ANNUAL PROGRESS REPORT

COASTAL MANAGEMENT PROGRAM

Matanuska Susitna Borough

MATANUSKA-SUSITNA BOROUGH
COASTAL MANAGEMENT PROGRAM

FIRST ANNUAL PROGRESS REPORT

PREPARED BY

SIMPSON USHER JONES, INC.
810 "N" STREET, SUITE 100
ANCHORAGE, ALASKA 99501

DAMES & MOORE CONSULTING ENGINEERS
510 "L" STREET
ANCHORAGE, ALASKA 99501

A. W. BURNS CO.
3231 MONTPELIER COURT
ANCHORAGE, ALASKA 99503

JUNE 1979

This project was supported in part by federal Coastal Zone Management Program Development funds (P.L. 92-583, Sec. 305) granted to the State of Alaska by the Office of Coastal Zone Management, National Oceanographic and Atmospheric Administration, U.S. Department of Commerce.

Matanuska-Susitna Borough

BOX B, PALMER, ALASKA 99645 • PHONE 745-3246

DEPARTMENT OF ADMINISTRATION

June 20, 1979

Lee McAnerney, Commissioner
Dept. of Community & Regional Affairs
Pouch B
Juneau, Alaska 99811

Dear Commissioner McAnerney:

In accordance with the terms of the contract between the Matanuska-Susitna Borough and the State of Alaska Department of Community and Regional Affairs, I am transmitting the first-year Matanuska-Susitna Borough Coastal Management Progress Report.

We wish to call to your attention that this progress report is not the final product of the Matanuska-Susitna Borough coastal management effort, nor does this particular progress report carry any specific endorsement or letter of adoption by the Matanuska-Susitna Borough Assembly. We ask you to consider it for exactly what it is, a progress report, demonstrating our efforts and progress towards the development of a coastal management program for the Matanuska-Susitna Borough in full compliance and consistent with the Alaska Coastal Management Policy Act and guidelines.

We look forward to continued work in the development of our coastal management program and assistance from the coastal management funds as administered by your office for 1979-1980.

Sincerely,

Norman J. Levesque
Borough Manager

NJL:ys

Matanuska-Susitna Borough
Box B
Palmer, AK 99645

Attn: Mr. Norm Levesque and Assembly Members

This document represents the coastal management progress report for the Matanuska-Susitna Borough for 1978 and the first part of 1979. It should be understood by all readers that this is a progress report and is not intended nor should it be considered as the Matanuska-Susitna Borough Coastal Management Program.

You will note that the report covers in detail the Alaska Coastal Policy enabling legislation, standards and guidelines, as well as the federal guidelines and enabling legislation.

Also, as you are aware, the Matanuska-Susitna Borough is presently faced with many economic development factors and considerations. We feel there is a definite need for more economic resource data, as well as social, physical, and other baseline data, which will enable the Matanuska-Susitna Borough to prepare a management program for the development of their coastal resources which, if used properly, can mitigate physical impact of development.

I want to thank you and members of your staff, specifically Mike Kleppinger, for the assistance and cooperation they have shown us during the preparation of this report. We are sure with continued fine assistance from yourself and the other staff members that the Matanuska-Susitna Borough will accomplish a coastal management program of great quality.

Sincerely,

SIMPSON USHER JONES, INC.

Paul A. Carr
Senior Planner

PAC/dl

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF MAPS

INTRODUCTION

During October of 1972, the U.S. Congress created a law which recognizes the economic and ecologic linking of coastal communities throughout the nation. It is called the Coastal Zone Management Act and its stated purpose is to:

> "a) ...preserve, protect, develop and where possible restore or enhance the resources of the nation's coastal zone for this and succeeding generations and,
>
> "b) ...to encourage and assist the state to exercise effectively their responsibilities in the coastal zone...to achieve wise use of land and water resources in the coastal zone...."

This federal law inspired the Alaska Legislature to enact the Coastal Management Act of 1977. Our state law recognizes the fact that Alaska is a very large land area with 34,000 miles of coastline (36% of the total U.S.) and is inhabited by a great variety of people, the majority of whom live near the coast.

The Alaska Coastal Management Act is designed to bring the restoration and enhancement of coastal resources to the local level, while ensuring the maintenance of statewide and national resource interests as well. The state law has created the Alaska Coastal Policy Council and designated Regional Education Attendance Areas (REAA) and boroughs and municipalities as local area or "district" coastal units. It is the job of the Alaska Coastal Policy Council to review and approve local district methods of achieving wise uses of land and water resources in the coastal area. It is the job of the Matanuska-Susitna Borough, as a district, to provide input to the Upper Cook Inlet and State of Alaska Coastal Management Programs. We are asked to manage as we see fit, or to step aside and allow the state to manage the coastal zone without this statement of local desire and intent.

This "progress report" is the product of the first phase of a project that will eventually result in the implementation of a management plan for the coastal areas of the Matanuska-Susitna Borough.

The time frame for completing the total coastal management program as presently envisioned is as follows:

Preliminary Program Development
July 1978 to June 1979
- Progress report submitted to federal and state agencies, as well as the Alaska Coastal Policy Council, for informational purposes only.

Program Development
July 1979 to March 1980
- Hearing draft program document detailing management mechanisms provided to Assembly, Planning Commission.

Program Adoption by Assembly
April 1980 to June 1980
- Hearing draft, as revised during March, presented at three public meetings.

Program Adoption by Alaska Coastal Policy Council
June 1980 to September 1980
- Final management program presented to ACPC, revised, and accepted.

Start of Implementation
January 1981
- Development of specific implementing programs continues.

The Matanuska-Susitna Borough as part of a continuing planning effort has recently had prepared a vitally needed Extractive Resource Inventory Report. This report, completed without state or federal assistance, was prepared by Mr. Levake Renshaw, P.E., Consulting Engineer. The reader of this Annual Progress Report is urged to review the Extractive Resources

Inventory Report as it will play a vital role in the development of the Matanuska-Susitna Borough's Coastal Management Program in the years to come. The Extractive Resources report is attached as an Appendix to this report.

Chapter IX of this Annual Progress Report is a summary of the first eight chapters and is intended to present an overview of the legislative requirements, issues, coastal management boundaries, authority, and future work program.

CHAPTER 1

THE IMPORTANCE OF COASTAL MANAGEMENT IN UPPER COOK INLET, ALASKA

INTRODUCTION

Cook Inlet commands the state's attention for several reasons. First, the economic productivity of the Cook Inlet Region and its coastal area holds statewide importance, and it continues to grow. Second, the coastal area of Cook Inlet offers an attractive mix of social, economic, and natural amenities; it is very livable. Third, the natural resource base of the coastal area is vital to its productivity and livability. To assure the continued productivity and livability of the coastal area in the face of its increased use and intensive development, the complex interactions of its natural resource systems must be understood and managed. Fourth, local governments (the coastal resource districts) and the state must jointly play a role in coastal management because a large part of the coastal resource base is publicly owned and still more of it is subject to established regulatory and public investment programs. Fifth, this area is the major port of entry for goods and materials supporting most of Alaska. Coupled with these factors is the fact that the complex interactions of the social, economic, and physical systems of the area must be understood and managed to maintain the present viability of the region.

The importance of Cook Inlet, for both today and the foreseeable future, is evident in the fact that the coastal area concentrates a majority of the state's population as well as a majority of its economic activity into a small land and water area compared to the state as a whole. It has grown rapidly, and most indicators point to continued growth. Because of the level of existing development in the Anchorage port area and

continuing bottom silt build-up, the size of ships and frequency of visitation to the port of Anchorage could be reduced. This increases the significance and importance of the potential Matanuska-Susitna Borough port planning activities for imported goods. Of equal importance is the potential for exportation of resources from the interior of Alaska and the Matanuska-Susitna Borough as well.

Developmental pressures will not only be great in urban areas, but increasing demands for new growth areas, recreational areas, future port facilities, industrial sites, mineral production, freshwater supplies, second homes, and environmental amenities will be felt throught Cook Inlet.

ECONOMIC PRODUCTIVITY

Several economic sectors depend directly upon coastal waters and/or adjacent lands - waterborne transportation, commercial fishing, recreation and tourism, and offshore or onshore resource exploration and development. Each of these compete with each other in varying degrees for the use of the coastal resources. Port facilities and dredged channels that may interfere with continued biologic productivity in some parts of Cook Inlet could have adverse effects on sport and commercial fishing. Likewise, aesthetic considerations that benefit recreation, tourism and residential areas sometimes could conflict with the intensive uses of coastal waters. Petroleum producers and refiners, petrochemical manufacturers, agriculture, and housing make competing demands for coastal resources. The water demands of these sectors and of the boroughs and municipalities of Cook Inlet may at some point reduce the inflows of freshwater and nutrients to coastal ecosystems. Likewise, the shipping waterway needed to sustain the Upper Cook Inlet economy requires dredging. Wetlands and other areas necessary for the continued biologic productivity of the coastal shorelands and estuary may be damaged by changed freshwater nutrient, or sediment inflows. The refinement of the Matanuska-Susitna Borough Coastal Management Plan will help to answer questions concerning the importance of Cook Inlet to the Pacific Ocean fisheries, the level of use that these shorelands can

sustain for an extended period, and the tradeoffs in land use that will be necessary to realize the economic productivity potential of the coastlands without causing undue damage to the coastal environment.

LIVABILITY

Direct economic activities, however, are not the only measure of coastal productivity; the "livability" of the coastal area must be considered. Livability refers to the qualities that make an area a good place to live. A livable place offers more than satisfaction of the necessities; it offers a balance between continuing economic opportunities and other attractive qualities. In the coastal area, these qualities include a mixture of natural resources, not all of which are adequately taken into account by the marketplace: an adequate freshwater supply, including unpolluted surface water and groundwater producible without adverse effects, clean fresh air, open spaces, fishing and hunting opportunities, and outdoor recreational opportunities. Other components of livability are the availability of jobs, public safety, public facilities, and freedom from unnecessary and unwanted governmental restrictions. Retaining all these components requires a balance between development, conservation, and preservation. People demand a mixture of elements for a high quality of life, and they assign different priorities to these elements. Coastal planning seeks to recognize competing priorities and mitigate any conflicts.

Just as the various economic sectors compete for resources, some of the components of livability conflict with one another. For example, some jobs may depend on intensive economic activities that conflict with aesthetics, health, or other social values; or increased transportation and access to remote areas for resource development may also increase recreational exposure and turn what was once a secluded area into a well used campsite.

NATURAL RESOURCES

The livability and abundant economic productivity of the coastal areas of Cook Inlet make it important; but why should there be concern for it? The answer is that the natural resource base which makes possible the livability and the economic activities of the coastal area is being changed by these very activities. When a river is dammed for flood control, hydropower generation, or water supply, freshwater, nutrient, and sediment inflows to the Inlet may be curtailed. When a channel is dredged, circulation patterns are changed by both the channel and its support area. When a marsh is partly filled for some development activity, marsh production is diminished. The complexity and interdependence of both the human and natural systems along the coastal area mean that activities using coastal resources may have unseen but important repercussions. To assure a lasting and desirable mix of benefits from coastal resources in the face of growing demands upon them, the workings of coastal resource systems must be better understood. This will allow mitigation measures to be applied where possible so that the repercussions of such interaction can be minimized.

Not all areas of the coastal waters or shorelands are alike. They do not all yield the same products in the same quantities, nor do they need the same ingredients to sustain them. Although shorelands, marshes, submerged grass areas, tidal flats and other resources of the coastal area differ from one another, they are interconnected and affect one another. Uses of the uplands affect the coastal resources and thus there is a need to prepare land use management plans to prevent the loss or excessive depletion of coastal resources.

To understand each of these areas in the context of the coastal system as a whole, the coastal system may be broken into a manageable number of geographic subunits. These may be referred to as "composite resource areas" called Policy Areas, since they create functional units containing resources (natural and cultural) which are or should be associated.

Composite resource areas or Policy Areas, whether natural or manmade, are mappable entities defined by local biophysical and cultural resources.

These composite resource areas are very important to the coastal resource management plan. It will be these composite resource areas and the sub-units that comprise them that will allow the definition of permissible uses to be made and allow for a determination of what land and water uses could cause direct and significant impacts on coastal waters.

These composite resource areas, called Policy Areas (Natural, Conservation, Urban and Rural), and their sustaining parameters must be taken into account if public and private decision makers are to harmonize the use and development of coastal resource systems with continued and future economic productivity and livability of the Matanuska-Susitna Borough.

ROLE OF COASTAL RESOURCE DISTRICTS

Given the rising demand for the economic resources and livability of the coastal area, and given the complex interdependence within and among the human and natural systems of the coast, why are these coastal issues governmental concerns rather than merely private sector matters? The answer, of course, is that a large part of the coastal area resource base is publicly owned and still more of it is subject to long-established regulatory and public investment programs.

The basic thrust of both the federal and state Coastal Management Acts is to recognize the national, regional, state, and local interests in coastal resources through a precedent intergovernmental network and to establish balanced resource management plans which recognize the need for economic development while at the same time preserving, protecting and, where possible, restoring valuable coastal resources. Implicit in this mission is the creation of conflict resolution mechanisms to help make the difficult resource allocation choices.

Local governments have traditionally been responsible for land use decisions within their boundaries. The coastal management program combines local interests with those of the state and federal government in some respects. It allows the state and federal agencies to have the

benefit of local coastal management policy for use in their regional, statewide, and national coastal planning programs. At the same time it establishes and protects the level of authority that local governments have over their own coastal areas.

All coastal salt water is publicly owned, as are the fish and wildlife in these waters. The submerged lands and most tidelands are owned by the state, although tidelands may be privately owned.

The state also conducts many regulatory and investment functions in the coastal area, and public safety regulations have been established to prevent significant costs to health and property. Other existing regulations protect the public's interest against undesirable externalities, for example - air pollution and water pollution, which cannot be adequately resolved by private enterprise alone because not all the costs and benefits of the decision to dispose of wastes into the air and water are borne by the parties making the decision. Significant costs are borne by others in the area whose health and property are damaged.

From a regional impact standpoint, apart from governmental action, the polluter has little economic incentive to avoid imposing this cost upon others. At the local level, however, most developers are acutely aware of the economic advantages associated with providing pollution control measures and economic incentives are not necessarily required.

Public bodies should organize their productivity and livability to maximize their investments as does the private sector.

The Alaska Coastal Management Act of 1977 created the Alaska Coastal Policy Council to help put district plans together into a statewide coastal management plan. Under this law, the State of Alaska has mandated specific controls (Guidelines and Standards) for the coast and also established a state review of district plans and, therefore, land use/management plans and ordinances having an effect on the coastal area. According to this type of management scheme, Alaska established criteria and standards for local implementation, with review by the state for conformity of local plans with such criteria and standards,

and enforcement of compliance with existing state authorities. Once the local plans are accepted by the state, the primary responsibility for managing coastal areas would reside with local governments. However, state agencies are required to perform their duties and activities in the coastal zone in conformity with approved district programs. Federal agencies, through the consistency provisions of the Act, must act and conduct their activities in a manner consistent with the district plans to the extent practicable. Guidelines relating to the "extent practicable", however, have not been fully defined at this time.

SUMMARY

The coastal area is a focus for concern because the increasing use and demand for coastal resources raises doubts that the present productivity and livability supported by coastal resources will be maintained into the 21st century. Coastal resources and resource values, economic productivity, and livability are interdependent. The full arena of these matters fall within the scope of governmental concern as it has been changed with protecting the public health, safety, and welfare. This has been clearly stated in the federal declaration of policy regarding coastal management.

> "The Congress finds and declares that it is the national policy (a) to preserve, protect, develop, and where possible, to restore or enhance the resources of the Nation's coastal zone for this and succeeding generations, and (b) to encourage and assist the state to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of land and water resources of the coastal zone giving full consideration to ecological, cultural, historic, and aesthetic values as well as to needs for economic development."

The preceeding paragraphs have presented an overall perspective of coastal management and federal declaration of policy. In concert, they allow the preparation of the next chapters - the development of a planning methodology, a framework for establishing and assessing direct and

significant impacts, and establishing a methodology to manage the resources of the coast.

First, however, consideration must be given to the specifics of the Alaska Coastal Management Act and a discussion of the specific coastal management problems facing the Matanuska-Susitna Borough.

CHAPTER II

REQUIREMENTS OF THE ALASKA COASTAL MANAGEMENT ACT OF 1977

INTRODUCTION

The purpose of this chapter is to relate the Matanuska-Susitna Borough's program to the specific requirements of the Alaska Coastal Management Act. The chapter is structured to emphasize the relationship of the Borough program to the key policies and requirements of the Act and Part 6, Alaska Administrative Code, Chapters 80 and 85, Standards and Guidelines relating to coastal zone uses and activities, boundaries, areas meriting special attention, public participation, and implementation procedures.

STATE POLICY

The management philosophy of the State of Alaska is that its coast is a distinct and valuable natural resource of concern to all the people of the state and that the demand upon the resources of the coastal area are significant and will increase in the future. The findings of the legislature provided the basic conceptual framework from which a planning methodology was developed. The legislature stated that "the protection of the natural and scenic resources and the fostering of wise development of the coastal area are of concern to present and future citizens of the state, and that the capacity of the coastal area to withstand the demands upon it is limited." Also of importance is the finding by the legislature that "the degree of planning and resource allocation which has occurred in the coastal area has been motivated by short term considerattions, unrelated to sound planning principles." Based upon these findings, the legislature concluded that :

"in order to promote the public health and welfare, there is a critical need to engage in comprehensive land and water use planning in coastal areas and to establish the means by which a planning process and management program....may be effectively implemented."

Based upon these findings, the legislature developed the following general policy to direct coastal management and planning.

It is the policy of the state to:

1. "preserve, protect, develop, use, and, where necessary, restore or enhance the coastal resources of the state for this and succeeding generations...";

2. "encourage coordinated planning and decision making in the coastal area among levels of government and citizens engaging in or affected by activities involving the coastal resources of the state...";

3. "develop a management program which sets out policies, objectives, standards and procedures to guide and resolve conflicts among public and private activities involving the use of resources which have a direct and significant impact upon the coastal land and water of the state...";

4. "assure the participation of the public, local governments, and agencies of the state and federal governments in the development and implementation of a coastal management program...";

5. "utilize existing governmental structures and authorities, to the maximum extent feasible, to achieve the policies set out in this section...";

6. "authorize and require state agencies to carry out their planning duties, powers and responsibilities and take actions authorized by law with respect to programs affecting the use of the resources of the coastal area in accordance with the policies set out in this section in the Guidelines and Standards adopted by the Alaska Coastal Policy Council under AS 46.35."

Today, most local government land use plans appear to reflect current growth pressures resulting from economic and political interests rather than an analysis of land development capabilities and limitations based on characteristics of natural land areas. The result has too often been the destruction of scarce environmental resources and the serious disruption of natural processes with evident immediate and future consequences. Fortunately, we have for the most part avoided serious problems of this type to date.

Today it must be realized that the characteristics of the physical environment have far reaching effects on urban development and the ultimate costs and pattern of land use. There is a need to incorporate information on natural phenomenon and process into the planning process and to apply the resulting analysis to land development. Broadly stated, the purpose of this ecological planning method is to understand the character of a place and to utilize such understanding in planning its use and development. The purpose behind this approach is simple. The natural resource base: land, water, biota, and minerals, is finite. Problems result from human demands on this natural system, because all lands and waters are not equally suited for all uses. The planner and public policy maker must, in their respective spheres, understand the diversity of the land and water and the uses of them in order to encourage sound and balanced development of multifaceted human systems. One of the responsibilities of public planners and policy makers should be the collection and dissemination of information regarding the complexity of natural resources. Heretofore, projects in both the public and private realms have too often been undertaken without an adequate knowledge of local land and water conditions. The planning process being utilized for the coastal management program is based on the general methodology

of the land suitability approach, it involves the analysis of the physical and social environment, the interpretation of these findings, the formulation of rational explicit criteria, and finally, the identification of geographic areas and their suitability for various land uses. This method, in concert with a sound economic development program, can best achieve the goals of the people of the Matanuska-Susitna Borough.

This philosophy and planning methodology are consistent with the general policy of the Alaska Coastal Management Act of 1977.

REQUIREMENTS OF THE ACT

All coastal resource districts are required by state law to develop and adopt coastal management programs in accordance with the Act as outlined in 6 ACC 85.010-100. Ten specific program elements are listed, and include:

1. NEEDS, OBJECTIVES, AND GOALS (6 ACC 85.010)

   The Matanuska-Susitna Borough must include a statement of overall needs, objectives, and goals for coastal management (reference Comprehensive Plan, Phase II).

2. ORGANIZATION (6 ACC 85.020)

   The Matanuska-Susitna Borough must include a description of the district program organization and include budgetary and a schedule for reorganization as necessary to implement and carry out a coastal management program.

3. BOUNDARIES (A CC 85.030)

   The Matanusua-Susitna Borough must map and delineate the boundaries of the coastal area within the district subject to the district program in accordance with the provisions of 6 AAC 85.040.

4. RESOURCE INVENTORY (6 ACC 85.040)

The Matanuska-Susitna Borough must include a comprehensive resource inventory which describes natural resource, land use and land status in a manner sufficient for program development and implementation.

5. RESOURCE ANALYSIS (6 ACC 85.050)

The Matanuska-Susitna Borough must include a resource analysis sufficient in detail for program development and implementation as specified in 6 AAC 85.060.

6. SUBJECT USES (6 ACC 85.060)

The Matanuska-Susitna Borough must include a description of the land and water uses and activities which are subject to the district program. Uses which must be included, if applicable, are: a) coastal development, b) geophysical hazard areas, c) recreation, d) energy facilities, e) transportation and utilities, f) fish and seafood processing, g) timber harvest and processing, h) mining and mineral processing, i) subsistence.

7. PROPER AND IMPROPER USES (6 ACC 85.070)

The Matanuska-Susitna Borough's district program must include a description of the uses and activities, including uses of state concern, that will be considered proper and improper within the coastal area, including land and water use designations.

8. POLICIES (6 ACC 85.080)

The Matanuska-Susitna Borough's district program must include a statement of the policies that will be applied to land and

water uses and activities subject to the district program and the process which will be used to determine whether specific proposals for land and water uses and activities will be allowed.

9. IMPLEMENTATION (6 ACC 85.090)

The Matanuska-Susitna Borough's district program must include a description of the methods and authority which will be used to implement the district program.

10. PUBLIC PARTICIPATION (6 ACC 85.100)

The Matanuska-Susitna Borough's district program must include evidence of effective and significant opportunities for public participation in program development.

COASTAL USES AND ACTIVITIES

Also, the Act states that in planning for and approving development in coastal areas, local districts must give consideration to the following areas:

1. COASTAL DEVELOPMENT — Districts shall give, in the following priority, priority to
   - A. Water-dependent uses and activities
   - B. Water-related uses and activities.
   - C. Uses and activities that are neither A or B for which there is no feasible inland alternative.

2. GEOPHYSICAL HAZARD AREAS
   - A. Districts shall identify known geophysical hazard areas.
   - B. Districts shall identify areas of high development potential.

		C.	Development in these areas may not be approved until standard siting, design and construction criteria have been met to minimize property damage and to protect against loss of life.
3.	RECREATION	A.	Districts shall designate areas for recreational use.
		B.	Receive significant use.
		C.	Have potential for recreational use.
4.	ENERGY FACILITIES	A.	In summary, this section required the state and districts to cooperatively identify sites that are suitable for the development of major onshore, nearshore, offshore and OCS energy facilities.
5.	TRANSPORTATION AND UTILITIES	A.	Transportation and utility routes and facilities in the coastal areas shall be sited, designated, and constructed so as to be compatible with local community goals and desires and expressed in district CZM plans and shall be sited inland from beaches and shorelines unless the route or facility is water-dependent and no feasible inland alternative exists.
6.	FISH AND SEAFOOD PROCESSING	A.	Districts shall identify and may designate areas of the coast suitable for the location or development of facilities related to commercial fishing and seafood processing.
7.	TIMBER HARVEST AND PROCESSING	A.	Commercial timber harvest activities in the coastal area shall be sited in areas where the management of reforestation, using the best available technology, will result in producing a sustained yield of merchantable timber unless the area is to be converted to a use other than timber harvest and shall meet the standards as specified in Part 6, ACC 80.100.

