immediately and on-line power production is predicted to start in late 1983 (APA). Phase two will proceed when additional power is needed, if funding is available; it is assumed that this will occur around the turn of the century.



The Tyee power project will allow Wrangell to enjoy a stable and relatively inexpensive energy supply that should meet community power demands well into the next century. This will save about two million barrels of oil that would otherwise be used for power operation. Relatively inexpensive electricity could encourage the growth of such energy-intensive activities as timber products processing, ore refining and seafood processing. Unfortunately, hydroelectric power projects have very high front-end costs and are designed to fill energy demand levels that often take decades to reach. This may result in high utility rates when the project first goes on line; a "worst case" scenario envisions a thirty-one cent per kilowatt-hour base rate in Wrangell in the first years of Tyee power deliveries, based on eleven percent interest. There are several possibilities for reducing high rates during the first few years of operation; the state may intervene and provide financing arrangements that would reduce initial consumer rates to between fourteen and twenty-one cents per kilowatt-hour - these would decline to between 9.4 and 13 cents per kilowatt-hour in 1995 (without adjustments for inflation). If Kake is brought into the Tyee grid, it might drop initial power costs to Wrangell consumers by three cents per kilowatt-hour. The Tyee hydropower project is a very bright prospect in Wrangell's future.

COMMUNICATIONS

Telephone service for the Wrangell area is provided by General Telephone Company of Alaska and there are approximately eight hundred subscribers. Long distance calls are routed through Alascom microwave link to Juneau. Local telephone service is of good quality, but residents often experience difficulties with long distance calls.

Public radio station KSTK offers FM radio programming and broadcasts from the state satellite television network. Present broadcast facilities provide fair to good television reception in the immediate Wrangell vicinity, but reception is poor in outlying areas and cable hookups are necessary. KSTK is planning to build a new facility on Cemetery Point that should be a great improvement on the present broadcast range. Wrangell is additionally served by commercial cable television station WPTV, an Alaska cablevision station that offers a variety of programming packages to over 550 subscribers in the Wrangell area. A new AM station operated by Central Alaskan Missions is expected to open in late 1981. The five thousand watt station located in Petersburg is expected to reach Wrangell and area logging camps.

The Wrangell Sentinel, the oldest continuously published newspaper in the state, provides excellent weekly newspaper service to the community.

Wrangell has a first class U.S. post office; delivery of mail is by post office box or general delivery. Mail delivery is often quite slow and some mail reportedly fails to reach its destination.

COMMUNITY FACILITIES AND SERVICES

SCHOOLS

Wrangell public schools consist of four school buildings located at two sites. A five-member school board oversees the operation. Wrangell also has an adult basic education program supported by the Southeast Regional Resources Center in Juneau. The Wrangell branch of Sitka Community College, part of the University of Alaska, began offering courses in 1981. The community college hopes to establish courses through a Petersburg and Wrangell outreach program, using local persons to teach some courses. A Christian school sponsored by the local Seventh-Day Adventist Church will start in the fall of 1981 on an experimental basis. Students ranging from first to sixth grade will participate in basic and Christian studies based on correspondence materials from the church's accredited home study program.

School enrollments showed a steady decline in recent years (Table 10), although slight increases are anticipated in the next few years due to many younger children in the city. The school superintendent estimates a total enrollment between 550 and 570 in the next five to ten years if economic conditions do not change substantially (Bob McConnel, personal communication).

The elementary school is located in two structures on Bennett Street next to the hospital. Grades K-3 are housed in a prefabricated structure constructed in 1968 as a temporary facility that will be remodeled based upon the recommendations of state and local studies. The new intermediate grades building (recently named Evergreen School) houses grades 4-6 in eight classrooms and was completed during the summer of 1980. There is a city-owned recreation area dedicated for public use behind this school complex. It consists of a ballfield with a gravel surface, both the city council and the school administration have expressed a desire to improve this recreation area by adding a track and grassy playing surface.

The junior and senior high schools are both located on Church Street on a hillside site overlooking the downtown area. The new junior high, grades 7-8, was completed in 1980 and includes three classrooms, a multipurpose room, business education, home economics and science labs. The senior high school is an old building constructed in 1933. It has high maintenance costs and is in need of major renovation or replacement. The old school complex includes the only gym in the city - a facility considered too small for the high school and totally inadequate for use by the community for indoor recreation. A temporary addition on the front of the school, which served as an annex, has been vacated by the school and turned over to the city for other use. A new industrial arts shop for the high school was constructed as part of the junior high school construction project; it has facilities for welding, mechanics and woodworking. The junior/senior high schools are staffed by fifteen teachers and a guidance counselor. Construction of the new intermediate and junior high schools cost \$4.75 million, funded by a \$3 million state grant, \$1.5 million in City of Wrangell bonds and an additional \$250,000 from the state for construction short-fall.

TABLE 10
School Enrollment Figures

Year	Kindergarten	Elementary	Jr. High	Sr. High	Total
1980-81	38	260	76	140	514
1979-81	43	242	75	147	507
1978-79	41	232	75	162	510
1977-78	46	254	81	153	534

Source: Wrangell School District

The school board has established three priorities for further capital improvements projects. The first priority is construction of a new elementary school, for which the school board has received a \$1.5 million grant from the state. The school district is presently working to get cost estimates and seek any additional funding needed. Renovation and expansion of the high school recreation facilities are next on the district's construction priorities. Among the items considered are improving the gym and building a swimming pool. Repair or replacement of the old high school building is third on the list of priorities as funding becomes available.

In the past, major component of Wrangell's educational system was the Wrangell Institute, located on Shoemaker Bay and operated by the BIA as a native boarding school. The school, which was established in 1932 and once had over 250 students, was permanently closed in 1975 in response to a shift in state and federal policies for native and rural Alaskan education. The facility was transferred from the Department of Interior to a native corporation, Cook Inlet Region, Inc., as part of the Alaska Native Claims Settlement Act of 1971. Future plans for the buildings and site are undetermined.

MEDICAL SERVICES

Most medical service in Wrangell is provided through the Wrangell General Hospital located on the Bennett (airport) Street. The new hospital was opened in 1968 and a long-term care unit was added in 1976. Present facilities include twenty-three beds in the hospital, a fourteen-bed long-term care unit and a nine-bed intensive care unit.

The hospital serves residents of Wrangell and a number of local logging camps. This service area population is estimated at thirty-five hundred people. The emergency room handles between fifty and one hundred patients during an average month. The hospital representative indicates adequate patient care space for present demands; a study of the long-term needs of the facility is currently underway and major facility expansion is being considered. Service and storage space is an immediate problem that the hospital is trying to solve. Current plans are to construct a storage shed behind the existing structure, eventually constructing a service and storage addition to the hospital.

There are two doctors in Wrangell, one general practitioner and a surgeon. Both have offices at the hospital and one is always on call. The one dentist in Wrangell is also on the hospital staff. The hospital is staffed by thirty-eight persons (excluding the doctors), including eight registered nurses and two licensed practical nurses. A PHS nurse in Wrangell functions independently and provides such service as home visits.

Emergency transportation to the hospital is normally provided by the Wrangell fire department ambulance. Emergency transportation from logging camps is by airplane or helicopter to the Wrangell airport, then by ambulance to the hospital. Persons requiring a specialist are flown to Juneau or Ketchikan. Patients requiring treatment for such things as severe head injuries and operations are flown to Seattle by scheduled or charter flights.

Mental health services are provided through the Gateway Mental Health Center, which operates out of city-provided space at the hospital. The center is staffed by a full-time psychiatric social worker and provides individual and family therapy, crisis intervention and referral services. The center also conducts psychological testing and evaluations for the schools, court, alcohol center and other agencies. It is funded by state and local funds, including a substantial city contribution.

The Wrangell Alcohol Information and Referral Center on Front Street provides counseling, referral and emergency services. The center is funded primarily by the state and by donations.

A nine-member Wrangell health planning board studies community health needs and sets priorities for community education and health services. Study areas include child nutrition, local accident occurrences and their prevention and the support of single parents and new mothers adjusting to their roles. The group is also responsible for expanding cardio-pulmonary resuscitation (CPR) education in the community.

LIBRARY

The public library is owned and operated by the City of Wrangell with support from the Wrangell Women's Civic Club and the local library

board. It was built in 1975 and contains over twenty-six thousand volumes, including an Alaska section with various reference works on Alaskan history, culture and landscape. It is open to the public seven days a week, with one full-time and one part-time employee.

MUSEUM

Originally serving as Wrangell's first schoolhouse, the old wood frame building that houses the museum is listed on the National Register of Historic Places. The building is owned by the city, but is operated by the Wrangell Historical Society, whose members work at the museum on a volunteer basis. The society is currently involved in seeking state funds to aid in the maintenance of the building and the preservation of artifacts. The old building is presently lacking adequate fire security, causing some hesitation on the part of the residents to loan or donate items of historic significance.

SENIOR CITIZEN CENTER

Administered by the Southeast Nutrition Program for the Elderly, the Senior Citizen Center, located at the Civic Center on Church Street, provides valuable services to Wrangell's senior citizens, including a transportation program and free lunches three days a week. There were two previous senior citizens programs - the senior citizen center operated by the city and the federally funded senior citizen nutrition program. The programs have recently been combined and are now federally funded. The city is no longer directly connected to the program, although it does make an annual contribution to it.

CITY HALL

The city's administrative offices and city council chambers are contained in the city hall building. The building was constructed at the corner of Lynch and Brueger Streets in 1972.

FIRE DEPARTMENT

Fire protection is provided by a volunteer fire department that is housed downtown in the business district. While the fire trucks are relatively old (1963, 1967 and 1969), they are adequate. Department representatives note that a fire hall with two additional bays is needed, but an alternative might be to build a substation in the Shoemaker Bay area. Water supply and pressure (fire flow) is generally adequate to meet fire fighting needs.

Emergency services are provided through a separate organization involving many of the same people providing fire protection. Services include search and rescue and an ambulance service.

POLICE DEPARTMENT

The police department consists of seven officers, including the chief, and one support person. The officer/citizen ratio is relatively low. Depending on whether one uses the city's estimated population of 3,325 people or the 1980 census figures of 2,174, the ratios derived are 2.1 and 3.2 officers per thousand persons, respectively.

Similar communities in the state (Haines, Homer, Nome and Petersburg) average about 2.9 officers per thousand citizens. Wrangell citizens, however, consider the police protection good. It was rated satisfactory to excellent by people participating in the Wrangell public opinion questionnaire. Equipment is generally in good condition.

EMPLOYMENT SERVICES

Limited state employment services will soon be offered in Wrangell as the result of a \$32,300 legislative appropriation for an employment specialist. The specialist will work out of the Petersburg employment security office and will visit Wrangell and Kake twice a year. Plans for the service include posting state job openings on a designated bulletin board, along with information on how to apply for these jobs. The listing would be updated as often as possible. The bulletin board will be located in one of the state offices in Wrangell.

