PHASE 1
COMPLETION REPORT

MATANUSKA-SUSITNA BOROUGH COASTAL MANAGEMENT PROGRAM

MAY 1981

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Matanuska-Susitna Borough Coastal Management Program

Phase 1 Completion Report

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Alaska Coastal Management Program

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LIST OF ABBREVIATIONS

AAC	Alaska Administrative Code
ACMA	Alaska Coastal Management ACt
ACMP	Alaska Coastal Management Program
ACPC	Alaska Coastal Policy Council
ADCRA	Alaska Department of Community and Regional Affairs
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADT/PF	Alaska Department of Transportation and Public Facilities
AEIDC	Alaska Environmental Information and Data Center
AMSA	Areas Which Merit Special Attention
ANCSA	Alaska Native Claims Settlement Act
BLM	Bureau of Land Management
COE	U.S. Army Corps of Engineers
CZMA	Federal Coastal Zone Management Act of 1972
DGGS	Alaska Division of Geological and Geophysical Surveys
DPDP	Division of Policy Development and Planning
F&WS	U.S. Fish and Wildlife Service
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OCM	Office of Coastal Management (Alaska)
OCZM	Office of Coastal Zone Management (Federal)
SCS	U.S. Soil Conservation Service
USGS	U.S. Geologic Survey

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INTRODUCTION

INTRODUCTION

Competing demands upon the natural, commercial, recreational, ecological, industrial, and aesthetic resources of the coast have increased significantly since 1960. Until recently, this increased demand upon coastal resources was met with insufficient planning and regulatory authority at the local, State, and federal levels. The result was a piecemeal short-term management approach to the allocation of limited coastal resources and use of coastal areas.

In 1972, recognizing the national need for a coordinated governmental approach to the balanced utilization of coastal resources, Congress passed the Federal Coastal Zone Management Act, (CZMA). The CZMA established a national program for the management, beneficial use, protection and development of the land and water resources of the coast. The federal program was designed to assist states in exercising their management responsibilities over land and water resources through the development and implementation of state coastal management programs. The intent of Congress was to achieve wise use of land and water coastal resources while giving consideration to ecological, cultural, historical, and aesthetic values, as well as the needs for economic development.

All of the intense pressures on coastal resources which prompted Congress to enact the CZMA were present and, in some ways, more severe in Alaska. Advances in oil and gas exploration and mineral extraction technologies, increased demands for fishery resources, and rapid growth and development along coastal regions of Alaska resulted in substantial economic, social, cultural, and environmental impacts on coastal resources, coastal communities, and their local residents. The size and diversity of Alaska's coastal area and wealth of coastal resources required specially adapted organizational arrangements for coastal management. Those specialized needs were reflected in the passage of the Alaska Coastal Management Act of 1977 (AS 44.19.891-894 and 46.40), which provided for a State coastal management program methodology based on the partnership of shared State and local management responsibilities for coastal areas and resources.

The Alaska Coastal Management Act created, in the Office of the Governor, the Alaska Coastal Policy Council. One of the initial duties of the Council was to adopt use, habitat, and resource standards for the Alaska Coastal Management Program and guidelines for the development of district coastal management programs. The standards and guidelines were subsequently approved by the Legislature and accepted into the Alaska Administrative Code, serving as the minimum requirements for coastal management in Alaska. Both the local coastal resource districts and State agencies are bound by the standards when considering uses and activities in coastal areas, coastal habitats, and specified coastal resources. The guidelines of the Alaska Coastal Management Program outline the planning process which local coastal resource districts will utilize in preparing a district coastal management program.

The Alaska Coastal Policy Council is responsible for State-wide oversight and coordination of coastal management efforts. Local coastal districts, such as the Mat-Su Borough, are responsible for developing district coastal management programs that meet State requirements and are specific to the desires and aspirations of local residents, land and water uses and activities along the coast, and the coastal resources contained within a district. These district coastal management program serve as building blocks of the Alaska Coastal Management Program, through which local, State, and federal governments, and the private sector operate to manage Alaska's coastal resources and promote their wise use and development.

MAT-SU BOROUGH COASTAL PERSPECTIVE

The Mat-Su Borough coastal area extends for approximately seventy miles from the Kenai Peninsula Borough in the west, along the extreme northern shores of Upper Cook Inlet and Knik Arm, to the mouth of the Knik River and the Municipality of Anchorage in the east and includes all offshore and estuarine areas, tideflats and wetlands, vegetated coastal bluffs, rivers, streams and lakes, and important upland habitats which have a significant impact on coastal fish and wildlife. Contained within the Mat-Su coastal area is a wealth of natural, cultural, aesthetic, and economic resources which support a variety of coastal land and water uses and activities. Examples of such coastal uses and activities include, but are not limited to, residential housing, tourism and recreation, industrial and commercial activities, petroleum exploration and development, port development, wildlife management, mining and mineral processing, timber harvesting and processing, and agriculture.

New economic development, population growth, and expanded resource extraction and utilization in the Borough has and will continue to place increased demands on coastal areas and resources. The Mat-Su Borough, like many other coastal communities in the State of Alaska is faced with the challenge of how to allocate valuable coastal lands and resources and plan for growth through a process that maximizes the benefits of available resources while minimizing the potential impacts of development. In order to plan for sound growth and preserve the values of their coastal resources, the Borough initiated a coastal management effort.

Development and implementation of the Mat-Su Borough Coastal Management Program provides a framework for guiding the dynamic elements of the planning and policy making process with respect to complicated coastal land use and resource allocation issues. The coastal management planning and policy making process is based on a thorough inventory of natural, human, and cultural resources present and facilitated by a locally expressed coastal goals and objective statement which takes into consideration the unique economic and social environment in the Mat-Su Borough. Local benefits that would be derived from the development and implementation of the Mat-Su Borough Coastal Management Program include, but are not limited to, the following:

- Strengthening of Borough and areawide planning and management capabilities;
- Increased coordination of Borough planning and management efforts with appropriate State agencies, Federal agencies, and the private sector;
- Improved opportunities for Borough residents to constructively influence land and water management decisions that affect their lives;
- Balanced consideration between the needs for economic resource development and conservation of Borough fish and wildlife, cultural, and aesthetic resources; and
- Provide for effective long-term management of the Borough's coastal resources.

SCOPE OF PHASE I

The primary objective of the Matanuska-Susitna Borough Coastal Management Program is to provide effective long-term local management of the Borough's coastal resources with an eye toward meeting local needs. The Phase I scope of work was designed to build a foundation and framework of scientific and technical analysis in conjunction with community-identified issues, goals and objectives, that will help shape the coastal management program, plan, and implementation policies to follow.

The identification of coastal issues, goals and objectives are particularly important in the Mat-Su Borough where studies for various resource developments, Point MacKenzie Industrial Port development, and State, Borough, and ANSCA land selections interrelate in the context of the coastal zone. Coordination efforts have also acknowledged that State and federal agencies have concerns in coastal management issues, and through which, cooperation will provide the mechanism for resolving conflicts prior to the program approval process.

Resource inventory and analysis was a major scientific endeavor conducted during Phase I. The effort encompassed the evaluation of existing literature, remote imagery interpretation, technical materials from State and federal agencies and the Mat-Su Borough, and the knowledge of local residents. Interim coastal boundaries identified in the Annual Progress Report (1978) were reviewed to determine their appropriateness. Final boundary determination will depend on the integration of the results of the resource inventory and analysis, certain program issues, goals and objectives, and policied related to program implementation considerations. A coastal area classification system based on sensitivity/capability criteria allows effective determination of coastal management policies used to evaluate appropriate uses.

The resource analysis and sensitivity/capability criteria utilized measure existing or potential uses and activities within specified development, conditional development, and conservation areas. These uses and activities included uses of State concern and national interests such as a port, energy facilities, navigational facilities and systems, national defense and resource development of federal lands. The potential of the Dow-Shell alternative at Point MacKenzie must await the feasibility study results to be released in September. (Early in Phase II.)

Due to the extensive coastal zone within the Borough, combined with the expressed desire to develop an industrial port at Point MacKenzie and related resource extraction and processing activities, the potential for conflict between competing coastal uses and activities is high. The identification of areas which merit special attention provides a mechanism for focusing management options in specific geographic areas while attempting to minimize conflicts and preserve values.

Policy development is the connecting link between community goals and objectives and the implementation of the Borough's coastal management program. It is the means for the Borough to evaluate the suitabilities of certain proposals for land and water uses and activities that will be subject to the coastal management program, thus, taking a major stride in achieving local management and control objectives. The policy development process emerges in Phase I and will be a significant portion of Phase II efforts.

The Planning Commission and Citizen/Agency Joint Forum identified issues and assembled goals and objectives that reflect the concerns of Borough residents and government agencies regarding coastal development. Through discussions and understanding of the characteristics, values and roles of coastal areas, the participants viewed the coastal program as a means of managing activities within the coastal area to meet the expressed public good. Through the encouragement of input, understanding, and feedback, the Planning Commission and Citizen/Agency Joint Forum have directed progress during Phase I toward achievement of community objectives.

SCOPE OF PHASE II

An uninterrupted continuation of work and programming is anticipated for Phase II, following the overall outline. The principal task elements will include further policy developments, with associated implementation measures, focusing toward the draft and concept approved Borough Coastal Management Plan and Program. The details of the Susitna Area Study progress will become available and any heretofore unknown qualities or issues will be assessed for impacts on the finalized versions of issues, goals and objectives; resource inventory and analysis; and various subject uses previously identified.

The policy development process will acknowledge the interests and concerns of individual local communities and evaluate the suitabilities of various proposals for land and water uses and activities within delineated geographic units described for development, conditional development and conservation. Policy makers will also evaluate methods of coordination with the Borough Comprehensive Development Plan to insure consistency and appropriateness. These Borough policies, combined with the proper/improper uses identified, will provide the conceptual framework for decisions regarding uses, activities, and the permissibility of projects and development proposals within the coastal management district.

Successful local management of the Mat-Su Borough Coastal Management Program over time will require consistent application of legal and administrative procedures for achieving incremental objectives in coordination with the overall Comprehensive Development Plan. The regulations and permit systems presently in place can greatly assist the Borough in the achievement of coastal management objectives, providing appropriate coordination and review procedures are arranged between the various authorities. The implementation program measures will recognize the adopted goals and policies of the Mat-Su Borough through identified administrative arrangements, ordinance modifications, and a permitting and monitoring systems that will provide the assembly, planning commission, and administration with the tools of management that will assure consistent and coordinative guidance to achieve Borough objectives. The principal elements of the implementation program will include an interagency memorandum of agreement providing a coordination mechanism for local, State, and federal review and permit issuance processes consistent with agency and governmental requirements. The Borough will also review and discuss new incentive based management tools that will provide flexible use intensity provisions, performance standards, and criteria for development.

The preparation of the Mat-Su Borough Coastal Management Program and Plan for concept approval by the Borough Assembly is a continuous, interactive process throughout the latter part of the study. The final program format will be determined by the Borough during Phase II. Preliminarily, the program elements will describe district boundaries; certain goals, policies, and objectives; an incentive based implementation program; identification of areas meriting special attention; memorandum of understanding between the Borough, State and federal agencies; and appropriate narrative, maps, and other supporting graphics to depict the Borough's Coastal Management Program.

Throughout, the Mat-Su Borough is maintaining a program of coordination and review with federal, State and local government agencies. This process was initiated by the Mat-Su Borough Planning Department, the Citizen/Agency Joint

Forum, and consultants during Phase I and will be carried out to the concept approval and submittal stages. The results of meetings and summarization of public and agency comments to date are presented in the appendix of this Phase I Completion Report.

The Mat-Su Borough has developed a creative public participation effort reflecting the concerns of Borough residents and government agencies regarding coastal development. The Citizen/Agency Joint Forum has encouraged input, understanding, and feedback through a participation process that facilitates discussion, technical review, evaluation, and coordination of program elements. Future workshops and public hearings will be utilized by the Planning Commission and Joint Forum to present and discuss implementation measures and the draft Coastal Management Program and Plan.

GUIDELINES AND STANDARDS

ALASKA COASTAL MANAGEMENT PROGRAM GUIDELINES AND STANDARDS

The Alaska Coastal Management Act provides for local coastal programs to be developed in conformity with the general guidelines and standards of the Alaska Coastal Management Program, as approved and adopted by the Alaska Coastal Policy Council. The procedural guidelines for district coastal management program development are found in Title 6, Chapter 85 of Alaska's Administrative Code (6 AAC 85.020-110).

COASTAL MANAGEMENT PROGRAM ELEMENTS

Ten coastal management program elements form the core of the district program. These elements need not be completed in sequential order, nor set our as discrete parts of the district program. The Mat-Su Borough Coastal Management Program demonstrates compliance, through an appropriate local approach, with the requirements of the Act and the Alaska Coastal Management Program.

Needs, Objectives, and Goals (6 AAC 85.020)

The identification of coastal management issues, needs, objectives, and goals are desirable for proper district coastal management program development. The citizen participation process for the Mat-Su Borough Coastal Management Program has evolved a statement of coastal issues, goals, and objectives that are unique and reflective of coastal resource utilization perspectives in the Mat-Su Borough.

Organization (6 AAC 85.030)

Coastal districts are to include a description of the district program organization, budgetary and staff needs, and any schedule for reorganization that would be necessary to implement and carry out a coastal management program.

Boundaries (6 AAC 85.040)

Each coastal district is to include a map of the boundaries of the coastal area within the district subject to the district program. The Mat-Su Borough Coastal Management Boundary takes into consideration uses and activities that may have a direct or significant impact on marine coastal waters and includes all transitional and intertidal areas, salt marshes, and saltwater wetlands.

Resource Inventory (6 AAC 85.050)

Each coastal district is to include a resource inventory which describes natural, cultural, and socioeconomic resources within the district in a manner sufficient for coastal management program development and implementation. The Mat-Su Borough Coastal Management Program resource inventory describes and includes:

1. Coastal habitats within and adjacent to the Borough;

2. Major cultural resources within and adjacent to the Borough (e.g., demographic and financial resources, man-made facilities, utilities, and recreational and transportation facilities);

3. Major land and water uses and activities conducted within and adjacent to the Borough;

4. Major land and water resource ownership and management responsibilities within and adjacent to the Borough; and

5. Major historic, prehistoric, and archaeological resources within and adjacent to the Borough.

Resource Analysis (6 AAC 85.060)

A resource analysis of the natural, cultural, and socioeconomic resources described in the resource inventory is to be presented by coastal districts and utilized in coastal management program development and implementation. The Mat-Su Borough Coastal Management Program resource analysis describes:

1. Any significant changes in the conditions identified in the resource inventory;

2. An evaluation of the environmental capability and sensitivity of both natural and cultural resources and habitats within the Borough coastal area; and

3. An assessment of present and anticipate needs and demands for coatal habitats and resources.

Subject Uses (6 AAC 85.070)

A description of land and water uses and activities subject to a coastal district program is to be included as an integral part of program development. The Mat-Su Borough Coastal Management Program, in accordance with 6 AAC 80.040-.120, addresses uses and activities subject to the Borough Coastal Management Program. Subject uses and activities addressed include:

1. Coastal development;

2. Development in geophysical hazard area;

3. Recreation;

4. Energy facilities;

5. Transportation and utilities;

6. Fish and seafood processing;

7. Timber harvesting and processing;

8. Mining and mineral processing; and

9. Subsistence.

In addition, the Borough Coastal Management Program addresses all uses and activities that may affect habitats and resources mentioned in 6 AAC 80.130-150, including:

1. Coastal habitats;

2. Air, land, and water quality; and

3. Historic, prehistoric, and archaeological resources.

Proper and Improper Uses (6 AAC 85.080)

District programs, within a district coastal area, are to include a statement or description of proper and improper uses and activities and are to include uses of State concern. The Mat-Su Borough Coastal Management Program bases determination of proper and improper uses, in part, on the statement of Borough coastal issues, goals and objectives and on the resource analysis and sensitivity/capability criteria established for the Mat-Su Borough coastal area.

Policies (6 AAC 85.090)

District programs are to include a summary or statement of the policies applicable to land and water uses and activities subject to the district program. The summary or statement is to include the process which will be used to determine whether specific proposals for land and water uses and activites will be allowed. Mat-Su coastal management policies will be completed during Phase II of Mat-Su Borough Coastal Management Program development.

Implementation (6 AAC 85.100)

District programs are to include a description of the methods and authority which will be used to implement the district program. Mat-Su Coastal Management implementation procedures will be completed during Phase II of Mat-Su Borough Coastal Management Program development.