8.	MINERAL AND MINERAL PROCESSING	A.	Mining and mineral processing in the coastal areas shall be permitted, designed, and conducted so as to be compatible with the standards contained in Part 6, ACC 80.100, adjacent uses and activities, regional programs, statewide and national needs, district programs, and local comprehensive plans.
			Sand and gravel may be extracted from coastal waters, intertidal areas, barrier islands, and spits when there is no feasible and prudent alternative to coastal extraction which will meet the public need for the sand or gravel.
9.	SUBSISTENCE	A.	Districts and state agencies shall recognize and assure opportunities for subsistence usage of coastal areas and resources.
			- Districts shall identify areas in which subsistence is the dominant use of coastal resources.
			- Districts sharing migratory fish and game resources shall be required to submit compatible plans for habitat management.
10.	HABITATS	A.	Habitats in the coastal areas which are subject to the Alaska Coastal Management Program include 1) offshore areas; 2) estuaries; 3) wetlands and tideflats; 4) rocky islands and seacliffs; 5) barrier islands and lagoons; 6) exposed high energy coasts; 7) rivers, streams, and lakes; and 8) important upland habitat, and shall be managed so as to maintain or enhance the biological, physcal, and chemical characteristics of the habitat which contribute to its capacity to support living resources.

11.	AIR, LAND AND WATER QUALITY	A.	Notwithstanding any other provision of this chapter, the statutes, regulations, and procedures of the Alaska Department of Environmental Conservation with respect to the protection of air, land, and water quality are incorporated into the Alaska Clastal Management Program and, as administered by that agency, constitute the components of the coastal management program with respect to those purposes.
12.	HISTORIC, PREHISTORIC, AND ARCHAEOLOGICAL RESOURCES	A.	Districts and appropriate state agencies shall identify areas of the coast which are important to the study, understanding, or illustration of national, state, or local history or prehistory.

In addition to the ten specified program elements, the Alaska Coastal Management Program Document requires districts to "specifically address other important aspects in their management program document. These include:

1. Areas Meriting Special Attention

2. Federal Consistency/Federal Exclusion/Federal Agency Participation

3. Uses of State Concern

4. Erosion Planning Element

5. Energy Facilities Siting

6. Shoreline Access Planning Element

These program elements are briefly described below:

1. Areas Meriting Special Attention - Article 4, 6 AAC 80.16

A. Means - a delineated geographic area within the coastal area which is:

a. sensitive to change or alteration and warrants special management, attention, or,

b. which, because of its value to the general public, should be identified for current or future planning, protection, or acquisition.

B. These areas include:

a. areas of unique, scarce, fragile, or vulnerable natural habitat, cultural value, historical significance, or scenic importance;

b. areas of high natural productivity or essential habitat for living resources;

c. areas of substantial recreational value or opportunity;

d. areas where development of facilities is dependent upon the utilization of, or access to, coastal waters;

e. areas of unique geologic or topographic significance which are susceptible to industrial or commercial development;

f. areas of significant hazard due to storms, slides, floods, erosion;

g. areas needed to protect, maintain, or replenish coastal land or resources, including coastal flood plains, aquifer recharge areas, beaches and offshore sand deposits;

h. potential esturine or marine sanctuaries;

i. areas important for subsistence hunting, fishing, and food gathering;

j. areas with special scientific values or opportunities.

District management programs must include management schemes for areas which merit special attention and must preserve, protect, enhance, or restore the value or values for which the area was designated.

2. Federal Consistency/Exclusion/Participation

Federal agencies are obligated to participate in coastal management by federal law and thus will be involved in local program development and implementation. The ACMP guidelines and standards likewise require that coastal resource districts provide opportunities for federal involvement in the development and approval of the district programs.

Federal agency participation is particularly important in the Mat-Su Borough. The Alaska Native Claims Settlement Act transfers some 115,000 plus acres to Eklutna Inc. and transfers land to Cook Inlet Regional Native Corporation, some of which is located in the borough. The Alaska Railroad (a federally owned railroad) occupies land in the coastal zone.

Federal agency participation in the planning process is important because the Federal Coastal Zone Management Act provides that once a state program is approved (and district programs are part of the state program), federal agencies must conform to it to the maximum extent practicable in all of their activities, including the issuance of federal permits and licenses.

The Coastal Zone Management Act is clear in its intent that federal activities in the coastal zone be consistent with state efforts. Section 307 (c) (1) states: "Each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs."

However, Section 304 (a) states in part: "Excluded from the coastal zone are lands the use of which by law is subject solely to the discretion of or which is held in trust by the Federal Government, its officers or agents."

In order to clarify the degree of control that states may exercise over activities on federal lands, the U.S. Justice Department rendered a legal opinion on August 10, 1976, which in summary states: "....the exclusionary clause excludes all lands owned by the United States from the definition of the coastal zone."

3. Uses of State Concern

The Matanuska-Susitna Borough, as a coastal resource district, is obligated in the ACMP Guidelines to consider and provide for uses of state concern, and thus will be accountable to the state and national interest as the state itself is.

Uses of State Concern are defined as:

"uses of state concern" means those land and water uses which would significantly affect the long-term public interest; these uses, subject to council definition of their extent, include:

A. uses of national interest, including the resources for the siting of ports and major facilities which contribute to meeting national energy needs, construction and

maintenance of navigational facilities and systems, resource development of federal land, and national defense and related security facilities that are dependent upon coastal locations;

B. uses of more than local concern, including those land and water uses which confer significant environmental, social, cultural, or economic benefits or burdens beyond a single coastal resource district;

C. the siting of major energy facilities or large-scale industrial or commercial development activities which are dependent on a coastal location and which, because of their magnitude or the magnitude of their effect on the economy of the state or the surrounding area, are reasonably likely to present issues of more than local significance;

D. facilities serving statewide or interregional transportation and communication needs; and

E. uses in areas established as state parks or recreational areas under AS 41.20 or as state game refuges, game sanctuaries or critical habitat areas under AS 16.20.

4. Erosion planning Element

Erosion mitigation is part of 6 AAC 80.050 - Geophysical Hazard Areas, which states that "a) districts and state agencies shall identify known geophysical hazard areas and areas of high development potential in which there is a substantial possibility that geophysical hazards may occur; b) development in areas identified under (a) of this section may not be approved by the appropriate state or local authority until siting, design, and construction measures for minimizing property damage and protection against loss of life have been provided."

Thus development and implementation of an erosion planning element will occur through district and state efforts to identify hazards and the regulation of development such that loss of life and property damage is minimized.

5. Energy Facility Siting

The Federal Coastal Zone Management Act of 1972, as amended in 1976, requires that states develop a "planning process for energy facilities likely to be located in, or which may significantly affect, the coastal zone, including, but not limited to, a process for anticipating and managing the impacts from such facilities (Section 305(b) (8))." To implement this section of the law, federal regulations require coastal states to pay special attention to energy facility siting and to address the following procedural elements:

a. "an identification of energy facilities which are likely to locate in, or which may significantly affect the coastal zone;

b. a procedure for assessing the suitability of site for such facilities;

c. articulation of state policies and other techniques for the management of energy facilities and/or their impacts;

d. a mechanism for coordination and/or cooperative working arrangements, as appropriate, between the state coastal planning or management agency and other relevant state, federal, and local agencies involved in energy facility planning and/or siting, including conformity of siting programs where they exist with the Coastal Zone Management Program; and

e. an identification of legal and other techniques that can be used to meet management needs."

The other half of the objective to manage onshore and nearshore activities associated with energy development is built into the Alaska Coastal Management Act of 1977 where the legislature directs the Coastal Policy Council to:

> "initiate a process for identifying and managing uses of State concern within specific areas of the coast;"

By "uses of State concern" the Act identifies those land and water uses which would significantly affect the long-term public interest, i.e.:

> "uses of national interest, including the use of resources for the siting of ports and major facilities which contribute to meeting national energy needs, construction and maintenance of navigational facilities and systems, resource development of federal land, and national defense and related security facilities that are dependent upon coastal locations;" (AS 46.40.210(6) (A)) and
>
> "the siting of major energy facilities or large-scale industrial or commercial development activities which are dependent on a coastal location and which, because of their magnitude or the magnitude of their effect on the economy of the State or surrounding area, are reasonably likely to present issues of more than local significance." (AS 46.40.210 (6) (C))

The uses so defined, the Standards and Guidelines of the Alaska Coastal Management Program require the State in cooperation with coastal districts to identify sites suitable for major facilities and to approve actual siting decisions on the basis of State policies concerning the onshore and nearshore aspects of oil and gas development. (6 AAC 80.070)

In the context of the framework established by the State Act and Standards and Guidelines, a major energy facility is defined as a development carried out in, or in close proximity to, the coastal zone, which meets one or more of the following criteria:

a. A facility required to support energy operations on federal and State lands leased for exploration and production purposes;

b. A facility utilized to produce, convert, process or store energy resources and marketable products;

c. A facility utilized for transferring, importing or exporting energy resources and marketable products;

d. A facility utilized for in-State energy uses of more than local concern; or

e. A facility used primarily for the manufacture, production, or assembly of equipment, machinery, products or devices which are involved in any activity described in (a)-(d).

Major energy facilities determined as likely to locate in, or significantly affect Alaska's coastal zone include:

a. exploratory drilling vessels

b. petroleum production platforms

c. marine service bases and storage depots

d. pipelines and rights-of-way

e. petroleum or coal separation, treatment and storage facilities

f. LNG plants and terminals

g. oil terminals and other port development for the transfer of energy products

h. concrete platform fabrication yards

i. petrochemical plants

j. refineries and associated facilities

k. hydroelectric projects

l. other electric generating plants

m. transmission lines

n. uranium enrichment or nuclear fuel processing facilities

o. geothermal facilities

6. Shoreline Access Planning Element

The federal Coastal Zone Management Act of 1972, as amended, specifically calls for states to develop a planning and management process to address public access and public use of coastal areas. Federal regulations pursuant to Section 305 (b) (7) of the Act cite six elements that are required in order for states to adequately address the access issue in the context of receiving federal program approval.

The Alaska Coastal Policy Council is charged with developing the Alaska Coastal Management Program. The council has adopted regulations for managing coastal areas in Title 6 of the Alaska Administrative Code (6 AAC 80.00 and 6 AAC 85.00). Although the regulations contain recreation concerns, there

are no specific standards to guarantee public shoreline access. The Alaska Coastal Management Act and coastal regulations do, however, appear to grant authority to state agencies and local districts to plan for public access.

CHAPTER III

THE PROBLEMS, ISSUES, NEEDS AND OBJECTIVES

OVERVIEW

According to the Borough's preliminary Comprehensive Plan, between 1970 and 1978, the Matanuska-Susitna Borough's population has grown over 138 percent and this rapid growth rate is expected to increase. Growth and development along and within the Borough's coastal area are both desirable and necessary; however, potential problems can arise unless that growth is planned for and guided. A balanced use philosophy should prevail in order to designate which coastal areas are suitable for certain uses and which areas are not. Piecemeal development often occurs which causes environmental quality and livability factors to decline. Competing uses could result in landscapes resembling those of some cities in the lower 48 states. There is a need to plan for the future, to do it right the first time so that tax dollars are not spent on playing the game of catch-up and repair.

INTRODUCTION

This program is intended to provide a means by which to determine which lands are most suitable for development at least cost with maximum benefit. Thus, while the analysis of land use suitabilities and of the supply of land available for various activities suggests a positive pattern for development, there are other necessary steps in the planning process. These involve the resolution of demand for land relative to supply, based on projected population and economic trends; the formulation of goals and objectives; the development of locational and functional criteria for prospective land uses; and the identification of means of implementation.

PLANNING GOALS

The Borough is expecting a population increase from 20,000 to 200,000 by the turn of the century. With this growth, the Borough is faced with potential problems such as depleted natural amenities and resources along with related social problems. But, opportunities also occur for a broader employment base, more jobs, services, and commerce. This growth should be directed by specific communities, goals and policies. There is a need to incorporate a coastal management plan into the comprehensive plan for the Borough. The "Comprehensive Planning Directions" document of 1978 outlines a logical process for accomplishing the needed planning.

The Goals Statement (May 1978) is the most current document illustrating the needs and issues involved in planning for the Borough, and these can be readily related to coastal management.

Over 300 Borough citizens filled out questionnaires and several hundred more attended public meetings to develop goal statements for the Borough.

The following quotes summarize the goals for the Borough as expressed by its citizens in the Goals Statement.

> "A settlement pattern should be developed which satisfies the aspirations of residents and provides an interrelated workable system of commercial services, transportation, and public facilities. Most reesidents prefer a dispersed residential pattern which blends with the natural setting."
>
> "Compact commercial core areas should be developed instead of linear or strip developments, which detract from the scenic quality of highway corridors...cause inconvenient and wasteful use of land...."
>
> "Maximum agricultural and related services, outdoor recreation, tourism, mineral extraction, forestry, and government seem to be the sectors most appropriate to be emphasized, with some light industry a more distant possibility."

> "Underlying all development should be a pervasive and sincere respect for the land and its wild creatures. It is the land that has attracted most current residents to the Borough and it will be the land that will sustain most of them in one way or another; therefore, the land must be nurtured, protected and respected so that it can continue to provide one of the most striking and hauntingly beautiful natural settings in the world."

Recent events such as a high rate of unemployment have highlighted the public interest in heavy industrial development such as the program to develop a port facility at Point MacKenzie. As demands increase in the coastal areas and competition of uses grow, application of the Borough's goals can provide the rational for sound coastal planning. This philosophy coincides with Congressional findings included in the Coastal Zone Management Act of 1972, which state that "in light of competing demands and the urgent need to protect and to give high priority to natural systems in the coastal zone, present state and local institutional arrangements for planning and regulating land and water uses in such areas are inadequate...." Based on this and other findings, Congress declared a policy to assist the state in developing coastal management programs to give ".... full consideration to ecological, cultural, historic, and aesthetic values as well as to needs for economic development...." This is especially pertinent to the Matanuska-Susitna Borough as it is an emerging regional center capable of becoming a major point of entry for servicing the needs of interior Alaska. It also is capable of serving as a major exporting center which will be needed as Alaskan and Matanuska-Susitna resources such as coal and other minerals are developed.

Competition for these port facilities, however, is very high. Other potential sites for port resource exportation include Seward, Kenai, Tyonek, and Valdez. Factors determining location include, but are not limited to, proximity and quality of surface transportation (road and railroad), air transportation (regional airports), water transportation (port suitability), and population centers (labor force).

The Matanuska-Susitna Borough recognizes the highly competitive conditions that currently prevail in the coastal area and that this competition will greatly increase in the future as the population of both the Borough and Anchorage Municipality increase, and is developing balanced use objectives in preparation of its coastal management plan. The plan will:

1) Allow for the wisest possible use of the coastal area.

2) Provide maximum retention of land and water use options for the future.

3) Be as compatible with local and regional planning efforts (adjacent districts) as possible.

4) Be formulated in an objective and impartial manner, utilizing well defined techniques, methods and criteria.

5) Attempt to strike a balance between development and preservation interests.

6) Protect the long-term interest of the state by maintaining and enhancing the quality of life in the coastal management area.

CHAPTER IV

PLANNING METHODOLOGY AND PROCESS

INTRODUCTION

The Matanuska-Susitna Borough is currently experiencing one of the fastest growth rates in the United States. During the past several years, thousands of acres of Borough land have been transformed from agricultural or vacant status to a developed status. New subdivisions dot the landscape of this largely rural area. In many cases, the baseline information needed to assess these developments is lacking or nonexistent.

Recognition of this information shortage suggests the appropriateness of a locally modified adaptation of an analytical approach to land uses. This involves inventorying and mapping information on natural phenomena, interpreting this data in light of its positive and negative characteristics for urban development, preservation and conservation, and designating land use suitability classes. The purpose of developing this information would be:

1. to identify those major uses which could cause direct and significant impacts to coastal waters; and

2. to utilize this information to prepare policy statements to:

   a. guide development,

   b. allow for mitigation of possible adverse impacts, and

   c. assist in the general planning process conducted by the Borough Planning Department.

PLANNING PHILOSOPHY

Traditionally, urban planners have presented goals, objectives and standards for the orderly development of an area in the form of comprehensive land use plans. Such plans have focused on the location and functional requirements of residential, commercial, and industrial areas, of community facilities, and the transportation network. The designations presented in related land use plans were often given legal expression in zoning ordinances and other land use regulations. This has been the accepted process to date in the Matanuska-Susitna Borough, and it lacks some very important considerations. The federal Coastal Zone Management Act focuses on the complex interaction between man and his physical environment, based on a concern about increased environmental deterioration in the coastal area. The increase in environmental awareness has forced realization that previous attempts at land use planning fell far short of attaining a comprehensive perspective, in that all too often they were oblivious to the topography, vegetative soils and other natural phenomena of an area's physical environment. Furthermore, natural processes (which create and modify the landscape) and the interactions between them and man's activities (which modify and significantly alter the landscape) have often been either completely ignored or inadequately considered in land use planning.

This awareness at the federal government level has prompted the creation of several pieces of environmental and land use legislation. Regional, state and federal agencies often find local land use plans inadequate. Such plans are often based on current growth pressures resulting purely from economic and political interests rather than land development capabilities and limitations based on variable characteristics of natural land areas. The result has too often been the loss and destruction of scarce environmental resources which ultimately require significant amounts of public tax dollars to rehibilitate.

Today, it must be realized that the characteristics of the natural ecology have far reaching effects on human development. Careless urban or rural land use and development have far reaching and too often deleterious effects on the land, air and water that constitute the

physical environment. The implications are clear: there is a need to incorporate information on natural phenomena and processes into the planning process and to apply the resulting analysis for all future development activities in the Borough.

PURPOSE

Basically, the purpose of the land use suitability planning method is to understand the character of a place and to utilize such understanding in planning its use and development. More specifically, the planning methodology is intended to determine which lands are most suited for various types of uses and activities. Specific geographic areas could be identified and the constraints of each area (resource classification unit) listed. If this process were used, a resource analysis listing potential impacts could be prepared which identifies possible adverse impacts that could result from various uses. Those uses which will cause direct and signifcant negative impacts could then be identified, and, if those uses and activities can be mitigated, the use or activity may be permitted.

The resource analysis and elements are shown in Figures 3 and 4. The value of using the information in this way allows for quick comparisons and early identification of negative impacts and allowable developments. It must be stressed that the findings of this process do not constitute a plan. While the analysis of the supply of land suggests a positive pattern for future land use and development, there are other necessary steps in the general plan process. These involve the resolution of demand for land relative to supply, based on projected population and economic trends; the formulation of goals and objectives; the development of locational and functional criteria for prospective land uses; and the identification of means of implementation.

Due to current growth trends in the Borough, effective land use control will soon be more critically needed than ever. The planning methodology presented here will show areas that can support multiple uses rather than the broad categories and often monotonous consistency of typical zoning.

METHODOLOGY

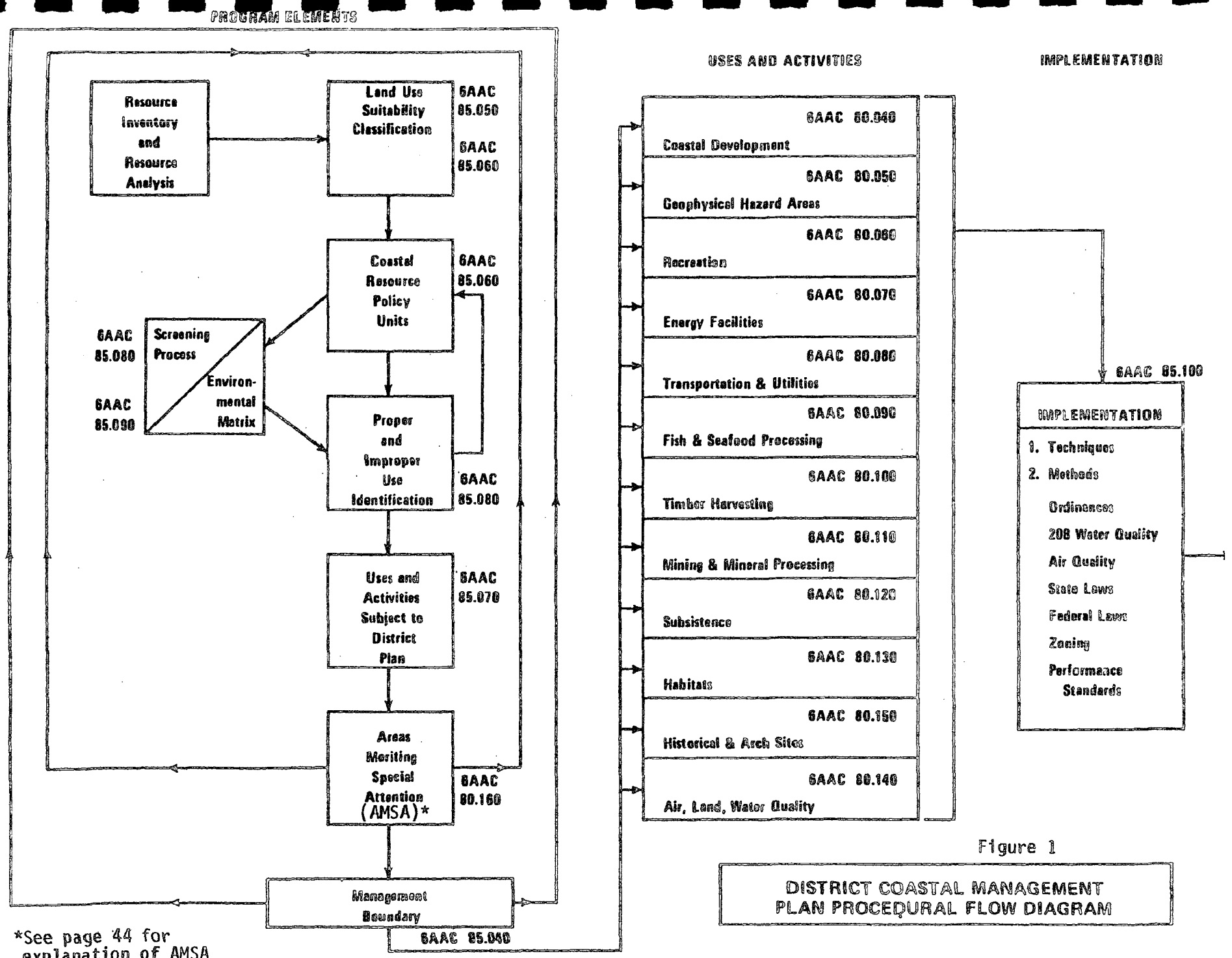
The general methodology of this planning approach involves the analysis of the physical environment to reveal natural features and characteristics, the interpretation of these findings, the formulation of rational, explicit criteria, and finally the identification of areas suitable for various land uses. But coastal management must also consider a balanced use philosophy and thus the cultural, social and economic aspects of the Borough. For each of the data categories, data is collected, compiled, described, and mapped. The information is presented later in this chapter. This information and the finding resulting from the analysis are then used to formulate both restrictive and permissive criteria for prospective land use. The end product is a map which portrays land in terms of four suitability categories - called Classifications. These Classifications are described in Chapter V.