CITY GARAGE AND STORAGE BARN

In addition to serving as a garage, this facility, as well as the storage barn, is used for storage.

REFUSE DISPOSAL

The city has provided refuse collection services since 1966. In 1981, the city purchased a new truck for collection.

COMMUNITY FINANCE

Table 11 summarizes the municipal budget of general fund expenditures and revenues for fiscal year 1980-1981. The city anticipates a per capita expenditure of \$427 to \$669 (ranges in per capita figures are due to a variance in U.S. Census and city government population estimate). Police protection is the largest single budgeted expenditure, at \$335,520. City administration (\$233,426) and community development (\$182,552) are the other largest line items of the budget; these three categories represent about fifty-two percent of the total anticipated expenditures. Of the several sources of city funding, local taxes contribute the most revenue. Real and personal property taxes are estimated to contribute thirty-four percent (\$595,157) of anticipated rev-

TABLE 11
Wrangell Municipal Budget
Fiscal Year 1980-81

Classification	1980-81 Approved Budget
Funds available July 1	\$ 413,440
<u>General Fund Revenue</u>	
General Taxes	771,957
Licenses & Permits	1,885
Revenue from State & Federal	260,985
Payment in lieu of Taxes	15,412
Federal Revenue Sharing	118,868
Charges for Services	104,445
Fines and Forfeitures	7,700
Sales and Leases	<u>72,250</u>
TOTAL REVENUE	\$1,766,942
<u>General Fund Appropriations</u>	
Administration & Council	\$ 233,426
Finance	126,486
Fire	55,811
Police	335,520
Security & Animal Control	-0-
Garage	8,960
Public Works	109,587
Streets & General Maintenance	134,299
Sanitation	77,480
Library	41,027
Senior Citizens	-0-
Community Development	182,552
Zoning & Planning	21,150
Recreation	33,090
Capitol Expenditures	94,868
	<u>\$1,454,256</u>
Appropriated Reserve	<u>312,686</u>
FINAL APPROPRIATIONS	\$1,766,942

venues for fiscal year 1980-81. Wrangell has a graduated, four-class property tax levy (tax differential zones); each tax class is dependant on the level of city services provided to the subscriber, with a base rate of 12.9 mills. Sales taxes are levied at five percent. They are estimated to accumulate to about \$270,000 and provide fifteen percent of general fund revenues for fiscal year 1980. Federal (\$118,868) and state (\$215,383) revenue sharing transfers are anticipated to provide about nineteen percent of city income in fiscal year 1980. The figures shown in Table 12 indicate a steady increase in public expenditures. The 1980 budget estimate indicates an approximate thirty percent increase in fiscal spending over the 1978 and 1979 levels.

TABLE 12
Public Expenditures

Year	Amount	% Change from Previous Year
1975	\$ 595,126	
1976	652,600	+ 9.6
1977	862,818	+32.2
1978	1,351,644	+56.6
1979	1,349,821	- 0.2

The assessed value of all real and personal property within the city of Wrangell was \$49,575,729 as of January 1, 1980, or \$14,900 to \$22,780 per capita. As of June 30, 1980, Wrangell has a general bonded indebtedness of \$2,689,000, or 5.4 percent of assessed value. Wrangell is forbidden by its city charter to incur bonded indebtedness in excess of twenty-five percent of the city's assessed value, which would be \$11,178,681.

RECREATION

REGIONAL RECREATION

South Wrangell Island is managed by the USFS both as a timber area and as an area for dispersed recreation. The transportation network on the south end of the island has been designed with the needs of recreationists in mind. Primary recreational uses of this area are hunting, hiking, cross-country skiing, snowmobiling and sight-seeing. Pat Lake is also used for ice skating, and development of a winter sports lodge has been considered for this site. Both Thoms Lake and Thoms Place are recognized by the state as important recreation areas and have been selected by the state from the USFS. Dispersed recreation such as hiking, camping, hunting and fishing will remain as

the primary uses of these areas; road construction in the area will facilitate access and increase use of the area. More details on hunting and fishing is provided in the wildlife section of the natural resources chapter.

Most Wrangell residents own boats, and water travel for recreation access is more common than overland travel. Residents consider the Stikine River their playground, although areas such as Thoms Place, Anan Creek, Bradfield Canal and numerous other islands, bays and streams are also frequented. Except for a few USFS cabins, there are no recreational facilities and recreational use is very dispersed. The plans for the Tye Lake hydroelectric plant call for development of a shelter and a few picnic tables at the powerhouse on Bradfield Canal and no facilities on Tye Lake itself. The powerline corridor across Wrangell Island would provide a corridor for snowmobiles or cross-country skiers.

The Stikine River-LeConte Glacier management area is a recreation area for residents of Wrangell and Petersburg and attracts a number of visitors for hunting, fishing and boating. The Stikine River itself is navigable some 125 miles to Telegraph Creek, British Columbia, with powerboats providing the primary access to the river. Canoeists and kayakers occasionally float the river from Canada, terminating their trips at Wrangell. Recreation cabins - thirteen in the lower Stikine area - are managed by the Tongass National Forest and receive heavy use due to good hunting and fishing. The spectacular scenery of the area is an attraction in itself. Hot springs on the river are used by bathers - most notably the Chief Shakes Hot Spring, where a small shelter and tubs are provided. The USFS is planning to build two fully enclosed bath houses at the site in 1981.

LeConte Glacier, about twenty-five miles north of Wrangell, is a popular attraction for visitors, though access is limited to charter sightseeing flights over the area or boat rides into LeConte Bay, usually from Petersburg. Goat hunting is good on the Horn Cliffs and Wilkes Range overlooking LeConte Bay.

Garnet Ledge, on the mainland at the base of Wrangell Peak, is a rock outcropping imbedded with garnets. It was deeded to the children of Wrangell and the Boy Scouts, and local children chip garnets from the ledge and sell them to visitors passing through Wrangell.

LOCAL RECREATION

In addition to varied recreation opportunities in the surrounding area, Wrangell residents enjoy recreational activities close to home. These include softball, fishing, swimming, berry picking, shooting at the rifle range, snowmobiling and cross-country skiing.

In the Wrangell area, as in most other Alaskan communities, not only must local recreation demands be satisfied, but those of tourists must also be considered. To some extent the same facilities can serve both groups; special recreational facilities must be provided for different

age groups. Another factor that must be taken into consideration when planning for recreation facilities throughout Southeast Alaska is the heavy year-round precipitation characteristics of this region. Wrangell averages .1 inches of precipitation on almost half of the days of the year and this, coupled with the fact that the ground is covered with snow during the winter months, makes the provision of covered play spaces and indoor recreation places as essential as the more conventional outdoor recreation areas.

Compared with most other Alaskan communities of a similar size, Wrangell has already gone a long way toward providing a comprehensive range of recreation equipment for toddlers; a paved, fenced playground with basketball hoops for the older children; a covered play area at the main school site; the high school gymnasium; a playground with slides, swings, etc., located at the elementary school site; and the Little League/softball field located between the city tourist park and Cemetery Beach. In addition, the Park and Recreation Board has developed a comprehensive summer activities program for ages four through adult. Included in this program is a portable size swimming pool that is used for instruction in water safety as well as beginning swimming for pre-teenage children.

Facilities for adults include the school gymnasium, which is used by the city basketball league, men's volleyball and women's recreation groups; bowling lanes at the Elk's Club; softball field; snowmobile trails and cross-country ski paths during winter months; and dining and dancing space at the local clubs.

For family recreation, the city tourist park and the state campground at Pat's Creek (at the southern end of Zimovia Highway), as well as several local beaches, are favorite picnicking spots. In addition, ice skating is offered at the Pat's Creek campground during the winter months and is a popular activity with all age groups. The campgrounds serve tourists and camper spaces have been provided for this purpose. New camper facilities are proposed near the Shoemaker Bay boat harbor.

Another recreational area was recently created by filling an area of muskeg to provide space for a much-needed second baseball field. Located behind the hospital just off the airport road, this field facilitates the development of a senior league baseball program, expansion of the men's and women's softball leagues and is a place the school can use for track and field instruction.

Another recently-constructed recreational facility is the shooting range. The range is to be made by clearing an area in the muskeg and filling it with sawdust to provide a road, parking and shooting area.

Wrangell offers a wide variety of unusual attractions for tourists. Shakes Island, with its restored communal house and totem poles, provides a vivid reminder of the Wrangell area's romantic past. When the tourships call at Wrangell, the communal house is opened up and passengers are treated to a display of traditional Tlingit entertainment. The petroglyphs located on the beach area north of the ferry terminal are another unusual feature of Wrangell (Wrangell OEDP, 1978).

Several types of recreational facilities have been proposed by the Wrangell Parks and Recreation Board to supplement the community's recreational opportunities. These recreational facilities were listed in the Wrangell Public Opinion Questionnaire to determine which facilities the respondents thought were most important to develop. The projects most desired follow in order of preference:

Swimming Pool - Wrangell has attempted to develop a community pool for several years; indecision and inflation have prevented the city from building one. A portable community pool was recently purchased and should be installed this year, probably at the elementary school. A privately-owned portable pool has been made available to the public and receives substantial use by children.

Tennis Court/Ice Skating Rink - There are no tennis courts in Wrangell. It has been proposed that a court be built with a lip that would allow it to be flooded and used as an ice skating rink in the winter. A tennis court is proposed as part of the shoreline park described below.

Shoreline Park - This may soon become a reality, as substantial funding has been received for the project. Various community boards and groups joined together to develop a plan for the city's seven-acre site at the northern end of Shoemaker Bay, adjacent to the small boat harbor. The plan, which calls for a variety of uses at the site, must be reviewed by state and federal agencies prior to construction. Available funding will be used to extend sewer and water lines to the site, obtain and set up restrooms, build a tennis court and concrete curbs for recreational vehicle spaces.

The preliminary plan includes a tennis court, parking area and restrooms at the far south end of the parcel, a picnic area on the south side of Institute Creek, a tent camping area on the north side of Institute Creek and a thirty-three stall recreational vehicle parking site at the south end of the Shoemaker fill. The stalls, as proposed, would be thirty by thirty feet, and the area would be geared to smaller recreational vehicles such as pickup trucks with camper shells. A multipurpose building is planned and funded, including an indoor firearms range that could also be used for roller skating and other community activities. The building, as proposed, would also include a harbormaster's office, restrooms, public showers and possibly a small coin-operated laundromat. A twenty foot "greenbelt" containing low shrubs, running along the water face of the fill, is proposed by the park board. A large designated parking area on the fill and eleven lots, each five thousand square feet, are to be leased by the city for private and commercial use. The lots would be located on the Shoemaker fill area, toward the highway. They would be made available for marine-related and recreation-related activities - small grocery stores, bait shops and marine repair shops, for example. At

the far north end, in the wooded area toward the airplane pullout, a twenty-two stall recreational vehicle park, designed mainly for larger recreational vehicles, is also being considered. A greenbelt would be retained along the length of the highway in that area (Wrangell Sentinel, December 10, 1980).