Public Participation (6 AAC 85.110)

District programs are to include evidence of significant and effective opportunities for public participation during program development and implementation.

The citizen participation process is extremely important in developing a district coastal management program that truly reflects local needs and aspirations. The aim of citizen participation in the development of the Mat-Su Borough Coastal Management Program is:

1. Assemble goals and objectives that reflect the concerns of Borough residents and appropriate governmental agencies, regarding use of coastal resources;

2. Establish an educational process that considers and understands the characteristics, values, and roles of coastal areas.

3. Provide Borough residents, Borough officials, and agency personnel the opportunity to share data and exchange ideas on a personal basis; and

4. Facilitate the administration of the Borough coastal management plan and program by encouraging input, understanding, and feedback by the public.

STANDARDS FOR LAND AND WATER USES AND ACTIVITIES, COASTAL HABITATS, AND RESOURCES IN THE COASTAL ZONE

In addition to the coastal management program elements, the Alaska Coastal Policy Council has approved and adopted standards for major land and water uses and activities, coastal habitats, and resources in the coastal zone. These standards have the force and effect of law and are found in Title 6, Chapter 80 of Alaska's Administrative Code (6 AAC 80.040-150). Both coastal resource districts and state agencies are bound by the standards. The nine major land and water uses and activities are considered as subject uses (6 AAC 85.070) under the coastal management program elements.

Coastal Development (6 AAC 80.040)

This standard addresses the problem of limited usable waterfront space and the effects of dredging and filling. In planning for and approving development in coastal areas, both the Mat-Su Borough and State agencies are obligated to give highest priority to water-dependent uses and activities; secondary priority to water-related uses and activities; and lowest priority to uses and activities which are neither water-dependent nor water-related.

Geophysical Hazard Areas (6 AAC 80.050)

This standard is specific to the problem of development in identified geophysical hazard areas. The Mat-Su Borough, in cooperation with State agencies are to identify known geophysical hazard areas. Development in hazard areas may not be approved by State agencies or the Borough until siting, design, and instruction measures for minimizing property damage and protection against loss of life is provided.

Recreation (6 AAC 80.060)

This standard obligates coastal districts to provide for recreational and tourist needs of their areas by designating areas for recreational use. Minimum criteria that the Mat-Su Borough can utilize in designating recreational areas are:

1. The area receives significant use by persons engaging in recreational pursuits or is a major tourist destination; or

2. The area has potential for high quality recreational use because of physical, biological, or cultural features.

Both the Borough and State agencies are to give high priority to maintaining and, where appropriate, increasing public access to coastal waters.

Energy Facilities (6 AAC 80.070)

This standard obligates coastal districts and appropriate State agencies to identify suitable sites for energy facilities. The identification of suitable energy facility sites in the Mat-Su coastal area does not necessarily mean a facility will be built. The standard will help to eliminate uncertainty as to where and actual energy facility can or cannot be located, should the need arise. In addition, the standard provides a list of siting criteria against which site proposals will be judged as to their appropriateness in the coastal area.

Transportation and Utilities (6 AAC 80.080)

This standard recognizes that the siting, design, and construction of transportation and utility routes and facilities in coastal areas should be compatible with properly expressed local desires. Mat-Su Borough coastal management goals and objectives specifically address the issues of transportation and utilities. Consideration must be given to the fact that transportation is considered a use of State concern.

Transportation and utility routes and facilities are not high priority uses of the coast. Borough planning should reflect this concern unless no feasible and prudent inland alternative exists to meet the public need for the route or facility.

Fish and Seafood Processing (6 AAC 80.090)

This standard obligates coastal districts to recognize the fishing industry and the need for shoreside facilities to support the fishing industry. There are currently no commercial fish processing facilities within the Mat-Su Borough coastal area, however the Borough retains the option to designate, if applicable, those coastal areas suitable for facilities related to commercial fishing and seafood processing.

Timber Harvest and Processing (6 AAC 80.100)

This standard addresses the major issues involved with commercial timber harvest activities in coastal areas. In addition, the standard outlines criteria to be followed for commercial timber harvest activities conducted in coatal areas and commercial timber transport, storage, and processing activities in coastal areas.

Mining and Mineral Processing (6 AAC 80.110)

This standard states that mining and mineral processing activities should be conducted so as to be consistent with other standards for land and water uses, State and national needs, and district coastal management programs. Sand and gravel extraction from coastal waters, intertidal areas, barrier islands, and spits are considered a low-priority use of the coast, unless there is no feasible and prudent alternative to coastal extraction which will meet the public need for sand and gravel.

Subsistence (6 AAC 80.120)

This standard obligates coastal districts to recognize and, if applicable, assure opportunities for subsistence usage of coastal areas and resources. The Mat-Su Borough has the option of designating and managing subsistence areas for the benefit of subsistence users.

Standards for coastal habitats and resources apply to the designated habitats and resources regardless of the use of activity under consideration. Thus, in addition to satisfying an applicable use standard, a use or activity affecting a specific habitat or resource must meet the relevant habitat or resource standard.

Habitats (6 AAC 80.030)

The aim of this standard to to protect habitats that are essential to coastal fish and wildlife species. Habitats in the coastal area 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 coats;

7. Rivers, streams, and lakes; and

8. Important upland habitats.

The above habitats are to be managed so as to maintain or enhance biological, physical, and chemical characteristics of the habitats which contribute to its capacity to support living resources. The Alaska Coastal Policy Council has established criteria to be used in the management of the respective coastal habitats. Uses and activities in coastal areas which do not conform with the management criteria of the respective coastal habitats may be allowed by the Borough or appropriate state agencies if the following are established:

1. A significant public need exists for a proposed use or activity in a coastal habitat;

2. There is no feasible prudent alternative to meet the public need for a proposed use or activity and still conform to the management criteria set out for a specific coastal habitat; and

3. All feasible and prudent steps to maximize conformance with management criteria for coastal habitats are taken.

Air, Land and Water Quality (6 AAC 80.140)

This standard incorporates the regulation of the Alaska Department of Environmental Conservation on air, land and water quality into the Alaska Coastal Management Program.

Historic, Prehistoric, and Archaeological Resources (6 AAC 90.150)

This standard obligates coastal districts and appropriate State agencies to identify areas of the coast important to the study, understanding, or illustration of national, State, or local history or prehistory. Evaluation of the Mat-Su Borough's cultural and historic resources was undertaken in conjunction with the resource inventory.

AREAS WHICH MERIT SPECIAL ATTENTION (AMSA)

An important coastal management program aspect which must be specifically addressed by coastal districts is the designation and development of management policies for areas which merit special attention within district coastal area boundaries. In general, the AMSA designation denotes a higher degree of planning and management effort for a specified coastal area as a result of unique social, economic, or environmental values present. The complete definition of areas which merit special attention is found in Section 46.40.210(1) of the Alaska Coastal Management Act. The standard for areas which merit special attention is found in Title 6, Chapter 80 of Alaska's Administrative Code (6 AAC 80.150).

Areas suitable for designation as AMSA's are to be identified early in program development by coastal districts, appropriate State and federal agencies, and local residents. For each AMSA designated by a coastal district, the following information must be provided:

1. The basis for designation;

2. A map and description of the area;

3. An analysis of existing ownership, jurisdiction, and management status of the designated AMSA and adjacent areas;

4. A description of present and anticipated conflicts between uses and activities within or adjacent to the AMSA; and

5. A proposed management scheme for the AMSA which includes:

    a. A description of proper and improper uses of land and water in the area;

    b. A statement of the policies which will be applied in managing the area; and

    c. Identification of the authority which will be used to implement the proposed management scheme.

USES OF STATE CONCERN

In addition to the standards for land and water uses and activities, coastal habitats, and resources, the Alaska Coastal Management Act specifies that there are particular land and water uses which are of State concern, and which should not be arbitrarily or unreasonably restricted or excluded as a result of the requirements of district coastal management programs. In brief, uses of State concern are those land and water uses and activities which would significantly affect the long term public interest. The complete definition of uses of State concern is found in section 46.40.210 (6) of the Alaska Coastal Management Act.

The Alaska Coastal Policy Council Resolution No. 13 outlines specific categories and criteria for uses of State concern. Use of State concern therein identified included;

1. The siting of major energy facilities;

2. Large scale industrial and commercial developments;

3. Transportation facilities;

4. Navigational facilities and systems;

5. New community development;

6. Defense and security facilities;

7. Management and enhancement of fish and wildlife resources;

8. Conservation of established state game refuges, sanctuaries and critical habitats;

9. Conservation of anadromous fish waters;

10. Harvest of fish and wildlife;

11. Disposition of land and water;

12. Disposition of forest resources;

13. Resource development on federal lands;

14. Disposition of energy resources;

15. Disposition of minerals and materials;

16. Agriculture development and protection;

17. Management of state parks, waysides, and recreational area;

18. Management of state historic, prehistoric, and archaeological resources; and

19. Management of air quality, water quality, and solid wastes.

Coastal districts should assure in their coastal program that none of the listed uses of State concern are excluded or restricted unless the district provides evidence of compliance with Section 46.40.070 (c) of the Alaska Coastal Management Act. Section 46.40.070(c) allows for the Alaska Coastal Policy Council to approve a restriction or exclusion of a use of State concern if it finds:

1. The coastal district has consulted with and considered the views of appropriate federal, State, or regional agencies;

2. The coastal district has based its restriction or exclusion on the availability of reasonable alternative sites; and

3. The coastal district has based its restriction on exclusion or on analysis showing that the proposed use is incompatible with a proposed site.

COORDINATION AND REVIEW

District coastal management programs form the foundation of the Alaska Coastal Management Program through which local, State, and federal governments, local residents, and private sector interests operate to manage Alaska's coastal resources and promote their wise use and development. In order to develop a district coastal management program that reflects local issues, goals, and objectives while meeting the requirements of the Alaska Coastal Management Act, a thorough coordination and review effort by all participants is necessary throughout all phases of district program development.

Alaska Coastal Management Program Standards 6 AAC 85.120-150 define the governmental process that coastal districts are to follow for proper public involvement, coordination and review, and final submittal and review by the Alaska Coastal Policy Council.

ISSUES, GOALS, AND OBJECTIVES

ISSUES, GOALS, AND OBJECTIVES

The identification of coastal district issues, goals, and objectives are important for completion of a coastal management program that reflects coastal resource utilization and development problems within a specific geographic area. In brief, an issue is anything which concerns a coastal district or could affect the livability, vitality, and economic well being of a district; a goal is a future vision or general end which the district aspires to achieve; and an objective is a target which provides specific incremental direction to help a district achieve identified goals. The identified issues, goals, and objectives serve as a foundation upon which coastal development policies and implementation strategies are based.

The Mat-Su Borough Citizen/Agency Joint Forum, the coastal management citizen participation body, has evolved an overall coastal issues, goals, and objective statement through a series of workshops and hours of deliberation. The Mat-Su Borough overall coastal issues, goals, and objectives statement expresses local aspirations toward coastal management, resource utilization, land use, and economic development within the Mat-Su coastal area. The overall coastal issues, goals, and objectives statement is based, in part, on general Borough wide goals and objectives developed for the Mat-Su Borough Comprehensive Development Plan, Goals Statement, (May 1978). The general Borough wide goals and objectives. Land use/environment, transportation, public facilities, and population/economy/government were reviewed and revised by the Joint Forum to reflect local concerns specific to the Mat-Su coastal area.

- ISSUE: <u>MANAGEMENT AND LOCAL CONTROL</u>

  GOAL: To maximize local Borough control over coastal management issues through the implementation of an approved coastal management program and through Memorandums of Agreement with State agencies.

  OBJECTIVES: Minimize the impact from State and federal regulations in order to foster commercial and industrial development and utilization of Borough natural resources.

Simplify present application procedures to encourage development of Borough natural resources through timely processing of applications.

Provide for a local permit coordinator to aid the public in various permitting procedures.

Encourage public agencies to obtain all required permits for contracts prior to the granting of contracts to private firms.

Promote a harmonious relationship between population growth, economic development, and natural resource utilization.

Review and update the Borough's coastal management program every five years.

Provide for conformance of coastal management program with local community plans.

- ISSUE: NATURAL RESOURCE UTILIZATION

GOAL: To provide for balanced conservation, utilization and development of Borough natural resources (e.g. fish and wildlife, timber, minerals, water, etc.), in a manner which enhances the livability and quality of life in the Borough.

OBJECTIVES: Plan for natural resource utilization in a manner which will provide the maximum long-term benefit to the Borough and residents.

Facilitate and provide for increased mining and mineral processing, including oil, gas, and coal exploration and development activities in coastal areas.

Facilitate and provide increased timber harvesting and processing in coastal areas.

Facilitate and provide for increased usage of land for agricultural and dairy production purposes.

Protect and enhance fish and wildlife and recreational resources.

- ISSUE: <u>LAND USE AND USER DEMANDS</u>

GOAL: To accommodate multiple uses and activities in coastal areas, recognizing the finite amount of coastal land in the Borough.

OBJECTIVES: Give priority to water-dependent and water-related uses in areas reserved for coastal industrial development (e.g. Point MacKenzie).

Manage and dispose of Borough selected lands for the greatest benefit to the Borough and its residents.

Accommodate the development of compact community or neighborhood core areas for location of community commercial services and public facilities.

Provide for adequate and appropriate industrial areas.

Accommodate mining and mineral processing, including oil, gas, and coal exploration and development in coastal areas.

Accommodate transportation and utility corridors in coastal areas.

Accommodate timber harvesting and processing in coastal areas.

Accommodate agriculture expansion in coastal areas.

Accommodate recreational activities (e.g. hunting, fishing, hiking, viewing, etc.) and tourism in coastal areas.

Provide for the protection and conservation of natural areas in the Borough.

Preserve natural and scenic areas of unusual value for the benefit of all.

Preserve sites and structures of historic and archaeological significance.

- ISSUE: <u>ECONOMIC STABILITY</u>

GOAL: To stimulate balanced economic development and growth in the Mat-Su Borough based upon sound planning and utilization of Borough resources.

OBJECTIVES: Provide for a broad base of economic development and activities, thereby avoiding seasonal fluctuations in employment.

Encourage development of Point MacKenzie Industrial Port Site.

Encourage timber harvesting and processing.

Encourage mining and mineral processing, including oil, gas, and coal development.

Encourage expansion of tourism, tourist related facilities, and outdoor recreational services (e.g. hunting guides).

Encourage expansion of dairy and agricultural production.

Encourage the location and development of manufacturing industry in the Borough.

- ISSUE: <u>TRANSPORTATION</u>

  GOAL: To improve and develop a Borough transportation system which is safe, efficient, and balanced.

  OBJECTIVE: Provide for development of arterial, collector, and local road networks.

  Provide for "alternative" modes of personal transportation, such as air, water, snowmachine, dogsled, or bicycles.

  Maximize efficiency, safety, and scenic aspects of major arterial routes.

  Promote the development of convenient modes of public transportation.

  Plan for and develop rail and road system to service the Point MacKenzie Industrial Port Site.

- ISSUE: <u>POINT MACKENZIE INDUSTRIAL PORT SITE</u>

  GOAL: Plan for and develop an industrial and deep water port complex, support facilities, and adjoining townsite at Point MacKenzie.

  OBJECTIVES: Provide for an economic and political atmosphere in the Borough that is receptive to the needs of industrial development at Point MacKenzie.

  Plan for and develop rail and highway transportation corridors to service the Point MacKenzie Industrial Port Site.

  Designate the Point MacKenzie location as an Area Meriting Special Attention, where development of facilities is dependent upon the utilization of, or access to, coastal waters.

  Encourage development of a Knik Arm bridge crossing.

Give priority to water-dependent and water-related development in the Point MacKenzie Industrial Port Site area.

- ISSUES: <u>PUBLIC FACILITIES AND UTILITIES</u>

GOAL: To minimize direct and indirect costs to the public in the provision of public facilities and services.

OBJECTIVES: Provide for adequate and appropriate defense against natural disasters and geophysical hazards (e.g. floods).

Provide for adequate and appropriate outdoor recreational opportunities (e.g. campgrounds, boat launches, etc.).

Plan for and develop efficient and environmentally compatible power generation and availability.

Provide for adequate and appropriate communications.

Provide for adequate and appropriate solid waste management.

Provide for adequate, safe, and high quality water supply.

Provide for adequate, safe, and feasible sanitary sewage.

Ensure public access to all significant natural areas (not necessarily road access).