PROCESS

The planning process required for coastal management is illustrated in Figure 1. These planning steps are:

1. IDENTIFY AND DELINEATE PLANNING AREA.

   The State of Alaska, Department of Fish and Game has delineated a coastal management boundary for the Upper Cook Inlet based on biophysical criteria. The initial inland boundary, called the "zone of direct influence", is defined where the bulk of anadromous fish spawning and rearing takes place, where moose seek out lowland areas for over-wintering and calving, and where coastal wetland habitats attract a large number of nesting birds and small mammals. This zone is best defined by the 1000 ft. (305 meter) contour. This defines the initial inland planning boundary.



*See page 44 for explanation of AMSA

Figure 1

DISTRICT COASTAL MANAGEMENT PLAN PROCEDURAL FLOW DIAGRAM

2. DATA REQUIREMENTS

Prior to the data inventory process, the types of data required to perform a coastal management program must be identified. For this program, special economic and physical data are required. Note: Physical data needs are perhaps most obvious and only recently has the Matanuska-Susitna Borough started a comprehensive data gathering program.

3. DATA INVENTORY

Once the data categories are defined, the actual gathering and collection of data is initiated. The data is an information base upon which interdisciplinary analysis and planning is undertaken. The data, when appropriate, is presented as resource maps, and a narrative describing the coastal resources for each data set is prepared; thus permitting both a graphic and narrative text. Other data such as social and economic considerations must rely solely on text presentations.

The inventory function of the planning process should be viewed as an ongoing series of actions related to collecting information and rendering that information useful for problem solving and decision making, both for specific land use questions encountered on a day-to-day basis and for policy formulation and long range planning. Thus, the inventory function serves not only for coastal management planning, but also serves as a data base for other planning programs, many of which are, and will be, interrelated to each other.

The purposes to be served by the inventory process related to coastal management are:

1. The preparation and continued updating of a borough wide inventory of the land uses and natural resources of the borough;

2. The projection of the nature, quantity, and compatibility of land needed and suitable for recreation, parks, open space, wildlife habitat, forestry, industry and commerce, solid waste management, housing, urban development, and the economic diversification of the community, taking into consideration future demands for and limitation upon the suitability and capabilities of the land;

3. The preparation and maintenance of current information necessary to determine the viability of resource use proposals over time.

4. RESOURCE ANALYSIS

Not all areas of the borough are suited for the same uses or intensity of uses. Portions of landscape of the borough possess characteristics that make it essentially suitable for urban development, whereas other portions of the borough have natural features that are less tolerant of such development. The resource analysis function makes it possible to prescribe dominant and subordinate land uses for each resource unit or area. The analysis function involves using the resource inventory, interpreting this data in light of its positive and negative characteristics, and designating land use suitability classes. Some measure of an area's suitability for development, conservation or preservation is an essential requirement of the Alaska Coastal Management Act, because permitted and prohibited land and water uses must be identified according to the land and water suitability for that use or activity. In resource analysis it must be remembered that the recognition of ecological sensitivity should be accomplished in concert with the total environment which calls for a recognition of economic sensitivity. The generic term used for the four composite resource suitability policy areas are: Natural Policy Area, Conservation Policy Area, Urban Policy Area, and Rural Policy Area. These terms are defined in Chapter V.

5. GEOGRAPHIC SEGMENTATION

Each of the four Policy Areas identified in step 4 are composites of smaller resource units. Geographic segmentation involves a division of the coastal area into different resource units, called resource policy/capability units, each representing a particular component of the four broader Policy Areas. The geographic segmentation of the coastal area into units of a similar nature allows land use planners and resource managers to prepare plans which address the particular characteristics of a specific geographic area. In this way, land use controls can be tailored to fit the needs of specific sections of the coastal area. The act of segmentation reveals a recognition that the coastal area is not homogenous. Clearly, one set of permissible uses could not adequately account for the inherent diversity present within the coastal area of the borough. Land uses which exist in harmony in one coastal area may be entirely inappropriate for another. Therefore, resource policy units are designated only after an evaluation of physical, social, and economic features of the Borough.

Resource policy units can be compatibly grouped to correspond with the four Policy Areas. This linkage between the four Policy Areas (broad land use suitability classes) and their associated subunits (specific geographic components - resource policy units) permits policy makers to address levels of implementation of a coastal management plan at two levels, depending upon the need and as more detailed information becomes available. For example, goals, objectives and policies can be implemented at the Policy Area level and address these broad land use suitability classes in general terms. As more detailed information becomes available and as development pressure warrants, more specific policies and criteria can be developed for the resource policy units.

6. PERMISSIBLE USE IDENTIFICATION PROCESS

Step 6 is a further analysis of a multi-phase process for the identification of permitted and non-permitted uses, e.g., those uses which would cause adverse impacts.

The basic concept employed in Step 6 is that each Policy Area in general, and each resource policy unit specifically, has an intrinsic suitability for certain land uses and that certain areas lend themselves to multiple co-existing land and water uses.

As a first step in the identification process, an inventory list of land and water uses is prepared and each use is weighed against each resource policy unit within each Policy Area. For example, single family dwellings can be evaluated and weighed against such resource policy units as "salt water marshes", coastal flood plains, and the 100 year river flood-plain. Common sense tells us that residential development in these areas is not prudent or safe, or suitable for such areas. A first pass can now be made in filling out the Land Use Impact Assessment matrix (Figure 2).

The second phase in the identification process is made by utilizing the Natural Systems Stress/Effect tables (Figure 3). Each land and water use can potentially cause certain environmentally adverse effects or impacts. The third phase in the identification process is made by inputting community needs and desires as expressed in the Goals Statement.

Information can now be weighted and a composite final matrix completed which identifies those land and water uses which could cause adverse impacts and thus uses which should be permitted. These uses are classified as:

Figure 2

LAND USE IMPACT ASSESSMENT MATRIX

Permitted Uses \ Resource Units	NATURAL POLICY AREA	Class I Waters	Wetlands & Freshwater Marshes	Tidal Creeks & Flats	Salt Water Marshes	Beaches	Coastal Habitats	Coastal Cliffs/Bluffs	Hazardous Lands/No Development	Historical & Archaeological Sites	Coastal Flood Zone	CONSERVATION POLICY AREA	Class II Waters	Class III Waters	Scenic Areas & Corridors	Parks & Recreation Areas	Marginal Lands	River Floodplains	Forestry & Game Management Areas	Agricultural Lands	Open Space	URBAN POLICY AREA	Class IV Waters	Urban Residential	Urban Development	Urban Waterfront	RURAL POLICY AREA	
Residential Uses:																												
low density																												
moderate density																												
high density																												
Commercial:																												
Recreation:																												
active																												
passive																												
Transportation:																												
airports																												
airstrips																												
float planes																												
ports/docks																												
highways/roads																												
oil/gas pipelines																												
Utilities:																												
power lines																												
power generators																												
sewer treatment																												
water/sewer line																												
solid waste disposal																												
Industrial:																												
polluting																												
non-polluting																												
Agricultural:																												
Mining/Mineral ext.:																												
Timbering:																												
Construction Material ext.:																												
Subsistence:																												

* = Marginal Lands: due to soil characteristics, drainage problems or other physical characteristics or restrictions, these lands require special treatment in order to be made suitable for development. It is therefore difficult to designate a permissible use on this land as conditional, allowed, or not allowed. If a designation were required it would either be conditional or not allowed, depending on use.

1 = allowed

2 = conditional

3 = not allowed

Figure 3

NATURAL SYSTEMS STRESS/EFFECT

Use	Effect	Natural Systems Consequence *	Possible Mitigation Measures **
1. Groundwater withdrawal	surface and subsurface subsidence salt water intrusion shortage of cheap supply	destruction of aquifer increase risk of flooding degradation of groundwater	
2. Excavation	create slope instability removal of groundwater recharge material alter aquifer increase runoff remove vegetation remove habitat for certain species aesthetically unpleasant to some people	increase erosion degradation of habitat reduction of groundwater degradation of water resources increase flooding risk degrade aesthetic quality increase risk of sloughing and mass wasting	
3. Filling	alter surface and groundwater chemistry decrease wetlands decrease of groundwater recharge alter aquifer increase runoff	degradation of habitat degradation of water resources increase flooding risk isolate areas from groundwater increase erosion	
4. Dredging	increase turbidity alter flow regime alter aquifer create fish traps	degradation of habitat degradation of water resources alter sedimentation/erosion characteristics	
5. Offshore discharge	alter water chemistry alter bottom chemistry and characteristics	degradation of habitat increase health hazard	
6. Cultivation	increase erosion alter surface and groundwater chemistry remove vegetation	degradation of habitat degradation of water resources eolian deposition increase	
7. Solid waste disposal	increase surface runoff alter surface and groundwater chemistry	degradation of water resources increase health hazard degradation of aesthetic quality	
8. Shoreline construction	alter sand budget removal of beach vegetation	degradation of habitat increase erosion loss of property increase wave and storm impact degradation of aesthetic quality	
9. Construction material extraction	removal of groundwater recharge create slope instability alter aquifer create fish traps	increase erosion degradation of habitat degradation of water resources increase risk of sloughing and mass wasting	
10. Liquid waste disposal	alter surface and groundwater chemistry alter air chemistry	degradation of water resources degradation of habitat	
11. Gaseous waste disposal	alter air chemistry alter surface water chemistry	degradation of habitat degradation of aesthetic quality degradation of air and water quality create immediate health hazard	
12. Draining wetland and spoil	removal of wetlands alter surface and groundwater chemistry	degradation of habitat degradation of water resources aesthetics	
13. Surfacing/paving	removal of groundwater recharge increase runoff	reduce groundwater quantity degradation of habitat degradation of water resources perimeter erosion	
14. Increased vehicular traffic	alter air chemistry increase noise pollution	degradation of habitat create health hazard	
15. Alteration of water course	alter flow regime alter sedimentation/erosion characteristics	degradation of habitat degradation of aesthetic quality loss of property degradation of water resources	

* Type of issue/concern commonly associated with use of land.
** To be developed as a part of the management plan.

1. little or no impact (allowable)

2. possible impact (conditional)

3. probable direct and significant impact (not allowable)

The following processes should be utilized to weigh the matrices for 1 and 2 uses.

1. First phase of completing the matrix - MATRIX 1.
   a. Permitted uses are given a value of +1.
   b. Non-permitted uses are given a value of 0.

2. Second phase of completing the matrix - MATRIX 2.
   a. Permitted uses are given a value of +2.
   b. Non-permitted uses are given a value of -2.

3. Third phase of completing the matrix - MATRIX 3.
   a. Permitted uses are given a value of +1.
   b. Non-permitted uses are given a value of 0.

The resultant weight for the composite matrix will have a range of values ranging from +1 to +4 for permitted use and from 0 to -2 for non-permitted uses. The range of values permits the identification of those permitted uses that have higher priority than other permitted uses to be given priority, in allowing future development, and in developing relative policies in the proposed Land Development Code that the Borough is now considering.

The weighting of the non-permitted uses allows a listing of those uses having the lowest priority and which should not be permitted unless no other alternative exists. These are uses which would cause the greatest amount of environmental impact and should not be permitted whenever possible. A Land Development Code would consider these issues when developing policies. Such a code is an alternate to the traditional land use

directives associated with zoning and would address each development on a specific basis. The evaluation criteria would be developed with local input and apply local standards. These standards become the basis for evaluation of each development. The land development code would be implemented by ordinance adopted by the Matanuska-Susitna Borough.

Ranging between the permitted and non-permitted uses are uses that are conditional; that is, uses that could be permitted uses, but which could be mitigated by proper design, construction and planning. The burden of proof would lie with the developer. If he can demonstrate that his project will not cause a negative impact and will meet the policy guidelines of the Policy Area in which it is located, the use will be permitted. If the potential adverse impacts cannot be mitigated, then the development, use, or activity would not be permitted. This is direct application of a Land Development Code.

Of particular importance throughout this entire step is the identification of water-dependent and water-related uses. These two Policy Areas take first priority for all coastal related development as specified in the standards and guidelines of the Alaska Coastal Management Program Document.

7. USES AND ACTIVITIES

In planning for and approving development in coastal areas, districts are required to specifically address twelve (12) special use/activity areas. These uses and activities are provided for in the Policy Area and resource policy unit matrix (see Figure 5).

8. USES OF STATE CONCERN

Uses of state concern means those land and water uses which would significantly affect the long-term public interest. At

the time of this writing, the Coastal Policy Council has not specifically identified or clarified this specific area of concern. When the Coastal Policy Council defines "uses of State concern", they must be considered in the process of identifying permitted and non-permitted uses. The Matanuska-Susitna Borough staff have just reviewed the state agency staff level nominations to the state's list of uses of state concern. Consequently, a detailed analysis of this list, as finally adopted by the Council, will have to be included in next year's program. That analysis must contain consideration of criteria, special considerations, trade-offs for the sake of greater public good, and decision factors.

9. AREAS MERITING SPECIAL ATTENTION (AMSA)

A special provision of the Alaska Coastal Management Act is the section dealing with a specific geographic area within the coastal area which is:

1. sensitive to change or alteration and which, because of plans or commitments or because a claim on the resources within the area delineated would preclude subsequent use(s); or

2. which, because of its value to the general public, should be identified for current or future planning, protection, or acquisition.

Areas Meriting Special Attention can fall within any Policy Area classification or resource policy unit or combine or fall within several resource policy units or Policy Areas. AMSA's are identified during the inventory and analysis process and based upon the special character of the AMSA, uses are identified which would not detract from, destroy, or alter these AMSA's. In the Matanuska-Susitna Borough, ASMA's might include:

1. areas where development of facilities is dependent upon the utilization of, or access to, coastal waters;

2. areas of unique, scarce, fragile or vulnerable natural habitat, cultural value, historical significance, or scenic importance;

3. areas of substantial recreational value or opportunity;

4. areas of significant hazard due to storms, slides, floods, erosion or settlement;

5. areas of unique geologic or topographic significance which are susceptible to industrial or commercial development; or

6. areas needed to protect, maintain, or replenish coastal lands or resources, including coastal floodplains, aquifer recharge areas, beaches, and offshore sand deposits.

10. MANAGEMENT BOUNDARY IDENTIFICATION

Several of the major components of the Coastal Management Act have now been met. Step 10 provides the mechanism to delineate a coastal resource management boundary. Using the four basic Policy Area designations and a Resource Policy Unit map, a visual guide can be developed which permits viewing the geographic areas requiring management under the coastal management program. Several alternatives will be available, and public input as well as Planning Department input and recommendations will be analyzed and unified into an acceptable management boundary identification. This recommendation must be presented to both the Planning Commission and the Borough Assembly for a final decision. The final management boundary,

as approved by both the Planning Commission and the Borough Assembly, will be presented to the Coastal Policy Council in the final program document.

11. GOALS, OBJECTIVES, POLICIES

Within the management boundary, goals, objectives and policies must be developed for each Policy Area classification and more specific goals, objectives and policies developed to deal with the smaller geographic areas - the resource policy units. As required, additional development criteria and other land use regulations can be developed as needed. The determination of this need will be the perogative of the Borough Assembly.

It should be noted that the Natural Systems matrix is a planning tool and does not necessarily imply that those uses classified as permitted and not permitted are absolutes. Its purpose is to aid the planner and decision maker in evaluating which land and water uses would have direct and significant impacts on coastal waters. The implementation plan must specify what method is most acceptable and appropriate for determining permitted and non-permitted uses and for mitigating direct and significant impacts. It is recommended that preparation and adoption of the proposed Land Development Code as prepared by Mr. Wickersham, be utilized as the implementation methods for the Borough's Coastal Management Plan. Proper preparation of both absolute and relative policies can serve as the means to mitigate adverse impacts and regulate land use.

It is anticipated that a matrix similar to that discussed in this chapter, including an analysis of socio-economic impacts similar in scope and methodology to that employed for assessing environmental impacts will be prepared in next year's work program. Criteria such as labor force requirements, employment, wage levels, seasonality, impact on schools, etc. should be incorporated into an analytical framework, as in the land use impact assessment matrix. This work program would relate to Borough

economic goals and objectives, as well as relative and absolute policies and weighting factors for the proposed land development code.

RESOURCES OF THE MATANUSKA-SUSITNA BOROUGH

The Matanuska-Susitna Borough Coastal Management Program was initiated in August 1978. In order to develop a coastal management program, the program must review the coastal resources of the Borough and identify the demands which make these resources important and identify through an analysis of that resource information what land areas are suitable for the variety of activities and uses occurring in the coastal area. This information must, in turn, be presented to the public for full discussion.

The following graphics present a general inventory of major resources and natural processes within the Matanuska-Susitna Borough to answer questions about the natural resources and their suitability for various uses and activities.

Figure 4 presents a summary of the inventory of information that was prepared by the Matanuska-Susitna Borough Planning Department. It is shown by Policy Area and by Planning District. These districts were created by the Department for use in preparing this and other studies. A variety of information has been collected for each district as can be seen by the table. It also shows which information was gathered and mapped by the Borough Planning Department, by others, or not at all. Map 1 shows the geographical extent of the information collected through the Borough's Cultural and Environmental Mapping Program. Areas outside this program that are within the recommended coastal management area should receive specific attention as part of next year's program.

This report does not attempt to present an exhaustive technical discourse on all important coastal resources because much raw data has yet to be collected and because such detailed studies in such diverse disciplines as spatial analysis, geology, hydrology, and soil science are beyond the intent and scope of this program at this time. The purpose is to give an overview of coastal resources in a concise manner.

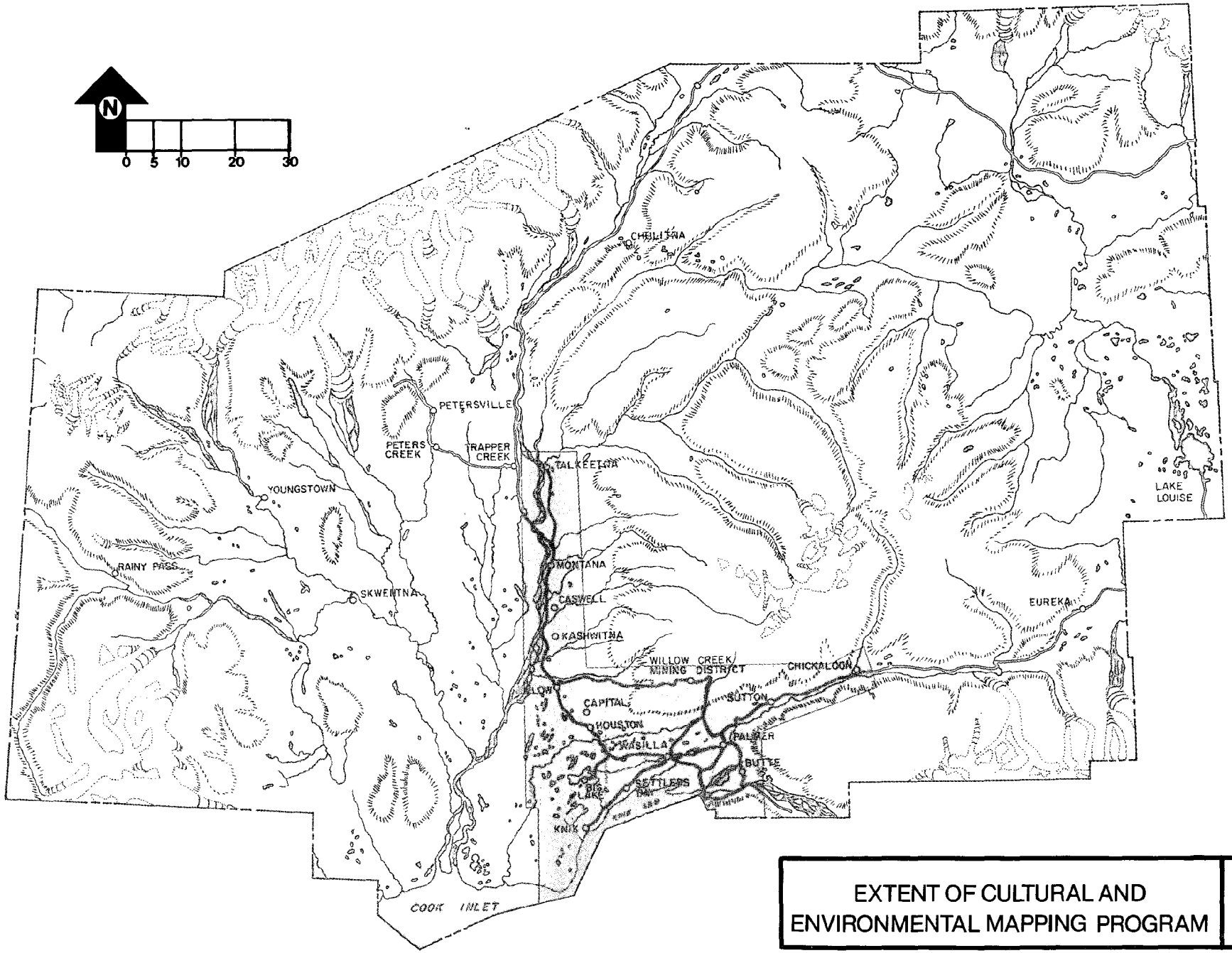
Figure 4

RESOURCE POLICY UNITS

PLANNING DISTRICT INVENTORY

	COASTAL			POINT MACKENZIE			SUTTON GLENN			TALKEETNA MOUNTAINS			UPPER SUSITNA			LOWER SUSITNA			WASILLA			PALMER		
	Mapped by Mat-Su Boro	Mapped by Others	Present Info. Form	Mapped by Mat-Su Boro	Mapped by Others	Present Info. Form	Mapped by Mat-Su Boro	Mapped by Others	Present Info. Form	Mapped by Mat-Su Boro	Mapped by Others	Present Info. Form	Mapped by Mat-Su Boro	Mapped by Others	Present Info. Form	Mapped by Mat-Su Boro	Mapped by Others	Present Info. Form	Mapped by Mat-Su Boro	Mapped by Others	Present Info. Form	Mapped by Mat-Su Boro	Mapped by Others	Present Info. Form
Natural Policy Area																								
Critical Habitat	N	Y	G	N	Y	G	N	Y	G	Y		I	N	Y	G	N	Y	G	N	Y	G	N	Y	G
Prime Habitat	Y		G	Y		G	Y		G	Y		I	Y		I	Y		I	Y		I	Y		I
Coastal Floodplain	N			N			-	-	-	-	-	-	-	-	-	N			N			N		
Historic Sites & Districts	N	Y	I	N	Y	I	N	Y	I	N	Y	I	N	Y	I	N	Y	I	N	Y	I	N	Y	I
Archaeological Sites	Y		I,C	N		I,C	N		I,C	N		I,C	N		I,C	N		I,C	N		I,C	N		I,C
Public & Private Drinking Water Sources	N			N			N			N			N			N			N			N		
Tidal Marshes & Flats	N			N			N			-	-	-	-	-	-	N			N			N		
Coastal Cliffs & Bluffs	N			N			N			-	-	-	-	-	-	N			N			N		
Traditional Subsistence Areas	N			N			N	Y	I	N	Y	I	N	Y	I	N			N			N		
Public Viewpoints & Landmarks	N			N			N			N			N	Y	I,C	N	Y	I,C	N	Y	I,C	N		
Conservation Policy Area																								
Wildlife Habitat	Y		I	Y		I	Y		I	Y		I	Y		I	Y			Y			Y		
Riverine Floodplains	N	Y	G,I	N	Y	G,I	N	Y	G,I	N	Y	G,I	N	Y	G,I	N	Y	G,I	N	Y	G,I	N	Y	G,I
Geophysical Hazard Areas	N	Y	I	N	Y	I	N	Y	I	N	Y	I	N	Y	I	N	Y	I	N	Y	I	N	Y	I
Public Viewsheds	N			N			N			N			N			N			N			N		
Aquifer Recharge Areas	N			N			N			N			N			N			N			N		
Fish & Marine Life Harvest Waters	N	Y	I	N	Y	I	N	Y		N	Y	I	N	Y	I	N	Y	I	N	Y	I	N	Y	I
Poorly Drained Soils	Y		I	Y			N	Y	I	N	Y	G	Y		I	Y			Y			Y		
Buffer & Screening Easements	N			N			N			N			N			N			N			N		
Forest Harvest Areas	N			N			N			N			N			N			N			N		
Prime Agricultural Lands	Y		I	Y			N			-	-	-	Y		I	Y			Y			Y		
Alpine Areas	-	-	-	-	-	-	N			N			N			N			N			N		
Urban Policy Area																								
Residential Areas	Y		I	Y		G	Y		G	N			Y		G	Y			Y			Y		
Commercial Areas	Y		I	Y		G	Y		G	N			Y		G	Y		I	Y		I	Y		I
Industrial Areas	Y		I	Y		G	Y		I	Y		G,I	Y		G	Y		I	Y		I	Y		I
Class IV Waters	N	Y	C	N	Y	C	N	Y	C	N	Y	C	N	Y	C	N	Y	C	N	Y	C	N	Y	C
Transportation & Utility Easements	Y		G,I	Y		G	Y		I	Y		I	Y		I,C	Y		I,C	Y		I,C	Y		I,C
Developed Recreational Areas	Y		I	Y		G	Y		I	Y		I	Y		I,G	Y		G	Y		G	Y		G
Areas Within City Limits	-			-			-			-			-			Y			Y			Y		
Rural Policy Area																								
Large Lot Size Areas	Y		I	Y		G	Y		G	Y		G	Y		G	Y		G	Y		G	Y		G
Undeveloped Recreation Areas	Y		I	Y		G,I	Y		G,I	Y		G,I	Y		G	Y		G	Y		G	Y		G
Multiple Use Areas	Y		I	Y		G	Y			Y			Y			Y			Y			Y		
Agricultural Lands	N	Y	G	N	Y	G	N	Y	I	N	Y	G	Y		I	Y			N			Y		
Bush Areas	Y		I	Y		G	Y		G	Y		G	Y		G	Y		G	Y		G	Y		G

Y=YES N=NO C=CARTOGRAPHY NEEDED G=GENERAL I=INCOMPLETE



EXTENT OF CULTURAL AND ENVIRONMENTAL MAPPING PROGRAM

1 MAP

CHAPTER V
COASTAL RESOURCE DISTRICT POLICY AREAS/ COASTAL RESOURCE POLICY UNITS

INTRODUCTION

The Coastal Zone Management Act of 1972 established a "balanced-use" philosophy in its requirements to establish a definition of land and water uses which have "direct and significant impacts on coastal waters" and to develop a local management program for them. The Act further specified that the process through which permissible uses are established include full consideration of preservation and conservation, as well as utilization and development activities.