It is notable that several of the recreational facilities desired by the questionnaire respondents are proposed to be included in the shoreline park - the roller skating rink, tennis court, indoor community recreation center and camping area.

In addition to the Shoemaker Bay Park, Barney's Point, near the mouth of Pat Creek, has long been considered as a place for low-impact recreational use. The sandy beach on the tip of the point appears to remain exposed except on the highest of tides. A picnic area could perhaps be developed upland from the beach.

Teen Recreation Center - A teen center called "The Bridge," located above City Market, is sponsored by the Church of God. Supervised by adult volunteers, the center is open three nights a week, Thursday through Saturday. Teens can use electronic games, pool, foosball, ping pong and other games. The center will relocate to the family recreation center, adjacent to the church, upon its completion.

Family Recreation Center - The Church of God plans to begin construction on a five thousand square foot public recreation center as soon as city approval is granted. This center will include a roller rink, game room and snack bar. The roller rink could also be converted to indoor tennis courts. Funds for construction and maintenance of the center will come from private and family memberships, donations and other fundraising events. A grant has also been applied for from the Southeast Alaska Regional Health Corporation.

Childrens' Playground - A playground at the high school was removed to make way for the new school buildings, which intensifies the need for playgrounds for small children, especially in residential areas. Small playgrounds could be imaginatively and inexpensively developed to provide small children with a place to play that would avoid crossing dangerous streets. Possible areas for neighborhood playgrounds include the Case Avenue area and the trailer parks.

The Lions Club designed an award-winning toddlers park located near the city library and the museum. The fenced park is planned to include a cement roadway with traffic signs for tricycles and a variety of playground equipment.

Indoor Adult Recreation Center - There has been a real problem in providing out-of-the-house indoor recreational activities for adults as an alternative to bars or restaurants.

If the proposed indoor gun range is built, it will also provide a place that adults can go to play volleyball, badminton and other games.

Softball - Many people in Wrangell play organized softball, with a resulting shortage of places for people to play. A softball field is being completed (summer 1981) near the elementary school that will relieve the pressure on the other ballfield. It has been suggested that a track with exercise stations be constructed around the new ballfield.

Campgrounds - There is a shortage of designated campground space in the Wrangell area. City Park, near Cemetery Point, is overrun by visiting campers each summer, limiting its use by residents. There was a state-maintained camping area near Pat Creek, ten miles from town, that included parking pads, picnic tables, fire pits and outhouses. The state no longer maintains this campground, but intends to move the picnic tables and fire rings to Shoemaker Bay and assist in its development. Camping areas are needed closer to town; such facilities are proposed for the recreational complex at Shoemaker Bay. (See Capital Improvements Program in Volume II.)

Hiking Trails - There are surprisingly few trails near Wrangell. There is the Rainbow Falls trail (five miles south of town), a path to the top of Mount Dewey and a rough trail going upland from Pat Lake. It has been suggested that an upland trail system be developed for use by hikers, cross-country skiers and snowmobilers.

Shelter at Pat Lake - It has been proposed that a shelter be constructed at Pat Lake for use by winter and summer recreationists.

Football/Soccer Field/Track - With the exception of the softball fields, Wrangell does not have any areas for field sports. The results from the public opinion questionnaire show, however, that there isn't much support for providing them.

Basketball Court - The Parks and Recreation Board has tried unsuccessfully to get the state to allow the development of a basketball court on the ferry terminal parking lot. The state indicated that although the court could theoretically be used when the lot is vacant, such use is incompatible. It has been suggested that a basketball court be developed on city-owned land on the shoreline at Shoemaker Bay. It is questionable, however, whether a basketball court is the best use of the shoreline location.

VISUAL RESOURCES

Southeastern Alaska is famous for its spectacular scenery, and the Wrangell area is certainly no exception. Cruise boats, yachts and many ferry passengers sail through the islands of the Alexander Archipelego to see the abundance of forested islands, mountains, glaciers and waterfalls. The Tongass National Forest has recognized these exceptional visual resource values and has started to consider them in its planning efforts.

Visual resource planners have used the term "viewshed" to describe the area that can be seen from any given point. Throughout much of Wrangell, the viewshed is dominated by the open waters of Zimovia Strait on the Eastern Passage and the forested mountains of Woronkofski, Mitkof, Kadin, Etolin and Wrangell Islands; the mainland view is dominated by Wrangell Peak.

The USFS has divided Alaska's national forest lands into eight visual character types - "discrete geographic units of land each having distinguishing visual characteristics of landform, rock formations, waterforms and vegetative characteristics." The character type in which Wrangell Island and nearby islands and waters are included is the coastal hill visual characteristics type. Most island areas of southern Southeastern Alaska between Petersburg and Ketchikan are included in this type.

Within each visual character type, the USFS analysis is broken down into three variety classes. These are:

Class A. Distinctive refers to those areas where features of landform, vegetative patterns, water forms and geologic features are of unusual or outstanding visual quality. They are usually not common in the character type.

Class B. Common refers to those areas where features contain variety in form, line, color and texture or combinations thereof, but which tend to be common throughout the character type and are not outstanding in visual quality.

Class C. Minimal refers to those areas whose features have little change in form, line, color or texture. Includes all areas not found under Classes A and B.

Most of the coastal areas around the city of Wrangell fall into Class B - common for the area.

While evaluation of the visual quality of the landscape is a subjective task, most would agree that the view from most parts of Wrangell is of a high quality and worthy of consideration when planning future developments. Forestry activity such as clearcuts, particularly on very visible slopes, as well as manmade additions to the landscape

such as power lines, can significantly alter this view. Clearcuts such as the one behind the Zimovia Highway just south of Wrangell can have a tremendous impact on the visual appearance of the community, while similar cuts on south Wrangell Island and other more isolated areas have less visual impact on far fewer persons.

The visual resources of the Stikine River valley are very striking and were a major consideration in the designation of this as a wilderness area under the Alaska lands legislation. The presence of a very large river with steeply rising mountains and several large glaciers, one reaching tidewater (LeConte Glacier), are all features that were considered of national significance. The USFS has classified much of the Stikine valley in the distinctive class (Class A) of the coastal range visual character type, acknowledging the high aesthetic quality of a major area dominated by massive mountains, steep cliffs and glaciers.

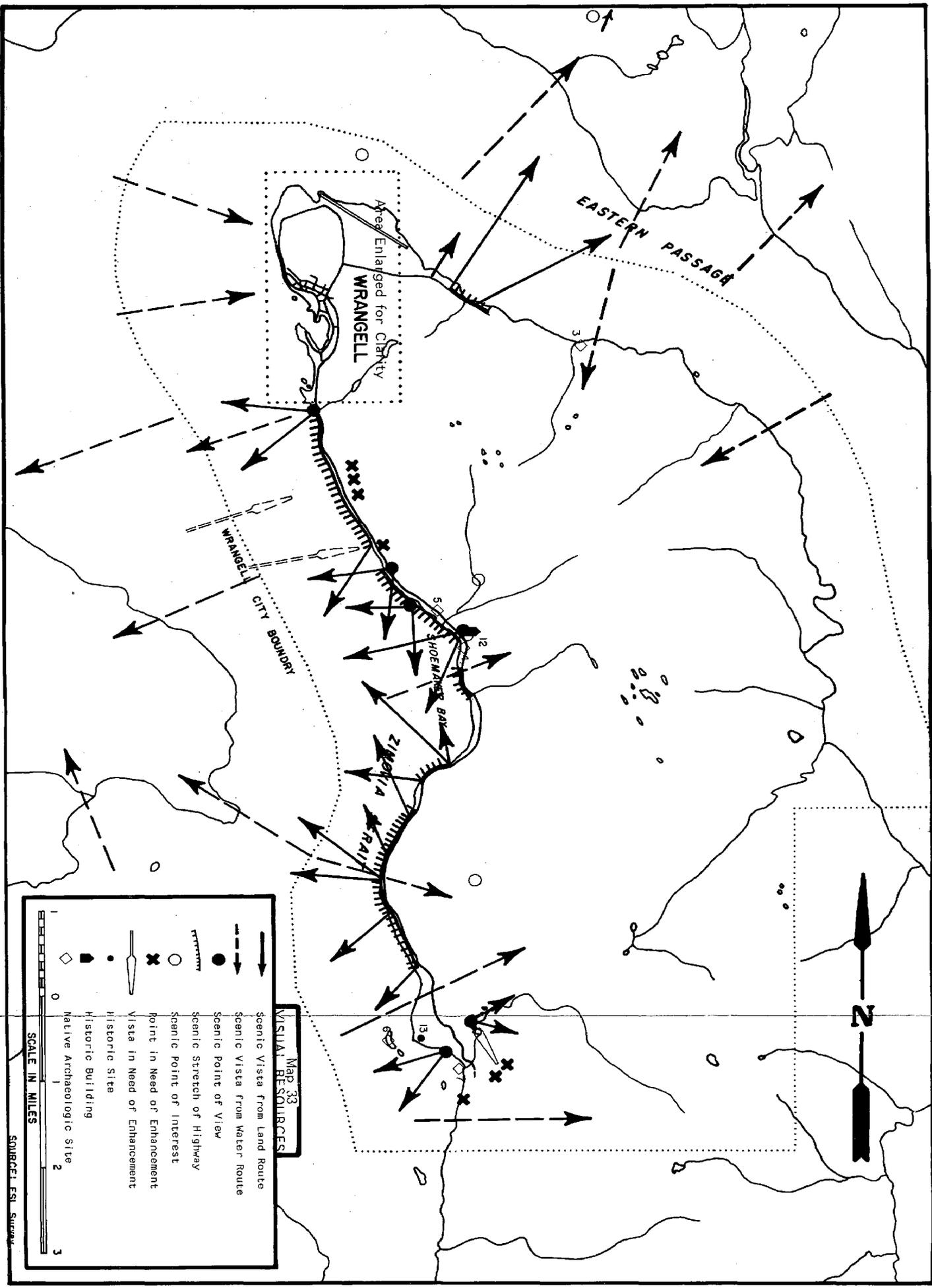
In planning for the use of the lands surrounding Wrangell, visual values must be considered. Of particular concern are new timber cuts on city or state lands on north Wrangell Island, near recreation areas such as Thoms Lake and Thoms Bay, and mainland areas near Wrangell Mountain. The power transmission line from Tyee Lake to Wrangell and on to Petersburg could have a significant negative visual impact if these resource values are not considered when the final routes and type of structures are planned.

While the management of visual resources in the distant viewshed is important, the proper management of visual resources in the immediate viewshed is critical. This management can be as simple as the location of and design of signs or as involved as land use controls that consider visual quality in design. The inventory of visual resources is broken down into two categories - the identification of scenic viewpoints or vistas worthy of protection and the identification of areas in need of visual enhancement or improvement. These areas are delineated in Maps 33 and 34.