COASTAL MANAGEMENT AREA

MAT-SU BOROUGH COASTAL MANAGEMENT AREA

The Upper Cook Inlet region in Southcentral Alaska is a large basin enclosed by the Alaska Range, Talkeetna Mountains, and Chugach Mountains to the west, north, and east respectively. The Mat-Su Borough is located in the northern portion of the Upper Cook Inlet region and is bordered on the southwest by the west shore Cook Inlet side of the Kenai Peninsula Borough, on the south by Upper Cook Inlet and Knik Arm, and on the southeast by the Municipality of Anchorage.

The coastal area of the Mat-Su Borough extends for over seventy miles along the extreme northern shores of Upper Cook Inlet and Knik Arm; from one mile west of the Beluga River mouth to just south of the Knik River mouth. The Mat-Su Borough coastal area marine environment is strongly influenced by the discharge of three major drainage systems in the Borough; the Susitna, Matanuska, and Knik rivers. Other smaller rivers in the Borough coastal area include the Beluga, Theodore, Lewis, Ivan, and Little Susitna River. Such a large influx of freshwater contributes dramatically to the low salinities found immediately offshore from the Borough during summer months.

Many of the rivers and tributaries which transect the Mat-Su Borough coastal area originate at glaciers located in the surrounding mountain ranges. The sedimentary products of these glaciers combine with terrestrial erosion to produce rivers which are heavily laden with silt, resulting in extensive tideflats and coastal wetlands. The coastal wetlands and tideflats in the Mat-Su Borough coastal area are highly productive environments important to the reproduction and rearing of birds, fish, and mammals. The most prominent of these coastal wetlands and tideflats are the Susitna Flats, Goose Bay area, and the Palmer Hay Flats. In addition, numerous lowland lakes and bogs in the Mat-Su Borough coastal area provide nesting and rearing habitat for waterfowl, shorebirds, fish, and small mammals.

INLAND AND SEAWARD COASTAL BOUNDARIES

The preliminary inland and seaward extent of the Mat-Su Borough coastal area is based on Biophysical Boundaries of Alaska's Coastal Zone published by the Office of Coastal Management and the Alaska Department of Fish and Game

(ADF&G)(Figure 1, Map A). With the passage of the Alaska Coastal Management Act in 1977, ADF&G was charged with the enormous task of defining coastal boundaries for Alaska' extensive shoreline. The coastal boundaries developed by ADF&G were based on a comprehensive review of available information concerning the geology, oceanography and biology for each major segment of the coastline (e.g., Upper Cook Inlet) and defined in environmental/biological terms rather than attempting to actually draw or define boundaries based on land use, political boundaries, or legislative actions.

The Alaska Coastal Management Program requires coastal districts to base their initial inland and seaward coastal management boundaries on the biophysical boundaries developed by ADF&G. Final inland and seaward coastal management boundaries may diverge from the initial boundaries (biophysical boundaries developed by ADF&G) 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 marine coastal water; and

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

Providing the above criteria are met, the final inland and seaward Mat-Su Borough coastal management boundaries may be adjusted to reflect new or more detailed resource information and may be based on political jurisdictions, cultural features, planning areas, watersheds, topographic features (e.g. contour lines), uniform setbacks, or the dependency of uses and activities on water access. The inland and seaward extent of the Mat-Su Borough coastal management boundaries depicted in Figure 1 are only preliminary in nature.

AREAS OF DIRECT INTERACTION AND DIRECT INFLUENCE

The rationale developed by ADF&G for determining inland and seaward coastal boundaries views the coast as a highly dynamic and complex continuum in which the intensity of biological and physical land/sea exchanges can be visualized as a gradient which decreases landward and seaward from the coastline. The total landward and seaward extent of this gradient is divided into areas of direct interaction and areas of direct influence, with each area reflecting the respective degree of biological and physical interaction between the land and sea.


MATANUSKA-SUSITNA BOROUGH
COASTAL MANAGEMENT PROGRAM
BIOPHYSICAL COASTAL BOUNDARY
Scale 1:346,000
COASTLINE
BOROUGH BOUNDARY
LIMIT OF DIRECT INFLUENCE
DIRECT INTERACTION
DIRECT INFLUENCE
BIOPHYSICAL COASTAL BOUNDARY
MAYNARD AND PARTCH
ANCHORAGE, ALASKA

FIGURE 1

Direct Interaction

The area of direct interaction is that area of the coast, defined by ADF&G, where physical and biological processes are a function of the direct contact between land and sea. The seaward extent of the area of direct interaction in the Mat-Su Borough coastal management area is defined as the area of nearshore sediment transport and deposition out to the 18-foot depth contour. This is a high energy region which is actively perturbed by tidal currents, ice scour, breaking waves, sediment dynamics, and freshwater dilution.

The landward limit of the area of direct interaction in the Mat-Su Borough coastal management area is defined to include the extent of saltwater intrusion into marshes and rivers and areas of active coastal erosion (e.g. bluffs fronting Knik Arm). Saltwater intrusion occurs up to 6 miles inland in the Susitna Flats and as far as 20 miles upstream in the Susitna River. Coastal bluffs experiencing rapid erosion range in height from less than 10 feet to over 100 feet. Areas of salt spray, ice coating, intertidal spawning, vegetative transitions, and important wildlife habitat also occur within the area of direct interaction in the Borough coastal area.

Direct Influence

The area of direct influence is that area of the coast, defined by ADF&G, which extends inland and seaward from the area of direct interaction. While this area is not subjected to the dynamics of land/sea energy dissipation characteristics of direct interaction, it is closely affected and influenced by the close proximity between land and sea.

The seaward extent of the area of direct influence in the Mat-Su Borough coastal management area includes the marine waters of Upper Cook Inlet south to Kalgin Island (actual Borough jurisdiction extends to southern Borough boundary in Upper Cook Inlet). Turbulent mixing between marine and freshwater takes place in the vicinity of Kalgin Island. The characteristic marine waters of Upper Cook Inlet, which include high turbidity and low salinity, interface with the waters of Lower Cook Inlet in this region.

The landward limit of the area of direct influence in the Mat-Su Borough coastal management area is defined where the bulk of anadromous fish spawning and rearing takes place, where some moose seek out lowland areas for overwintering and calving, and where coastal wetland habitat attracts a large number of nesting birds and small mammals. In the Mat-Su Borough coastal area, direct influence includes all coastal drainages, their primary tributaries, and adjacent wetlands to the 1000-foot elevation contour. The area of direct influence, according to ADF&G, extends up the main stem of the Susitna River to include Devil's Canyon. Important uplands which directly support or impact coastal processes are also included within the area of direct influence. The upland extent of direct influence in the Mat-Su Borough coastal area is delineated by the 200-foot upland elevation contour.

PRELIMINARY COASTAL MANAGEMENT BOUNDARIES

At the outset of its coastal management program, the Mat-Su Borough adopted the biophysical boundaries established by the Alaska Department of Fish and Game. These boundaries include all areas under the 200 foot contour, except on major river drainages, such as the Susitna and Skwenta Rivers, where the boundary was set at the 1000 foot contours.

During the current phase of the coastal management program, the biophysical boundaries were reviewed with the Mat-Su Borough Coastal Management Citizen/Agency Joint Forum. Three major issues were raised: The probability of actions taking place between the 200 and 1000 foot contours outside the river drainages having an indirect influence on coastal resources; the possibility of resource development outside the coastal area requiring new access through the coastal area to tidewater export locations; and the desirability of expanding district coastal management boundaries to increase Borough input into State and federal resource management decisions.

Pending the results of the completed resource analysis, the Citizen/Agency Joint Forum established preliminary Mat-Su Borough coastal management boundaries at the 1000 foot contours. These boundaries will be modified as the resource analysis and the Citizen/Agency Joint Forum dictate. The total area included under the 1000 foot contour is approximately 3700 square miles. The coastal management district includes approximately 200 square miles of offshore area and 75 miles of shore line.

RESOURCE INVENTORY

COASTAL RESOURCE INVENTORY

NATURAL RESOURCES AND COASTAL HABITATS

Eight habitats critical in coastal management are identified by the Alaska Coastal Policy Council. These habitats include: offshore areas; estuaries; wetlands and tideflats; rocky islands and seacliffs; barrier islands and lagoons; exposed high energy coasts; rivers, lakes, and streams; and important upland habitat. However, not all habitats are present within the Mat-Su Borough; barrier islands and lagoons and high energy coasts do not exist. In some instances, habitat definitions are modified or combined to conform to the natural characteristics of the Borough's coastal features.

The Mat-Su Borough's saltwater shoreline is characterized by extensive tidal flats interspersed with low-level bluffs. During summer months coastal waters are appreciably diluted by river run-off, principally from the Susitna River. Dilution is much less during winter months when ice inhibits the flow of the rivers. Knik Arm is an underwater extension of adjacent lowlands. Heavy sediment loads in river runoff are creating additional land surface leading to the encroachment of the deltas into the tidal flats. Knik Arm essentially empties twice daily during low tides (ESL 1978).

Upland areas in the Mat-Su coastal area tend to be poorly drained. As a result, lakes and wetlands abound. Local relief in the Susitna lowlands typically ranges between 50 and 250 feet. The 1000-foot contour of the inland coastal management boundary is usually not reached until the Susitna River and associated drainages reach the base of the Alaska Range and Talkeetna Mountains. The following sections present descriptions of coastal habitats and important fauna that occur within the Mat-Su Borough.

OFFSHORE AND ESTUARINE AREAS

All offshore areas of Mat-Su Borough are considered estuarine. Salinity in offshore oceanic waters typically ranges between 34 and 36 parts per thousand. An estuary is technically defined as a waterbody with a free connection to the sea in which sea water is measurably diluted by fresh water. This is the case in the offshore areas of the Mat-Su

Borough where Knik Arm and Upper Cook Inlet have an unrestricted connection to the sea and salinities are greatly reduced with fresh water runoff. In summer months salinities range between 10 and 15 parts per thousand in the offshore areas (Evans et al. 1972, Gatto 1976). Winter salinities are higher, usually slightly greater than 20 parts per thousand, but that still is much lower than oceanic seawater. As a result, the offshore and estuarine habitat classifications have been combined and include all waters and submerged lands beyond mean lower low tide to the offshore Borough limits.

Heavy summer runoff, particularly from the Susitna River creates a net export of water from the Upper Cook Inlet. This is accompanied with high sediment loads. tidal movement is the primary driving force during the winter months when ice essentially reduces river runoff to zero. Large changes in estuarine salinity which accompany this runoff pattern and high sediment loads during periods of runoff reduce the offshore biological productivity. Diatoms which utilize the high silicate content of the runoff are the primary phytoplankton (Evans et al. 1972). Sea ice often forms in Upper Cook Inlet during winter months. Tidal action, however, is usally sufficient to keep the ice shattered in the offshore estuarine coastal habitat areas.

Anadromous Fish

Salmon use the offshore estuarine coastal habitat area as they prepare to enter the river systems. Since the Susitna River is a major spawning stream in Cook Inlet, there is heavy use of the offshore areas by adult salmon between mid-May and mid-September. Salmon smolt are present in offshore areas from early May through the end of August (Evans et al. 1972).

Smelt also traverse through the coastal waters. Adults enter the Knik and Susitna rivers beginning in mid-May, peaking at the end of May. Two to three weeks later the newly hatched smelt migrate into offshore areas (Evans et al. 1972).

Marine Mammals

Both harbor seals and beluga whales utilize the offshore areas of the Mat-Su Borough. Both tend to congregate at the mouth of the Susitna River and in lower Knik Arm to take advantage of the spawning runs of anadromous fish. Most marine mammal use of the offshore estuarine coastal habitat area is limited to spring, summer and fall due to extreme weather conditions (ADF&G 1973, Governor's Committee 1980).

WETLANDS AND TIDEFLATS

Wetlands are permanently moist, shallow submerged lands, such as marshes, wet tundra, swamps, and bogs. Tideflats include those habitats that are alternately covered and uncovered by tidal changes.

Both tideflats and wetlands are extensive in the Mat-Su Borough. The three extensive areas of tidal flats along Knik Arm and Upper Cook Inlet have been designated State Game Refuges. these areas include Susitna Flats (301,950 acres*, Palmer Hay Flats (25,340 acres*), and Goose Bay (13,262 acres*). The primary purpose of all three refuges is to protect, maintain, and enhance fish and wildlife populations and habitats in concert with other components of the ecosystem. All three refuges are regulated to protect waterfowl habitat and Susitna Flats is regulated to protect big game habitat, particularly moose and black bear.

Birds

The Mat-Su tideflats and associated wetlands are critical waterfowl and shorebird habitat for both breeding and migration. Most waterfowl nesting probably occurs at the interface of the marsh and shrub habitats (Ritchie et al. 1981). Key areas for duck staging and brood rearing include the Jim-Swan lakes areas, Palmer Hay Flats, Goose Bay, and Susitna Flats. Approximately three-fourths of the ducks utilizing the wetlands are dabblers, primarily pintail, mallard, and green winged teal. Scaups are the primary diving duck (Table 1).

Population size and composition of migrating waterfowl, however, shift continuously (Tables 2 and 3). Daily changes reflect the departure and arrival of new individuals. Seasonal variations also occur and reflect the different timing of migrations for different species. For example, on September 1, 1980 over 5,000 ducks, primarily pintails, green winged teal and widgeons, were present at the wetlands at the head of Knik Arm. By early October, a large influx of mallards had arrived and thus became most abundant (Ritchie et al. 1981).

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*Acreage includes uplands, tidelands, and submerged areas.

Densities of breeding waterfowl on Mat-Su wetlands is greater than in most other areas in Upper Cook Inlet. King and Lensink (1971) estimated 12.1 ducks per square mile as typical in Kenai-Susitna habitat. This figure was derived from wetlands other than those listed above (Timm 1976, 1977). In Mat-Su wetlands, densities range from 32 to 141.4 birds per square mile (Table 2). Moreover, strip surveys on the Susitna Flats State Game Refuge have shown a summer peak of 478 waterfowl per square mile (Governor's Committee 1980). Fall bird use of these wetlands is generally more dispersed than spring use.

During spring migration, trumpeter swans are abundant on Palmer Hat Flats where they may rest for several hours or may wait out poor weather. In 1980, trumpeter swans were using open water near Jim-Swan lakes in early April. Between April 22 and 25 a minimum of 4785 swans were observed in the area. Flocks of swans were again prevalent during October (Table 3) (Ritchie et al. 1981).

Canada, white-fronted, and snow geese utilize all the coastal tideflats, associated wetlands, and nearby agricultural fields. The most abundant species is the Canada goose which uses the wet meadows, marshes, and mudflats as staging areas. In addition, Canada geese have been identified as using the Palmer Hay Flats for breeding (Ritchie et al. 1981).

Numerous other species utilize the wetland-tideland habitat (Table 4). Primary use of coastal wetlands by raptors occurs during spring and fall migrations. Bald eagles are the most abundant species, especially in the spring. Bald eagles are usually associated with waterfowl presence on Palmer Hay Flats and with salmon in the Jim Creek areas (Ritchie et al. 1981). Peregrine falcons make moderate use of the coastal wetlands and use the Susitna River as a migration route (ESL 1978).

Resident raptors which breed in the coastal areas include goshawks, great horned owls, and hawk owls. Migrating raptors which breed in the area are marsh hawks and red-tailed hawks (Ritchie et al. 1981).

Shorebird concentrations (greater than 100 birds) generally do not occur in the area. Only one colony of 10 to 100 glaucous-winged gulls using Susitna Flats have been identified (Sowls et al. 1978, Ritchie et al. 1981).

Species Composition of Ducks Using the
Matanuska-Susitna Wetlands

	1976	1977	1978
Dabblers (% of total duck population)	86	96	73
Percent among Dabblers			
Pintail	58	63	31
Teal	18	6	16
Mallard	11	19	26
Others (Shoveler)	13	12	27
Divers (% of total duck population)	14	4	27
Percent among Divers			
Scaups	63	99.9	53
Others	37		47

Source: Timm 1977, 1978, 1979.

TABLE 1

Numbers and Densities of Breeding Ducks in the
Matanuska-Susitna Borough Wetlands and Associated Tideflats

		Susitna Flats	Goose Bay	Palmer Hay Flats	Jim-Swan Lakes
1975	April 29		830	1510	476
	May 2		9096	2114	383
	June 2	8272	679	3267	1980
	No. of birds*/mi^2	60.9	73.8	76.5	128.1
1976	______	13097	427	2076	1793
	No. of birds/mi^2	96.3	46.4	48.6	141.4
1977	______	13273	784	3427	
	No. of birds/mi^2	97.6	85.5	80.2	
1978	______	6108	294	2293	
	No. of birds/mi^2	44.9	32	53.7	

*Density for June 2 count.