An inventory and resource analysis has received increasing attention since the Comprehensive Development Plan update began in July, 1977. The ongoing resource inventory and its subsequent analysis, as required by the Act, reveal that portions of the Matanuska-Susitna Borough possess characteristics that are essentially suitable for urban and rural development, whereas other land areas have natural features that are less tolerant of such development. This process of land use suitability analysis makes it possible to recommend dominant and subordinate land uses for the various coastal enviornments found within the Borough, within specific geographic areas which are called coastal resource policy units. This planning methodology makes possible objective rather than subjective determinations regarding permissible uses within the coastal resource district. Some measure of an area's suitability for development, preservation, or conservation is essential to any coastal management plan.

In order to more effectively implement goals, objectives and policies of the Matanuska-Susitna Borough Coastal Resource District Program and the Alaska Coastal Management Act, the coastal areas of the Borough have been placed into four separate "Policy Area" classifications. These Policy Areas are to be used as policy guides for land use regulations and permitting. The system is designed to encourage uses in each Policy Area which enhance its character.

The determination as to which designation should be given to any specific coastal area is based on the existing development pattern, the biophysical capabilities and limitations of the land and the goals and objectives as outlined in Comprehensive Development Plan Goals Statement of May 1978.

As previously shown, the generic term used for the four land use suitability Policy Areas as applied to the Borough's coastal management plan are: NATURAL POLICY AREA, URBAN POLICY AREA, CONSERVATION POLICY AREA, and RURAL POLICY AREA. Each of these have been assigned broad policy guidelines appropriate to the maintenance of the individual Policy Area. Each of the four Policy Areas is actually a composite of many resource units, designated geographically.

An effective and equitable permissible use framework must be tied to specific areas within the coastal resource Policy Area. This is the purpose of subdividing the four Policy Areas into resource parts by units.

The geographic segmentation of the coastal area into similar units allows planners to make decisions which address the particular social, economic, and physical characteristics of a particular area. In this way land use controls can be tailored to fit needs of specific sections of the coastal area. The act of segmentation reveals a recognition on the part of planners that the coast is not homogenous. Geographic segmentation also allows the managing entity to test its management techniques in a limited area, using this experience to refine its management program as it is implemented along the entire coastal area.

Identification of resource units within the coastal resource districts also allows specific policies to be written that apply to each unit, and for this reason the resource units shall be called "coastal resource policy units". Figure 5 illustrates the grouping of the coastal resource policy units and their linkage with the four Policy Areas. Specific policies, to be adopted as law by the Matanuska-Susitna Borough Assembly, will apply to each resource policy unit within any given Policy Area.

NATURAL POLICY AREA

The Natural Policy Area classification consists of areas (resource policy units) characterized by the presence of some unique natural feature considered valuable in their undisturbed or original condition and which are relatively intolerant of intensive human use. Such areas should be essentially free from development or be capable of being restored to their natural condition, and they should be large enough to protect the value of the resource. Natural Policy Area policies are designed to preserve, enhance, and restore natural systems and resources and to minimize uses and activities which would substantially degrade or destroy the natural environment. A part of the overall consideration should be access to and through these natural policy areas. This is a policy that should be considered. A proposed activity which would change the existing situation would be desirable only if it further enhances, restores or preserves the character of an area so classified. In certain of these land areas, man is to be only a visitor.

The purpose of designating the Natural Policy Area is to preserve, enhance and restore those natural resource systems existing relatively free of human influence, and to protect from disruptive immediate use those resources which have been determined by the public to be important to the long range social, economic or physical interests of the community.

Natural Policy Area Coastal Resource Policy Units

Within the Natural Policy Area classification are contained ten (10) coastal resource policy units, each of which merit Natural Policy Area

Figure 5

RESOURCE POLICY UNIT LIST

URBAN POLICY AREA	RURAL POLICY AREA	CONSERVATION POLICY AREA	NATURAL POLICY AREA
Residential Areas	Large Lot Size Areas	Wildlife Habitats	Critical Habitats
Commercial Areas	Undeveloped Recreation Areas	River Floodplains	Prime Habitats
Industrial Areas	Multiple Use Areas	Geophysical Hazard Areas	Coastal Floodplains
Class IV Waters	Agricultural Lands	Public Viewsheds	Historic Sites & Districts
Transportation & Utility Easements	Bush Areas	Aquifer Recharge Areas	Archeological Sites
Developed Recreational Areas		Fish & Marine Life Harvest Waters	Drinking Water Sources (Public & Private)
Areas Within City Limits		Poorly Drained Soils	Tidal Marshes & Flats
		Buffer & Screening Easements	Coastal Cliffs & Bluffs
		Forest Harvest Areas	Trad. Subsistence Areas
		Prime Agricultural Lands	Viewpoints & Landmarks (Public)
		Alpine Areas	

status and which meet the purpose and definition of this designation. Each coastal resource policy unit is defined so that specific designation of permitted uses can be identified and specific policy statements applied. They are mapped and will be specifically designated by the Matanuska-Susitna Borough Planning Commission as:

1. Critical Habitats
2. Prime Habitats
3. Coastal Floodplains
4. Historic Sites and Districts
5. Archeological Sites
6. Drinking Water Sources (Public & Private)
7. Tidal Marshes and Flats
8. Coastal Cliffs and Bluffs
9. Traditional Subsistence Areas
10. Viewpoints and Landmarks (Public)

CONSERVATION POLICY AREA

The Conservation Policy Area consists of those land and water areas of the coastal area identified as having certain natural or institutional uses which require special precaution prior to their use or development. Conservation areas include those areas designated for long-term uses of sustained yield resources in the coastal resource district. Conservation areas would include tracts of lesser ecological sensitivity and biological importance, and lands which can sensibly sustain some development. Lands classified as Conservation would be those requiring special

precautions when being developed. Conservation Policy Area policies are designed to accomplish this. They also allow for transportation facilities or systems in the classification.

The purpose of the Conservation Policy Area classification is to assure public safety and natural systems maintenance during human use. While the natural enviornment is not maintained in a pure state, and selected developments are encouraged, all activities and uses to be carried out provide minimal adverse impact. The key to this classification is active management. Development in specified resource policy units of the Conservation Policy Area will be limited to those uses which protect the public safety and are non-destructive when consumptive of the resources designated as being valuable and requiring protection and management.

Conservation Policy Area Coastal Resource Policy Units

Within the Conservation Policy Area Classification are contained eleven (11) coastal resource policy units. Each coastal resource policy unit is defined so that specific designation of permitted uses can be identified and specific policy statements applied. They are mapped and will be specifically designated by the Matanuska-Susitna Borough Planning Commission as:

1. Wildlife Habitats
2. River Floodplains
3. Geophysical Hazard Areas
4. Public Viewsheds
5. Aquifer Recharge Areas

6. Fish and Marine Life Harvest Waters

7. Poorly Drained Soils

8. Buffer and Screening Easements

9. Forest Harvest Areas

10. Prime Agricultural Lands

11. Alpine Areas

URBAN POLICY AREA

The Urban Policy Area classification includes those lands and water areas of the coastal resource district more suitable for development; already developed or officially committed to an acceptable development activity; or undeveloped but suited for development.

The Urban Policy Area classification includes those lands that could be developed with economically feasible alteration of the natural systems within the coastal zone, and includes that classification of open water designated for transportation, navigation, utility and industrial use. Lands within this category are to be reserved for water dependent and water related uses and activities. The Urban Policy Area is particularly suitable to those areas presently subjected to extremely intensive uses, as well as areas planned to accommodate urban expansion. Shorelines planned for future urban expansion present few biophysical or hazardous limitations for urban activities. Naturally accommodating dock and port sites should be reserved for such uses, to avoid conflicts with non-water dependent uses which may preclude them if not regulated.

The purpose of the Urban Policy Area classification is to ensure optimum utilization of the coastal resources within urbanized areas by permitting intensive use and by managing development so that it enhances and maintains

the area for a multiplicity of urban uses. Management programs for this are designed to reflect a policy of increasing utilization and efficiency of urban areas, to promote a more intensive level of use through development of areas now under-utilized and to encourage multiple use of the coastal area. Policies are designed to substantiate the developmental claim to coastal resources, and to protect potential urban expansion areas from encroachment by improper uses.

Urban Policy Area Coastal Resource Policy Units

Within the Urban Policy Area classification are contained seven (7) resource policy units. Each coastal resource policy unit is defined so that specific designation of permitted uses can be identified and specific policy statements applied. They are mapped and will be specifically designated by the Matanuska-Susitna Borough Planning Commission as:

1. Residential Areas
2. Commercial Areas
3. Industrial Areas
4. Class IV Waters
5. Transportation and Utility Easements
6. Developed Recreational Areas
7. Areas Within City Limits

RURAL POLICY AREA

The Rural Policy Area classification includes coastal areas characterized by low density residential uses where most urban services are not available and will not soon be provided.

The purpose of designating the Rural Policy Area is to limit development intensity along undeveloped coastal areas, function as a buffer between urban areas, and recognize rural uses along the coast. Rural atmosphere is a limited resource. New developments in a Rural Policy Area should reflect the character of the surrounding area by limiting density, providing permanent open space and by maintaining adequate building setbacks from water to maintain safety, prevent shoreline resources from being destroyed, and to permit public access.

Rural Policy Area Coastal Resource Policy Units

Within the Rural Policy Area classification are contained five (5) resource policy units. Each resource policy unit is defined so that specified designation of permitted uses can be identified and specific policies applied, etc. They are mapped and will be specifically designated by the Matanuska-Susitna Planning Commission as:

1. Large Lot Size Areas

2. Undeveloped Recreation Areas

3. Multiple Use Areas

4. Agricultural Lands

5. Bush Areas

CHAPTER VI

ASSESSING DIRECT AND SIGNIFICANT IMPACTS

INTRODUCTION

The Alaska Coastal Management Program requires districts to identify permitted uses within the coastal management boundary, and further, that the significant social economic and physical impacts of these uses must be determined. The list of permitted uses discussed in this report includes all those activities expected to accompany development and increased population. The list of permissible uses is structured so as to apply to the coastal Policy Areas discussed in a previous chapter. It is important at the outset to recognize that this list may not include all of the possible activities. There are uses addressed within the report which may be deleted and others which may be included as the program matures through the public hearing process and is refined by more resource inventories.

Clearly, activities within the coastal zone take on a wide variety of types and have various levels of impact. It is paramount for public understanding and acceptance of this program to be able to describe what will be impacted and what will cause the impact. The coastal management program is primarily concerned with the identification of the developmental and recreational activities that directly and significantly affect the coastal waters. In an effort to illustrate this process, certain definitions are required.

DEFINITIONS:

Coastal waters: all water bodies in the coastal area, including wetlands, lakes, and intertidal area. Those waters adjacent to the shoreline

which extend inland no further than the limit of regular tidal influence and contain a measurable quantity or percentage of seawater. Coastal waters comprise various ecological systems. These areas are the tidally influenced streams, estuaries, tidal deltas, bays, tidal flats, and the beach/upper shoreface areas.

Estuary: a semi-closed coastal body of water which has a free connection with the sea and within which seawater is measurably diluted with fresh water derived from land drainage.

Exposed high-energy coasts: open and unprotected sections of coastline with direct exposure to ocean generated wave impacts and usually characterized by coarse sand, gravel, boulder beaches, and well mixed coastal waters.

Geophysical hazards: includes potential flooding, tsunami run-up, landslides, snowslides, severe faults, and ice hazards.

Offshore areas: submerged lands and waters seaward of the coastline.

Tideflats: mostly unvegetated areas that are alternately inundated and exposed by the rising and falling of the tide.

Shorelands: those areas in proximity to the shoreline that strongly influence or are strongly influenced by coastal waters. Shorelands are areas that begin with the beach/shoreface interface and extend inland from that point.

Impact: the result of a human activity that causes a measurable change in the chemical, physical, or biological characteristics of water, substrate, or biota which are present in coastal waters. Impacts are measured by the degree of disruption of the existing composite resource area ecological system. Social and economic impacts must also be considered as part of the total system. The emphasis of the federal Coastal Zone Management Act (CZMA) is on those land and water <u>uses</u> having direct and significant impact on coastal waters.

Direct impact: an activity produces a direct impact only if it is connected to the coastal waters through ecological systems that both strongly influence and are strongly influenced by coastal waters. The influence of one ecosystem on another occurs through the immediate transport of water, sediment, nutrients, biota, or energy. An activity produces an indirect impact if the activity is connected to the coastal waters only through ecosystems that are not both strongly influencing and strongly influenced by coastal water.

Significant impact: a measurable chemical, physical, or biological change which exceeds as a system's prescribed level of ecological tolerance. This tolerance threshold is scientifically established and takes into account naturally occurring fluctuations and the ability of the system to withstand stress. An impact may be judged significant by virtue of either its extent, duration, or severity of disruption of the ecological system.

PERMISSIBLE USE

Policies will be adopted and applied which will permit or restrict certain uses in each coastal environ and resource unit. The designation of permissible use is arrived at after the identification of land and water uses, geographic areas of particular concern, coastal boundaries and the prioritizing of uses within the coastal environs. As a result of land use inventories a list of current and potential land and water uses within the coastal zone of the Matanuska-Susitna Borough is established. The uses which are expected to occur within the Matanuska-Susitna Borough are summarized as follows:

- Residential uses - low, medium and high density
- Commercial
- Recreation - active and passive

- Transportation - airports, airstrips, float planes, ports/ docks, highways/roads, oil/gas pipelines

- Utilities - power lines, power generators, sewer treatments, water/sewer lines, solid waste disposal, submarine cables

- Industrial - polluting and non-polluting

- Agricultural

- Minerals and mining, including sand and gravel extraction

- Timbering

- Construction material extraction

- Subsistence

The establishment of permissible uses originates from community goals. The four major goals established by the Matanuska-Susitna Borough are as follows:

GOAL: 1. Land Use/Environment

The development of Borough land use must consider the protection of natural resources balanced against the need for economic development.

GOAL: 2. Public Facilities

To provide a system of public facilities and services which are interrelated at the Borough-wide level but designed to support the various local lifestyles. The system should be convenient yet efficient and therefore, economical. Public facilities development should be used to direct growth in support of overall development goals;

to help create or enhance a sense of community in local areas by providing a focus for community life; and to contribute to the development of safe and desirable environments by providing appropriate levels of service and appropriate arrangement and amounts of public space.

GOAL: 3. Transportation

The goal of the Borough transportation network is to provide a safe, efficient, logical environmentally sound and balanced transportation system which serves the land use and development objectives of the communities, the Borough, and the Upper Cook Inlet region.

GOAL: 4. Population Growth/Economy/Government

The role of government is to achieve a harmonious relationship between population growth, economic development, and natural resource utilization.

Some preliminary guidelines for permissible uses on State lands have been established by the Alaska State Department of Fish and Game. These guidelines or goals were established to help effectively manage the fish and wildlife resources of the State. For example, all activities conducted on State lands and waters must provide for the unrestricted passage of fish.

DIRECT AND SIGNIFICANT IMPACTS

The direct and significant effect of the permissible uses must be evaluated. Various development factors which can be expected to affect the environment or Policy Area should be considered. The degree of effect is not only dependent on the level of development but the particular operation associated with the development. For example, for

most areas and for most developments the environment would be less sensitive to the withdrawal of groundwater than it would be to the lack of proper solid waste disposal.

The Matanuska-Susitna Borough does not intend to go into the business of measuring the impacts of specific resource units on coastal lands and waters at this time. Through the use of the Coastal Land Development Code permitting system, resource allocation decisions will be based on probable impacts, as defined by social scientists, economists, and ecologists familiar with the particular project proposed. The existing agency review procedures will be adequate.

CHAPTER VII

BOUNDARIES OF THE COASTAL ZONE AND AREAS MERITING SPECIAL ATTENTION

INTRODUCTION

The federal Coastal Zone Management Act of 1972 requires states receiving program development grants to identify boundaries of the coastal zone subject to its management program. In addition, the Act identifies the parameters which a state must use in identifying its boundaries by defining the coastal zone as the "coastal waters" (including the lands therein and thereunder) and the adjacent shorelands (including the lands therein and thereunder), strongly influenced by each other and in proximity to the shorelands of Alaska (as well as other coastal states), and including transitional and intertidal areas, salt marshes, wetlands, and beaches. The zone extends inland to the extent necessary to control shorelands, the uses of which have a direct and significant impact on the coastal waters. Excluded from the coastal zone are lands the use of which is by law subject solely to the discretion of or which is held in trust by the federal government, its officers or agents.

Regulations pertaining to program development grants indicate that:

1. States may wish to delineate a planning area which is generally larger than and encompasses the area ultimately identified as the coastal management area. This provides a means for taking into account existing development, political and administrative conditions, as well as biophysical processes that may be external, but having some impact upon the coastal area eventually selected for management.

2. States must indicate the manner in which they will coordinate with those federal officials administering excluded federal lands in the development of their management program.

3. A state's management program must show evidence that the state has both developed and applied a procedure for identifying the boundary of its coastal zone.

These regulations indicate the acceptability of a boundary which is delineated by a strip of land of uniform depth or by political boundaries, cultural features, property lines or existing designated planning areas with the condition that any such boundaries include those lands which have any existing, projected or potential uses which would have a direct and significant impact upon coastal waters.

PRINCIPLES APPLIED TO BOUNDARY IDENTIFICATION

1. All shorelands, the uses of which have a direct and significant impact upon coastal waters, must be included within the landward boundary.

2. Transitional and intertidal areas, salt marshes, wetlands, and beaches must be included within the coastal management boundary.

3. The coastal zone management program must exclude federal lands, but, in a case where a state does exert a form of jurisdiction as to use over federally owned lands, and the uses of these lands are determined to have or potentially could have a direct and significant impact on coastal waters, such lands should be considered part of the coastal zone and thus included with the coastal management boundary.

4. The state and the districts must be capable of applying the policies, objectives and controls of its coastal management

program consistently within the entire coastal management area or consistently within each "section" in cases where the coastal management area is divided into sections. Coastal management must be administered in a manner which is not arbitrary.

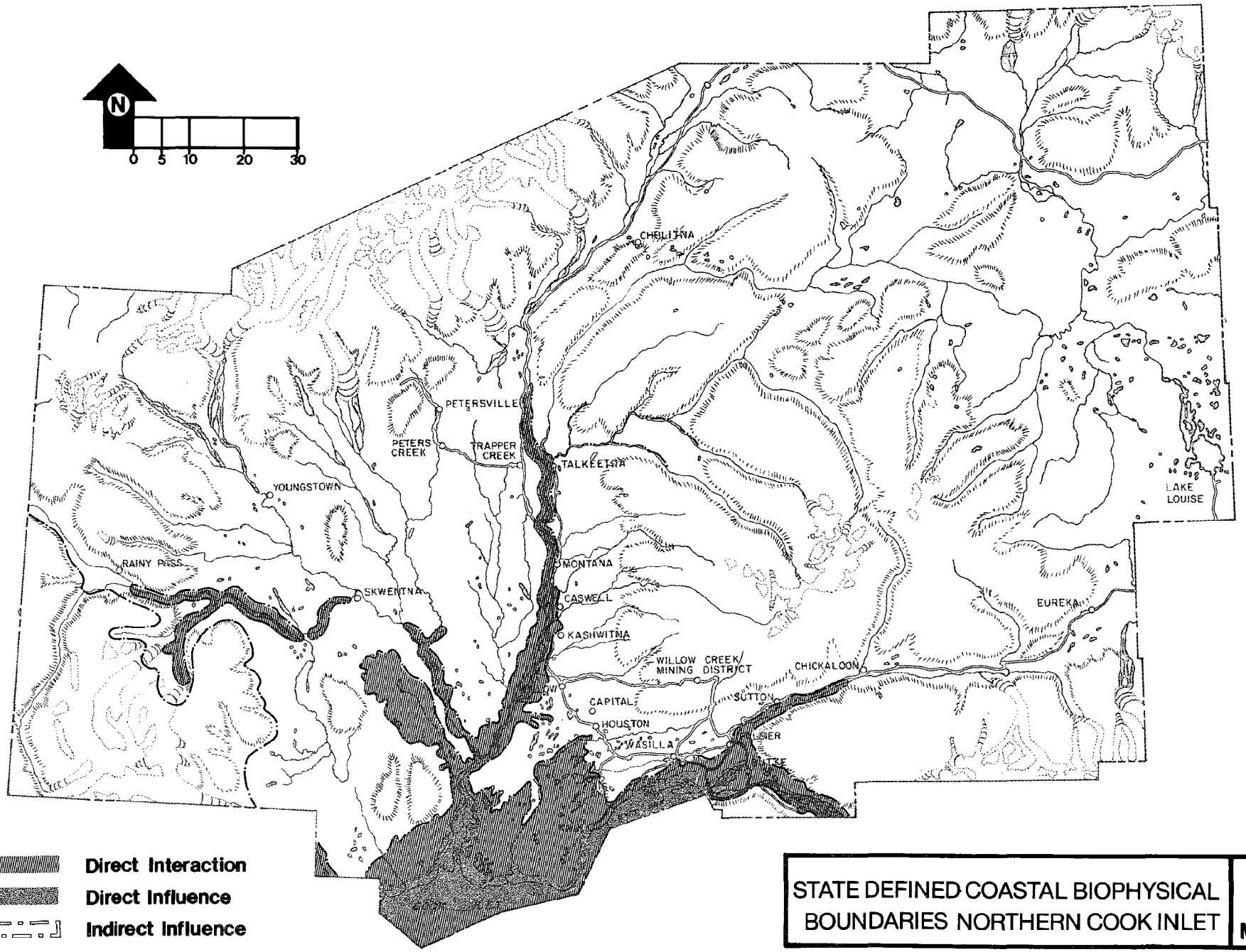
5. The inland management boundary(s) for program approval must be determined after a clearly defined and documented procedure, which incorporates permissible uses and areas meriting special attention, has been applied.