Scenic Vistas or Viewpoints. Most of the length of the Zimovia Highway south of the Wrangell townsite offers an exceptional view of Zimovia Strait, Chichagof Pass, Woronkofski Island and Etolin Island. Most development has occurred on the inland side of the highway, and only in a few areas is this exceptionally scenic highway obscured from the water by manmade structures. The map of visual resources indicates locations where views are especially good or where access in the form of public parking or recreation areas, such as Shoemaker Bay and the city park near Cemetery Point, is available to the public. Other scenic vistas or viewpoints include views from the top of Dewey Hill and from residential areas on the lower slopes of Dewey Hill, Pat Lake, the Wrangell East Road, the city reservoir and views from and around Shakes Island. The map also delineates scenic views from the primary ferry and cruise ship routes.

Areas for Visual Enhancement. The visual quality of certain areas of Wrangell could be improved for the benefit of visitors and residents alike. Areas identified for visual improvement

are the storage areas along the waterfront near the city docks, Front Street - where it has been suggested that face-lifting of buildings to fit a historic theme be considered, the placement of utility poles on Shakes Island and the areas used for dumping along Zimovia Highway. Other visual or visually-related problems with a more widespread impact are the city's dust problem, which can turn freshly painted homes into dust covered houses in a few days, and inadequate reforestation of clearcuts such as these along Zimovia Highway.



EASTERN PASSAGE

Area Enlarged for Clarity
WRANGELL

WRANGELL CITY BOUNDARY

HOEMANS BAY

ZIMONIA

RAIL

Map 33
VISUAL RESOURCES

Scenic Vista from Land Route

Scenic Vista from Water Route

Scenic Point of View

Scenic Stretch of Highway

Point in Need of Enhancement

Scenic Point of Interest

Vista in Need of Enhancement

Historic Building

Historic Site

Native Archaeologic site

0 1 2 3

SCALE IN MILES

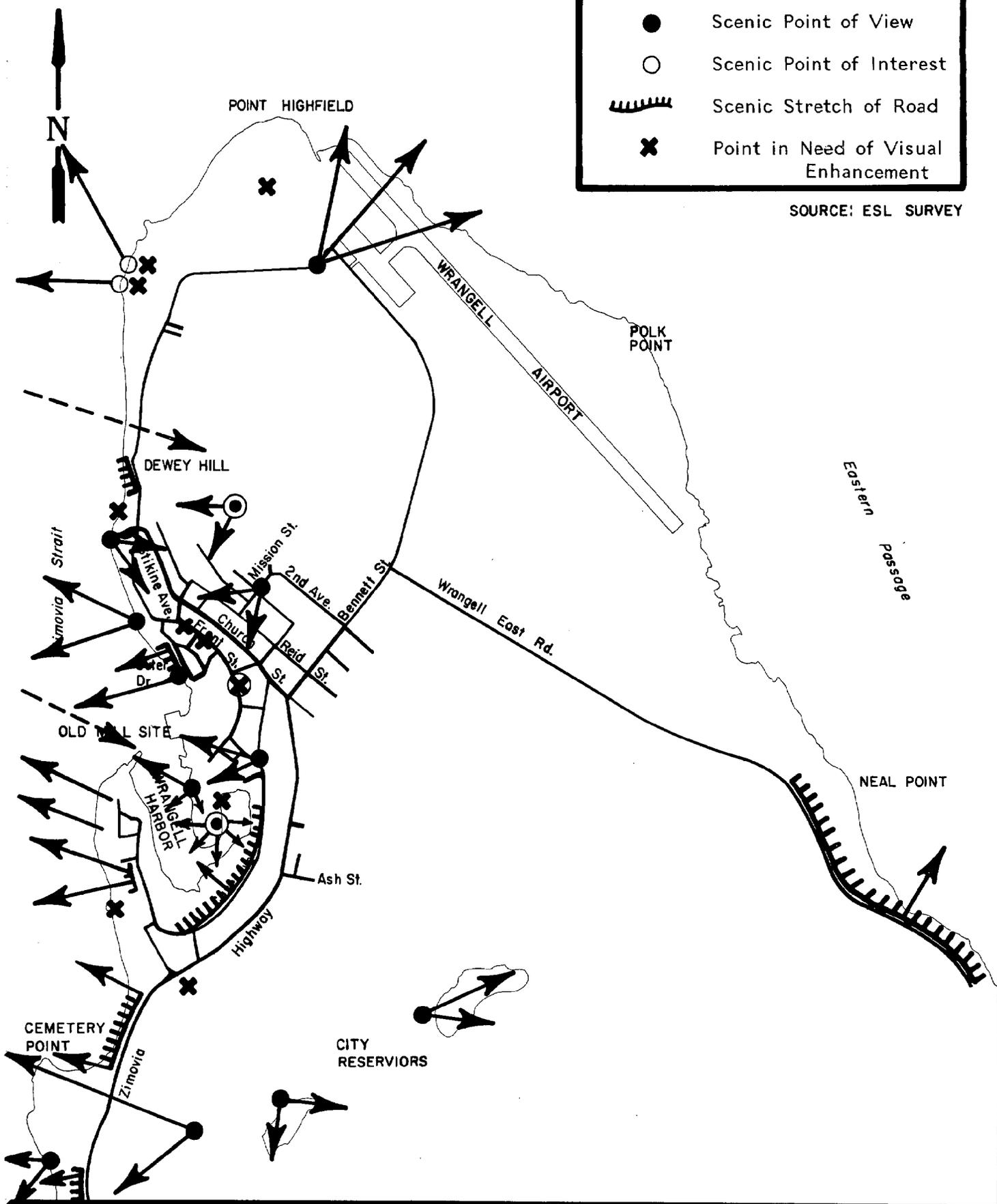
SOURCE: FSI Survey

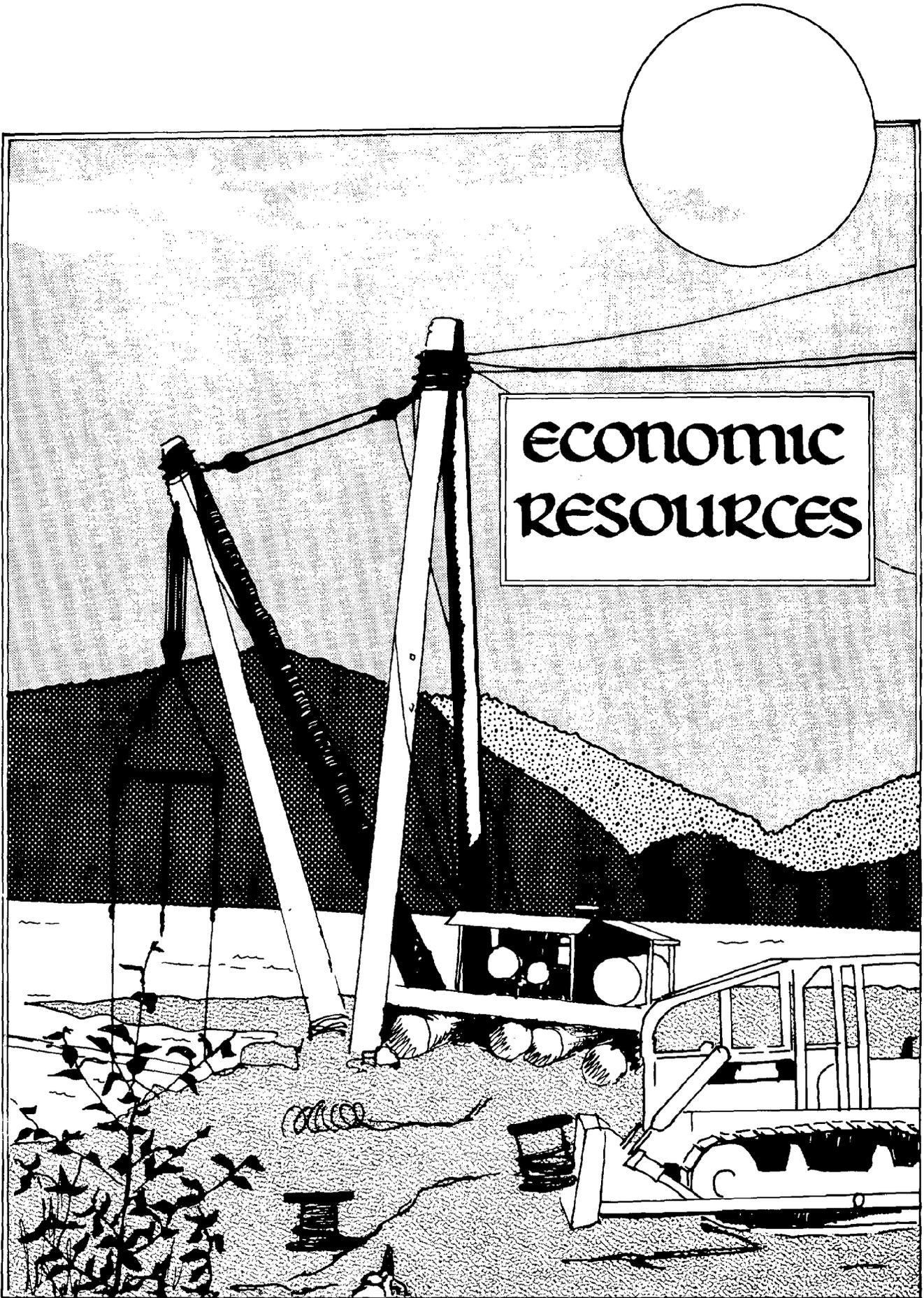
1600 0 1600 feet

Map 34 VISUAL RESOURCES

- ➔ Scenic Vista
- Scenic Point of View
- Scenic Point of Interest
- ▬ Scenic Stretch of Road
- ✕ Point in Need of Visual Enhancement

SOURCE: ESL SURVEY





ECONOMIC
RESOURCES

With a strategic location near the mouth of the Stikine River, Wrangell was founded as a fur trading center and military outpost. It later became a transshipment, outfitting and entertainment stopover for two nineteenth century gold rushes. Wrangell's economy in recent years has been dominated by the timber and seafood processing industries started about one hundred years ago. Wrangell's economy has always been based on regional resources, and today's industries depend on processing timber and seafood harvested throughout Southeast Alaska. The health of the Wrangell economy is dependent on the regional economy as well as on foreign and domestic markets.

EMPLOYMENT

Employment in Wrangell is primarily provided by the timber and seafood processing industries. As shown in Table 13, trade, transportation, communications and utilities, as well as government service, provide a major portion of the employment opportunities in Wrangell, but service businesses are a growing portion of the local economy. Construction activity has remained at about the same level for the last few years. There was an upswing in 1980-81 with the construction of the ALP mill at Shoemaker Bay and the expansion of the city dock. The upcoming Tyee Lake hydroelectric project will provide some construction-related employment.