Source: Timm 1976, 1977, 1978, 1979.

TABLE 2

Number of Waterfowl (other than ducks) Utilizing
Matanuska-Susitna Borough Wetlands and Associated Tideflats

			Susitna Flats	Goose Bay	Palmer Hay Flats
1972	August	Canada Goose	1450		
	September 20	Canada Goose	200		
		Swan	40		
	October 2	Canada Goose	125		
		Swan	3897		
1974	July	White-fronted Goose	60		
1975	April 29	Swan		135	124
		Canada Goose		1699	11533
		Snow Goose			3040
		White-fronted Goose			413
		Sandhill Crane			10
	May 2	Swan		911	1776
		Canada Goose		1847	1586
		Snow Goose		245	
		White-fronted Goose		125	19
	June 2	Swan	91		11
		Canada Goose	170	28	107
		Sandhill Crane		12	43
		Common Loon			53
		Red Throated Loon	34		16
		Arctic Loon	34	9	
1976		Swan	45		
		Canada Goose	2051		315
		Sandhill Crane	45	12	
		Common Loon		25	32
1977		Swan	23		
		Canada Goose	478	75	171
		Sandhill Crane	45		
		Arctic Loon	91		21
1978	May	Swan	23		5
		Goose (all sp.)	149	52	150
		Sandhill Crane	23	18	
	August	White-fronted Goose	500		

Source: Timm 1976, 1977, 1978, 1979.

TABLE 3

Birds Which May Occur in the Knik Arm Wetlands Study Area, Alaska [1]

Species		Observed in 1980	Status Season[2]
Common loon	Gavia immer		R-s
Arctic loon	Gavia arctica		U-s
Red-throated loon	Gavia stellata		R-m
Red-necked grebe	Podiceps grisegena	x	C-s
Horned grebe	Podiceps auritus	x	C-s
Great blue heron	Ardea herodias		Ca
Whistling swan	Olor columbianus	x	C-m
Trumpeter swan	Olor buccinator	x	U-m
Canada goose	Branta canadensis	x	A-m
Black brant	Branta nigricans		R-m
White-fronted goose	Anser albiforms	x	U-m
Snow goose	Chen hyperborea	x	U-m
Mallard	Anas platyrhynchos	x	C-s,U-w
Pintail	Anas acuta	x	C-s
Green-winged teal	Anas carolinensis	x	C-s
Blue-winged teal	Anas discors	x	Ca-s
Northern shoveler	Spatula clypeata	x	C-s
European wigeon	Mareca penelope		R-m
American wigeon	Mareca americana	x	C-s
Canvasback	Aythya valisineria	x	R-s
Redhead	Aythya americana		Ca-m
Ring-necked duck	Aythya collaris	x	R-m
Greater scaup	Aythya marila	x	C-s
Lesser scaup	Aythya affinis	x	R-m
Common goldeneye	Bucephala clangula	x	U-m
Barrow's goldeneye	Bucephala islandica	x	R-m, R-w
Bufflehead	Bucephala albeolc	x	U-m
Oldsquaw	Clangula hyemalis		R-s
Harlequin duck	Histrionicus histrionicus		R-s
White-winged scoter	Melanitta deglandi		R-m
Surf scoter	Melanitta perspicillata		R-m
Black scoter	Oidemia nigra		R-m
Common merganser	Mergus merganser	x	U-m,R-w
Red-breasted merganser	Mergus serrator	x	U-m
Goshawk	Accipiter gentilis	x	U-p
Sharpeshinned hawk	Accipiter straitus	x	U-s,Ca-w
Red-Tailed hawk	Buteo jamaicensis	x	U-s
Rough-legged hawk	Buteo lagopus	x	U-m
Golden eagle	Aquila chyrsaetos	x	U-m
Bald eagle	Haliaeetus leucocephalus	x	C-m,U-s,R-w
Marsh hawk	Circus cyaneus	x	C-m,U-s
Osprey	Pandion haliaetus	x	R-m
Gyrfalcon	Falco rusticolus		Ca-w
Peregrine falcon	Falco peregrinus		R-m

TABLE 4
(Page I of 2)

continued

Species		Observed in 1980	Status Season[2]
Merlin	Falco cloumbarius	x	R-s,Ca-w
American kestrel	Falco sparverius	x	R-m
Sandhill crane	Grus canadensis	x	C-m,U-s
American coot	Fulica americana	x	Ca
Semi-palmated plover	Charadrius semipalmatus	x	U-s
Kildeer	Charadrius vociferus		U-s
American golden plover	Pluvialis dominica	x	U-m
Black-bellied plover	Squatarola squatarola		R-m
Hudsonian godwit	Limosa haemastica		C-s
Marbled godwit	Numerius phaeopus		Ca
Whimbrel	Numerius phaeopus		U-m
Upland sandpiper	Bartramia longicauda		Ca
Greater yellowlegs	Totanus melanoleucus	x	C-s
Lasser yellowlegs	Totanus flavipes	x	C-s
Solitary sandpiper	Trigna solitaria	x	U-s
Spotted sandpiper	Actitis macularia	x	C-s
Wandering tattler	Heteroscelus incanum		U-s
Ruddy turnstone	Arenaria interpres		R-m
Northern phalarope	Lobipes lobatus	x	C-s
Common snipe	Capella gallinago	x	C-s
Short-billed dowitcher	Limnodromus griseus	x	C-s
Long-billed dowitcher	Limnodromus scolopaceus		R-m
Sanderling	Crocethia alba		R-m
Semi-palmated sandpiper	Freuhetes pusillus		R-m
Western sandpiper	Ereuhetes mauri		U-m
Least sandpiper	Erolia minutilla		C-s
Baird's sandpiper	Erolia bairdii		R-m
Pectural sandpiper	Erolia melanotos		U-m
Dunlin	Erolia alpina		R-m
Parasitic jaeger	Stercorarius parasiticus		R-m
Long-tailed jaeger	Stercorauius longicaudus		R-m
Glaucous gull	Larus hyperboreus		R-v
Glaucous-winged gull	Larus glaucescens		C-s,U-w
Herring gull	Larus argentatus	x	C-m,R-w
Mew gull	Larus canus	x	A-s
Bonaparte's gull	Larus philadelphia	x	C-s
Arctic tern	Sterna paradisaea	x	C-s

[1] From Gabrielson and Lincoln (1959), Williamson et al. (1965), Wapora (1976), Anchorage Audubon Society (1978), Batten et al. (1978), Kesseli and Gibson (1978), Sellers (1979).

[2] R = resident, U = uncommon, s = summer, f = fall, w = winter, m = migrant, C = common, P = permanent resident, Ca = casual.

Source: Modified from Richie et al. 1981.

Bird activities associated with upland wetlands are not well documented. Only four whistler swan nesting sites have been identified within the Mat-Su Borough. These include two west of Alexander Creek between Rabbit and Sucker Lakes and two west of the Yentna River (Governor's Committee 1980 map). Other areas of upland marsh may be used by swans but have not been identified (Sowls et al. 1978).

Mammals

Moose and black bear are the most prevalent large animals and muskrats the most abundant furbearers in the coastal wetlands (ADF&G resource maps and Ritchie et al. 1981).

Moose use the coastal areas primarily during spring calving. The thick cover and boggy nature of the terrain provides desirable forage and protection from predators. Summer use is more limited as moose disperse in search of browse. Winter use of coastal wetland areas is generally restricted to those years when heavy upland snowfall drives moose into the area in search of forage.

Other mammals which utilize the wetland areas have been identified for the Knik Arm wetlands (Table 5). The relative abundance of each and the extent to which they inhabit Goose Bay and Susitna Flats have not been determined.

HIGH VEGETATED BANKS

The high vegetated banks coastal habitat designation is used in place of the rocky island and seacliff habitat found in 6 AAC 80.130 of the Alaska Coastal Management Program. A rocky island and seacliff habitat typically refers to rocky shores with steep faces, offshore rocks, and capes. The Mat-Su Borough has none of the characteristics, thus, this habitat classification has been modified to refer to the high coastal bank areas (generally between 25 and 100 feet) in the Borough. Rather than rock composition, the high banks consist of vegetated upper slopes with muddy intertidal zones. Two areas fall into this classification, the shorelines between Palmer Hay Flats and Goose Bay and south of Goose Bay to the Susitna Flats.

Typical vegetation along the more northern section is young mixed forest interspersed with nonforested areas and backed by medium and old-aged mixed forest. Along the coastal edge of the more southern section, a ten acre bank of nonforested area is backed with extensive areas of medium and mixed old-aged forest interspersed with very poorly drained nonforested areas and other forested lands typical of poorly drained soils (ESRI 1981).

Mammals which May Occur in the
Knik Arm Wetlands Study Area, Alaska Wetlands and Tidelands

Species	Scientific Name	Major Vegetation Types*
Masked shrew	Sorex cinerus	3-10
Dusky schrew	Sorex obscurus	3,5,6,7,8,9,10
Northern water shrew	Sorex palustris	riparian
Northn bog lemming	Synaptomys borealis	3,6,8
Brown lemming	Lemmus trimucronatus	3,6,8
Red-backed vole	Cleathrionomys rutilus	2-10
Meadow vole	Microtus pennsylvanicus	3-10
Tundra vole	Microtus oeconcmus	3,5,6,7,8
Singing vole	Microtus miurus	5,6,7,8
Meadow jumping mouse	Zapus hudsonius	3,5,6,7,8
Little brown bat	Myotis lucifugus	1-10
Muskrat	Ondatra zibethicus	1,2,3,4,6
Coyote	Canis latrans	3-10
Fed fox	Vulpes fulva	3-10
Black bear	Ursus americanus	9,10
Mink	Mustela vison	1,2,3,4,6
River otter	Lutra canadensis	1,2,3,4,6
Moose	Alces alces	5,7,9,10

*(1) Aquatic vegetation, (2) Marshes, (3) Wet meadows, (4) Harbaceous vegetation of levees, bars, and mudflats, (5) Willow thickets, (6) Wet Myrica fens, (7) Alder thickets, (8) Ericaceous shrub-sphagnum bogs, (9) Black spruce forests, (10) Cottonwood, birch & white spruce forests.

Source: Modified from Ritchie et al. 1981.

TABLE 5

Birds, Mammals, and Fish

The areas between Palmer Hay Flats and Goose Bay is the more productive of the two bluffs. Waterfowl extend their use of Palmer Hay Flats along this shoreline (ADF&G resource maps). Important moose habitat occurs inland from the bluffs (ADF&G resource maps). Three creeks enter along this shore. As a result, it is considered an important fish habitat (ADF&G resource maps).

RIVERS, STREAMS, AND LAKES

Rivers, streams, and lakes include all surface freshwater systems within the coastal management boundary. Rivers and streams provide permanent habitat for many species and act as a conduit and spawning area for anadromous fish. In addition, rivers, streams, and lakes support summer and winter activities of primarily local bird and mammal populations.

The Mat-Su Borough has an extensive network of rivers, streams and lakes. The three major rivers - the Susitna, Matanuska, and Knik, provide approximately 70 percent of the fresh water entering Upper Cook Inlet (ESL 1978). Freshwater runoff occurs during spring, summer and fall. In winter, frozen rivers, lakes, and streams provide transporation corridors. Based on data on the Susitna, Willow, and Talkeetna Rivers, rivers in the Borough are frozen sufficiently to support people from December 1 through mid to late April; rivers are generally safe for vehicular travel between mid-December and the beginning of April (Selkregg 1974).

The major rivers of the Mat-Su Borough are of glacial origins and, therefore, are silty during the ice free season (ADF&G 1978b). Glacial deposits and stream and terrace gravels are prevalent along the drainages (Selkregg 1974). All of the streams, rivers and lakes in the Borough provide vital habitat for resident and anadromous fish, large and small upland mammals, and raptors (ADF&G 1981) (Table 6).

Birds

Bald eagle nesting along local rivers has been documented near the confluence of Moose Creek and the Yentna River. (Governor's Committee 1980). Eagles likely also occur along other rivers during the summer season.

Rivers Identified on ADF&G Resource Maps as Critical Habitat

River or Stream	Salmon	Big Game Bear	Big Game Moose	Furbearers
Little Susitna River	Co P C K		X	
Alexander Creek	K S Co P		winter	
Lower Sucker Creek	K S Co P		winter	
Yentna River	K S Co C P	X		X
Lake Creek	S Co C P			
Skwentna River	Co C P	X		
Happy River	Co C P	X		
Portage Creek	Co C P	X		
Hayes R.	Co C P	X		
Trimble River	Co C P	X		
Red Creek	Co C P	X		
Talachalina River	Co C P			
Deshka River (Krato R.)	Co P	X	X	
Trapper Creek	Co			
Moose Creek	Co P	X		
Susitna River	K S Co P	X	X	X
Kashwitna River	Co P	X		
Sheep Creek	K Co C P	X		
Chulitna	K S			
Talkeetna	K S			
Chunilina	K Co P C			

[1] Co - Coho (Silver), P - Pink (Humpback), C - Chum (Dog), K - King (Chinook), S - Sockeye (Red).

Source: ADF&G

TABLE 6

Resident Fish

Since the major rivers are of glacial origins, fish normally prefer lakes and the moderately swift clearwater streams tributary to the glacial rivers. Resident fish include rainbow trout, lake trout, Arctic grayling, Dolly Varden/Arctic char, northern pike, burbot, and whitefish (sp.). In addition to native fish, numerous lakes are stocked with rainbow trout, grayling and silver salmon (Table 7).

Rainbow trout are distributed throughout the tributaries of the Yentna, Skwentna, Talkeetna, and lower Susitna Rivers and the Matanuska, Chuit, Theodore, and Lewis Rivers. The mainstream rivers are used primarily for migration and wintering when icing inhibits activity in the tributaries. Most favorable summer habitat is in clearwater tributaries such as Alexander and Lake Creeks and the Deshka and Talachulitna Rivers (ADF&G 1978b).

Lake trout are found in lakes in close proximity to the Alaska and Talkeetna Mountains. Their preferred habitat is glacial and clearwater lakes. Prime lakes for these fish include Byers, Red Shirt, Shell, Chelatna and Swan Lakes (ADF&G 1978b).

Arctic grayling are in nearly all tributaries of the Susitna River. They are particularly abundant in Talachulitna River and Lake, Clear Creek, and Peters Creek (ADF&G 1978b).

Both anadromous and resident Dolly Varden and Arctic char are widely distributed but are not abundant. Western tributaries to the Susitna River, particularly the Lewis, Theodore, Chuit and Talachulitna Rivers have relatively large populations. Stream residents are notably smaller (length equal 6 to 8 inches) than lake or anadromous Dolly Varden which normally run 12 to 14 inches (ADF&G 1978b).

Northern pike have a limited distribution. In 1950 they were introduced into Bulchitna Lake near the mouth of Lake Creek. This range has been extended into portions of the Yentna River up to the Hewitt-Whskey Lakes area (ADF&G 1978b).

Burbot utilize the mainstream of the Susitna River and the larger tributaries such as the Yentna, Chulitna, Talkeetna, and Skwentna rivers. Other suitable habitat includes the slow moving streams draining the lowlands between the Yentna and Susitna Rivers. Although several lakes in the Mat-Su Valley have suitable habitat for burbot they have not been

Lakes Stocked in the Matanuska-Susitna Borough

Lake	Type of Fish Rainbow Trout	 Silver Salmon	 Grayling
Knik Lake	X		
Marion Lake	X		
Rocky Lake		X	
Loon Lake		X	
Prator Lake		X	
Seymour Lake	X		
Memory Lake		X	
Reed Lake	X		
Lucille Lake		X	
Wishbone Lake	X		
Finger Lake		X	
Johnson Lake	X		
Long Lake	X		
Irene Lake	X		
Meirs Lake			X
Victor Lake		X	
Bradley Lake	X		
Harriet Lake			X
Echo Lake	X		
Kepler Lake	X		
Matanuska Lake	X		
Lower Bonnie Lake	X		
South Rolly Lake		X	
Little No Luck Lake		X	
Big No Luck Lake	X		
Christiansen Lake		X	
Benka Lake		X	

Source: ADF&G 1978.

TABLE 7

identified in the literature. Burbot and whitefish are somewhat unusal in they they both spawn in the mainstreams which tend to be silty. Nonspawning whitefish utilize clearwater streams and sloughs tributary to the larger rivers.

Anadromous Fish

Smelt and salmon spawn in the rivers within the Borough. Smelt spawn in the Knik River and in the Susitna River as far upstream as the Deshka River (Evans et al. 1972).