   The boundary identification process cannot be merely the result of an arbitrary determination, but rather must take into consideration the direct relationship that exists between the requirement for determining inland boundaries and the requirements for determining permissible land and water uses and areas meriting special attention.

The identification of uses and the incorporation of them within the boundary appear to be sufficient to delineate the inland boundary and fulfill the mandate of the Congressional definition, except for one other requirement. Areas Meriting Special Attention (ASMA's) may, in some instances, exceed that boundary based on "use parameters" and would therefore require consideration in boundary determination. Any of the eight classifications of areas meriting special attention listed in 15 CFR 923.13 would normally be located within the boundary. However, there may be areas in which the chief values lie in their recreational, cultural or scenic importance, but the uses of which do not have a direct and significant impact on coastal waters. If compatibility of uses is desired by the district to protect those qualities and the integrity of the system, then these areas could be included within the management boundary as well.

STATE CONSIDERATIONS

The State of Alaska, Office of Coastal Management, in cooperation with the Department of Fish and Game, has delineated an initial planning boundary for Upper Cook Inlet based on biophysical criteria (see Map 2).



STATE DEFINED COASTAL BIOPHYSICAL BOUNDARIES NORTHERN COOK INLET

2 MAP

Initial planning boundaries must be based on Biophysical Boundaries of Alaska's Coastal Zone; however, final management boundaries may diverge from the initial boundaries if the final boundaries:

1. Extend inland and seaward to the extent necessary to manage uses and activities that have or are likely to have a direct and significant impact on coastal waters; and

2. Include all transitional and intertidal areas, salt marshes, saltwater wetlands, and beaches.

If the criteria in 1 and 2 above are met, then final management boundaries of the coastal area may be based on political jurisdiction, cultural features, planning areas, watersheds, topographic features, uniform setbacks, or the dependency of uses and activities on water access.

Zone of Direct Interaction

A. Landward Limit

Landward, the zone of direct interaction is defined by saltwater intrusion into marshes and rivers and areas of active coastal erosion such as the bluffs fronting Knik Arm. Saltwater intrusion occurs up to 10 km (6 mi) inland in the Susitna Flats and as far as 32 km (20 mi) upstream in the Susitna River. Areas of active coastal erosion are best approximated by the 15 m (50 ft) contour throughout the Upper Cook Inlet region. Salt spray, ice coating, vegetation transitions and the range of most wildlife intensively using coastal marshes also occurs within this elevation.

B. Seaward Limit

Seaward, the zone of direct interaction is defined by nearshore sediment transport and deposition out to the 5 m (18 ft) depth contour. This is a high energy zone which is actively perturbed by tidal currents, ice scour, breaking waves, sediment dynamics and freshwater dilution.

Zone of Direct Influence

A. Landward Limit

The landward zone of direct influence in Upper Cook Inlet is defined where the bulk of anadromous fish spawning and rearing takes place, where moose seek out lowland areas for overwintering and calving, and where coastal wetland habitat attracts a large number of nesting birds and small mammals. Direct influence is best defined by the 200 foot contour in the Matanuska-Susitna Borough.

B. Seaward Limit

Seaward, the zone of direct influence, includes the marine waters of Cook Inlet extending south to Kalgin Island. Turbulent mixing between marine and freshwater takes place in the vicinity of Kagin Island. The characteristic marine waters of Upper Cook Inlet which include high turbidity and low salinity areas are formed in this region. This is also the average southern extent of heavy winter sea ice.

Zone of Indirect Influence

A. Landward Limit

The landward zone of indirect influence extends to the margins of glaciers and watersheds of the Cook Inlet Basin. This zone includes the limits of spawning and rearing areas for anadromous fish, the summer migration of moose from lowland calving areas to upland breeding grounds, denning areas for bears and other mammals dependent on coastal foraging during the spring and summer and the physical moderation of temperature and precipitation from the sea on the land.

B. Seaward Limit

Seaward, the zone of indirect influence includes all of Cook Inlet and the Gulf of Alaska to the limits of winter migrations of beluga whales, salmon, eulachon and harbor seals which depend on the coastal zone of Upper Cook Inlet for part of their life cycle.

The management boundaries of the Matanuska-Susitna Borough must be sufficiently compatible with those of Anchorage and Kenai to allow consistent administration of the Alaska coastal management program.

DETERMINING A MANAGEMENT BOUNDARY

A purely biophysical definition of the coastal zone is in many cases well suited for parts of Alaska's coastline, but south-central Alaska has almost two-thirds of the state's population and is a rapidly growing area. There is a need to consider not only the biophysical parameters, but economic opportunities, expansion, and livability or the cultural/physical aspects. Portions of the Borough have been heavily impacted by both natural and man-made changes. The Alaska Department of Fish and Game has stated:

> "Urbanization of both the Anchorage area and the Matanuska Valley has resulted in the alteration of habitat due to the cutting of trees, draining wetlands, siltation of streams and the introduction of pollutants. The fish and wildlife populations have declined because of the loss of habitat as well as hunting and fishing pressures. Examples of the co-existence of people and wildlife are found where habitat requirements are maintained and consumption is controlled. The 1964 earthquake produced changes in the coastal environment through land subsidence. Saltwater intrusion and flooding in some areas has altered coastal marshes, spawning and soils. The environment of the Upper Cook Inlet region remains in a dynamic state as a result of recent and continuing change."

Several options are available for selection of the management boundary. Local citizen input in concert with Planning Department, Planning Commission, and Assembly input assisted in selecting a management boundary option that meets the intent and requirements of the Act and one that coincides with the needs and desires of the Borough. At this time the Matanuska-Susitna Borough Assembly recommends that the zone of direct influence as determined by the Alaska Department of Fish and Game (200 foot contour) be considered as the Matanuska-Susitna Borough coastal planning boundary and the preliminary management boundary or zone of direct interaction as determined by the Alaska Department of Fish and Game be set at the 50 foot contour.

This boundary is subject to change prior to final program submittal to the Alaska Coastal Policy Council. This boundary change may occur with the continuing process of data inventory and analysis, consideration of Borough goals and policies, and of areas which merit special attention, and designations and consideration of uses of state concern. It is anticipated that next year's work program will build upon this work by concentrating on designating areas which merit special attention and developing management plans for them, addressing uses of state concern appropriate to the Borough and how they will be incorporated into the Borough's program, further refining the proposed land development code by specifying policies and weighting factors, and finalizing the management boundaries.

A partial listing on synthesis of options or boundary alternatives is presented in Figure 6.

AREAS MERITING SPECIAL ATTENTION

Areas Meriting Special Attention (AMSA) is a special provision in the ACMP document (6AAC 80.160) that provides coastal resource districts an opportunity to preserve, restore, maintain, enhance, develop or extract natural resources. They are areas within the coastal management area that warrant special treatment in management. AMSA's mean a delineated geographic area within the coastal area which is sensitive to change or

Figure 6

SYNTHESIS OF OPTIONS

Please make comments in the spaces provided.

BOUNDARY ALTERNATIVES	ADVANTAGES AND DISADVANTAGES
Narrowly Defined Coastal Management Area	ADVANTAGES 1. Would allow concentration of Federal and State planning and management funds in the most important coastal areas. 2. Would permit State and Borough regulatory programs that focus specifically on coastal problems. 3. _____ _____ DISADVANTAGES 1. Many significant coastal areas and activities would be arbitrarily excluded from the Coastal Management Program. 2. Difficult to control direct and significant impact on coastal waters because the activities that cause these impacts would, in some cases, be inland of the boundary. 3. Difficult to define zone in operational and political terms. 4. _____ _____
Broadly Defined Coastal Management Area	ADVANTAGES 1. Allow greater integration of coastal management program with related Borough-wide planning efforts (water quality planning, comprehensive plan development, etc.). 2. Coastal planning funds and the resultant products can supplement other planning activities and thus reduce costs and improve efficiency. 3. Coastal program can better address all activities impacting coastal land and waters. 4. _____ _____ DISADVANTAGES 1. Difficulty in defining boundary that is easily visible in operational and political terms. 2. The basic concept, and one which must be clearly understood, of "permissible uses" under the program is not the same as that of permitted uses as used in traditional zoning ordinances. Permissible uses in the coastal management program encompass both land and water use activities that have been determined to have a direct and significant impact on coastal waters rather than uses being automatically allowed in a given area as is the case with the permitted use schedule of zoning regulations. 3. _____ _____

alteration and which, because of plans or commitments or because a claim on the resource within the area delineated would preclude subsequent use of the resources to a conflicting or incompatible use, warrants special management attention or which, because of its value to the general public, should be identified for current or future planning, protection, or acquisition; these areas, subject to council definition of criteria for their identification, include ten different categories. They are:

1. Areas of unique, scarce, fragile, or vulnerable natural habitat, cultural value, historical significance, or scenic importance;

2. Areas of high natural productivity or essential habitat for living resources;

3. Areas of substantial recreational value or opportunity;

4. Areas where development of facilities is dependent upon the utilization of, or access to, coastal waters;

5. Areas of unique geologic or topographic significance which are susceptible to industrial or commercial development;

6. Areas of significant hazard due to storms, slides, floods, erosion or settlement;

7. Areas needed to protect, maintain, or replenish coastal land or resources, including flood plains, aquifer recharge areas, beaches and offshore sand deposits;

8. Areas important for subsistence hunting, fishing, food gathering and foraging;

9. Areas with special scientific values or opportunities, including those where ongoing research projects could be jeopardized by development or conflicting uses and activities; and

10. Potential estuarine or marine sanctuaries.

The Matanuska-Susitna Borough must, through its resource inventory and analysis process, continue to identify areas suitable for nomination as AMSA's and a management plan for each developed. The management plan must outline a means to preserve, protect, enhance, or restore the value or values for which the area or areas was designated. AMSA's can cross over or be contained within any resource policy unit or Policy Area.

Within the Borough, several potential AMSA's exist. More of these should be identified by the district, by the public, and through cooperative planning efforts with state agencies and maps prepared and then officially recommended for designation. The following figure shows areas or places that have been identified as appropriate for designation as AMSA's and are so recommended. As part of next year's program, these should be reviewed, the appropriate forms and maps prepared, and any other potential AMSA's. The figure also shows which of the ten criteria listed above each recommended AMSA most closely relates to.

Figure 7
RECOMMENDED AMSA's

AMSA	Meets Criteria
Matanuska/Knik River Floodplain	1, 2, 6, 7, and 8
Point McKenzie Industrial Port Site	1, 4, and 5
Palmer Hay Flats Prime Habitat Area	1, 2, 5, 6, and 8
Goose Bay State Game Refuge	1, 3, 6, and 10
Susitna Flats State Game Refuge	1, 2, 3, 6, 7, and 8

SUMMARY

A complete understanding of the entire coastal environment is needed to comprehensively manage a coastal program. Many difficulties can be encountered when defining coastal management boundaries and areas meriting special attention. The primary problems encountered at this point are lack of adequate data, and lack of public understanding of the significance of the coastal management program.

CHAPTER VIII

COASTAL MANAGEMENT AUTHORITY

INTRODUCTION

In order for any planning program to be successful there must be both the authority and logistical means available to carry the program through to its implementation. This chapter will discuss the logistical considerations that the Mat-Su Borough will be concerned with in conducting the coastal management program. It will also discuss the location and extent of the governmental authority necessary to successfully complete the program.

The national coastal management effort involves all levels of federal, state, and local governments. The activities of various state and federal agencies in coastal management and the need for coordination on the part of the Matanuska-Susitna Borough is also discussed in this chapter.

While this program is a vital planning tool, it is by no means intended to be a comprehensive plan. Fortunately, the Mat-Su Borough is in the process of finalizing a new Comprehensive Development Plan for the entire Borough. The relationship of this study to the comprehensive planning process and the Borough's new Comprehensive Development Plan is examined in this chapter.

ABILITY TO CONDUCT PROGRAM

Because of the nature and language of the Alaska Coastal Zone Management Act, some local coastal management districts may be required to expand

the scope of their activities in the areas of zoning, comprehensive land use planning, A-95 review, public works, and zoning enforcement. State agencies will closely monitor local districts to see that the implementation strategies included in the coastal management plans are fully carried out. In the case of the Matanuska-Susitna Borough, the organizational structure and planning program is already under way that will enhance the Borough's ability to carry out this coastal management program.

The Matanuska-Susitna Borough is a second-class borough. Its areawide powers include education, health, planning and zoning, and assessment and taxation and ambulance. The areawide planning power will be the most important in successfully conducting this coastal management plan.

The Borough currently has a planning staff of two professionals and two support and technical personnel. At present this staff is pursuing an active planning program which includes the development of a new comprehensive plan.

To date, in preparing this coastal management program, the Matanuska-Susitna Borough has utilized both their professional staff, a staff level consultant, and outside consultants. This system has worked well in preparing this first progress report. Assuming that the same approach is continued, there is no reason to expect that this system will not be adequate to complete the coastal management plan in the next two years. Upon completion of the plan and during the implementation process, it will be necessary for the Borough to hire at least one additional professional-level planner. This position will be necessitated by the requirement to operate the monitoring systems set up as part of this plan, coordinate activities with state, federal, and other local agencies, to maintain an updated data base within the coastal management area, and to operate the permits system of land use regulations that is envisioned as part of this coastal management plan.

AUTHORITY OF THE BOROUGH TO REGULATE LAND USE

As indicated, the Matanuska-Susitna Borough is a second-class borough. As such and under Alaska Statute 29.33.070 through 29.33.245, the Borough has both the authority and mandate to regulate land use within its jurisdiction. This is currently being done in the Borough through both subdivision and zoning processes. As indicated earlier, the Borough is also in the process of preparing a comprehensive land use plan. As part of that plan they will be recommending changes and modifications to the existing land use control system. The Alaska Coastal Management Act of 1972 also grants authority to the local government to regulate land use within the coastal zone for the purpose of managing the resources within that area. There would seem to be no question as to the authority of the Matanuska-Susitna Borough to regulate land use both within the coastal management areas as well as throughout the remainder of the Borough.

RELATION TO THE COMPREHENSIVE PLAN

It has been pointed out that the Borough is developing a new comprehensive plan concurrent with this coastal management program, and also that this program will be an element of that plan. It would be appropriate at this point to further explain the relationship of these two documents in order to give a clear understanding of the responsibilities and potential of each.

The term "comprehensive planning" has been used many ways. The comprehensive plan may be expressed in both maps and statements giving the policies, standards, plans, and programs intended to govern the physical and social development of a community. The plan maps show the relationships among various land uses and major features of the community as a whole. They include descriptions of the neighborhoods, business, institutional, and industrial centers, and depict major streets and show the proposed distribution of public facilities such as schools, parks, utilities, etc.

The plan narrative consists of stated goals, objectives, and standards to be used in developing the community on controlling land uses and associated development.

For most communities the major element of the comprehensive plan is the land use element. Traditionally, a land use element depicts various types of densities and types of developments and shows where existing and future public facilities should be placed. The land use element's main objective is to facilitate coordinated land use policies among the various levels of government. One of the oldest considerations in developing a land use plan, the one that has received renewed emphasis and importance through the passage of the Coastal Zone Management Act of 1972, is the impact that land use policy has on air and water qualities in areas of critical concern in unique natural resource areas. In the CZM Act of 1972 Congress declared that it is national policy "(a) to preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone for this and succeeding generations, (b) to encourage and assist the states who effectively exercise their responsibilities in the coastal zone through the development and implementation of development programs to achieve wide use of the land and water resources of the coastal zone, giving full consideration to ecological, cultural, historic, and aesthetic values, as well as the needs for economic development...."

These as well as other declarations make it clear that it was the intent of Congress to make the management of sensitive coastal areas a part of the land use planning process. This was also true of the State of Alaska in the enactment of the Alaska Coastal Management Program.

The foundation of local land use planning is the comprehensive plan. It sets out long range policies for physical development of the community, and thus provides a standard against which current issues concerning planning and development may be used. Coastal management should be an integral part of the comprehensive plan. It is also recommended that the implementation procedures recommended for application to the coastal zone areas should be consistent with general land use regulation procedures throughout the Borough. The permit system that is recommended as part of

this coastal management program is easily adapted to areawide application, and strong consideration should be given to a speedy adaptation of that system within the Borough.

CITIZEN PARTICIPATION

Obviously, citizen participation is a very important part of any planning project. Without the views of the citizens, the end result may bear no relationship to the needs and desires of the community. There has been a great deal of input today as part of the Matanuska-Susitna Borough Comprehensive Plan. That input was obtained from nine public meetings held during the months of June, July, and August of 1978. At these meetings the Alaska Coastal Management Program was discussed. After these meetings the Matanuska-Susitna Borough initiated their coastal management program. Additional input will be necessary in the future.

Specifically as part of this coastal management program, meetings have been held with the Matanuska-Susitna Borough Planning Commission, and additional public meetings have been held with the Matanuska-Susitna Borough, and additional public meetings will be held with both the Planning Commission and the Assembly prior to adoption of the recommendations herein.

IMPLEMENTATION TECHNIQUES

The implementation of the Matanuska-Susitna Borough Coastal Management Plan can be accomplished in a variety of ways. The following methods are listed in order to outline some options that are available. They are:

1. Permit system
2. Certification process
3. Creation of zoning districts to reflect resource policy units.
4. Performance standards and criteria (these can be developed and applied to numbers 1, 2, and 3 above also).

It is generally felt that, where possible, it is advantageous to use existing regulation controls to the maximum extent. Where such existing controls are inadequate to meet coastal management regulation needs, the new regulations and/or land use controls should be developed. At present, the Matanuska-Susitna Borough does not have areawide land use regulations. The Borough administers subdivision regulations throughout its boundaries, and zoning is actively pursued only in a few areas. After careful study by both the consultants and the planning staff, a preliminary decision has been made to utilize the perimt system similar to that developed for Breckenridge, Colorado and Petaluma, California in handling land use decisions in the coastal management area. This system may also be expanded to be utilized as a land use regulatory system throughout the Borough.

Based upon information available to date, it appears that the permit system can be adapted for utilization in the Matanuska-Susitna Borough in a regulatory capacity within the coastal area. Under the permit system concept, there are no uses allowed by right, and there are few or no prohibited uses. All development proposals are subject to a single comprehensive permit system. The permit is either granted or denied based on the basis of a set of predetermined policies which address every aspect of concern that might be directed towards the area within which the land use is proposed.

The underlying principle in developing the policies is to maximize the benefits of the development process and to minimize its negative impacts. The policies adopted by the Matanuska-Susitna Borough in preparing their permit system will be unique to the needs, desires, and conditions within the Borough. The policies are based upon environmental conditions, social conditions, economic conditions, and fiscal concerns related to the local government. The policies can also be developed to address special issues such as areas sensitive to floodplains, historic districts, limitations concerning the rate and configuration of growth, phasing new growth with capital improvements programming, and a number of other use sensitive areas.

As the permit system has been utilized in the past, two types of policies are considered: absolute policies which require or prohibit certain features, and relative policies which encourage or discourage features by allocating positive or negative points to the proposal. Each request for permit had to first demonstrate that all of the absolute policies were met. Then, the relative policies were addressed by the permit application. Each relative policy is assigned a multiplier which indicates its relative importance. The development's score on a relative policy then consists of performance points multiplied by the importance factor for the policy.

Again, according to the information available concerning the permit system, it is indicated that such systems can be alternative to traditional zoning and subdivision regulations where the prospect of growth requires the community to respond to:

1. citizens' demands for consideration of a full range of impacts from development--environmental, socio-cultural, economic, energy, and fiscal;

2. developers' demands for predictability, shorter processing times, lower front end costs, and incentive rather than punative regulations;

3. taxpayers' demands for increased governmental efficiency;

4. consumers' demands for creativity, quality, and variety in development projects; and

5. the legal profession's demands for ascertainability and precision in the standards, and fairness and uniformity in their application.

Having made the decision to pursue the permit system type of development control within the coastal area, the Matanuska-Susitna Borough's next step is to begin the development of the formal policies that will go into making up their permit system. That process has already begun. As

part of next year's program, the Borough will be working with a consultant (Wickersham and Associates, Inc.) who has substantial experience in the development of permit systems for communities. The first draft of a proposed new Land Development Code is now being developed as a permit system. The Borough should continue with finalization of this Code as part of next year's program.

CHAPTER IX
SUMMARY
AND
FUTURE WORK PROGRAM

This is a summary of the first eight chapters and is intended to present an overview of the legislative requirements, issues, coastal management boundaries, authority, and future work program.

INTRODUCTION

The coast of the United States, and especially the coastline of Alaska, is a focus of concern because of the increasing use and demand for coastal resources. This increasing use and demand for coastal resources raises doubt that the present productivity and livability supported by coastal resources will be maintained into the 21st century. Coastal resources and resource values, economic productivity, and livability are interdependent. The full arena of these matters fall within the scope of governmental and public concern. This has been clearly stated in the federal Declaration of Policy regarding coastal management.

> "The Congress finds and declares that it is the national policy (a) to preserve, protect, develop, and where possible, to restore or enhance the resources of the Nation's coastal zone for this and succeeding generations, and (b) to encourage and assist the State to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of land and water resources of the coastal zone giving full consideration to ecological, cultural, historic, and aesthetic values as well as the needs for economic development."

The policy established by Congress means that activities within the coastal management boundary should be undertaken so as to be compatible with the capabilities and limitations of that area. The Matanuska-Susitna Borough's Coastal Management Program presents a perspective of resource management for sustained resource yield. Together they have fostered the preparation of a management program framework for assessing and directing significant impacts and encouraging permitted uses of coastal land and water resources that are ecologically sound and economically productive.

LEGISLATIVE REQUIREMENTS

Before describing the planning and management strategies recommended by this report, consideration will be given to the specifics of the Alaska Coastal Management Act and a discussion of the specific coastal management problems facing the Matanuska-Susitna Borough.

This First Annual Progress Report presents the relationship of the Matanuska-Susitna Borough's Coastal Management Program to the specific requirements of the Alaska Coastal Management Act. It is structured to emphasize the relationship of the Borough's program to the key policies and requirements of the act, and to Part 6, Alaska Adminisrative Code, Chapters 80 through 85, Standards and Guidelines. The sections cited above relate to the coastal zone uses and activities, areas meriting special attention, public participation, and implementation procedures.

The State of Alaska's general policy concerning its coastline is that the coastal area is a distinct and valuable natural resource of concern to all people of the state, and that the demand upon the coastal resources of the coastal area are significant and will increase in the future. The state legislature in setting up the Alaska Coastal Management Act concluded that there is a need to engage in planning coastal areas in order to promote public health and welfare. Planning should establish the means by which coastal resource management can be effectively implemented. In the Matanuska-Susitna Borough, the planning process being utilized for the coastal management program is based largely upon

the general methodology of the land suitability approach. As data becomes available over time, technicians undertake an analysis, formulate rational criteria, and finally identify specific geographic areas and their suitability for various land uses. This philosophy and planning methodology is consistent with the general policy of the Alaska Coastal Management Act of 1977 and subsequent amendments to the policy guidelines.