A significant proportion of Wrangell's employment opportunities are seasonal. Employment in the seafood processing industry occurs primarily in summer; increased winter production, however, has brought more stability to the industry. Logging is also seasonal, with layoffs occurring in the winter. While trade remains fairly stable throughout the year, there is increasingly more trade in the summer months, reflecting increasing tourist business. This trend will continue as summer tourism increases.

It is important to note that Table 13 only includes jobs covered by unemployment insurance. Occupations such as fishing are not covered by unemployment insurance and are not included in these figures. The table therefore does not reflect actual employment levels in the community. These figures are also prone to error as more than one person may have held a single position during the year; double counting thus occurs. Despite these shortcomings, the annual figures provide a good indication of general employment trends within the major sectors of the economy.

The remainder of this chapter examines in depth the existing and potential basic job-generating components of Wrangell's economy - timber, fisheries, mining and tourism. The support sector of the economy includes those jobs that exist because of the basic component's existence. Support sectors of the economy, such as services, government and trade, will receive less attention in this section.

While there will be some changes in the employment levels of various components of the economy, it appears that Wrangell's economy should

remain relatively stable. The new ALP mill requires about forty fewer workers to operate it than the old mills, but employment should remain stable at the new level. Some minor overall economic growth may occur because of increases in tourism and possibly expansion in the fishing and seafood processing industry. In the long term, changes in the timber industry or the development of Wrangell as a support base or export point for mineral development could have dramatic effects on the local economy. Development of the old institute site as a training center as is being considered by Sealaska Corporation would also substantially strengthen Wrangell's economy.

TABLE 13
Average Annual Employment*
1970's

	70	71	72	73	74	75	76	77	78	79
Contract Construction			17	31	61	45	42	43	33	43
Manufacturing	334	297	310	319	317	315	298	285	221	284
Transportation Communications Utilities	118	135	137	133	143	168	135	109	107	113
Trade	70	88	103	109	112	125	116	129	132	121
Services	35	37	37	38	38	37	32	43	55	55
Federal Government	80	83	94	87	76	66	16	21	52	43
Local Government									125	139
State Government										4
TOTAL	637	640	698	717	747	746	639	630	725	799

Source: Unemployment Security Research Section

The development of the Tyee Lake hydroelectric project will substantially strengthen the economy by providing major industrial users (e.g., seafood freezing plant) with a stable and relatively economical source of

power. It will also help attract industry to the community that would benefit from this economical and dependable power source, and construction for the hydroelectric project will provide a substantial economic boost during the two to three year long construction period. The contractor that will be building the power generation facilities has indicated that it will attempt to hire as much of the project workforce as possible locally, with transportation provided to and from Wrangell and the worksite and training to be offered to local people to provide them with necessary skills. While most of the skilled "trade" jobs will come from outside the area, it is hoped that Wrangell residents will be able to fill thirty or more jobs as support, maintenance and construction workers, with many of the jobs lasting for over two years. Some work will begin in late 1981, with the peak occurring in 1982, when more than 120 people may be involved in the construction of the power plant and associated facilities. In addition, laying underwater cable, transporting and storing materials and equipment, project inspection team, removal of timber from the transmission line corridor and other tasks associated with the project will require support services and a few jobs based in Wrangell. It is expected that many of the former ALP employees will take advantage of these employment opportunities. Because of the current relatively high rate of unemployment with the loss of ALP jobs, the Tyee Lake jobs can probably be filled without much disruption of the current work force. The Tyee Lake project should also provide a temporary boost for the trade and service business, since Wrangell businesses will probably be called upon to provide some goods for the work camps and employees at the camps will come into town to purchase items and to relax. Employment of local people will also obviously help these secondary businesses. When the job is completed, about six people will be employed on a permanent basis at a local dispatch office.

MAJOR COMPONENTS OF THE WRANGELL ECONOMY

TIMBER

Timber processing has been an important part of Wrangell's economy since the late 1880's, when Alaska's first sawmill began operation. A hundred years later, timber harvesting and processing still form the cornerstone of Wrangell's economy, with the ALP mill the largest employer in town. Most of the timber processed at the Wrangell mill is shipped directly to Japan, in the form of cants, for commercial and residential construction markets.

ALP has consolidated its Wrangell operations at its new mill at Shoemaker Bay and the two old mills have ceased operations. There are about forty fewer jobs at the new mill than were at the two old mills, which will obviously have a substantial adverse impact on the local economy. (As noted earlier, the Tyee project should take up the slack for the next two or three years.) The new mill will, however, provide a stable place of employment for the remaining workforce and continue as the cornerstone of Wrangell's economy.

The new mill is much more efficient than the old mills. Modern equipment enables ALP to use smaller logs for cant production, and greater utilization of the timber is achieved through efficient, computerized sawing methods. These improvements allow the mill to remain competitive in a period when the average timber is smaller and harder to get than has traditionally been the case. Availability of large timber is reduced due to federal wilderness and native land withdrawals, changes in federal regulations restricting the harvest of much of the accessible virgin timber and because much of the rest of the accessible acreage has already been harvested.

The ALP mill is part of a regional timber industry that is dependent on an international market. Consequently, the factors that effect the Wrangell mill the most are regional and international in nature. The major factor that will shape the future of the timber industry in Wrangell is the regional availability of economically harvestable timber. Annual fluctuations in production will partially be affected by international market conditions and, to a small degree, by competition from round log sales. Each of these factors are briefly discussed in this section.

Availability

It is the intent of the USFS to make available an adequate amount of timber to sustain the operation of the mills in Southeast Alaska. The total 105 billion board feet log measure that ALP (in both Wrangell and Sitka) is allotted under long-term contract from the USFS does not meet the volume requirements of the ALP Sitka pulp mill. Since the ALP contract with the USFS basically requires that the pulp mill operate before ALP can manufacture any other types of products, there is no saw timber available for the Wrangell saw mill until the requirements of the pulp mill can be satisfied. ALP's objective is to obtain the lower quality logs necessary to operate the pulp mill from other sources so that higher quality saw logs can be manufactured in the Wrangell mill. It is expected that the Pacific Northern Timber sale, which has been a major source of timber, will expire in 1982. This will probably require ALP to obtain a large amount of wood from independent sales,



LOGGING IN WRANGELL

state sales or from native-owned land. Wood from native-owned lands would probably be logs for pulp production at ALP's pulp mill in Sitka, relieving the need for using saw logs from USFS lands for pulp and thus increasing the availability of sawlogs for the ALP mill in Wrangell.

Discussions with USFS representatives indicate that although the USFS is required to make available an average of 450 mbf (million board feet) of timber from the Tongass National Forest each year, sales will probably be "front end loaded." A greater volume of timber (e.g. 520 mbf) will probably be available for the next few years, with less being made available later when large volumes of timber from native land begin to enter the market. In other words, there should be a relative abundance of timber harvested from the national forest over the next few years, tapering off to a lesser supply in subsequent years. It should be noted, however, that the USFS has considerable flexibility in determining how much timber will be made available each year in keeping with market conditions, etc.

In addition to needing a sufficient volume of timber, it must be economical to process. The costs of road construction, logging and transporting logs to the mill account for over seventy percent of the total cost of manufacturing of cants and related products. These costs vary with the characteristics of the particular stands of timber being harvested. As accessible areas are harvested and other areas are protected from logging or are transferred to private ownership, ALP and the rest of the industry is forced to harvest timber that is more costly to harvest per unit of volume. The availability of timber with high enough recovery rates for industry use is vital (as previously noted, the increased cost of obtaining less accessible and smaller timber will be offset somewhat by the efficiencies of the new mill). Despite the inevitable difficulties, representatives of ALP believe that they can acquire an adequate volume of timber to maintain their operations over at least the next decade. ALP's substantial investment in the new mill demonstrates their confidence.

Markets

A good timber supply is obviously of no use to the mill unless the products it produces can be sold at a reasonable profit. Southeast Alaska must compete as a wood supplier with other regions, many of which have both location and cost advantages. Alaska timber products have been most competitive in the Pacific Rim market, notably Japan, and the situation is likely to continue. Prospects in other markets are more precarious. Within Southeast Alaska, the market is not of sufficient magnitude to justify development of a diversified wood or finished timber products industry to satisfy local demands. A small, efficient operation could conceivably meet some limited local lumber needs profitably. This would be difficult, however, considering that wood must be dried, planed smooth and maintained in sufficient inventories such that local people would want to purchase from the potential supplier. Portable sawmills are providing local residents with some lumber; small operations, however, are not capable of producing many wood products (e.g., plywood and particle board). Since southeast timber is not suitable for

some types of construction, local producers are limited to a small segment of the local market. The southeastern region, with the possible exception of Haines, is not competitive in the remainder of the state with most wood products from Puget Sound or with locally-sawn green lumber. Greensawn lumber can be produced in Southeast Alaska and shipped to Anchorage at about the same cost that kiln-dried lumber can be imported from Puget Sound (USFS, Tongass National Forest Land Management Plan, 1978).

Alaska has not been competitive in markets within the continental United States for most wood products, and its potential to do so appears limited in the future. There is a possibility, however, of selling round logs or cants to the Puget Sound area during periods of high market demand. Although Alaska may have some production advantages, its high manufacturing costs tend to offset these relative to competing regions in the U.S. In addition, the Jones Act requires that products shipped by water between American ports must travel on American ships - a significant cost disadvantage relative to foreign-registered ships. These factors significantly undermine the Southeast timber industry's ability to compete in "lower 48" markets. One apparent advantage for Alaska is its low stumpage prices, but this is the result of the USFS appraisal system, which takes into account high logging and road construction costs. Even if low stumpage fees were a real advantage, they would be offset by higher costs of site preparation, facility construction, labor and transportation. As a result, wood products such as cants requiring minimal local manufacture are apt to be most competitive in foreign or "lower 48" markets.

In recent years, high interest rates in the "lower 48" caused a severe drop in U.S. construction. This forced U.S. firms to sell lumber in international markets, which added to an oversupply of timber in Japan. As a result of the reduced international markets, regional harvesting and processing at the Wrangell mill occurred at a reduced level during 1980.

If interest rates drop sufficiently to spur construction, an increase in world consumption of lumber and plywood is expected through the 1980's. USFS is managing their timber land such that the quality of timber from the national forest will tend to stay somewhat higher, or at least not decrease any faster, than timber that will be available from other market areas. Log quality is decreasing in the Pacific northwest and in southeast Asia, while log quality from Russia was never high. These areas, in addition to southeast Alaska, have traditionally supplied Taiwan, Korea and Japan with raw wood. Consequently, if market conditions are favorable, the Alaska timber industry may become more competitive in this market (ALP representatives).