The Susitna River is the most important producer in Cook Inlet for pink, chum, sockeye, and king salmon (Table 8) (Governor's Committee 1980). Sockeye utilize the extensive lake system associated with the Susitna River drainages plus the mainstream and the tributaries. Primary sockeye tributaries include the Yentna, Skwentna, and Talachulitna Rivers. Major lakes include Shell and Judd Lakes (ADF&G 1978, Evans et al. 1972, Governor's Committee 1980).

Pink salmon exhibit an even year numerical strength. In spite of a greater than 2 year life cycle, coho and chum likewise have an even year strength. Both are widely and evenly distributed throughout the Borough river systems (ADF&G 1978b).

King salmon arrive in Cook Inlet in mid-May. They are followed closely by sockeye and pink salmon. Coho and chum do not enter streams until July. King salmon spawn between June 20 and August 15. Pinks follow, spawning between July 10 and September 1. Sockeye, and chum do not spawn until the beginning of August. Chum and sockeye continue spawning into October and November respectively. Coho continue spawning through February (ADF&G 1978b).

Mammals

All the major river systems in the valley provide essential habitat for both big game species and furbearers. The rivers and streams provide migration paths, spring and summer bear forage, and spring moose calving habitat.

Moose: Moose populations in the Matanuska Valley appear to be a moderate levels. In the Susitna River area the populations are considered healthy. In all cases the population is expanding (ADF&G 1980).

Primary moose habitat types include successional willow and aspen groves below receeding glaciers, climax willow stands at timberline, and seral birch, willow, and aspen in fire

Peak Salmon Escapement Counts for Selected Matanuska-Susitna Streams

Stream	Pink	Chum	Red	Silver	King	Total
Little Susitna River	45,000	-	3,900	-	405	49,305
Susitna River*	2,470,100	148,400	94,000	-	118,620	2,931,920
Alexander Creek	100,000	700	100	2,000+	6,150	108,950
Sucker Creek	-	-	-	-	-	-
Lewis River	-	-	-	-	380	380
Theodore River and Olsen Creek	-	-	5	-	1,000	1,005
Beluga River	1,000's	25	550	25	100	1,700

*Most important producer of pink, chum, and king salmon in Cook Inlet.

Source: Governor's Committee 1980.

TABLE 8

created fringes. Much of the moose habitat has been created through man's activities, especially road building, logging, and agriculture which replace mature forests with new growth. Through this process the area between the Knik and Matanuska Rivers has become one of the more productive moose areas in the State. Many river areas throughout the Borough provide outstanding moose habitat. Notable among these are lower Talkeetna River, Kahiltna River, Moose Creek, Lower Chulitna River, Tokositna River, Willow Creek, Deception Creek, Little Susitna River, Alexander Creek, Theodore River, Knik River, Swan Lake, Susitna River, Yentna River, Johnson Creek, Skwentna River, Deshka River, and Trapper Creek (ADF&G resource maps).

Although riparian communities have the least preferred forage, they provide important winter moose range, especially during severe winters (Arneson 1981). Moderate use of river islands occurs in later May and June during calving.

Bear: Black bear are more prevalent than brown bear within the Mat-Su Borough. Riverine habitat is most important to bears during the summer months when red and silver salmon are abundant. Coal Creek, Lewis River, Talachulitna Creek, Lake Creek, Alexander Creek, and Deshka River and Susitna River are prime black bear habitat (ADF&G 1973, 1981).

Brown bear habitat often overlaps with black bear habitat. Brown bear preferred habitat is in the upper drainages of the Susitna River tributaries and to the west of the Susitna River (ADF&G 1973).

Other Furbearers: Wolves and wolverine are relatively abundant in river areas. Wolves are particularly abundant at the headwaters of the Yentna and Skwentna Rivers. They are evident in reduced numbers along the lower Susitna River, Matanuska River, and Little Susitna River. Wolverine frequent the rivers and streams in pursuit of salmon (ADF&G 1973).

IMPORTANT UPLAND HABITAT

Important upland habitats are those areas above mean higher high water exclusive of wetlands, rivers, streams, and lakes which are within the upland boundaries of the coastal management area. In the Mat-Su Borough the study boundary extends inland to the 1000-foot contour.

Typical dry upland vegetation includes agricultural areas, willow thickets, cottonwood stands, tall white spruce stands, and mixed forests such as cottonwood/birch/spruce and cottonwood/willow/alder. These areas are frequently interspersed among poorly drained areas, lakes, streams, and rivers. Uplands provide habitat for species unique to it plus provide additional habitat for species which use riverine and wetland habitat (Table 9). Only bear, moose, and a few bird species are discussed in detail. Information concerning the remaining upland users is relatively unknown, even for the furbearers.

Birds

Upland agricultural areas provide forage for some waterfowl, particularly sandhill cranes and geese (Ritchie 1981). Upland game birds, such as grouse and ptarmigan, likewise take advantage of the grain fields as well as other upland areas such as willow thickets (Ritchie 1981).

Passerine diversity increases substantially in the uplands (Table 10). thrushes, warblers, and dark-eyed juncos are particularly common (Ritchie 1981).

Mammals

Moose and black bear are the primary large mammals utilizing the coastal uplands. Brown bear habitat overlaps with black bear habitat usually at higher elevations such as in Sunflower Basin, Kahiltna-Peters Hill area, Beluga Mountain, Mt. Susitna, or Mt. Yenlo. As a result much of the brown bear habitat is outside the coastal boundary. This also holds true for much of the prime sheep, caribou, and mountain goat habitat which is available in the Talkeetna Mountains (Bader et al. 1981).

Moose: Moose became prevalent in the 1950's after mature spruce hardwood forests were replaced with secondary successional stages of vegetation thereby providing essential winter forage. Willow is the most important browse vegetation for moose. Birch, when available, is also well utilized. Other preferred forage includes cottonwood, high-bush cranberry, and rose. Alder is seldom browsed (Arneson 1981).

Many riparian areas offer prime winter habitat. These areas were listed under the riverine habitat. Another upland area providing essential winter habitat for moose is that north of Wasilla (ADF&G resource maps).

Summer moose range is extensive. It includes all the area between the Yentna River-Lake Creek drainages and Deshka River, the area south of the Yentna River and around Beluga Mountain, and the area between Little Susitna River and

Mammals which may occur in the Knik Arm Wetlands Study Area, Alaska, Upland Habitat

Species	Scientific Name	Major Vegetation Types*
Masked shrew	Sorex cinerus	3-10
Dusky shrew	Sorex obscurus	3,5,6,7,8,9,10
Pigmy shrew	Microsorex hoyi	7,9,10
Red-backed vole	Clethrionomys rutilus	2-10
Meadow vole	Microtus pennsylvanicus	3-10
Tundra vole	Microtus oeconomus	3,5,6,7,8
Singing vole	Microtus miurus	5,6,7,8
Meadow jumping mouse	Zapus hudsonius	3,5,6,7,8
Little brown bat	Myotis lucifugus	1-10
Snowshoe hare	Lepus americanus	5,7,9,10
Hoary marmot	Marmota caligata	10
Arctic ground squirrel	Citellus parryi	5,7,10
Red squirrel	Tamiasciurus hudsonicus	9
Northern flying squirrel	Glaucomys sabrinus	9,10
Beaver	Castor canadensis	5,7,10
Porcupine	Erethizon dorsatum	9,10
Coyote	Canis latrans	3-10
Wolf	Canis lupus	5,7,9,10
Red fox	Vulpes fulva	3-10
Black bear	Ursus americanus	9,10
Brown bear	Ursus arctos	9,10
Pine marten	Martes americana	9
Ermine	Mustela erminea	5,7,9,10
Least weasel	Mustela rixosa	5,7,9,10
Wolverine	Gulo gulo	9,10
Lynx	Lynx canadensis	9,10
Moose	Alces alces	5,7,9,10
Dall sheep	Ovis Dalli	10
Mountain goat	Oreamnos americanus	10

*(1) Aquatic vegetation, (2) Marshes, (3) Wet meadows, (4) Harbaceous vegetation of levees, bars, and mudflats, (5) Willow thickets, (6) Wet Myrica fens, (7) Alder thickets, (8) Ericaceous shrub-sphagnum bogs, (9) Black spruce forests, (10) Cottonwood, birch & white spruce forests.

Source: Modified from Richie et al. 1981.

TABLE 9

Upland Birds Identified in Knik Arm and Which Probably Occur Throughout Matanuska-Susitna Uplands[1]

Species		Observed in 1980	Status Season[2]
Black-capped chickadee	Parus atricapillus	x	C-p
Boreal chickadee	Parus hudsonicus	x	C-p
Red-breasted nuthatch	Sitta canadensis		U-p
Brown creeper	Certhia femiliaris		U-p
Dipper	Cinclus mexicanus	x	U-p
Winter wren	Troglodytes troglodytes		U-p
American robin	Turdus migratorius	x	C-s,R-w
Varied thrush	Ixoreus naevius	x	C-s
Hermit thrush	Hylocichla guttata	x	U-s
Swainson's thrush	Hylocichla ustulata	x	C-s
Gray-cheeked thrush	Hylocichla minima		U-s
Townsend's solitaire	Myadestes townsendi		R-s
Golden-crowned kinglet	Regulus satrapa		U-p
Ruby-crowned knglet	Regulus calendula	x	A-s
Water pipit	Anthus spinoletta	x	C-s
Behemian waxwing	Bombycilla garrulus	x	U-p,A-f
Northern shrike	Lanius excubitor	x	U-p
Starling	Sturnus vulgaris		R-v
Red-eyed vireo	Vireo olivaceus		Ca
Orange-crowned warbler	Vermivora celata	x	A-s
Yellow warble	Dendroica petechia	x	U-s
Townsend's warbler	Dendroica townsendi		U-s
Blackpoll warbler	Dendroica striata	x	U-s
Northern water thrush	Seiurus noveboracensis	x	U-s
Wilson's warbler	Wilsonia pusilla		C-s
Red-winged blackbird	Agelaius phoeniceus		R-s
Rusty blackbird	Euphagus carolinus	x	C-s,R-w
Pine grosbeak	Pincicola enucleator		U-p
Hoary redpoll	Acanthis hornemanni		
Common redpoll	Acanthis flammea	x	R-w
Pine siskin	Spinus pinus		U-s
Red crossbill	Loxia curvirostra		R-v
White-winged crossbill	Loxia leucoptera		U-p
Savanah sparrow	Passerculus sandwichensis	x	A-s
Dark-eyed junco	Junco hyemalis	x	A-s,U-w
Tree sparrow	Spizella arborea	x	U-s,R-w
White-crowned sparrow	Zonotrichia leucophrys	x	A-s,R-w
Golden-crowned sparrow	Zonotrichia atricapilla		C-s
Fox sparrow	Passerella iliaca	x	C-s,R-w
Lincoln's sparrow	Melospiza lincolnii		C-s
Song sparrow	Melospiza melodia		U-s
Lapland longspur	Calcarius lapponicus	x	C-m
Snow bunting	Phectrophenax nivalis		U-m,U-w

TABLE 10

(Page 1 of 2)

continued

Species		Observed in 1980	Status Season[2]
Rock dove	Columbia livia	x	C-p
Mourning dove	Zenaidura macroura		Ca
Great horned owl	Bubo virginianus	x	C-p
Snowy owl	Nyctea scandiaca		R-v
Hawk owl	Surnia ulula	x	U-p
Great gray owl	Strix nebulosa		R-p
Short-eared owl	Asio flammeus	x	U-s
Boreal owl	Aegolius funereus		U-p
Rufous hummingbird	Selasphorus rufus		R-s
Belted kingfisher	Megaceryla alcyon	x	U-s,R-w
Common flicker	Colaptes auratus	x	U-s
Hairy woodpecker	Dendrocopus villosus	x	U-p
Downy woodpecker	Dendrocopos pubescens		U-p
Back-backed three-toed woodpecker	Picoides arcticus		R-p
Northern three-toed woodpecker	Picoides tridactylus		U-p
Say's phoebe	Sayornis saya		R-m
Alder flycatcher	Empidonas traillii		C-s
Western wood pewee	Contopus sordidulus		U-s
Olive-sided flycatcher	Nuttallornis borealis		C-s
Horned lark	Eremophila alpestris		U-s
Violet-green swallow	Tachycineta thalassinc		A-s
Tree swallow	Iridoprocne bicolor	x	A-s
Bank swallow	Riparia riparia		C-s
Cliff swallow	Petrochelidon pyrrhonota		U-s
Gray jay	Perisoreus canadensis	x	U-p
Black-billed magpie	Pica pica	x	C-p
Common raven	Corvus corax	x	C-p
Spruce grouse	Canachitas canadensis	x	U-p
Willow ptarmigan	Lagopus lagopus	x	U-w
Rock ptarmigan	Lagopus mutus		U-w
White tailed ptarmigan	Lagopus leucurus		

[1]From Gabrielson and Lincoln (1959), Williamson et al. (1965), Wapora (1976), Anchorage Audubon Society (1978), Batten et al. (1978), Kessell and Gibson (1978), Sellers (1979).
[2]R = resident, U = uncommon, s = summer, f = fall, w = winter, m = migrant, C = common, P = permanent resident, Ca = casual.

Source: Modified from Richie et al. 1981.

Willow Creek (ADF&G resource maps). Much of the remaining upland area is of general importance as moose habitat.

Bear: Black bear are closely associated with timber areas and dense alder growth. Spring black bear habitat west of the Susitna River is not critically limited. Grasses, sedges, and horsetail are abundant and moose calves also are available. In August black bear tend to leave this habitat to take advantage of berry crops (ADF&G 1973). Preferred brown bear habitat is alpine or sub-alpine and usually outside the coastal boundary.

PHYSICAL CHARACTERISTICS AND RESOURCES

WATER RESOURCES

Water is a renewable resource that has increasing demands placed on it as development of an area increases. The natural users of water include vegetation, fish, and wildlife. Development of an area potentially leads to a multitude of new demands on the water resource; these demands can include domestic, livestock, seafood processing, oil and gas development, petrochemical, pulp mills, coal processing, steam electric, mineral processing, sand and gravel, fish hatcheries, irrigation, and hydroelectric. Many of these users are not currently using water in the Mat-Su Borough Coastal Management Districts and some may never develop there.

A significant water demand for any type of development is domestic use. The amount of water used per capita is dependent on the water distribution system. In communities with municipal water systems, such as Palmer, use may exceed 100 gpd (gallons per day) per capita. In remote areas, where individuals are required to carry water by hand, consumption typically drops to about 5 gpd per capita (Balding 1976). Fire protection for most communities in the Borough is provided by tank truck and pumper.

Agricultural use also varies significantly. Livestock can use from 2 to 30 gpd per animal, with dairy cows being one of the greatest users of water (11 to 30 gpd per cow) (Balding 1976). Crop irrigation water use depends on the type of crop and condition of the irrigation system.

The availability of surface and ground water and the quality of these waters are discussed in the following sections for the Mat-Su Borough Coastal area.

Surface Water Resources

The two major streams bordering most of the developed land in the Mat-Su Borough are the Susitna and Matanuska Rivers. Numerous smaller streams, which are tributaries to the Susitna and Matanuska rivers or to Upper Cook Inlet or Knik Arm, also provide a potential surface water source for the communities in the Borough. Most of the major streams in the Borough originate in the mountains and are fed by large glaciers. The glacial origin causes these streams to carry large quantities of water even between rainstorms; however, the water is heavily laden with silt and glacial flour.