There are 10 specific program elements required in the Coastal Management Act. These are explained in the Matanuska-Susitna Borough's First Annual Progress Report. Briefly, they are:

1. needs, objectives and goals;
2. organization;
3. boundaries;
4. resource inventory;
5. resource analysis;
6. subject uses;
7. proper and improper uses;
8. policies;
9. implementation; and
10. public participation.

In addition to the ten specified program elements listed above, the Alaska Coastal Management Program requires districts to specifically address several important issues in their management program documents. These include:

1. areas meriting special attention;
2. federal consistency, federal exclusion, federal agency participation;
3. uses of state concern;
4. shoreline erosion;
5. energy facility siting; and
6. shoreline access.

Each of these is explained in detail in the First Annual Progress Report.

THE ISSUES, APPROACH AND METHODOLOGY

The process of preparing a Coastal Management Program is somewhat complicated. In the Matanuska-Susitna Borough it is even more complicated due to the rapid growth and demands that are currently being placed on the coastal areas. Between 1970 and 1978 the Matanuska-Susitna Borough's population grew over 138%. This growth rate is expected to continue. Growth and development along and within the Borough's coastal area are both desirable and necessary. The purpose of the program is to understand the character of a particular coastal area and to utilize such understanding in planning its use and development. More specifically, the Borough intends to provide a means by which officials may determine which lands are most suitable for development at least cost and with maximum benefit to the public.

The Borough is in the process of preparing a comprehensive plan. As part of that process, a Goals Statement was prepared in May of 1978. It is the result of an extensive survey of public opinion among Borough residents. In essence, the Goals Statement calls for a balanced use philosophy in managing resources within the Matanuska-Susitna Borough. As demands increase in the coastal area and competition for uses rises, application of the Borough's goals can provide for rational, sound coastal resource management. This philosophy coincides with Congressional findings included in the Coastal Management Act of 1972.

The Matanuska-Susitna Borough recognizes the highly competitive conditions that currently prevail in the coastal area, and further recognizes that this competition will greatly increase in the future as the population of both the Matanuska-Susitna Borough and Southcentral Alaska increases. This plan is being developed for balanced use objectives in resource management that will accomplish the following:

1. The wisest possible use of the coastal area.

2. Maximum retention of land and water use options for the future.

3. Compatability with adjacent local and regional planning efforts (adjacent districts) as possible.

4. A better balance between an objective utilizing well defined techniques and criteria.

As a result of the resource inventory and the subsequent resource analysis as required by the act, it has been determined that portions of the Matanuska-Susitna Borough land area possess characteristics that are essentially suitable for urban and rural development, whereas other land areas have natural features that are less tolerant of such development. In order to more effectively implement the goals, objectives, and policies of the Matanuska-Susitna Borough Coastal Resource District Program and the Alaska Coastal Management Act, the coastal areas of the Borough have been categorized into four separate Policy Area designations. The purpose of these Policy Areas is to differentiate between those areas whose geographic features imply differing objectives regarding their use and future development. The system is designed to encourage uses in each Policy Area which enhance the character of the environment.

The determination as to which designation should be given to any specific coastal area has been based on, and is reflective of, the existing development pattern, the biophysical capabilities and limitations of the land, and the goals and objectives as outlined in the Comprehensive Development Goals Statement of 1978. The generic term used for the four land use suitability Policy Areas as supplied to the Borough's Coastal Management Plan are: NATURAL POLICY AREA, CONSERVATION POLICY AREA, URBAN POLICY AREA, and RURAL POLICY AREA. Figure 8 illustrates the types of land areas that are included with each of the four Policy Areas. Each of these Policy Areas are described in detail along with recommended policies in the text of the report.

THE MANAGEMENT BOUNDARY AND AMSA'S

After this resource work, it is necessary to identify permitted uses within the coastal management boundary and further, to determine the

Figure 8

RESOURCE POLICY UNIT LIST

URBAN POLICY AREA	RURAL POLICY AREA	CONSERVATION POLICY AREA	NATURAL POLICY AREA
Residential Areas	Large Lot Size Areas	Wildlife Habitats	Critical Habitats
Commercial Areas	Undeveloped Recreation Areas	River Floodplains	Prime Habitats
Industrial Areas	Multiple Use Areas	Geophysical Hazard Areas	Coastal Floodplains
Class IV Waters	Agricultural Lands	Public Viewsheds	Historic Sites & Districts
Transportation & Utility Easements	Bush Areas	Aquifer Recharge Areas	Archeological Sites
Developed Recreational Areas		Fish & Marine Life Harvest Waters	Drinking Water Sources (Public & Private)
Areas Within City Limits		Poorly Drained Soils	Tidal Marshes & Flats
		Buffer & Screening Easements	Coastal Cliffs & Bluffs
		Forest Harvest Areas	Trad. Subsistence Areas
		Prime Agricultural Lands	Viewpoints & Landmarks (Public)
		Alpine Areas	

significant social, economic and physical impacts these uses might result in. The list of permitted uses discussed in the main report includes all those activities expected to accompany development and increase population in the Matanuska-Susitna Borough. The list of permissible uses is structured so as to apply to the coastal Policy Areas; however, it is important at the outside to recognize that the list may not include all of the possible activities within the coastal management area. Clearly, activities within the coastal management area take on a wide variety of types and various levels of impact. The report defining the elements of the permissible use framework utilizes a Land Use Assessment Matrix as a planning tool to show the possible range of impacts associated with various land and water uses within the coastal management area. The purpose of the matrix is to illustrate the possible adverse impacts that could result from various uses. The matrix is to be used as a planning tool only in developing policies for each Policy Area. The matrix is utilized to identify the impacts that could potentially occur with permissible uses.

The federal Coastal Management Act of 1972 requires states receiving program development grants to identify those boundaries of the coastal zone subject to its management program. There are a number of elements that can be utilized to determine what that management boundary might include. These include biophysical elements, economic elements, demographic elements. In many cases a biophysical boundary has been used to define the coastal zone; however, while such a boundary definition may in many cases be suited for much of Alaska's coastline, southcentral Alaska has almost two-thirds of the state's population and is rapidly growing. There is a need to consider not only the biophysical perimeters, but the economic opportunities, expansion, and livability of the cultural and physical aspects. Several options are available for selection of the management boundary. After careful consideration, the First Annual Progress Report recommends that the 50 foot contour be utilized as the management boundary until further defined.

Areas Meriting Special Attention (AMSA) is a special provision of the Alaska Coastal Management Plan document that provides coastal resource districts an opportunity to preserve, restore, maintain, enhance,

develop, or extract natural resources within the coastal management area. These are areas within the coastal management area that warrant special treatment in management. The Matanuska-Susitna Borough, through its resource inventory and analysis process, has identified several areas suitable for nomination as AMSA's within this First Annual Progress Report. As part of the second year's program a management plan must be developed for each AMSA so designated. The AMSA's selected as part of this year's program are listed below.

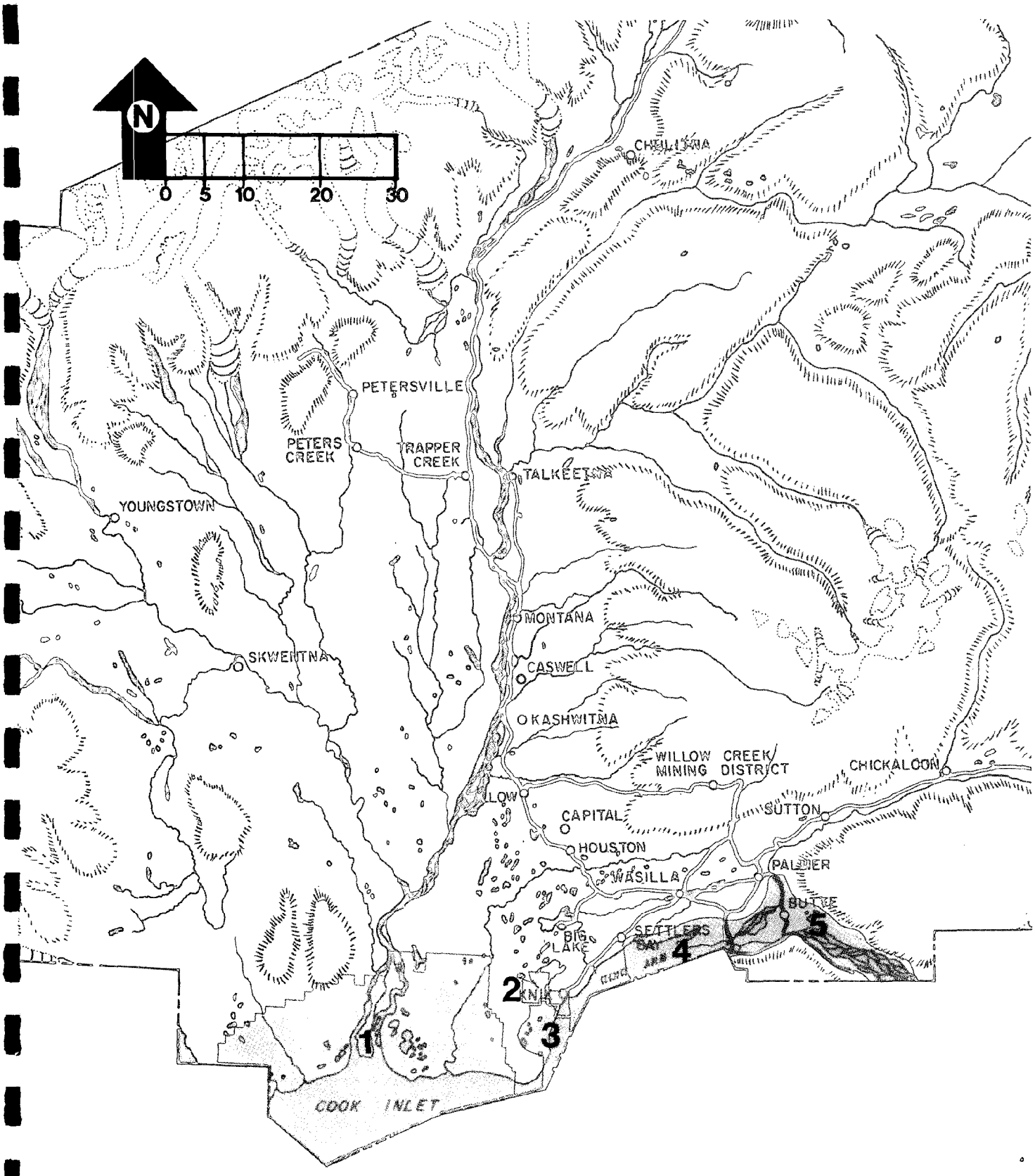
- Matanuska/Knik River Floodplain*
- Point McKenzie Industrial Port Site*
- Palmer Hay Flats Prime Habitat Area*
- Goose Bay State Game Refuge*
- Susitna Flats State Game Refuge*

* Generalized mapped areas shown on the following pages.

COASTAL MANAGEMENT AUTHORITY

In order for any planning program to be successful, there must be both authority and the logistical means to carry a program through to its implementation. In the Matanuska-Susitna Borough, both of these elements are available. The Matanuska-Susitna Borough has the logistical means to carry out this planning program through its existing planning department. It currently has a planning staff of two professionals and two support and technical personnel. It is presently pursuing an active planning program which includes the development of this coastal management program, as well as the development of a new comprehensive plan.

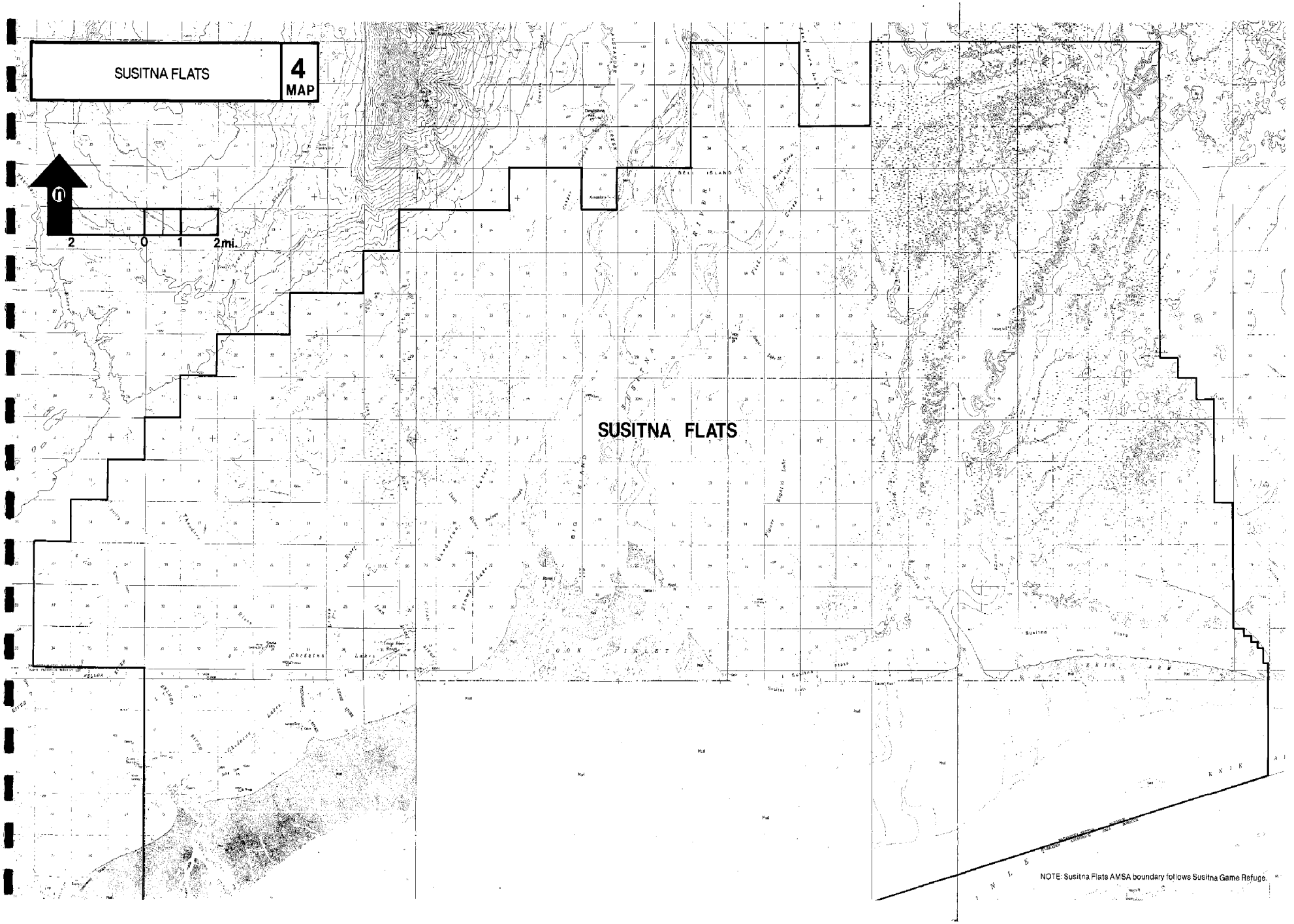
The Borough has authority to regulate land use, thus to implement this coastal management program under Alaska Statute AS29.33.070 through 29.33.245. This authority to regulate land use within these boundaries, as well as the logistical means whereby the Planning Department will be utilized in implementing the Coastal Management Program, assures that there will be a close relationship between this Coastal Management Program and the Matanuska-Susitna Borough's comprehensive plan. That

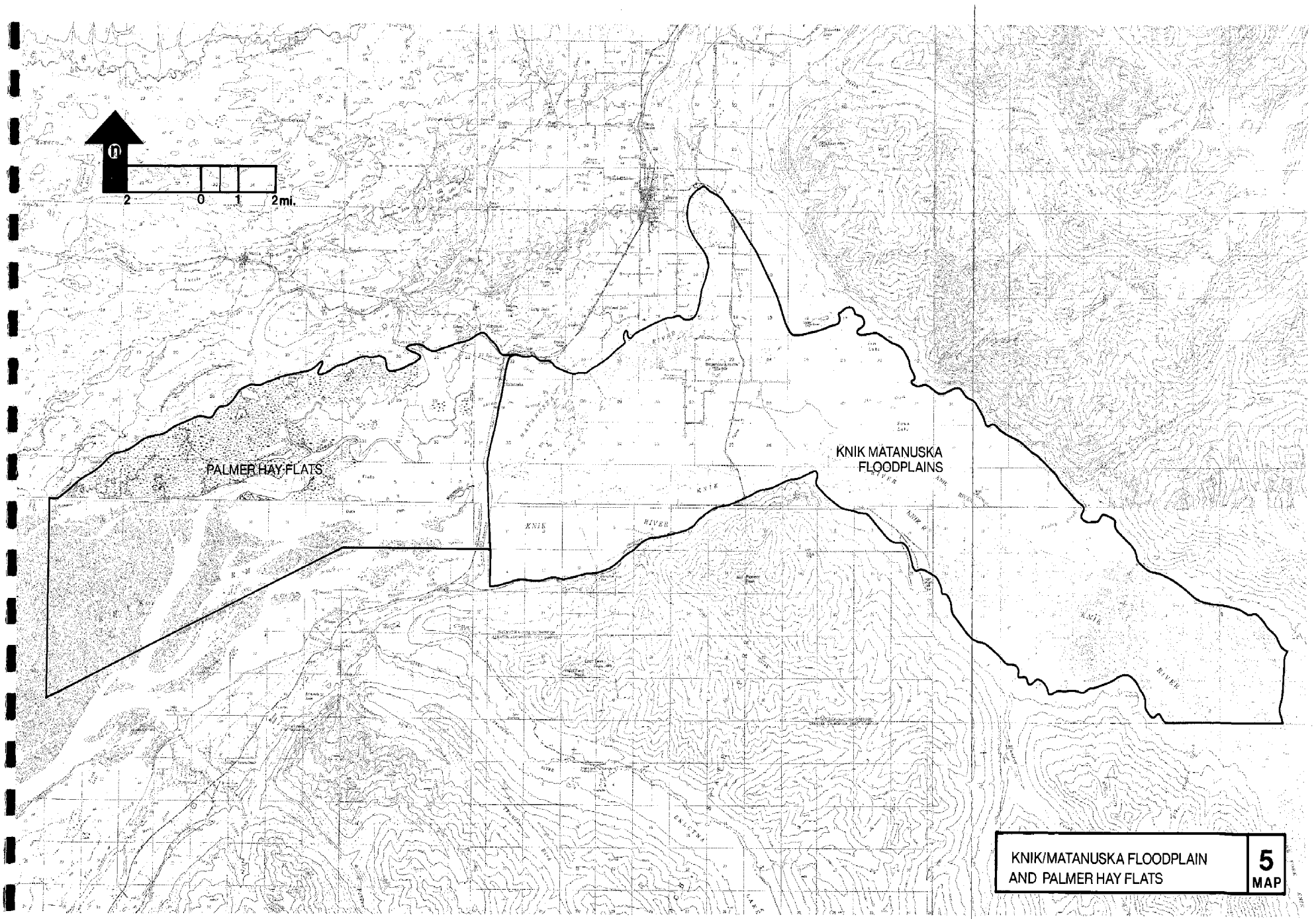


1. SUSITNA FLATS
2. GOOSE BAY RESERVE
3. PT. McKENZIE
4. PALMER HAY FLATS
5. KNIK MATANUSKA FLOODPLAINS

INDEX OF AMSA'S

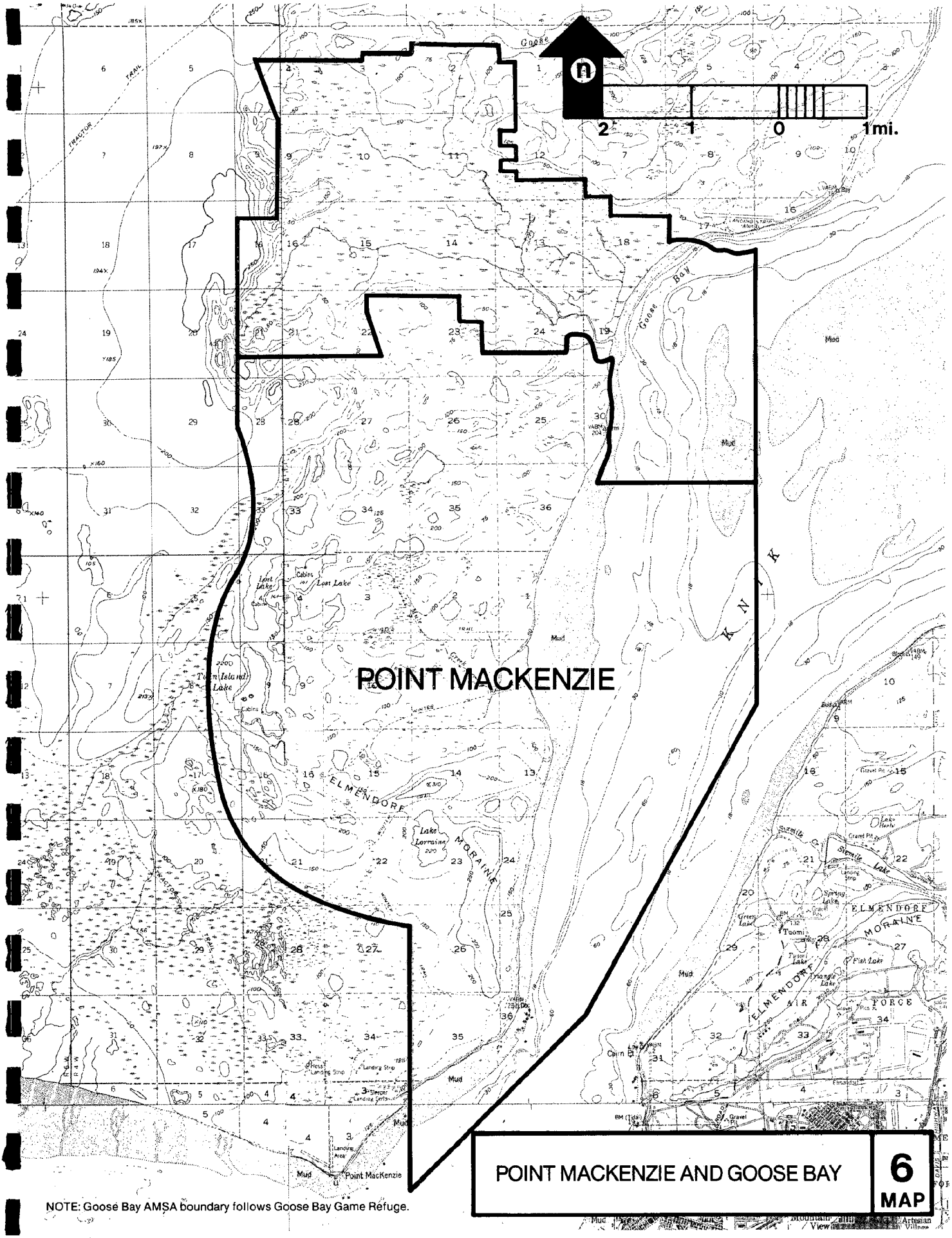
3
MAP


SUSITNA FLATS
4
MAP
N
2 0 1 2mi.
SUSITNA FLATS
NOTE: Susitna Flats AMSA boundary follows Susitna Game Refuge.