The prospect for cant demand, which is of most importance to Wrangell, is uncertain. Industry representatives indicate that they expect demand to be stable, while the USFS foresees a possible decline in cant demand. While the USFS expects the export of round logs originating on private lands to replace a small, undeterminable volume of cant exports, ALP representatives indicate that this will not be the case. (Federal law prohibits the export of round logs obtained in national

forests, while timber from state and private land can be exported in the round.) Round logs are more desirable in some segments of the Japanese wood processing as efficient Japanese mills can obtain more lumber and by-products from round logs than cants. Many saw mills in Japan, however, are dependent on cants because they are not sized to saw round logs. In general, the priority of imports for the Japanese and Koreans are logs, cants and then lumber. Since, log exports with the exception of native exports from Alaska, are decreasing from all sources along the Pacific Rim, there is every likelihood that cants will remain in demand. There could be an oversupply of Sitka spruce for export; the industry has been successful in differentiating this product within the market in order to create higher values.

Japan has been attempting to develop greater self-sufficiency with respect to timber products, which could somewhat reduce imports by the year 2000, when the timber plantations planted after World War II begin to be harvested.

Round Log Exports

With current technology and transportation networks, it is economically prudent to export logs in the round as opposed to processing them. In 1978, the USFS determined the net returns for various types of wood products from Southeast Alaska (based on 1978 production cost estimates and prices). They determined that a million board feet of timber harvested for round log export would yield nearly \$88,000 in net revenues. A similar quantity of wood used to produce cants would yield only \$22,000 in net returns. If this same quantity of timber was manufactured into lumber in Alaska, it is estimated that the total effort would lose \$44,819. Stumpage costs were not included in this calculation; therefore, further reduction may be appropriate in some cases. These figures show a clear advantage for the exporters of round logs (USFS, 1978).

The extent to which cant demand and production is affected by these round log exports is debatable. Industry representatives are of the opinion that round log exports from private land in southeast Alaska (estimated to be 100 to 225 mbf) will comprise such a small percentage of the total round log exports (3.1 billion board feet) from the U.S. that they will have little, if any, impact on the demand for cants. There will probably always be a cost differential between logs and cants, with logs being more profitable. Cant production will be relatively independent of log exports, however, with the exception of spruce. Should the differential in value between cants and logs become too wide, the Japanese and others will tend to purchase more cants to keep market values in line. Industry representatives think that hemlock cants can compete if the stumpage price, as set by USFS, is not too high. If the minimum stumpage rates are too high, then the cant manufacturers will be operating in a deficit situation and will not be able to compete. In the opinion of industry representatives, the USFS needs to be in tune with market values. This has not been the case in the past, when it has tended to lag so severely that market values have sometimes been low when stumpage minimums have been set high (ALP representatives).

In recent years, the native village corporations of Kake, Kasaan and Saxman have been harvesting and selling round logs from their land. Approximately thirty million board feet of timber is expected to be harvested by the Kake Village Corporation through 1981. Much of this timber is being shipped through Wrangell enroute to Japan and Korea, thus benefitting local longshoremen and tug operators. The city also accrued considerable wharfage and loading fees. In addition, Sealaska Corporation formed a timber corporation to manage, develop and market its extensive resources. Sealaska has received about two-thirds of its land entitlement from the federal government. Consequently, it holds the most valuable forest inventory in private ownership in the state and is producing timber at a level consistent with market conditions. Sealaska is expected to produce about 150 to 225 mbf of timber annually.

The State of Alaska may provide limited quantities of timber from its lands in Southeast Alaska in the future, though there is much uncertainty regarding the time this might occur or the volumes likely to be involved. Since timber harvested from state lands are no longer bound by primary manufacturing laws, it is possible that state timber will be exported in the round. The state is appealing the decision against the primary manufacture requirement and is also looking into laws of other states that prohibit export in the round. In any case, the state has only a relatively small quantity of timber that it could offer for sale.

Projected Activity

The USFS developed several projections for the timber industry for the next decade, based on assumptions relating to the level of harvest from private lands and possible expansion of the pulp capacity in Southeast Alaska. According to USFS, two of the most likely situations are (1) an annual sustained yield harvest of 150 mbf per year from privately-owned lands in Southeast Alaska, and (2) an accelerated harvest of 225 mbf per year from privately-owned lands in Southeast Alaska.

If privately-owned lands are managed on the sustained-yield basis, it is estimated that the total cut in Southeast Alaska would be between 520 and 600 mbf per year. As a result, approximately 450 mbf per year would be required from the Tongass National Forest to support the industry, assuming that some timber would be made available from private land to supply pulp mill needs (industry representatives claim that approximately 520 mbf are necessary to adequately supply existing industry). Under these circumstances, total employment in the timber industry in Southeast Alaska would increase ten percent above the past seven-year average. Some jobs would probably shift from sawmilling to logging, thereby displacing some people from present jobs while providing work opportunities for others.

If privately-owned timber land is harvested at a level of 225 mbf per year, the total Southeast Alaska timber cut would increase to about

625 mbf annually. About four hundred million board feet of this would come from Tongass National Forest. Employment would be approximately the same as in the sustained-yield alternative, but there could be a further shift from cant manufacturing to logging. Industry representatives contend that production from privately-owned timber land will not decrease the demands placed on the national forest. The requirements will still be at the maximum allowable cut that the forest can provide, which by law is an average of 450 mbf per year.

According to the USFS, of these projections the accelerated harvest from private lands appears most likely to materialize by 1990. Sealaska representatives have indicated, however, that they intend to harvest on a sustained-yield basis (e.g., 150 mbf per year). Indeed, in 1981, the native corporations reduced their projected harvest levels by about forty percent because of lower prices and demand.

There is considerable disparity between USFS market projections and analysis and the view of some industry representatives. The ALP representatives are optimistic about the future and do not consider round log exports as much of a threat. Their confidence is demonstrated by their investment in the new mill and the future of Wrangell.

Projected Employment

Based on available information, ALP's Wrangell employment levels will be as much as thirty-five percent lower than 1980 figures, but relatively stable during the next decade. As previously noted, the decrease in employment is because the efficient new mill requires about forty fewer people to operate on a single-shift basis than the old mills. ALP is striving to maintain as stable an employment situation as possible and, provided that USFS stumpage rates don't go too high and a sufficient volume of timber is available, jobs at ALP will remain secure. ALP is confident that this will be the case.

Increases in employment, layoffs or reduced work weeks will reflect the cyclical nature of the Japanese lumber market, which typically "bottoms out" every three or four years. The entry of round logs from native and state lands could effect the demand for cants slightly. This probably would not result in a decrease in employment unless a reduction in cant demand persisted for an extended period.

Logging employment based on Wrangell Island should stay about the same for the next few years with approximately sixty jobs. When the Pacific Northern Timber sale terminates in 1982, there will be a decrease in logging employment in the immediate region. The south Wrangell Island timber sale could absorb some of these workers, and other sales are planned on Etolin Island. Approximately 250 people were employed in logging activity near Wrangell in 1980. Wrangell provides various services to logging camps, including transportation, medical facilities, some supplies and entertainment. The USFS has a stated policy of trying to limit major long-term timber sales to the Chatham and Ketchikan districts, which probably means that the Stikine district is slowly being set up for SBA and independent timber sales.

There should therefore be a moderate amount of small sale activity scattered around the Stikine area. Wrangell can still be a service hub for some of this activity, but it probably will not have the stability that the Pacific Northern sale offered in the past (ALP representatives).

Small logging operations, several of which are based in or near Wrangell, have joined together in an organization (SEATO) to enhance their ability to purchase independent timber sales (SBA), to market their logs to small sawmills and perhaps eventual sale in foreign markets. This group's efforts could provide a good economic outlook for small independent loggers, road builders, sawmills and service businesses, thus boosting the Wrangell economy.

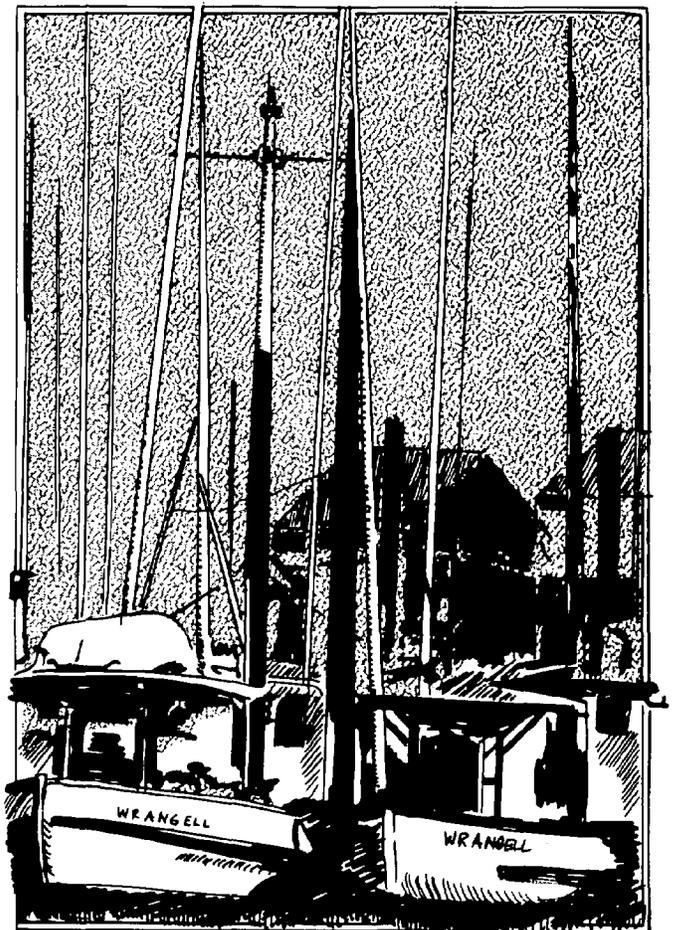
FISHING

Fisheries

The fishing and seafood processing industry plays an important role in the Wrangell economy. About fifty relatively full-time and sixty to seventy part-time commercial fishermen took part in local and regional fisheries in 1981. Most of the part-time fishermen have other sources of employment and fish from small boats in waters near Wrangell in their off-hours. Longlining for halibut and other bottomfish, as well as hand trolling for salmon, often prove profitable for these individuals. The people that rely on fishing for all or a major part of their income use larger boats (e.g., gillnetters, purse seiners and power trollers) and enter several fisheries, such as salmon, herring, shrimp and perhaps crab or bottomfish.

Salmon fishing, which occurs between June and September, is the most important fishery for Wrangell fishermen, with pink salmon making up the bulk of the catch. Red salmon, however, due to their substantially higher selling price, provide a major portion of the fishermen's income. During the peak of the season, as many as ninety local and outside gillnetters may fish for salmon near Wrangell. A substantial number of purse seiners also frequent these waters. When fishing is good, boats from other areas lay over in Wrangell to get fuel, provisions and maybe a little rest and entertainment. This trade obviously boosts the local economy.

The salmon hand trolling fishery provides a supplemental



income for numerous Wrangell residents. It appears, however, that some people will no longer have the option to participate, since a limited entry system was put into effect in 1981. Permits for the fishery were awarded on a point system, with points accruing on the basis of dependency on the fishery, years of involvement in the fishery and boat ownership. In addition, to further reduce the hand troll harvest of coho and king salmon, the Alaska Board of Fisheries approved reductions of hand troll gear and reduced the king season by one month for both hand and power trollers. Although this may place an economic hardship on some individuals, the overall long-term economic benefit derived from this fishery will probably remain about the same.