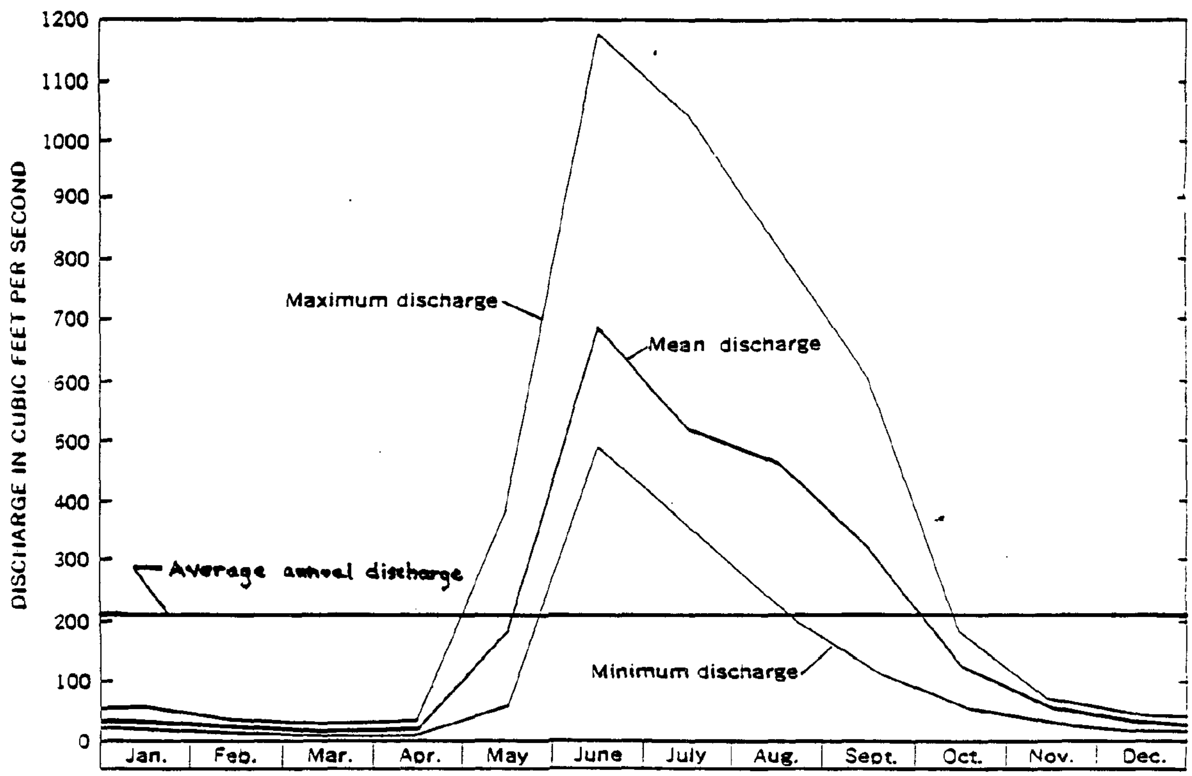
The average discharge of gaged streams in the Borough (Table 11) indicates that these is an ample supply of surface water available from these streams. This average discharge is typically exceeded in the months of May through September,

Average Measured Discharge of Gaged Streams in the Matanuska-Susitna Borough/Coastal Management District.

Name	Discharge in cubic feet per second	Discharge in acre-feet per year	Discharge in millions of gals per day
Knik River near Palmer	6,887	4,990,000	4,451
Matanuska River near Palmer	3,857	2,794,00	2,493
Cottonwood Creek near Wasilla	16	11,680	10
Little Susitna River near Palmer	203	147,100	131
Talkeetna River near Talkeetna	4,029	2,919,000	2,604
Susitna River at Gold Creek	9,612	6,964,000	6,212
Chulitna River near Talkeetna	8,748	6,338,000	5,654
Skwentna River near Skwentna	6,385	4,626,000	4,127
Susitna River at Susitna Station	48,150	34,880,000	31,120

TABLE 11

when rainfall, glacier melt, and snowmelt are at a maximum. Peak flows typically occur in June, July, and August. Stream flow decreases in October as the temperature drops, decreasing melt waters and causing precipitation in the mountains to fall as snow. Lowest flows typically occur in February and March (Feulner 1971). The annual variation of the monthly mean discharge for the Little Susitna River is typical of the major streams in the Borough (Figure 2). The average annual discharge is shown in Figure 2 for comparative purposes. It is apparent the the winter months are most critical in terms of surface water availability. All streams freeze over, and many of the smaller ones freeze to their bed. Streams typically freeze up in later October or early November and do not break up until late April or May (Table 12).



Seasonal Distribution of Monthly Mean Discharges for the Little Susitna River near Palmer (modified from Feulner 1971).

FIGURE 2

Break-up and Freeze-up Dates Determined from Stream Flow Measurements (Carlson, et al. 1977).

	Most probable break-up date	Most probable freeze-up date
Knik River	April 24-May 3	Oct. 26-Nov. 4
Matanuska River	April 26-May 4	Oct. 24-Nov. 3
Little Susitna River	May 2-May 11	Oct. 22-Nov. 1
Susitna River	May 5-May 14	Oct. 16-Oct. 25

TABLE 12

There are many lakes in the Mat-Su Borough. The largest lakes include Big Lake, Wasilla Lake, Lucile Lake, and Nancy Lake; these lakes are used for recreational purposes. Most lakes feed small streams; flow in these streams in regulated by the lakes. For example, Cottonwood Creek, which flows out of Wasilla Lake, had a monthly range of only 11 to 34 cfs and averaged 16 cfs in 5 years of record (Feulner 1971).

Ground Water Resources

The best potential source of ground water in the Borough is located in the Susitna lowlands (Feulner 1971). Well yields of 1,000 gpm (gallons per minute) or more should be achievable near major streams in this area. Most wells serving communities in the Borough yield 10 to 50 gpm. Five wells were reported to yield more than 100 gpm within the floodplain and lowland areas adjacent to streams in the Borough. The Palmer city well 3 located north of Palmer yielded 325 gpm at a well depth of 625 feet. An irrigation well south of Palmer yields 200 gpm at a depth of 95 feet. The well at Big Lake summer camp yields 300 gpm at a well depth of 31 feet, and a well at the former road construction camp southwest of Sunshine yields 250 gpm from a well 105 feet deep (Feulner 1971).

Characteristically, well water in the Mat-Su Borough is located in the interbedded sand and gravel lenses in glacial deposits. Well depths average 30 to 295 feet near Palmer and 25 to 170 feet near Wasilla and westward. The most successful wells are drilled 50 to 150 feet below the surface. Wells that will yield 10 to 50 gpm are usually 75 to 150 feet deep (Feulner 1971).

Springs occur along the base of the mountains in the Borough. The largest known spring is located near Palmer; it flows at a rate of about 150 to 200 gpm (Balding 1976).

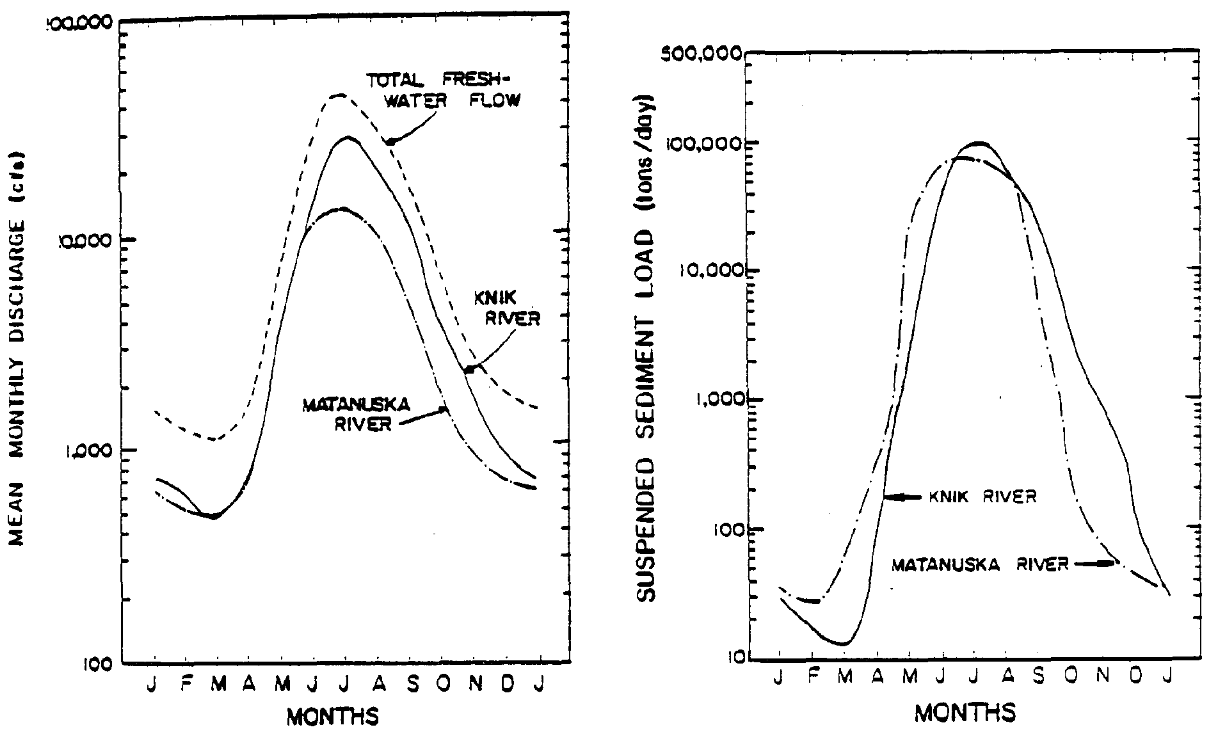
Water Quality

All major rivers are sustained primarily by snow and glacial meltwater. These glacial fed rivers contribute heavily to sediment load in Upper Cook Inlet and Knik Arm. Sediment load in this region is one of the highest in the State. The highest rate of suspended sediment yield per square mile in the Borough has been recorded in the Knik River near Palmer. The average annual yield for this are is 6,000 tons per year (Balding 1976). The Knik, Matanuska and Susitna rivers and Susitna River tributaries carry the bulk of sediment load during the summer months (Figure 3). Very little sediment is transported during the winter months when the rivers are frozen over and the glaciers contribute very little melt water.

Surface water has less chemical-quality variation that ground water. It is also softer than ground water. Generally speaking the quality of surface water in the Mat-Su Borough is good. It usually contains less than 0.3 mg/1 (milligrams per liter) of iron. The surface water hardness is less than 150 mg/l (Feulner 1971). It is mainly of the calcium magnesium bicarbonate type. The Matanuska River near Palmer contains a higher concentration of sulfate than other streams in the Borough. This phenomena is attributed to the presence of coal mines near Palmer,the drainage from which enters tributaries of the Matanuska River (Feulner 1971).

A high iron content is known to exist in ground water within the Borough. Water taken from shallow wells drilled in alluvium contain high concentrations of iron. Ground water resources characteristically have 50 to 200 mg/l in hardness and are of a calcium bicarbonate type. The Palmer city well 3 water is of the sodium bicarbonate type and registers the highest concentration of sulfate present in the well water in the area. The presence of sulfate in the well is attributed to the theory that the well is located in a former channel of the Matanuska River. The theory is based on the observation that the water level and sulfate concentration in the well seems to fluctuate with the river level and sulfate content.

Palmer well water also contain a high concentration of boron; the maximum recorded concentration was 2.6 mg/l (Feulner 1971). Both surface water and ground water along the Matanuska River contain measurable concentrations of boron. Nitrate is also present in some wells. High concentrations of nitrate have been found in water near



Annual Water and Sediment Variation in the Matanuska and Knik rivers (Murphy, et al. 1972).

FIGURE 3

Palmer and Wasilla. A well northwest of Palmer yielded 270 mg/l of nitrate. The United States Public Health Service sets the suggested maximum concentration of nitrate at about 45 mg/1 (Feulner 1971). The nitrate present in this region appears to be geologic in origin.

METEOROLOGY AND AIR QUALITY

The climate of the Mat-Su Borough Coastal Management District is in the transition between coastal and continental climates. The annual precipitation ranges from about 15 inches at low elevations to over 80 inches in the mountains. The normal temperature range is from about -3 degrees F to 70 degrees F. Winds average less than 10 knots. A summary of climatic data are shown on Table 12A.

Temperature

The highest recorded temperature in the Mat-Su Borough Coastal Management District was 91 degrees in Talkeetna. The lowest temperature was -56 degrees in Willow. The coldest period occurs in January, while the highest temperatures usually occur in June, because of the amount of sunlight and less cloud cover (Howard, et al. 1972).

As the mean daily temperature rises, breakup, or ground thawing begins in late March or early April and continues through the month of May in some poorly drained areas. In the fall, rapidly decreasing sunshine causes the mean daily temperature to decrease below 32 degrees on about October 25 each year (Howard, et al. 1972). Mean annual temperature in the District ranges from about 30 to 35 degrees F (Figure 3A). The lower temperatures are generally associated with higher elevations.

Precipitation

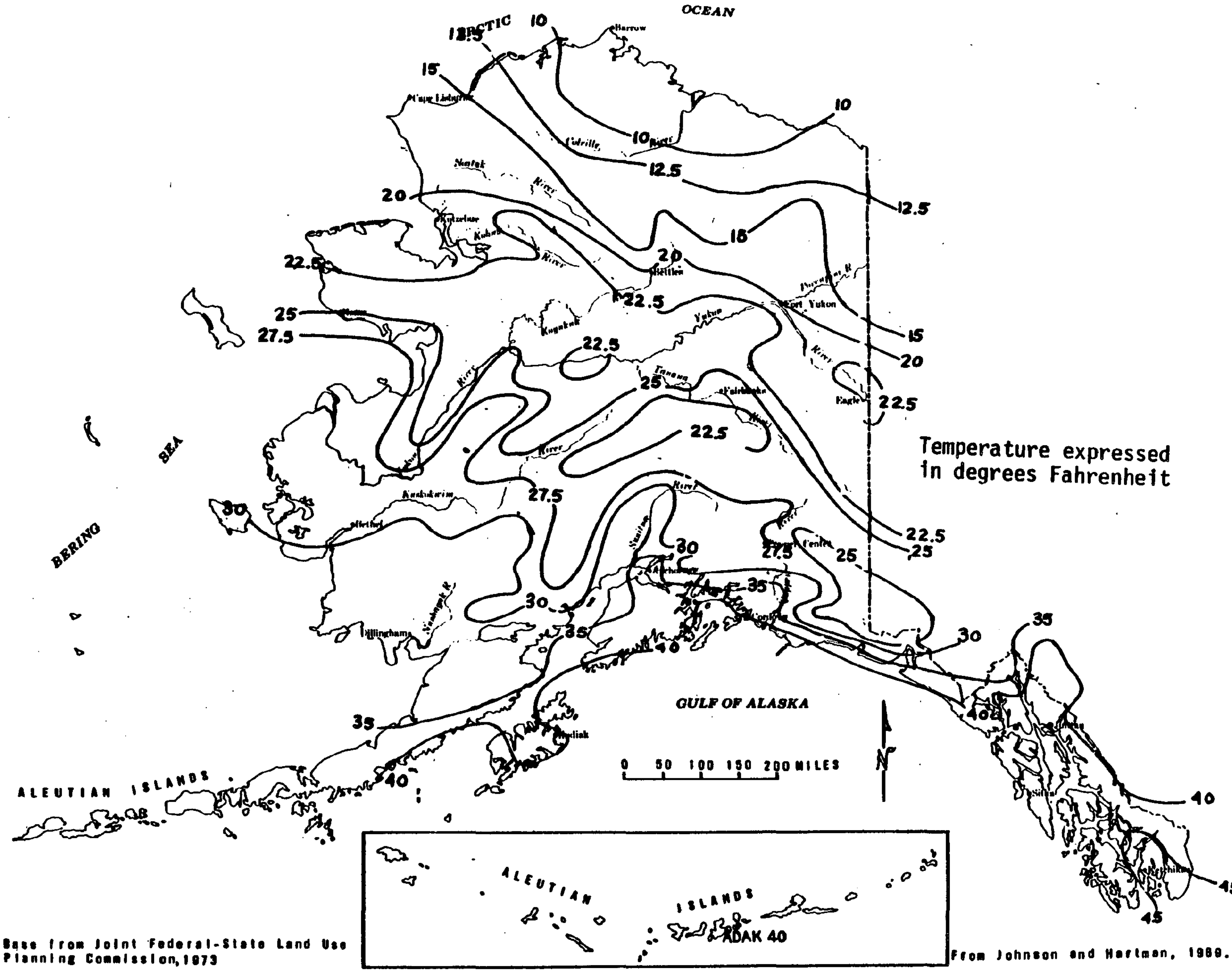
Mean annual precipitation recorded within the Mat-Su Borough Coastal Management District varies from 14 to 29 inches, which includes snow fall of about 45 to 119 inches. Mean annual precipitation would be greater at higher elevations (Figure 3B). The figure was based on actual precipitation records and estimations for areas with no precipitation data.

About one half of the total precipitation occurs as shown in the winter and about one half is contributed by rains. The amount of precipitation in the Borough (Table 12A) is inadequate for most agricultural development and irrigation is required.

Climatic Data for Selected Areas in the Matanuska-Susitna Borough Coastal Management District (Howard et al. 1972, Selkregg 1974).