KNIK/MATANUSKA FLOODPLAIN AND PALMER HAY FLATS

5 MAP



POINT MACKENZIE AND GOOSE BAY

6 MAP

NOTE: Goose Bay AMSA boundary follows Goose Bay Game Refuge.

plan is currently being prepared. It is intended that this Coastal Management Program, when completed, will be an element of the comprehensive plan. This is particularly important because the comprehensive plan lays out the foundation for future growth and should, therefore include not only goals, objectives, and needs, but implementation strategies that are developed as part of the Coastal Management Program.

The implementation techniques available for use as part of this program as well as the comprehensive plan are numerous. However, the Borough is currently investigating a relatively new system known as the permit system. The permit system is based on a series of policies that each development project is compared against. The underlying principle behind the policies is a desire to maximize the benefits of the development process and to minimize its negative impacts. A discussion of the permit system is included in the text.

WORK PROGRAM - FY 1979-80

As a result of this Phase I Progress Report of the Coastal Management Program for the Matanuska-Susitna Borough, a work program has been developed for the next year. The specific work program has not yet been adopted, but it is estimated that the cost will be approximately $100,000.00. The work program is composed of a number of elements which, when combined with the work done as part of this Phase I report, should complete the Borough's Coastal Management Program. The work program includes the following:

1. Assigning one member of the Borough planning staff to the Coastal Management Program to coordinate the preparation of the management plan, to incorporate the input of the members of the general public, Planning Commission, and Assembly through a series of meetings and revisions until consensus is achieved. This staff member will be responsible for the following items:

a. Refinement, alteration, and presentation of the coastal management boundary.

b. Justification and nomination of the Areas Meriting Special Attention.

c. Proposal of necessary management program for each Area Meriting Special Attention.

d. Continually monitoring and gathering additional data for inclusion into the coastal management program and to render it useful in day-to-day decision making during the permitting process.

e. Coordinating the coastal aspects of the permit system with the areawide aspects as part of the comprehensive planning program.

f. Presentation of the coastal management program to the public as part of the citizen input process.

2. Preparation of a social, economic, and physical resource atlas. This resource atlas will be a cultural, economic, and environmental atlas including data concerning the coastal management area. It should provide a full range of information and data concerning the coastal management area that is available as part of the resource inventory and analysis. It should also provide a statement of the goals and objectives that the Borough intends to pursue in the development of its coastal resources.

   The atlas will facilitate the development of policies and weighing factors related to the permit system, identification of and management plans for uses of state concerns. It will help to assure that socio-economic and cultural considerations are considered in and as a part of the overall program.

3. Continue the resource mapping effort that is currently under way. This will include mapping of each of the AMSA's, as well as including a low altitude aerial potography program within the 200 foot contour planning area.

The above outlined work program should complete all the requirements necessary for approval by the Alaska Coastal Policy Council.

APPENDIX

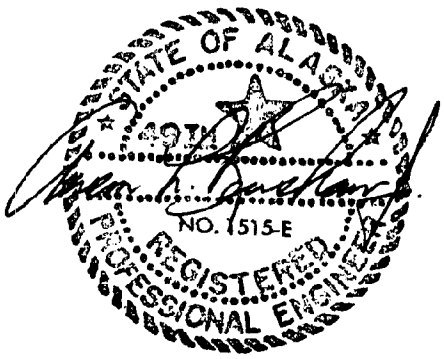
Extractive Resources

This information was prepared by A. L. Renshaw, P.E., consulting engineer and is included in this report by the request of the Matanuska-Susitna Borough.

SUMMARY REPORT

MATANUSKA-SUSITNA BOROUGH
SURFICIAL GEOLOGY (GENERALIZED)
with
DISTRIBUTION OF MINERAL DISCOVERIES

Prepared for
Matanuska-Susitna Borough



By

A. L. RENSHAW, JR., PE
Consulting Engineer
1850 Wickersham Drive
Anchorage, Alaska 99507

June 1979

CONTENTS

INTRODUCTION AND EXPLANATION OF MAPS

This text is intended as a supplement to the four-segment maps prepared for the Matanuska-Susitna Borough entitled "Surficial Geology (Generalized) with Distribution of Mineral Discoveries", and dated June 1979. Taken together, the maps and text represent a broad-brush view of geological-mineral relationships, their associations and aerial distribution. Due to the map scale (1:250,000), and time constraints, the work is not represented as being entirely accurate in detail nor comprehensive in all respects. Future revision will update the maps to include all appropriate detail consistent with scale.

In viewing the maps the following explanations and limitations should be considered:

Geologic Formations (rock type units) - Twenty-four references are cited for this work. Due to great variations in time (1907 through 1977), detail, comprehensive "state of the art" knowledge, and emphasis of the several investigators, a middle ground had to be chosen by which the source information could be correlated and presented for the present intended purposes. In some instances detail was sacrificed and in others assumptions made which may not be entirely valid or technically appropriate. Formational divisions have in certain respects been selected to emphasize various features while other units have been combined to minimize map detail. In so doing the writer feels an apology should be accorded several

source authors due to the liberties taken.

Faults and Lineaments - Generally only those fractures are shown which could be identified or deduced from satellite imagery (Land sat). It should be understood that in areas of detailed geological investigation many faults have been mapped while in other areas such detail is lacking. Those shown therefor represent major fracture zones (active and inactive) and the many secondary and subsidiary faults, even where known, are not represented.

Mineral Discoveries - No designation of individual metal or mineral is presented as such detail is of secondary importance to the distribution of discoveries. Many of the documented occurrences are of multiple metals and cannot be adequately depicted at the scale of these maps. Also, by far the greatest number of documented discoveries are for gold, with coal and copper distant seconds. In the broader context the gold discoveries should not be considered only as a single high-value commodity, but rather as an indicator of metallic mineralization. Over the years, and in the future, it is the search for gold which has, and will, provide the incentive by which serendipitous discoveries of other minerals are made. Later in this text the relationship between metallic mineral occurrence, faulting and igneous intrusion will be described.

Placer Occurrences - These are concentrations of mechanically durable heavy minerals which, having been released from their rock source through the agents of erosion, have been concentrated by the processes of gravity and flowing water in alluvial sediments. Although gold is the principal mineral of interest in such deposits, platinum, tin, tungsten, uranium-thorium, and gemstones are among the other minerals often produced from such deposits. The placers are emphasized because of the current and accelerating mining activity in progress on them, their relatively wide-spread occurrence, and their potential for conflict with other land and water uses. The relative significance depicted is a gross generalization. Intensive mining activity may be anticipated at various points on many of the stream courses, regardless of classification, due to site specific conditions. However, those indicated as the more significant are likely to experience the heaviest activity, and of longer duration, due to the probability of success by individual mining ventures.

Limestone Deposits - The Borough has a large potential for commercial limestone as many of the older sedimentary rocks contain repetitive beds of substantial thickness. With few exceptions, however, little detailed mapping or sampling has been done to define quantity or quality. Those deposits or areas of particular interest have been

identified, although many other occurrences have also been identified. The marl deposits of measured, but relatively small reserves, have been plotted merely as mineral discoveries (Big, Lucille, Wasilla and Finger Lakes) to differentiate them from the more massive limestone occurrences.

Mining Districts - The boundaries of five mining districts are shown on the maps. These are areas within which 90% of past mining activities have taken place, and within which most future mining and exploration may be expected. By 1910 the extent of the most intensely mineralized areas had been defined by prospectors and since that time the district names have been in common use by both industry and government. In the early days these districts were also quasi-political subdivisions; most having had elected councils to regulate local conflicts and common law. Recently several of the districts have been re-established as non-profit associations composed of claim owners. The purpose of these district organizations is to perform traditional arbitration functions; and in addition, to present a united front in response to the proliferation of government regulations. The boundaries shown, while largely indefinite, are essentially the same as those recommended to the Borough by the writer for inclusion with mineral related land use considerations, and which appear on page 164,

Phase I: Comprehensive Development Plan, Background Report, Matanuska-Susitna Borough Planning Department, April 1978.

MINERALIZATION - GENERAL STATEMENT

With the exception of economic mineral deposits resulting from sedimentary processes, certain broad generalizations may be made as to where metallic mineral deposits may be expected to occur:

1. Along the borders of large intrusive masses.
2. Along major fracture zones.
3. Where lime-rich rocks are invaded by igneous rocks and associated effusions.
4. Areas tectonically active at the times of igneous intrusion.

As may be seen on the maps, these generalizations hold true within the Matanuska-Susitna Borough. The Alaska Range, Talkeetna Mountains and Chugach Mountains have, over long periods of geologic time, been tectonically active. Major fracture patterns parallel the arcuate axis of the Alaska Range. Lime-rich rocks of great age, both sedimentary and volcanic, have been intruded during several periods of igneous activity. Together these factors have resulted in several belts of mineralization:

1. The Yentna-Chulitna mineral belt extends along the southern border of the Alaska Range. Within the Chulitna Mining District fracturing has been intense with considerable igneous intrusion associated. Many bedrock exposures are available and prospecting has been successful.

   Between the Chulitna Mining District and the Yentna little in way of discoveries have been made.

Here the largely barren core of an igneous mass is exposed and the border areas are covered on the south by recent sediments and to the north by inaccessible glaciated areas.

Within the Yentna Mining District little bedrock is exposed and lode discoveries are few. The mineralization is in evidence, however, due largely to the accumulations of placer minerals derived from local erosion. Unlike the Chulitna Mining District, lime-bearing host rocks are absent in the Yentna Mining District and therefor only relatively small vein-type lodes would be expected. This condition persists southwesterly across the Yentna River. Southward, beyond the Skwentna River, old volcanics and lime-rich rocks are again in evidence but little exploration has been done due to remoteness, lack of exposures and difficult accessibility. The few discoveries made in this area are considered significant and much more prospecting activity is anticipated in the future.

2. The Valdez Creek-Talkeetna mineral belt extends from the McLaren River, through the Valdez Creek Mining District and into the central Talkeetna Mountains. In addition to gold, a number of important copper occurrences are known and new discoveries have been made in recent years. Much

of this country is difficult to prospect because of the lack of exposures and the ruggedness of the Talkeetnas. Geochemical prospecting has indicated the persistence of copper and several other base metals along this belt.

3. The western border areas of the large Talkeetna intrusive mass (batholith) may be an important area for future exploration. Molybdenum is persistent and several gold and silver areas are known. Intense prospecting and past mining has occurred within the Willow Creek Mining District where several types of gold lodes are found along with important accessory minerals.

4. A very complex mineralized area exists between the Knik and Matanuska Rivers. Mineralization is widespread, but to date no sizeable deposits have been found. This belt is likely related to the Nelchina District mineralization, but no clear pattern has yet been seen. Within the Nelchina District gold is widespread but often of low grade. The lack of bedrock outcrops has inhibited interest in lode prospecting, and the origin of the gold is an open question. It is the writer's opinion (as well as that of others) that the placer gold has been largely derived from erosional reconcentrations of massive conglomerates. However,

the original source is likely related to sparce mineralized fracture zones in the Talkeetna formation. The area needs to be systematically prospected by modern exploration methods. Between the Knik and Matanuska area, tungsten mineralization has been found geochemically to be particularly persistent.

5. Isolated discoveries cannot be dismissed as being of minor importance. Rather they should be viewed as a hint of future potential. The most likely place to find new discoveries will always be those areas adjacent to known occurrences. Re-evaluation of existing finds often will lead to new developments. The very fractures which permitted the deposition of valuable minerals often pose extreme difficulty in extending the search for valuable deposits and often detailed and expensive drilling and mapping will be necessary to find a viable deposit.

As may be seen, all the conditions are present along the mineralized belts to promise the existence of commercial deposits. However, to date exploration detail has been on the whole minimal and even in intensely prospected areas the surface has barely been scratched.

SPECIFIC MINERAL DISCOVERIES

I. Non-metallic minerals and industrial materials:

Abrasives (possible sources)

Garnet and Kyanite

- in bedrock north side Valdez Creek
- heavy sands in sediment concentrates in Valdez Creek

Garnet

- in bedrock near Tsusena and Deadman Creeks (North-central Talkeetna Mountains)

Asbestos

- drainage of Grubstake Gulch and on Bald Mountain Ridge (Willow Creek Mining District)

Clay

- within Cantwell formation (Broad Pass area)
- at head of Coal Creek (Valdez Creek District)
- red clay "mass" on Doone Creek (Chickaloon area)
- within the Chickaloon formation as claystone (Matanuska Valley)
- as a weathering product: blue-white kaolinic clay at base of tertiary sediments (Yentna Mining District)
- residual at Sheep Mountain
- bentonite in association with coal at Chickaloon
- on the Little Susitna River
- on Wolverine Creek (Knik area)

- on Kings River, Hicks, Granite, Wolverine and Boulder Creeks; Matanuska River

- in the upper Kenai formation in the Beluga-Yentna area

- beneath glacial deposits in Beluga-Yentna area; lower Coal Creek, Bishop Creek, streams east of lower Beluga Lake, also lower Lake Creek, Kahiltna River and Cache Creek

Feldspar

- masses of released crystals in weathered rock debris on east form of Jack River (Broad Pass area)

Fluorspar

- as an accessory mineral in altered granitic rock on Treasure Creek (tributary of Portage Creek north of the Susitna River

Gypsum

- at Sheep Mountain (measured reserves)

Limestone

- extensive massive layer at Limestone Gap and Bubb Creek (Nelchina Mining District)

- near the Matanuska River (Nelchina Mining District)

- on Valdez Creek

- upper Susitna River

- on Coal Creek (Valdez Creek Mining District)

- at Castle Mountain

- on the Jack River and Upper Nenana

- on Butte Creek (west of Valdez Creek)

- east of Jack River

- southeast of Nenana Glacier
- south of west fork of Wells Creek to west fork glacier of Susitna River
- Upper Nenana and east fork of Wells Creek; head of Wells Creek
- between western Susitna branch glaciers
- Knik Glacier vicinity
- northern Nelchina-Susitna area
- between Watana and Jay Creeks north of Susitna River
- on Tsisi Creek (central Talkeetna Mountains)
- on Squaw, Alfred and Billy Creeks; and head of Little Nelchina River (Nelchina Mining District)
- between Kashwitna and Talkeetna Rivers
- upper west fork of Chulitna River (Chulitna Mining District)
- Mclaren River
- great bend of the Susitna River
- on the Susitna River above the Chulitna River
- upper Nenana River in Mesozoic sediments
- on Iron Creek (also marble); Sheep Creek
- Costello, Colorado, Long, Copeland, Ohio Creeks, and west fork of Chulitna River (Chulitna Mining District)
- on Antimony Creek (Chulitna Mining District)
- between Knik and Matanuska Rivers in greenstone
- Skwentna area
- north of Chilligan River

- Broad Pass

- McCallie Creek (Chulitna Mining District)

- Clearwater, Coal Creeks, north fork Coal Creek (Valdez Creek Mining District); south of Valdez Creek (Valdez Creek Mining District)

- in Mesozoic; Jurassic and Devonian rocks

- as marl in Big Lake, Wasilla, Lucille and Finger Lakes; likely other lakes

- on Wolverine Creek (Matanuska area)

- at Shellabarger Pass

Light Weight Aggregate

- as Haydite at Kings River (Matanuska formation)

- as perlite, upper Matanuska-Nelchina, and eastern Talkeetna Mountains in late tertiary volcanics

- as perlite float on Iron Creek

- White Tuff on Poorman Creek (Nelchina Mining District) (?)

- White Tuff between Boulder and Hicks Creek (upper Matanuska area) (?)

- tertiary tuffs on upper Matanuska River; head of Chickaloon River

- on Gravel Creek (southwest of Matanuska Glacier) (?)

- in recent tuffs, Mt. Spurr area (?)

- pumice in late tertiary volcanics (?)

Mica

- in pegmatite at head of Craigie Creek; other Willow Creek Mining District pegmatite dikes

- on Carpenter Creek (south of Matanuska River)

- in sand shoals in upper Cook Inlet

Potassium

- as alunite at Sheep Mountain
- as apatite on Kahiltna River
- southeast of Boulder Creek - a light colored dike with "abnormally abundant apatite". (south side Matanuska River)

Talc

- basin of Grubstake Gulch as soapstone; as talc on Bald Mountain Ridge (Willow Creek Mining District)

II. Metallic Minerals and Ores

Antimony

- in Willow Creek Mining District ores
- Broad Pass area
- Kashwitna River; Iron Creek
- upper Chulitna River
- west fork Chulitna River
- Antimony Creek (south of Chulitna River)
- at Golden Zone; Long Creek, Ohio Creek (Chulitna Mining District)
- in placer concentrates of Cache Creek
- geochemically anomalous along Yentna-Chulitna Mineral Belt

Arsenic

- accessory mineral, Golden Zone ores
- same throughout Chulitna District
- at Gold Hill (Valdez Creek District)
- as an accessory to molybdenum at Hayes Glacier (Skwentna area)
- throughout the Yentna-Susitna
- at Cummins prospect, Tokositna Glacier vicinity
- at Bird Creek (head of Peters Creek)
- in Willow Creek District ores

Bismuth

- on Colorado Creek; west fork Chulitna; Yentna-Chulitna in anomalous geochem amounts

Cadmium

- anomalous geochem amounts in Yentna-Chulitna area
- in association with zinc and molybdenum at Hayes Glacier (Skwentna area)

Chromium

- west fork of Chulitna
- in Cache Creek placer concentrates on Kahiltna and Kachatna Rivers
- at south side of Knik River

Cobalt

- on Wolverine Creek south Matanuska River

Copper

- on Iron Creek (Talkeetna area)
- on upper Skwentna River
- at base of limestone on Castle Mountain
- upper Kings River
- upper Moose Creek
- south side Sheep Mountain
- Willow Creek Mining District ores
- south of Butt Creek (west of Valdez Creek)
- Wachana Creek (west of Valdez Creek)
- upper Chulitna area
- Iron Creek (tributary of Moose, Matanuska)
- Sheep Creek basin
- native in placer concentrates of Windy Creek; Bird Creek (Cache Creek District)
- Kashwitna and Iron Creek

- Mclaren River

- Valdez Creek

- at head of Craigie Creek (Willow Creek Mining District); also Fairangel; north fork Peters Creek at Gold Mint mine; Little Susitna River; Lone Tree Gulch; Moose Creek

- west fork of Chulitna River, Costello Creek, Colorado Creek, Long Creek at Golden Zone mine

- Carpenter Creek, Jim Creek, Wolverine Creek (Matanuska-Knik area)

- at Rusty Hill, east of Clearwater (Valdez Creek District)

- Purchase Creek - Craigie Creek divide; Purchase Creek-Fairangel Creek divide; Little Willow Creek, head of Kashwitna River (Willow Creek Mining District); also Iron Creek and Moose Creek

- Timberline Creek (Valdez Creek Mining District); near Denali

- Cache Creek and Peters Creek concentrates (Yentna Mining District)

- Shellabarger Pass

- Jim Creek (Knik area)

- Eldridge Glacier; also Ruth Glacier

- Treasure Creek (Portage Creek-Susitna area)

- Rusaw Creek (upper Matanuska area)

- Hidden River (Chulitna Mining District)

Iron

- on Moose Creek (Matanuska River)

- upper Matanuska River area

- as carbonate strata within Chickaloon formation

- as magnetite on Tsusena Creek
- as hematite on Iron Creek (Talkeetna area)
- as specular hematite near twin glaciers at head of Skwentna River
- as bog iron on Goose Creek (Montana Creek); perhaps other bog areas

Lead

- Skwentna River
- at Gold Hill (Valdez Creek Mining District)
- in Willow Creek Mining District ores
- on Gopher Gulch (Peters Creek area)
- upper Chulitna; west fork Chulitna River; at Golden Zone mine
- Lucky Gulch (Valdez Creek Mining District)
- Mint mine, Portage Creek (Susitna River area)
- Ohio Creek and Hidden River (Chulitna Mining District)
- Cache Creek placer concentrates
- Shellabarger Pass
- Boedecker mine (Chulitna Mining District)
- Gold Creek (Alaska Railraod near Susitna River)
- Hayes Glacier (Skwentna area)
- anomalous geochemically along the Yentna-Chulitna Mineral Belt

Manganese

- head of Nenana River
- Hayes Glacier vicinity
- Chelatna Lake vicinity

Mecury

- in Willow Creek Mining District ores; at Gold Bullion mine; north side of Craigie Creek; Grubstake Gulch, Homestake Gulch
- south side of Knik River
- McRoberts Creek (Matanuska River)

Molybdenum

- in Willow Creek Mining District ores
- on Fairangel Creek; Purchase-Fairangle divide (Willow Creek Mining District)
- on Alaska Railroad south of Curry
- east of Portage Creek; Treasure Creek (north of Susitna River)
- at Hayes Glacier (Skwentna area)

Nickel

- on Moose Creek and Wolverine Creek (Matanuska area)
- anomalous geochemically along the Yentna-Chulitna Mineral Belt

Tellurium

- in Willow Creek Mining District ores; at Lucky Shot mine
- on Valdez Creek
- Chulitna Mining District ores

Tin

- Kahiltna River placer concentrates
- Windy Creek, Poorman Creek, Ruby Gulch, Canyon Creek, Peters Creek, Big Willow Creek (Cache Creek-Peters Creek areas of Yentna Mining District)
- Ohio Creek, Canyon Creek, Long Creek, Golden Zone mine (Chulitna Mining District)

- anomalous geochemically along the Yentna-Chulitna Mineral Belt
- Yentna and Kachatna River placer concentrates
- along a belt north of Ohio Creek (Chulitna Mining District)

Titanium

- as rutile in Matanuska-Nelchina limestone
- as titanite south of Butte Lake (west of Valdez Creek Mining District)
- as ilmenite at Kings Mountain (Matanuska area)
- in Cache Creek and Kahiltna River placer concentrates

Tungsten

- Windy Creek, Bird Creek, dikes in Dutch Hills, Cache Creek-Peters Creek placer concentrates, head of Bird Creek; Kahiltna River placer concentrates (Yentna Mining District)
- in ores of Willow Creek Mining District
- in Metal Creek, Glacier Creek, Fall Creek (Knik area)
- at Red Bar on Kahiltna River

Uranium-Thorium

- anomalous in Willow Creek Mining District pegmatites
- in Cache Creek and Poorman Creek placer concentrates as monazite
- in Kahiltna River placer concentrates
- at Shirley Lake (Rainy Pass area)
- Costello Creek (Chulitna Mining District)

Zinc

- at Gold Hill, Lucky Gulch, Valdez Creek (Valdez Creek Mining District)
- Moose Creek (Matanuska area)
- Jim Creek (Knik area)
- west fork Chulitna River, Costello Creek, Golden Zone mine, Ohio Creek, Hidden River, Eldridge Glacier (Chulitna Mining District)
- Portage Creek, Treasure Creek (Susitna area)
- anomalous geochemically along the Yentna-Chulitna Mineral Belt
- Shellabarger Pass

Zirconium

- Cache Creek and Kahiltna River concentrates (Yentna Mining District); placer concentrates of other areas

III. Precious Metals

Gold

- placer, Chickaloon River
- placer, gravel bars of Matanuska River
- associated with streams heading into mica schists (Willow Creek Mining District)
- associated with slates and graywacke of Yentna-Talkeetna areas
- gravel bars of Beluga River
- Metal Creek (Knik area)
- Wagner Creek (Lake Creek vicinity)
- Granite Creek (Matanuska area)
- Little Willow Creek (Willow Creek Mining District)
- Iron Creek (Talkeetna area)
- Nakochna River, Kachatna River, Keller Creek, Eagle Creek, Independence Creek (west of Yentna River)
- tributaries of Lake Creek
- Skwentna River
- Willow Creek, Wet Gulch, Grubstake Gulch, Homestake Gulch (Willow Creek Mining District - placer)
- Goose Creek (Oshetna River area)
- Butte, Gold and Wickersham Creek (west of Valdez Creek)
- Granite Creek, Caribou Creek, Upper Kings River (Matanuska area)
- Lower Kahiltna River and Lake Creek (Yentna District)
- Twin Creek, Doller Creek (Fairview Mountain area)

- Upper Little Susitna River

- Sheep Mountain

- Albert and Alfred Creek (Nelchina Mining District)

- Hicks Creek (Matanuska area)

- Crooked Creek, Mazuma Creek, Little Nelchina River (Nelchina Mining District)

- west fork Susitna River

- Wachana Creek (Watana Creek ?)