There is a bait herring fishery near Wrangell and a sac roe herring fishery near Ketchikan in which local fishermen participate. Although the season is short, a couple of hours to a week or two, it can be most rewarding. A single set may yield herring worth a hundred thousand dollars.

Wrangell is located in area 2C of the commercial halibut fishery. The 1981 commercial halibut catch totaled 3.8 million pounds in the opening week, exceeding the 3.4 million pound quota. People often fish for halibut near Wrangell with small boats. This short fishery, only ten days, requires relatively little investment in equipment, so many people may therefore participate.

There is concern regarding the potential effects of the growing Canadian salmon fishery on the Stikine River. A two-year interim agreement, introduced as part of the Canadian salmon interception talks, proposes to hold the Canadian fishery to 1979 levels or somewhat less and to establish joint management of Stikine salmon. The agreement is designed to ensure salmon protection until 1983, the earliest a formal treaty could be ratified between the two countries. The Canadian Stikine fishery may be escalated in 1982 if an expected high salmon run does occur.

People are also concerned about the possible impacts a dam on the Stikine River could have on local fisheries (see section on regional land use). The Canadians are currently in the process of identifying the resources of the Stikine drainage to provide a basis with which to determine the probable affect of various dams on the Stikine and Iskut rivers to resources.

There has been some mention of the possibility of developing an aquaculture project near the mouth of Crittenden Creek. If this project occurs and is properly managed, it could boost the number of salmon available for commercial harvest. ADFG representatives are concerned, however, that the proposed location of the project, near the mouth of the Stikine River, could interfere with fishery management for that area (e.g., fish stocks from the Stikine might be mistaken for private hatchery stock and harvested).

It seems that most Alaskan fishing communities are interested in entering the budding bottomfishery that is evolving with the advent of the two hundred mile limit. Wrangell is no exception. Wrangell can

gain some insights into the potential and feasibility of bottomfisheries based on the experience of the now defunct PFI bottomfish plant in Petersburg. It appears that part of the reason the PFI operation was abandoned was insufficient markets and, consequently, inadequate prices paid to fishermen for bottomfish. The inappropriately large boats and gear - and overhead - that were used in fishing inside passage waters were also part of the problem.

The bottomfish resource is available near Wrangell; for instance, the Stikine River flats contain substantial populations of flounder. A few Wrangell fishermen successfully harvest bottomfish in the area with small boats and gear, with much of the catch sold on the docks. In order to expand the bottomfishery, it appears to be necessary to devise methods for efficiently and cheaply harvesting and processing the fish. This will probably entail using small boats and equipment that can effectively fish the small confined bays in the area.

Although bottomfishing in the Wrangell area does not appear to be ready to blossom into a major industry, innovations may occur in the rapidly evolving industry that would make a small-scale bottomfishery economically viable. In order to help fully evaluate its possibilities for a bottomfishing industry and prepare for such development if appropriate, Wrangell should participate in CRA's Bottomfish Community Development Program. The purpose of this program is to assist communities in assessing the feasibility of a bottomfishery and developing the infrastructure necessary to attract and support an onshore bottomfish industry appropriate to each community's needs and aspirations.

Seafood Processing

There are two seafood processors in Wrangell - Harbor Seafoods and Reliance Shrimp Company. Harbor Seafoods is the larger of the two and processes a variety of seafood including salmon, halibut, herring, crab, and some cod and snapper. Employment levels vary with the fishing seasons. As many as 110 people are employed during a two-month period in the salmon season. Efforts are being made to enter into agreements with other firms that would bring more salmon to Wrangell for processing. During the remainder of the year, except during January through March when the plant is idle, employment levels vary about fifteen to forty people, depending on the level of processing occurring.

Harbor Seafoods has expanded its facilities with a crab line and increased freezer capacity in the last two years (relatively economical electricity provided by the Tyee Lake hydro project will substantially benefit this operation). The seafood market has been fairly tight in recent years and no further expansion is expected until market conditions warrant it. Barring expansion, production and employment levels are expected to remain at about the same level as 1980, with seasonal fluctuation depending upon the size of the catch.

Reliance Shrimp Company, as its name implies, processes shrimp; it has done so for the past sixty years. Much of the processing occurs

in the spring and summer, and the company relies to some extent on a transient work force. Production and employment levels vary from year to year, depending on the catch and market condition. During normal production periods, ten to fifteen people are employed. It is probable that long-established production and employment trends will continue, barring a drastic change in the shrimp populations in the region.

A bait herring processing plant has been proposed for construction south of Shustak Point. Tax assessments and permit reviews are underway for this plant.

In 1967, there were three seafood processing companies in Wrangell. Reductions in fish catches combined with increased competition forced the elimination of one producer. The situation has improved through the efforts of local producers over the last few years. Harbor Seafoods has added cold storage and broadened markets (institutional-size salmon canning lines and herring) and increased vigor in attempting to purchase salmon for processing. While the market is as unpredictable as the annual catch, the future of seafood processing in Wrangell is promising.

TOURISM

Tourism has traditionally played a relatively small role in Wrangell's economy. Tourists arriving on cruise ships are the most noticeable visitors. Tourists also come to Wrangell on ferries and planes; Wrangell's tourist access is relatively good. Wrangell is a mainline stop on the Alaska Marine Highway (which primarily carries tourists in the summer) and jets service Wrangell daily. Wrangell is only an hour's running time from the main cruise ship route in Clarence Strait (about eighty thousand tourists travelled this route in 1980).

Wrangell has accommodations adequate to serve a substantial increase in visitors. There are two hotels downtown, with a total of forty-six rooms, and another is located four miles to the south on the Zimovia Highway. There is a shortage, however, of overnight camping areas close to Wrangell, though a camping area is proposed in the Shoemaker Bay recreational development plan (see section on recreation).

Wrangell residents have become increasingly interested in tourist trade in recent years. A tourism vocational education course was taught at the high school, and as many as twenty students and CETA workers were involved in tourist-related activities during the summer. The tourism committee of the Chamber of Commerce was responsible for promoting Wrangell as a tourist destination. As one of this group's projects, an A-frame visitor information center was constructed. Despite these efforts, Wrangell is relatively unknown to tourists. It does not have the range of attractions and drawing power of the more well-known communities frequented by cruiseships.

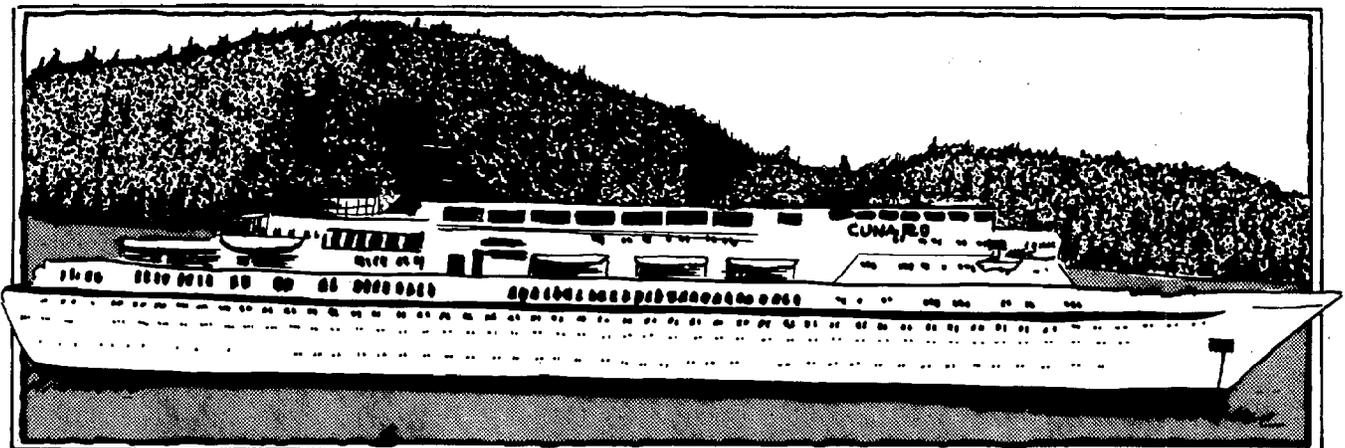
Tourism has been increasing statewide at the rate of about twelve to fifteen percent annually for the last several years. Over the last two years, however, the increase in tourism fell to about a nine percent

increase over the previous years, perhaps attributable to dramatic increase in transportation costs over the last few years. While tourism probably will not increase statewide as it has in the past, it remains a growing business. Wrangell can certainly attract a bigger share of Alaska's tourism.

Although the summer months bring a stream of tourists to Alaska - tourism is Alaska's second largest industry - some Wrangell residents do not want to divert more of the tourist flow through Wrangell; they do not want Wrangell to become a tourist town. They should recognize, however, that tourists do more than congest the sidewalks and fill the cash registers of gift shop owners. The money spent by tourists in shops and hotels in Wrangell is passed through the community when the shopkeepers purchase goods and pay taxes. These dollars are passed on from merchants to employees and to other merchants. The cumulative effect of even a fairly small number of tourists can have a substantial individual and community benefit with minimal public costs.

As previously mentioned, cruise ships bring the largest influx of tourists to Wrangell. The 328-passenger "Princess Patricia", which will be retired in 1982, has been the most long-term and reliable visitor to the city. This vessel made twenty-two stops in Wrangell during the summer of 1981. The "Renaissance" called on Wrangell fifteen times in 1981. In addition, the 500 to 550 passenger "Universe" began calling on Wrangell in July of 1981, and may continue calling on Wrangell in future years. It appears that three ships will be stopping on Wrangell in 1982, the 88-passenger "Majestic Alaska Explorer", the 285-passenger "Prince George" and the "Renaissance". A new 120-passenger ship may begin calling on Wrangell in 1982. The ship, operated by Alaska Tour and Marketing Services, will be based in Ketchikan.

The city dock, which was damaged by the "Princess Patricia" in May of 1980, was repaired. Expected expansion of the dock is not expected until fall of 1981. The "Princess Patricia" was allowed to use the ferry dock, but larger ships probably will not use it due to possible damage to the transfer bridge, an essential to the operation of the ferry dock. The "Renaissance" lightered its passengers ashore.



Visitors arriving on cruise ships have traditionally been treated to a performance by the volunteer welcoming band and the Wrangell Cancan Dancers. The award-winning Stikine Native Dancers greeted tour ships for a while. Unfortunately, the band broke up because of a lack of community support and the Stikine Native Dancers declined to continue working without pay, leaving only the Cancan Dancers performing to the sound of a feeble cassette recording. While the Cancan Dancers' effort was commendable and enjoyable, the absence of the band detracted from the performance. One cruise ship visitor who had previously visited Wrangell remarked that he had been "talking up" the show at Wrangell on the cruise up. He was noticeably disappointed that the band was missing. The people that greet and entertain the cruise ship visitors do a great deal to present an attractive image of Wrangell. Their contribution to tourism in Wrangell should be acknowledged by the community and financially supported by the Chamber of Commerce and the local AVA chapter.