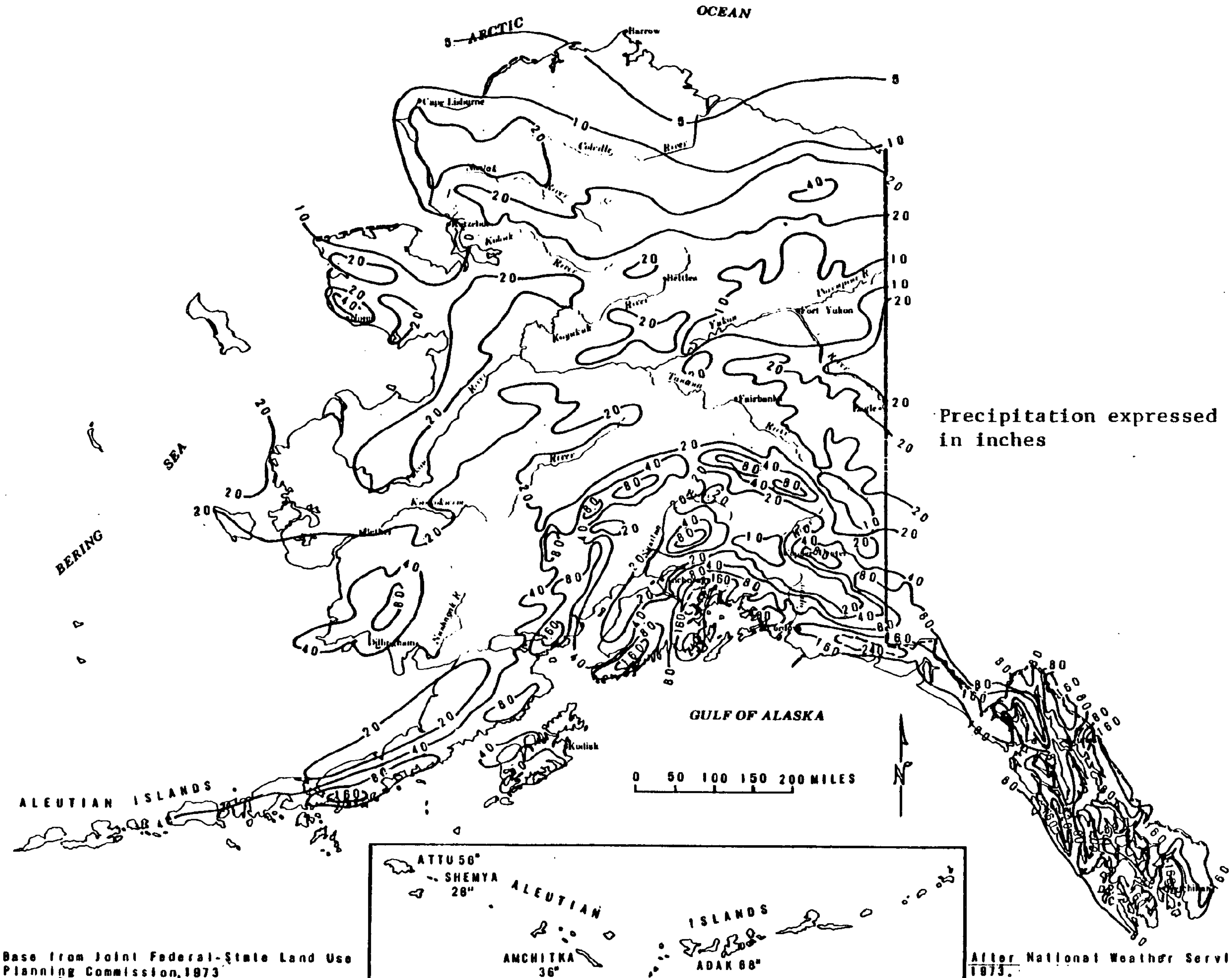
	Summer Temperature High (°F)	Summer Temperature Low (°F)	Winter Temperature High (°F)	Winter Temperature Low (°F)	Extreme Temperature High (°F)	Extreme Temperature Low (°F)	Precipitation (inches)	Snowfall (inches)	Average Wind (knots)	Extreme Wind (knots)
Wasilla	69	43	43	4	90	-30	19	51	5.8	53
Palmer	67	44	42	6	90	-35	17	64	3.8	87
Chickaloon	69	40	39	-3	90	-42	14	69	-	-
Willow	70	40	33	-10	90	-56	24	-	-	-
Skwentna	69	44	40	-4	90	-50	29	119	-	-
Talkeetna	68	40	40	0	91	-48	29	102	3.7	33
Matanuska Agriculture Experiment Station	-	-	-	-	91	-41	21	45.4	-	-

TABLE 12A



Mean annual temperatures (Balding 1976).

FIGURE 3A



Precipitation expressed in inches

Base from Joint Federal-State Land Use Planning Commission, 1973

After National Weather Service, 1973.

Mean annual precipitation (Balding 1976).

FIGURE 3B

Air Quality

Air quality in the Mat-Su Borough Coastal Management area is classified by the Department of Environmental Conservation as Class 2 P.S.D. (Prevention of Significant Deterioration) which is considered "very clean air" (Bob Rasmassen, Municipality of Anchorage, personnal communication).

The most significant pollutant is currently not associated with industrial development, but is blowing dust which occurs naturally in the District (Bob Rasmassen, Municipality of Anchorage, personnal communication).

Inversions could create a problem if traffic or industrial facilities increased. Air inversion occurs when warmer air acts as a cover overlaying a colder air mass near the ground surface and doesn't allow air masses to mix. This results in high concentrations of pollutants being trapped near the ground surface (Environmental Services Limited 1978).

The development of the Point MacKenzie area may produce more pollution for Anchorage. However, the concentrations of SO_2, NO_2, and NO_3 are presently very low level in Anchorage airshed. These substances are the major pollutants produced by a petroleum facility. With modern techniques of emissions control, a large industrial plant could operate at Point MacKenzie without significant impact on the allowable attainment levels of SO_2, NO_2, and NO_3 (Environmental Services Limited 1978).

GEOPHYSICAL HAZARDS

The geophysical hazards present in the Mat-Su Borough Coastal District are discussed in the following section. The hazards that are discussed in the report and delineated on the hazard maps are those that were identified in previous investigations. Much of this information was transferred from more detailed mapping to the 1:346,000 scale geophysical hazard maps for this Phase I Completion Report; information accuracy is lost in such a data transfer. The hazard maps are not adequate for site specific work. Many areas have not been studied at all; in these areas, no hazards are shown or hazard boundaries are estimated using professional judgement but should not be interpreted as an absence of hazards. Detailed studies of geophysical hazards should be conducted in any area of proposed development.

HAZARDS OF GEOLOGIC ORIGIN

A literature search was conducted and the resultant entries recorded in the bibliography. Ongoing studies were identified and should be incorporated into the geologic hazards analysis for the Mat-Su Borough Coastal Management Plan as the information becomes available. The geophysical hazards map included in this report are of a general nature. Hazards information was compiled from maps of surficial geology, geology, surface features, and soils association at scales ranging from 1:2,500,000 to 1:24,000 and mapped at a scale of 1:346,000 for this Phase I Completion Report. Hazard mapping on a larger scale for site specific planning is a possible future study. In the following sections bedrock and surficial geology are described and geologic hazards of seismic, volcanic and mass wasting origin are delineated. A detailed analysis of the geologic hazards in the Mat-Su Borough coastal area is presented in the resource analysis section.

Geologic Setting

Regional Geology: The Mat-Su Borough Coastal Management District is located in one of the most seismically active areas on earth, accounting for about 7 percent of the annual worldwide release of seismic energy. The seismic activity delineates the Benioff subduction zone which originates from the collision of the North American and Pacific Ocean tectonic plates. The convergent margin of the North American continental plate where it is being underthrust by the Pacific oceanic plate along the Aleutian Trench (Figure 4) lies approximately 400 km (250 miles) south of the Borough. Depth to the plane of seismic activity below the Borough is 40+ km. Numerous geologic

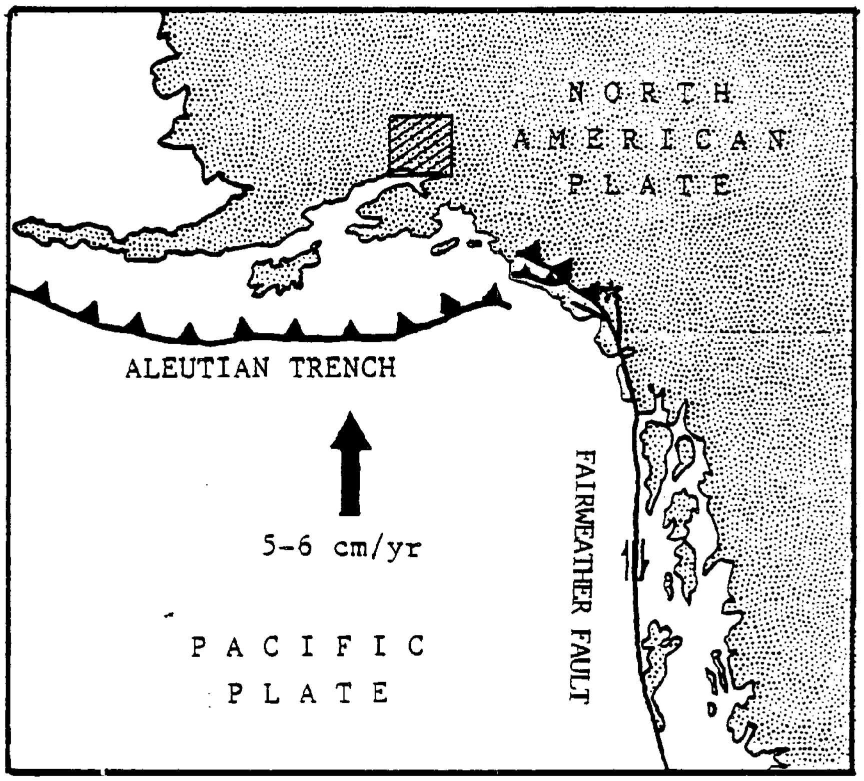


Plate tectonics relationships in the NE Pacific Ocean. Star indicates epicenter of February 28, 1979, St. Elias earthquake, the most recent large event in the region (Science Applications, Inc., 1980).

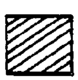
 Matanuska-Susitna Borough Coastal Management District

FIGURE 4

hazards in the Mat-Su Borough are related to this regional plate tectonic framework, i.e., earthquakes, volcanism, and earthquake-triggered mass wasting.

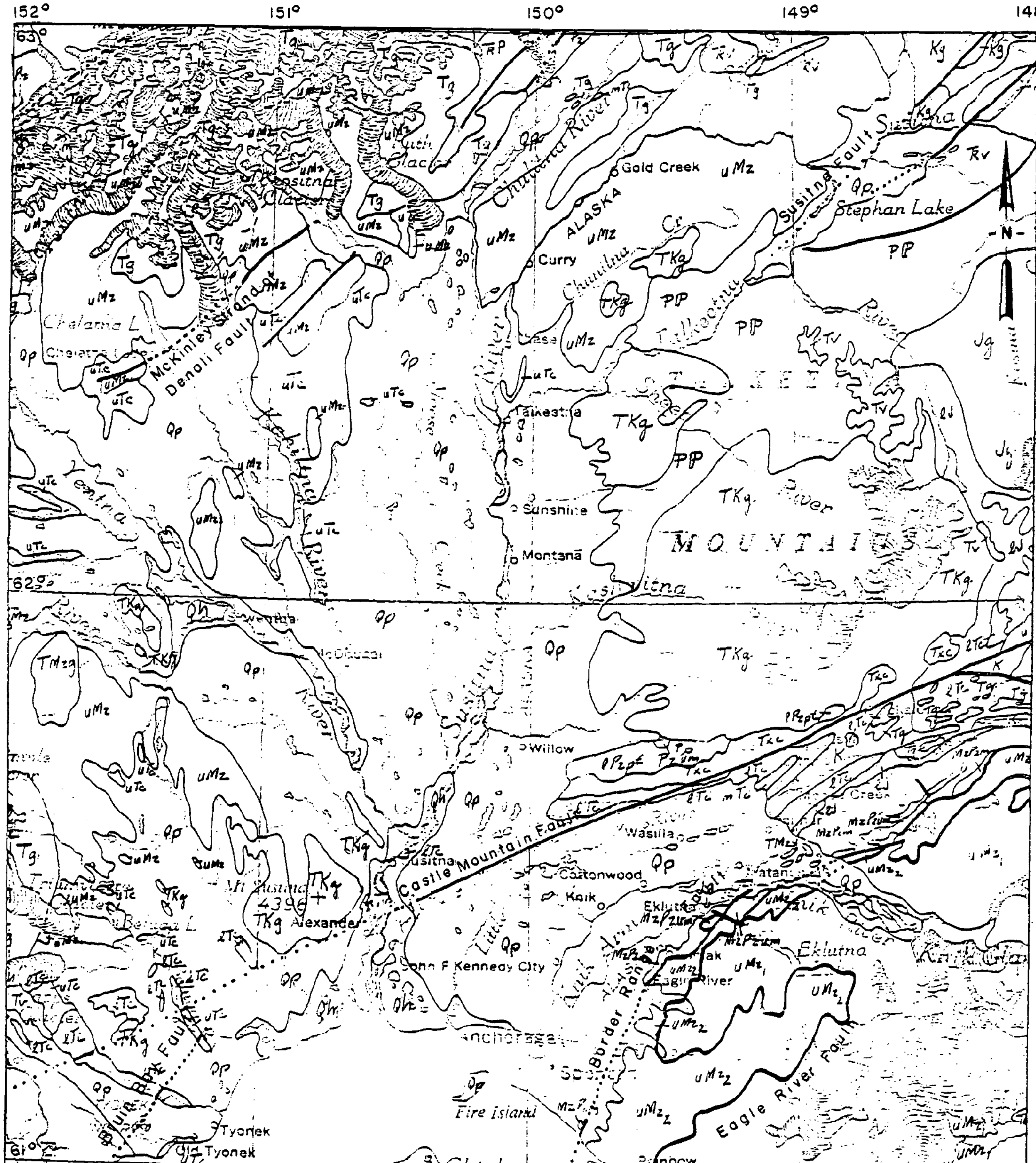
A series of northeast striking major faults, including the Border Range, Castle Mountain, Talkeetna Thrust, and McKinley strand of the Denali Fault, cross the Borough and are part of a broad arcuate fault system including the Denali and Fairweather faults to the east. Faults classified as active are those along which there has been displacement within the last 100,000 years (WCC, 1980). The active faults in the Borough include the Castle Mountain Fault and the McKinley strand of the Denali Fault. Other faults within the Borough also may be active, but none have been positively identified and confirmed as active at this time. Woodward-Clyde Consultants is currently investigating the Susitna and Talkeetna Thrust Faults to determine their classification.

Mount Spurr located 13 km (8 miles) south of the Borough boundary, is the northernmost volcano in a chain of 24 active volcanic centers extending along the Alaska Peninsula. These active volcanoes are a surface expression of the subducting plate beneath the Borough. Due to the andesitic composition of the volcanos, eruptions tend to be explosive (L.L. Selkregg, 1974). Regionally, the Mat-Su Borough Coastal Management District is within a highly active tectonic setting with resultant seismic and volcanic phenomenon.

Bedrock Geology: The Mat-Su Borough Coastal Management District is bounded on three sides by mountain ranges. The Alaska Range forms the west and north boundaries while the Talkeetna and Chugach Mountains collectively form the eastern boundary. The Matanuska Valley is bounded on the north by the Talkeetna Mountains and on the south by the Chugach Mountains.

Bedrock geology in the West-Central and Central Alaska Range is primarily stratified sedimentary rocks of Mesozoic age with a southeastern wedge of Upper Tertiary continental deposits (Figures 5 and 6). The West-Central Alaska Range is intruded by Mesozoic felsic to intermediate composition igneous rocks which are expressed topograghically by Mount Spurr (quartz monzonite to granite), and Mount Susitna and Little Mount Susitna mountains (granodiomite to granite). The Central Alaska Range is intruded by felsic rock of which Mount McKinley is the chief expression.

The Talkeetna Mountains are predominantly stratified metasedimentary rocks with a central core of Jurassic through Tertiary felsic igneous rock. A segment of



GENERAL GEOLOGIC MAP of MATANUSKA-SUSITNA BOROUGH COASTAL MANAGEMENT DISTRICT

Adapted from H. M. Beikman, 1974

0 10 20 30
Miles

FIGURE 5

Legend for General Geologic Map of the Matanuska-Susitna Borough Coastal Management District.

CENOZOIC

Stratified Sedimentary and Volcanic Rocks in Part Metamorphosed

Quaternary

Qh Holocene Deposits - Alluvial, glacial, lacustrine, swamp, landslide, and beach deposits.