- Beluga, Theodor and Lewis Rivers (Mt. Susitna area)

- Valdez, Timberline, White, Rust, Lucky, Roosevelt Creeks; Surprise Gulch (Valdez Creek District)

- Cache, Windy, Fox, Short, Nugget, Dollar, Spruce, Lower Ruby, Little Doller, Falls, Ruby, Thunder, Rambler, Lucky, Iron, Gold, Columbia and Long Creeks (Yentna Mining District)

- Peters, Gold Bottom, Pioneer, Bird, Ptarmigan, Dry, Dray, Little Willow, Lucky, Puzzel, Gopher, Ruby, Pas, Poorman, Big Willow, Cottonwood Creeks, Dandy Gulch (Peters Creek area); Canyon, Long, Bunco, Wonder Gulch, Wolf, Ramsdyke, Bear, Wild Horse (Yentna Mining District)

- Camp, Pass, Notobac, Cottonwood, John, Big Boulder, Little Boulder, Wagner, Fergy, Chicago, Orin, Dome, Big Skookum, Mills, Twin, Ptarmigan Creeks (Mt. Fairview-Lake Creek areas)

- Dutch Creek, First Creek, Granite Creek, Cache Creek, Peters Creek, Treasure Creek, Beaver Creek, Kahiltna River (Kahiltna River area)

- Yenlo Creek and Lake Creek

- Partin, Shotgun, McCallie, Ohio, Copeland, Long, Bryn Mawr Creeks; West Fork, Colorado and Camp Creeks (Chulitna Mining District)

- Gold Creek, Clear Creek, Baking, John, Clear, Chunilna Creeks; bars of Susitna River below Gold Creek (Talkeetna area)

- Willow Creek Mining District: Purchase, Peters, Shorty, Craigie, Upper Willow, Fishhook Creeks; Little Susitna River, Reed, Arcangel, Fairangel Creeks; Lone Tree Gulch, etc.

- Metal Creek (Knik area)

- Iron Creek (Talkeetna area)

- Talkeetna River

- Labor Creek (Mt. Fairview area)

- west fork Chulitna River

- Antimony Creek (Chulitna area)

- Carpenter Creek (Matanuska-Knik area)

- 25 miles northeast of head of Stoney River in basin of Styx Creek

- between Eldridge and Ruth Glaciers

- Kashwitna River

- Beluga Mountain; Texas Creek

- near Curry; Susitna River bars

- Hidden River (Chulitna area)

- Fish Creek (Talkeetna area)

- Mt. Estelle (Skwentna area)

- Daisy Creek (Tyone Creek)-(Nelchina District)

- bars of Kahiltna River

- Kichatna River at mouth of Nakochna River

- Cheechako Gulch (Cache Creek area)

- Mclaren River (Kathleen-Margret mine)

- Stibnite Creek (Antimony Creek) (Chulitna Mining District)

- Sheep Mountaint

- Wistler Creek (Chulitna area)

- Martin Creek (Yentna Mining District)

- Roaring, Granite, Gold Creeks; Little Oshetna River; Landslide, Joe, Red, Yacko, Walker, Forth of July, Daisy, Tyone, Sanona Creeks; Little Nelchina River; Mazuma, Billy, Flat, Shovel, Placer, Meade, Meyer, Willow, Crooked, North, Albert, Sleigh, South, Alfred, Caribou Creeks (Nelchina Mining District)

- Eldarado Creek (Valdez Creek Mining District)

Platinum (and platinum-group metals)

- Poorman, Cache, Ruby Gulch, Canyon Creek (Yentna Mining District)

- Beaver Creek, Round Bend Bar, Boulder Bench, Leslie's Bar, Red Hill Bar (Kahiltna River)

- Big Willow Creek (Peters Creek area)

- Albert, Alfred (Nelchina Mining District)

- Metal Creek (Knik area)

- Lake Creek

- Kachatna River

Silver

- upper Chulitna area

- as tetrahedrite, north fork Peterson (Peters Creek) (Willow Creek Mining District)

- Moose Creek and Iron Creek (Matanuska area)

- in ores of Chulitna Mining District

- Carpenter Creek (Matanuska area)

- Jim Creek (Knik area)
- Mint Mine (Silver Dome Mine) on Portage Creek north of Susitna River
- west fork Chulitna River above Colorado Creek
- Lucky Gulch and White Creek (Valdez Creek Mining District)
- Peters Creek; head of Kashwitna River (Willow Creek Mining District)
- Ohio Creek, Hidden River (Chulitna Mining District)
- Lonesome Mine on Lone Tree Gulch (Willow Creek Mining District)
- Metal Creek (Knik area)
- Valdez Creek
- in the ores of Willow Creek Mining District
- in the ores of Chulitna Mining District
- Mclaren River
- Ivan Creek (Skwentna area)
- anomalous geochemically along the Yentna-Chulitna Mineral Belt

IV. Energy Minerals

Petroleum and Natural Gas - It is beyond the scope of this report to include an overview of oil and gas occurrences or potential for future discoveries. Such deposits within the Cook Inlet Basin are generally associated with a lower unit of what is shown on the maps as the Kenai formation (Hemlock Zone). North of the Castle Mountain Fault it is doubtful that extensive areas of this unit will be found, although the westerly half of the Susitna low-lands are somewhat more favorable than toward the east. Future discoveries of natural gas deposits are more likely than those of petroleum.

Most of the exploratory drilling activity has to date been conducted south of the Castle Mountain Fault. Within the Borough boundaries results have not been greatly encouraging. However, at least two shut-in gas wells have been drilled and additional future successes are anticipated.

Peat - Extensive peat bogs are found throughout the Susitna Basin. At any locals the thickness exceeds 10 feet in discontinuous semi-circular deposits of from several hundred to several thousands of feet in diameter. On a dry-weight basis the quality of energy content of peat is very similar to that of lignite coal.

At several locations compressed peat layers are

found interbedded with alluvial gravels. The reserves of peat have not been estimated, but would likely exceed several billion tons on a dry-weight basis. These deposits have not been exploited commercially for fuel or other purposes (agricultural soil conditioner) and due to environmental considerations near future exploitation is unlikely.

Coal - Coal is of widespread occurrence within the Borough and has been recognized as existing in commercial deposits within three basins: Susitna low-lands, Broad Pass, and the Matanuska River Valley. Isolated occurrences are also documented east of Valdez Creek, in the vicinity of the great bend of the Susitna River, and northwest of Lake Louise and other places.

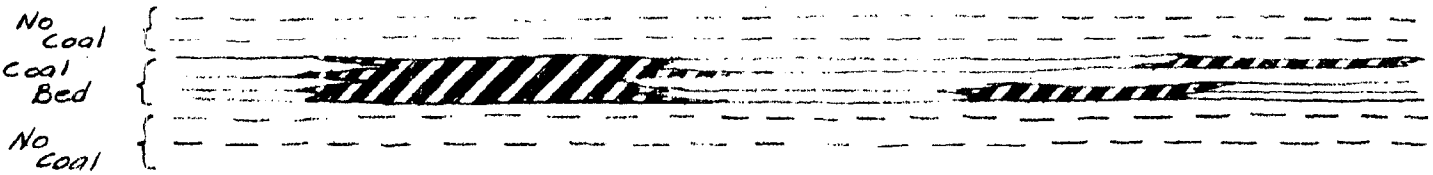
No attempt has been made to show individual coal discoveries on the maps. Rather the formational outcrops are shown along with the probable extent of the formations. The same shading has been used for both the Kenai formation (lignite and sub-bituminous coals) and Chickaloon formation (bituminous and anthracite coals) even though it is now considered unlikely that these units are contemporaneous. Several other formations exhibit coaliferous sandstones and carboniferous shales, but these have not been designated on the maps as coal-bearing. These formations may, however, be responsible in part for the reports of isolated coal occurrences.

It should be understood that the Kenai and Chickaloon formations are several thousand feet in overall thickness. It is near the center of each formation where coal-bearing zones are found. These zones are several hundred feet thick and consist of alternating bands sediments more or less coal rich. Certain of the bands may consist of one or more commercial coal seams separated by from several feet to several tens of feet of non-commercial coaliferous or non-coal rock. Adjacent bands of beds in close proximity may be separated by considerable thickness of barren rock. An outcrop identified as belonging to the coal-bearing formation is therefor no guarantee that commercial coal will also be found. Even where actual coal outcrops occur it is only by careful and expensive exploration drilling that a commercial deposit may be defined (measured reserves).

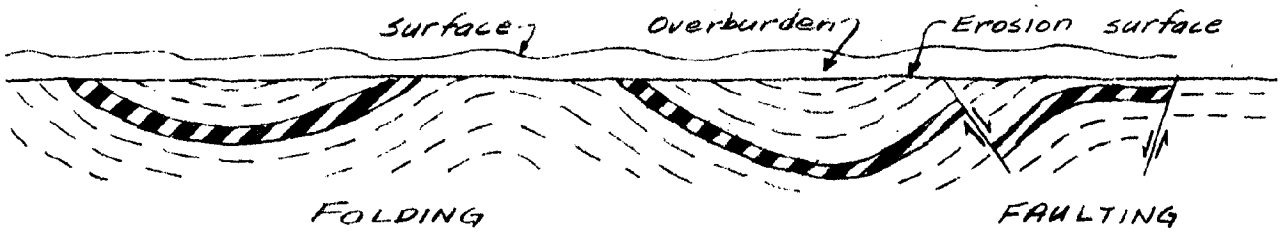
Having identified the coal-bearing zone of the formation is only a part of the difficulties that may be encountered. Diagram "A" attempts to illustrate other problems which may exist; and which must be addressed before any consideration of commercial production is possible.

Two additional problems not shown on the diagram must also be considered: In the eastern Matanuska Coal Field it is not uncommon to find igneous dikes

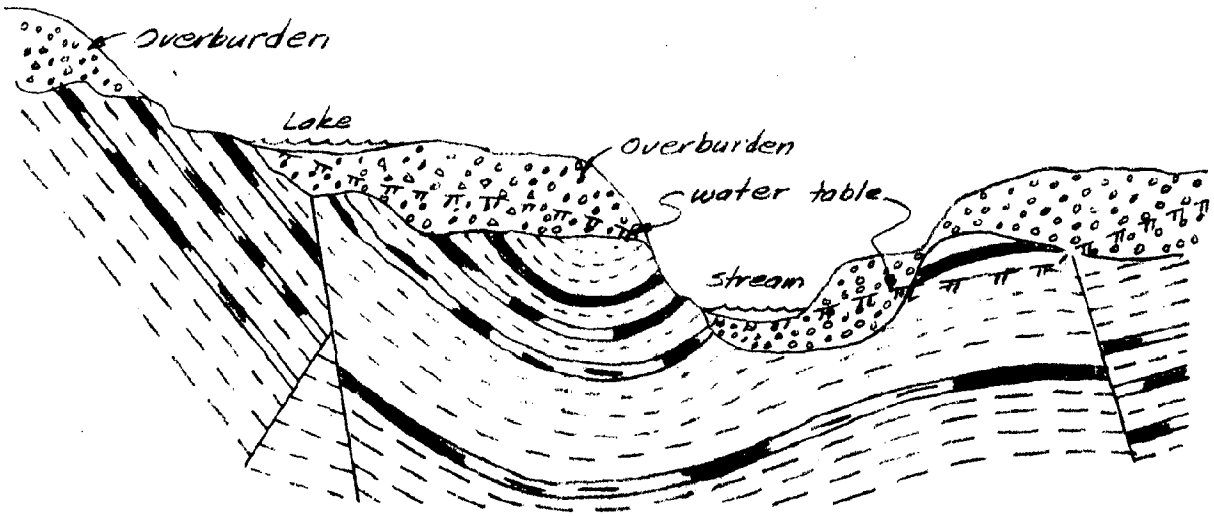
THE DEPOSITIONAL PROBLEM



THE STRUCTURAL PROBLEM



PROBLEMS OF COMMERCIAL EXTRACTION



Deep overburden.
Steep coal seams, faulting, folding, crushed zones, etc.
Discontinuous quantity and quality.
Drainage and dewatering
Incomplete or mis-leading exploration information.
Environmental, access & transportation, markets, etc.

DIAGRAM "A"

COAL — Considerations in resource evaluation.

and sills intruding the coal formation. Wherever these cross or parallel the coal beds the coal may have been coked (burned) in place and the bed rendered worthless. Also, it is not uncommon that lignite and sub-bituminous coal beds, where dry, may have been burned as a result of spontaneous combustion.

MEASURED RESERVES

Coal - Susitna Basin

The most detailed and comprehensive work on the Susitna Basin coal deposits is the work by Barnes (USGS Bulletin 1202-C, 1966). He estimated reserves within 1/2 mile of mapped exposures along the western rim of the basin, within 14 Townships, as totaling 251 million tons of sub-bituminous coal. He believed that the tertiary coal beds of the Kenai formation covered 3400 sq. mi., but a portion of that area extens beyond the Matanuska-Susitna Borough boundary.

Little consideration has been given in published reports to documented coal outcrops along the eastern basin rim, nor of the southeastern half of the basin. This apparent reluctance has been based upon geophysical evidence that formational thicknesses are less toward the east, although such thinning is relative and not conclusive. Additionally, the formational continuity across the Castle Mountain Fault with respect to the erosion surface made such projections justifiably questionable. Consequently, the gross potential of the Susitna Basin has (in the writer's opinion) been under-rated to a substantial degree.

More recent evidence of probable formational continuity justifies a less conservative view of overall resource potential. It is therefor considered likely that the coal measures of the Susitna basin (within the Matanuska-Susitna Borough) are likely continuous over an area of 4900 square miles.

Obviously because of warping, faulting, and erosion,

(see Diagram "A") portions of the coal-bearing zones of the formation may not be present continuously throughout this area. Also, it is well established that thinning and thickening of beds laterally must be expected; and that the commercial quality of the coal may vary considerably over relatively short distances. However, for the purposes of resource magnitude, it would not appear unreasonable to assume that an equivalent 10-ft. bed thickness may be continuous throughout the 4900 square miles even though the actual net thickness of coal beds may actually range between 0-feet and 60-feet or more. Based on such a minimal assumption, the Susitna Basin should contain a resource potential in the magnitude of 55 billion tons.

On an equivalent energy basis this would represent more than 18 Prudhoe Bay Oil deposits.

Coal-Broad Pass Field

Estimates for the Broad Pass area are formalized by Barnes in USGS Bulletin 1242-B, 1967. As with the Susitna Basin, estimates are restricted to within 1/2 mile of measured outcrops in the vicinity of Costello Creek and at Broad Pass Station. The published total for this area is 64 million tons of predominantly lignite rank coal, although it is admitted that the field is likely larger than the total of 8 1/2 square miles than mapped.

Based on the aerial extent of noted coal exposures it is apparent that the coal-bearing formation likely extends over an actual area of 216 square miles; about three-quarters of which are within the Matanuska-Susitna Borough.

Using the same assumptions as with the Susitna Field for continuous 10-foot net thickness, the magnitude potential for this field is 2.4 billion tons.

Coal - Matanuska Field

Published estimates for the Matanuska Field have been figured even more conservatively than the other area due to the complexities of folding, faulting and igneous intrusion. USGS Bulletin 1242-B accords a potential of 137 million tons to the Matanuska Field exclusive of the northerly, southerly and westerly areas of formation exposure. The coal rank ranges from subbitumious to anthracite.

While the problems of complexity cannot be disregarded the fact remains that this field is more or less continuous over an area of 205 square miles. Applying the same net 10-foot of coal thickness for bituminous coal, a gross magnitude potential of 2.38 billion tons is derived.

Near the western end of the field the line common to Range 2 East and Range 1 East is taken as the dividing line between the Kenai formation of the Susitna Basin and the Chickaloon formation of the Matanuska Valley. The segment between the Little Susitna exposures and those of Moose Creek has been taken as continuous in view of recent opinions (with which the writer concurs that the drilling previously done there failed to penetrate sufficiently deep to have encountered the principal coal horizons of the Chickaloon formation.

SUMMARY OF COAL POTENTIAL - GROSS MAGNITUDE

Susitna Field	55 billion tons
Broad Pass Field	2.4 billion tons
Matanuska Field	2.4 billion tons
Total (approximate)	60 billion tons

Limestone

With the possible exception of the privately held portion of the Castle Mountain deposit, there are no measured limestone reserves; nor is there sufficient quality information published to assess commercial potential. Those deposits which appear to be of commercial grade, and which likely could contain in excess of 100 million tons are as follows:

Sheep River (south deposit)
Sheep River (north deposit)
Iron Creek (Sheep River vicinity)
Tsisi Creek (Watana vicinity)
Windy Creek - Little Clearwater Creek
(Valdez Creek Mining District)
White Hill (Little Nelchina River)
Limestone Gap (Nelchina area)
Doone Creek (Chickaloon vicinity)
Castle Mountain
Ohio Creek (Chulitna Mining District)

Marl deposits have been noted in and near to several of the Matanuska Valley Lakes. USGS Bulletin 1039-A contains estimates as follows:

Wasilla Lake - Edlund deposit	195,000 tons
Finger Lake	500,000 tons
Lucille Lake	700,000 tons
Total	1,395,000 tons

Other lakes and swamps within the Matanuska and Susitna Valleys may also contain reserves.

Gypsum

A mineralized zone of the Talkeetna formation at Sheep Mountain contains gypsum. Indicated and inferred measurements contained in USGS Bulletin 989-C total 659,000 short tons of commercial and near commercial grade ore.

A similar mineralized zone is noted in the river canyon several miles to the northwest, but no information is available as to gypsum content, if any.

Haydite

An expandable shale, suitable for use as a light-weight aggregate, have been investigated on Kings River and near Sutton. These shales occur in the Matanuska formation and, while no volume estimates have been made at these, or other outcrops, the potential is very large. Volume estimates for other expandable materials within the upper Matanuska Valley and Nelchina areas would be tremendous.

Clays

Many of the claystones (shales) of the Chickaloon formation will produce excellent quality brick. Potential volumes are very large. Substantial deposits of residual clays derived from the weathering of these claystones are also present.

Other clay deposits are also known, but quantity and quality information is largely lacking.

Gold and Other Precious Metals

The dramatic increase in the price of gold and other precious

Gypsum

A mineralized zone of the Talkeetna formation at Sheep Mountain contains gypsum. Indicated and inferred measurements contained in USGS Bulletin 989-C total 659,000 short tons of commercial and near commercial grade ore.

A similar mineralized zone is noted in the river canyon several miles to the northwest, but no information is available as to gypsum content, if any.

Haydite

An expandable shale, suitable for use as a light-weight aggregate, have been investigated on Kings River and near Sutton. These shales occur in the Matanuska formation and, while no volume estimates have been made at these, or other outcrops, the potential is very large. Volume estimates for other expandable materials within the upper Matanuska Valley and Nelchina areas would be tremendous.

Clays

Many of the claystones (shales) of the Chickaloon formation will produce excellent quality brick. Potential volumes are very large. Substantial deposits of residual clays derived from the weathering of these claystones are also present.

Other clay deposits are also known, but quantity and quality information is largely lacking.

Gold and Other Precious Metals

The dramatic increase in the price of gold and other precious

metals in recent years has resulted in a resurgence of placer mining activity. Potential is huge. Mining activity will accelerate as long as the ratio of price to costs is on the increase. Currently, depending upon site specific conditions, as little as 0.1 part per million may be commercially viable. Although large volumes of gravels are processed during placer mining the recovered concentrates may represent only a fraction of one percent. After the precious metals are removed it is seldom profitable to also extract the accessory heavy minerals. In certain instances, however, the larger operations may recover by-product tin and tungsten as the market value for these metals has also been raising.

Lode gold mining will lag placer mining in activity largely because it is much more labor and capital intensive. Comparable to the late 1930s the current price to cost ratio, even with recent price increases, are not yet quite on a par. Lode development is also dependent upon specialized fixed-plant equipment, whereas placer mining is mobile and largely makes use of earth moving equipment common to the construction industry. Governmental policy and attitude, both state and federal, has been adverse to lode development for several years. Largely due to this attitude venture capital is difficult to obtain.

The potential for lode production is large and even those areas mined previously have had minimal impact upon a reduction of potential. Of the 50 square miles of known mineralization within the Willow Creek Mining District, it is the writer's

estimate that only about 62 acres have been mined or even explored in detail. None of the lode mining properties presently have sufficient measured reserves to justify operations. At the Golden Zone Mine in the Chulitna Mining District indicated reserves of about 10 million tons are known, but remain mostly sub-commercial due to the rapid escalation of costs.

Future lode production, if any, will come primarily from the Chulitna and Willow Creek Mining Districts. And, though several properties may also see development in the Yentna and Valdez Creek Districts, placer mining will continue to predominate there. The gross gold value magnitude of the two lode districts would each be in the range of two billion dollars. Mineral concentrates (exclusive of primary gold value) to be shipped out of state to smelters would be in the ratio of about one percent of the ore tonnage processed on site (milled). A 100-ton per day mine would therefor generate about one to two tons per day of concentrates having a value at a smelter of several hundred to several thousand dollars per ton. With respect to proposed port development plans of the Borough the gold mining industry, lode or placer, would produce little in the way of revenues. Silver will primarily be produced in conjunction with and accessory to gold and copper mining.

Platinum metals production will be associated with placer gold production; particularly from the Kahiltna River vicinity.

Base Metals

Ferrous metals have not been found in deposits of sufficient

size to constitute a major mineral commodity. The known iron deposits could serve a local cement manufacturing industry, but it is doubtful that such ores would be exported.

Copper is the most attractive metal from an export point of view. The concentrates from local mine site processing would represent substantial tonnages for export. Copper mineralization is persistent throughout the mineral belts, as well as other base metals. Several copper deposits are known in the Valdez Creek Mining District vicinity which have measured reserves of several million tons. The deterrents to development have been adequate transportation, unstable markets and adverse governmental policies.

CONCLUSION

In conclusion it should be stated that the mineral resources of the Matanuska-Susitna Borough are in many ways similar to those of the so-called underdeveloped countries of the world. The promise and potential is excellent; but overall, little detailed exploration and evaluation has been done to date. The near term development for coal and placer gold appears excellent. Other commodities, however, do not share that promise.

Mining is highly dependent upon risk capital for both exploration and development. Such capital is difficult to obtain even under the best of circumstances because of the unknowns of natural circumstance. With unsettled regulatory and land use policies, and with laws which are subject to change yearly, both the state and the federal governments have created a situation where risk capital cannot justifiably operate. Additionally, many agencies of both governments exhibit attitudes adverse to the minerals industry in the name of environmental protection. To a large extent these controversies result from a lack of communication and understanding of objectives on both sides. If a viable mining industry is to be re-established it will largely fall to the Borough Government to act as arbitrator, educator, promoter; and to effect a reasonable middle ground. However, industrial development, and the attendant creation of jobs, cannot be accomplished by local government on a benign basis. It must be activist. The Matanuska-Susitna Borough has made a good start in that direction in recent months.

BIBLIOGRAPHY

Several sources have been cited in the text. Nearly a hundred sources were utilized in preparation of the maps. The writer has yet to exhaust either published or private sources available.

At this time credits due will not be given in this report; however, a listing is available. It is intended that continuing work will result in a complete index of all source materials relating to the mineral resources of the Matanuska-Susitna Borough; and which will be issued subsequently. Additionally, more specific information on various of the minerals and mineralized areas will be the subjects of future reports.