A one-time grant was awarded to the IRA (Wrangell Cooperation Association) to help provide a tour guide and custodian at Shakes Island. The grant will allow these services to be provided six days a week to tour groups arriving on cruiseships from June to August. The tour includes a visit to Shakes House and the island totems and an explanation of the island's history.

Tourists usually have a particular reason for choosing to visit communities. Attractions that entice people to visit Wrangell include its historic resources (see section on historic sites), fishing, hunting and scenic beauty. Other attractions include:

Fourth of July Celebration - The three day event is a major celebration and features a parade, fireworks, a logging show and competition, boat races, street games, toddler events, booths, variety show, melodrama, six-mile foot race, childrens' fishing derby and queen contest.

Tent City Festival - Wrangell staged its first Tent City Festival in 1980, commemorating Wrangell's historic role as a city made up of miner's tents during the nineteenth century gold rush days, when hundreds of miners congregated in Wrangell while waiting to go up the Stikine River to the gold fields. The first Tent City Festival was a success, and it is expected to become an annual mid-winter event (see section on history). Activities at the festival reminiscent of the gold rush era include a tall-tale contest, beer drinking and beard growing contests, melodrama by the Tent City Players, sourdough pancake breakfast, bluegrass music, beanpot supper, a hoe-down, period costume contest, horseshoe tossing, childrens' movies, mens' and womens' arm wrestling, and judging of crafts and cooking.

Shakes Island - The island, with its historic communal house and surrounding native totems, is an interesting and picturesque attraction in the Wrangell Harbor.

Stikine/LeConte Wilderness Area - The scenic Stikine River offers recreation opportunities including sightseeing, fishing and hunting for bear, moose, deer, goats and waterfowl. The Stikine River mudflats, about four miles north of Wrangell, offer the best waterfowl hunting in Southeast Alaska. Because of the recent wilderness designation, recreation/tourist use of this area should be increased. Several charter boat operations offer trips to the area, including the LeConte Glacier.

Fishing Resort - A floating luxury wilderness fishing resort/retreat is scheduled to be in operation in 1982. The floating resort will initially consist of two barges, constructed in Wrangell, with three-bedroom cedar houses built on them. Each barge will be equipped with a skiff, fishing gear, food, water, linen, crab pots and a cook/guide if desired. The floating resorts will be towed and anchored at various locations in the Wrangell Island/Bradfield Canal area, taking advantage of fish migrations and wildlife observation opportunities. Each barge can accommodate up to six people at about \$250 per day per person. A third barge that will be made available for guest use will contain a cocktail lounge, dance floor and a sauna. The intent of the resort operators is to provide vacationers with the comfort and safety of home while in beautiful wilderness surroundings (Wrangell Sentinel).

Charter Boats - Several charter boat operators in Wrangell offer sightseeing trips to such places as the Stikine River and LeConte Glacier, as well as fishing excursions in the area. Recent entries in the charter boat business are two nineteen-passenger boats that will be used for cruises throughout the area.

A recent report on tourism in Wrangell prepared for the Stikine Native Organization noted that, in order to attract significant tourist trade, attractions must be "packaged" - for example, a variety of attractions and activities assembled as part of a tour. Tour packages are enticing because it is otherwise difficult to know in advance what is available and how much it will cost. Tour packages also offer security by ensuring transportation, lodging and services.

A tourism program that attempts to attract fairly stable, moderate-volume and relatively unobtrusive tourism would probably be best accepted by the community. For example, small package tours of ten to twenty people at a time, spaced throughout the summer, combined with other low-profile tourism generating attractions (e.g., a moderate number of charter boats for sightseeing and fishing), would have little adverse effect on the lifestyle of Wrangell residents or the character of the community. This is particularly true if visitors spend most of their time on outings in the surrounding area. A concentration of visiting fishermen or hunters at places frequented by local residents could potentially pose problems.

In an effort to attract more tourist trade to Wrangell, a local AVA chapter was formed in 1980. Recognizing that Wrangell is all but invisible in the tourist market, the local AVA chapter, with the support of the statewide AVA, the city, Chamber of Commerce and state findings, is trying to disseminate information about Wrangell to people before they make vacation plans. As part of this effort, brochures were developed and distributed statewide and in the northwest.

The AVA also intends to help get the town ready for tourists by participating with other community groups to clean up the town and pick up garbage, among other activities. Another objective of the local AVA is to work with the Wrangell Historical Society to preserve native artifacts and make them accessible to the public.

The AVA's long-range interests include the development of an overnight camper area, perhaps at Shoemaker Bay. While such a facility would attract more people with recreational vehicles and campers to Wrangell, the proportion of people coming to Alaska in vehicles is diminishing, presumably due to the ever-increasing cost of fuel. RV's and campers are generally self-contained and need only be supplemented with perishables, such as fresh produce and seafood, available locally. Some of these people will undoubtedly be enticed into chartering a fishing or sightseeing trip, having a few meals at a local restaurant or purchasing souvenirs.

If a camper park is located more than walking distance from downtown, one can expect increased traffic and the need for parking spaces in areas frequented by visitors - the business district and grocery stores. If Wrangell does become part of a recreational vehicle/camper circuit, provisions should be made for an appropriate increase in parking areas.

The local AVA chapter, along with many community residents, supports the development of a road that would link Wrangell with the Canadian highway system (see the transportation section for details). Such a road would bring more tourists to Wrangell and give local residents considerably more mobility; however, the high costs of construction and the need for Canadian cooperation and funding of a portion of the highway makes this a long-term method of increasing tourism at best (see section on transportation).

MINING

Although mining is not a significant component of the Wrangell economy, it has the potential to be (see section on Natural Resources). Exploratory work is being done in Groundhog Basin, about eleven miles due west of Wrangell, by Amax Exploration of Denver. They hope to find a substantial deposit of molybdenum. Amax started its work in the area in 1976 and has drilled a test hole each year since, with Amax representatives reportedly encouraged by the results. Discussions with Amax representatives indicate that if a deposit is found that is large enough to warrant

extraction, it would probably be ten to twelve years after the discovery before mining would actually begin. Market conditions and permit requirements could delay operations substantially.

In the event that major mining operations do occur in Groundhog Basin, it would have a substantial impact on Wrangell. State policy discourages the development of towns for mining operations and mining companies typically avoid setting up major camps; Wrangell would therefore probably be used as a trade and service center and perhaps as a "bedroom community" and support base. The project is too speculative at this time to identify potential impacts and prepare for them. If it becomes evident that a major mining operation will occur in Groundhog basin, Wrangell will have several years to prepare for it.

In addition to the mining potential at Groundhog Basin, substantial iron deposits near the north fork of the Bradfield River, about fifty miles southeast of Wrangell, could be developed. If so, it is likely that Wrangell would be used as a supply base.

The high level of claim activity on Kupreanof, Zarembo and Woronkofski Islands near Wrangell, associated primarily with hard-rock deposits of gold, holds some promise. Here again, Wrangell would probably serve as a support base if significant mining activity occurred.

There is a possibility that exploitation of the world-scale copper resources in the Scud River area of British Columbia (about sixty-five miles from Wrangell via the Stikine River) could affect Wrangell. As was noted in the 1978 Wrangell Overall Economic Development Plan, the extent of economic benefit of the Scud River deposits to Wrangell is dependent on the size and scope of the mining operation, the selection of a transportation route for transporting the ore and the location of smelting operations. In the event that price and demand for copper reach a level to warrant extraction, it is possible that ore might be barged down the Stikine (if federal regulations permit) to Wrangell for transshipment. If a deepwater port is established at Crittenden Creek or at another location near Wrangell, the city will benefit from providing services and trade (see the 1978 Wrangell OEDP for additional information, pp. 30-33).

GOVERNMENT

After a downturn in federal employment in Wrangell in 1975, when the BIA closed the Wrangell Institute, employment in government service has generally been increasing in recent years. The institute was later used by the USFS as a Young Adult Conservation Corps (YACC) center. About 125 youths were employed, with over thirty supervisors and attendants. This operation, which was recently abandoned, injected about \$1.75 million into the Wrangell economy each year. The community also benefited from free-of-charge recreation facility projects completed by the YACC participants.

While there was a dip in employment levels in 1979, USFS representatives indicate that their Wrangell staff will probably double by the end of 1981. Reorganization at the ranger district level within USFS is expected to add fifteen positions in Wrangell, making a total of thirty. Some of these positions will be filled locally, while other positions will be transferred from Petersburg.

State and local government employment is expected to remain relatively stable. Gradual increases in local government employment should occur commensurate with community growth.

TRADE AND SERVICES

Trade and service components of the economy have shown steady growth over the last decade, reflecting the general growth in Wrangell's economy. Future employment levels in these sectors are dependent on overall trends in the economy. Short-term downturns in the economy generally do not result in an equivalent drop in trade and service employment, however, as people are still dependent on these services.

The decrease in employment levels at the new ALP mill will probably result in a minor reduction in trade and service businesses. The increasing promotion of tourism in the community will more than likely offset this setback, at least seasonally, providing growth in the trade sector. The Chamber of Commerce attempt to increase business with area logging camps could also generate an upswing in retail business and dependent employment. Large construction projects that employ people from Wrangell and outside will also keep shopkeepers at their cash registers more of the time and, as was previously mentioned, the Tyee Lake hydroelectric project will bring considerable business to Wrangell for the duration of the project (about three years).

TRANSPORTATION, COMMUNICATIONS AND UTILITIES

This industry showed a slight drop over the past ten years, despite a sharp increase between 1970 and 1975. The drop between 1975 and 1976 corresponds to the closing of the Wrangell Institute. The transportation sector could experience gains in the next few years with increased port activity (log exports) and increases in tourism. Any major increases in timber production and exports or increased mineral exploration activity would also require more transportation services. Communications and utilities are not expected to show any significant changes in the future.

CONSTRUCTION

Employment in this industry in recent years has been dependent on major construction jobs; high interest rates have seriously reduced residential construction and this trend could continue for

several years. The construction of the ALP mill provided employment in the trades for many people. Upgrading roads in the area also provided some employment. The expansion of the city dock required a substantial workforce, though most of the workers were imported from outside community. Construction of the recreation complex at Shoemaker Bay, whether all at one time or in phases, will provide a substantial number of jobs, many of which could be filled by local people. The availability of state funds from oil revenues for construction of various projects should continue to support a healthy construction industry in Wrangell for several years.

The Tye Lake hydroelectric project will require a large number of people (80 to 120) for construction of the facility. While many of these people must be brought from outside the area to obtain necessary skills, the contractor hopes Wrangell residents will be able to fill thirty or more construction and support positions, with training to be provided for some. The project is expected to take about three years to complete, with employment expected to peak in 1982.