Qp Pleistocene Deposits - Alluvial, glacial, dune sand, loess, terrace and pediment gravel, and reworked sand and silt deposits.

Tertiary

lT Lower Tertiary Rocks - Marine and continental clastic rocks of Paleocene and Eocene age. Includes Kulthieth and Kushtaka Formations, clastic rocks of the Orca Group, and related unnamed rocks in the Gulf of Alaska area. Intensely deformed.

Continental Deposits

uTc Upper Tertiary - Sandstone, siltstone, claystone, minor conglomerate and coal beds. Includes upper part of Kenai Group in Cook Inlet area and Nenana Gravel and related unnamed rocks in west-central Alaska Range. Includes rocks ranging in age from Oligocene (?) through Pliocene

mTc Middle Tertiary - Sandstone, siltstone, conglomerate, claystone, and coal beds. Includes the Healy Creek Formation (Oligocene and Miocene) in the central Alaska Range; the Gakona Formation (Oligocene) in the east-central Alaska Range; and the Tsadaka Formation (Oligocene) in the Matanuska Valley.

lTc Lower Tertiary - Claystone, siltstone, sandstone, conglomerate, and coal beds. Includes the Chickaloon and Wishbone Formations in the Matanuska Valley and equivalent rocks in the Cook Inlet area. Includes rocks ranging in age from Paleocene through Eocene.

Txc Paleocene - Conglomerate, arkose, sandstone, coaly shale, and shale. Consists of the Cantwell Formation in the central Alaska Range and the Arkose Ridge Formation in the Matanuska Valley.

Volcanic Rocks

Tv Tertiary - Acidic lava flows, mostly rhyolite and trachyte with some andesite south of the central Alaska Range; basalt flows and associated pyroclastic rocks in Talkeetna Mountains.

Granitic Rocks

Tg Tertiary - Epizonal to hypabyssal quartz monzonites and granites in the central Alaska Range; mainly rhyolite and trachyte in the Matanuska Valley.

TKg Tertiary and Cretaceous - Granodiorite to granite in the Alaska-Aleutian Range batholith and quartz diorite and granodiorite in the Talkeetna batholith. Bath are of Late Cretaceous and early Tertiary age.

TMzg Tertiary and/or Mesozoic - Quartz monzonite, granodiorite, and quartz diorite with subordinate granite and diorite. Probably Mesozoic in age but may include rocks of Tertiary age.

FIGURE 6

(Page 1 of 3)

(Continued)

MESOZOIC

Stratified Sedimentary and Volcanic Rocks in Part Metamorphosed

Cretaceous

K Cretaceous rocks - Shelf deposits of sandstone, siltstone, shale, limestone, claystone, conglomerate, mudstone, and procellanite ranging in age from Early Cretaceous (Valanginian) to Late Cretaceous (Maestrichtian). Rocks of Aptian age apparently absent. Includes the Matanuska Formation in the Matanuska Valley.

uMz Cretaceous and Jurassic Rocks - Argillite, shale, graywacke, conglomerate, lava, tuff, and agglomerate; almost barren of fossils; probably includes rocks ranging in age from Early Jurassic to Late Cretaceous. In places moderately to highly (amphibolite facies) metamorphosed.

uMz_1 Cretaceous and Upper Jurassic(?) Rocks - Graywacke, slate, argillite, with minor conglomerate, volcanic detritus, and interbedded mafic volcanic rocks. Mainly of Late Cretaceous (Maestrichtian) age but includes some rocks of Early Cretaceous and possible Late Jurassic age; sparsely fossiliferous. Includes the Valdez and Yakutat Groups of the Chugach Mountains. Mildy metamorphosed, locally to greenschist facies.

uMz_2 Cretaceous and/or Upper Jurassic Rocks - A deep-water clastic sequence of siltstone, graywacke, arkose, and conglomeratic sandstone chaotically juxtaposed with a sequence containing massive pillow basalts and associated radiolarian chert, argillite, and minor ultramafic rocks and marble. Mildy metamorphosed (prehnite-pumpellyite facies). In part a melange. Consists of the McHugh Complex.

Jurassic

lJ Lower Jurassic Rocks - Sandstone and argillite interbedded with volcanic flows and pyroclastic rocks of the Talkeetna Formation in the Cook Inlet area and southern Talkeetna Mountains.

Triassic

ꞦP Triassic and Permian Rocks - Argillite and limestone with siltstone and conglomerate and abundant gabbroic sills along east-central Alaska Range. Includes upper part of Mankomen Group of Middle Pennsylvanian to Early Permian age.

Volcanic Rocks

Triassic

ꞦV Triassic - Basaltic lava, commonly amygdaloidal, with local thin interbeds of volcaniclastic rocks, and local basal conglomerate. Includes the Nikolai Greenstone and related rocks of Middle and/or Late Triassic age.

Granitic Rocks

Cretaceous

Kg Cretaceous - Granodiorite with subordinate granite, quartz monzonite, and diorite. Includes extensive migmatitic granodiorites in the central Alaska Range.

(Concluded)

Jurassic

Jg Jurassic - Quartz diorite and granodiorite of Early and Middle Jurassic age in the Alaska-Aleutian Range batholith; granodiorite with subordinate quartz monzonite and quartz diorite of probable early Middle Jurassic age in the Talkeetna batholith.

MESOZOIC AND(OR) PALEOZOIC

Ultramafic Rocks

MzPzum Mesozoic and(or) Paleozoic - Serpentinized periodicite

Metamorphic Rocks

MzPzm Mesozoic and(or) Paleozoic - Metaplutonic, metasedimentary, and metavolcanic rocks near Anchorage and amphibolite - facies schist along south side of Matanuska Valley.

PALEOZOIC

Stratified Sedimentary and Volcanic Rocks In Part Metamorphosed

Pz Paleozoic Rocks - Near Cantwell in south-central Alaska Range, limestone, slate, and conglomerate with some fossils of Devonian age. West of Chulitna River, unfossiliferous argillite and graywacke, mildly metamorphosed.

lPzp€ Lower Paleozoic and(or) Precambrian Rocks - Highly metamorphosed clastic rocks. Includes Keevy Peak Formation and rocks formerly included in the Birch Creek Schist

Permian

PP Permian and Pennsylvanian Rocks - Basaltic to andesitic lavas and their derivative volcaniclastic rocks, tuffs, minor gabbro, and local shallow-water sedimentary rocks. Includes Skolai Group of Early Permian age, equivalent rocks in the Strelna Formation, the Tetelna Volcanics of Pennsylvanian age, and related unnamed rocks. In the Talkeetna Mountains, metamorphosed mainly to greenschist facies, locally to amphibolite facies.

Ultramafic Rocks

Pzum Paleozoic - Peridotite, dunite, and pyroxenite of probable Paleozoic age northeast of Anchorage.

SYMBOLS

———··· Fault, approximately located. Dotted where concealed or inferred.

———··· Contact, approximately located. Dotted where concealed or inferred.

Adapted from H. M. Beikman, 1974.

Paleozoic rock crops out in the center of the batholith. Younger Mesozoic meta-sedimentary rocks crop out in the northwestern Talkeetna Mountains. Slivers of Paleozoic sedimentary and Mesozoic metamorphic rocks crop out in the southwestern Talkeetnas along the Castle Mountain Fault, which traverses the southern edge of the Talkeetna Mountains (Figure 5).

Bedrock geology along the walls of the Matanuska Valley is complex. Generally, stratified sedimentary rocks of Lower Jurassic to Middle Tertiary age crop out along the north wall of the valley and are highly faulted by the Castle Mountain-Caribou fault system. The bedrock outcrops on the south valley wall are Jurassic, Triassic and Permian metamorphic rocks and Lower Cretaceous and Upper Jurassic melange rocks. Contacts are fault bounded by the Border Range and Eagle River Faults. The Valley floor is composed of Tertiary and (or) Cretaceous felsic igneous rock.

Surficial Deposits: The main portion of the Mat-Su Coastal Management District is occupied by the Cook Inlet-Susitna Lowland, which is overlain by glacially derived Pleistocene deposits. Six periods of glaciation have sculpted the Borough lowlands and surrounding mountains (Table 13). The earliest and most extensive glaciations were the Mount Susitna and Caribou Hills (T. L. Pewe, 1965 and K. G. Dean, 1980). Expanding ice caps on the Alaska Range, Chugach and Talkeetna mountains completely filled the Matanuska and Susitna Valleys; largely covered the bordering mountains; and pushed out to join other major glaciers to fill Upper Cook Inlet to elevations of 3,000 to 4,000 feet (T. L. Pewe, 1965). During the Eklutna glaciation, trunk glaciers filled the Susitna and Matanuska valleys and coalesced with ice spilling off the Alaska Range. Below the confluence of the Matanuska and Knik valleys, many of the divides between tributary glaciers stood above the ice surface and a large upland area on the southwest flank of the Talkeetna mountains stood above the ice. During the next two glaciations (the Knik, older, and the Napetowne), the Matanuska-Knik ice lobe did not coalesce with ice flowing down the Susitna River. Ice from the Alaska Range extended eastward across Cook Inlet to near Anchor Point (K. G. Dean, 1980). Evidence indicates that the glaciers of Knik and Napetowne age advanced into and retreated from regional proglacial lakes. The sixth glaciation (Alaskan) was generally confined in narrow mountain valleys where end moraines were often deposited at the confluence with broader valleys.

The Mat-Su Borough contains landforms which resulted from glacial, fluvial, lacustrine, pereglacial and paludal processes. During the six Pleistocene glacial advances discussed above, bedrock was scoured and debris was

Table 13: Cook Inlet Glacial Chronology

Glaciation	Age	Associated Events in Cook Inlet
Alaskan	200-4,800 yrs ago	Minor sea level Fluctuations
Interglacial Period		High Sea Level Stand
Naptowne	6,000-30,000 yrs ago	Glacial Lake Cook: Final drainage 275' high lake drainage 500-600' high lake drainage 750' high lake drainage Advance lake phases
Interglacial Period		High Sea Level Stand
Knik	38,000-65,000 yrs ago	Proglacial Lake
Interglacial Period		Deep Weathering
Eklutna	25,000-110,000 yrs ago	Cook Inlet icefilled
Interglacial Period		Major weathering
Caribou Hills Retreat	155,000-190,000 yrs ago	Cook Inlet icefilled
Interglacial Period		Deep weathering
Mount Susitna	Older than 110,000 yrs ago	Cook Inlet icefilled

Adapted from: K. G. Dean, 1980 and T. L. Pewe, 1965.

transported and deposited by the glaciers and their attendant streams and lakes. The broad lowland area is characterized by north-south trending elongate drumlins and fluted ridges with intervening swampy, till-covered lows on the north. Farther south in the Borough lowlands, the drumlins and ridges give way to flat, poorly-drained areas of glaciolacustrine deposits. These lowlands are underlain by a thick sequence of coal-bearing Tertiary rocks which rest on Mesozoic rocks.

Superimposed on the glacial landforms are floodplain and terrace deposits. Generally well-sorted floodplain, terrace, and alluvial fan deposits occur in association with the rivers and streams that drain the Mat-Su Borough. Alluvial fans are extensive along the Alaska Range front and a few occur in the Talkeetna and Chugach Mountains. A large alluvial fan deposit has accumulated where the matanuska and Knik Rivers drain into the Knik Arm. At the mouth of the Susitna River is a large deposit of eolian sand and silt.

Geologic Hazards

The geologic hazards in the Mat-Su Coastal Management District fall into three broad categories: seismic, volcanic, and mass wasting. The hazards were mapped on a scale of 1:346,000 for this Phase I Completion Report by incorporating data from a series of maps ranging in scale and detail (from 1:2,500,000 to 1:24,000). Due to the variance of scale and detail the geologic hazards features such as major faults and potential mass wasting zones are approximately located. Numerous other mass movement hazards are expected through the Borough in the steeper terrain. Detailed aerial photography and aerial reconnaisance is recommended to accurately designate these features. Any site-specific hazards would require further evaluation, including field study. Faults were compiled from original sources as they are interpreted to occur within the Borough. Extensive lineament maps have been compiled for the Borough although detailed hazard analysis of those features has not been done to date. One is referred to the Surficial Geology map by Simpson Usher Jones, Inc., 1979 for a more detailed lineament map of the Borough.

Seismic Hazards: As a consequence of its dynamic tectonic setting, the Uniform Building Code places the Mat-Su Borough in Seismic Zone 4 (on a scale of 0 to 4) where structural damage caused by earthquakes is generally the greatest. Several major and minor fault systems either border or cross the Borough. Major active regional faults include the McKinley strand of the Denali Fault and the Castle Mountain Fault. In addition, the Benioff zone can be expected to produce earthquakes of magnitude 8.5 or greater (WCC 1980). Major inactive faults that fringe the District are the Border Ranges and Eagle River faults. No evidence of displacement younger than Tertiary in age (approximately several tens of millions of years old) has been reported for the Talkeetna Thrust Fault. The Susitna lineament has not been definitely identified as a fualt and is presently being studied by Woodward-Clyde consultants in conjunction with the Susitna Hydroelectric Seismic investigation. The Susitna lineament may be the result of glaciation of stream drainages whose alignment reflects structural control such as joints or perhaps folding (WCC, 1980).

Preliminary maximum credible earthquake (PMCE) magnitudes were determined by Woodward-Clyde Consultants for the active faults and the Benioff zone as a part of their 1980 seismic study for the Susitna Hydroelectric Project. The PMCE for the Denali fault is estimated to be a surface-wave magnitude (M_s) 8.5 event. The PMCE for the Castle Mountain fault is estimated to be a magnitude (M_s) 7.4 event. The PMCE for the Benioff zone is estimated to be a magnitude (M_s) 8.5 event.

Damage due to earthquakes is caused primarily by ground rupture, ground failure, and ground shaking. Ground rupture damage is usually restricted to the area on or near the fault tract. Ground failure in the form of liquefaction may occur in areas of thick unconsolidated deposits where the water table is at or near the ground surface. Areas of potential liquefaction in the Borough include the floodplains of major streams and alluvial fans. R. Updike, of the Alaska Geological and Geophysical Survey, plans to study the liquefaction potential of the Mat-Su Borough in the near future. The study would address the extent of Bootlegger Cove clay and equivalent deposits into the Borough, liquefaction calculations and establishment of geologic engineering parameters. Ground shaking effects, which are the third primary cause of earthquake damage, can be amplified in the areas of fine silt and clay deposits as well as in peat bog areas. Ground shaking response, however, is also dependent on a number of other factors such as duration of shaking, response spectra, earthquake magnitude, depth of focus and building design and construction.

Secondary destructive mechanisms are regional and local uplift and subsidence, consolidation of soils, landslides, and avalanches. Records from the 1964 Alaska earthquake indicate that structural damage in the Mat-Su Borough was minor, with some avalanche damage to an Eklutna Power Plant transmission line. Landslides were recorded on Point MacKenzie and 2 miles south of Sutton on the Alaska Railroad line (USGS, 1965). Ground cracking occurred in the swampy areas along streams. Cracks were also noted on the alluvial fans which flank the Chugach Mountains on either side of the Knik River valley (oral communication, R. Updike, 1981).

The location of the major faults and potential earthquake-induced landslides and avalanches are shown on accompanying Geophysical Hazards Map, Map D. Areas of potential liquefaction are not mapped pending results of current research. The location of the Susitna lineament is shown on the map although its classification as a fault is stell being investigated by Woodward-Clyde Consultants (WCC, 1980).

Volcanic Hazards: Mount Spurr is located 13 km south of the Mat-Su Borough boundary and is the closest active volcanic peak to the Coastal Management District (Map D). Because of its close proximity, primary volcanic hazards are considered a threat to the area. These include turbulent clouds, violent directed explosions and glowing avalanches. Turbulent ash clouds, which are bursts of gas, steam, and ash that rise vertically to heights of 50,000 to 100,000 feet (15,000 to 30,000 meters), can be hazardous to aircraft in the area. The turbulent cloud accompanying the 1954 eruption of Mt. Spurr rose 70,000 feet (20,000 meters) in 40 minutes. Violent directed explosions can carve a destructive path for many miles. Glowing avalanches can flow swiftly downslope from the summit for great distances. Some of the destructive secondary phenomena associated with andesitic volcano eruptions are voluminous volcanic mudflows or flash floods, lightening discharges, corrosive rains, earthquakes, sea waves, ash fall and landslides. Active volcanic centers which could cause secondary damage in the Borough include Trobert, Spurr, Redoubt, Iliamna and Augustine. Volcanic mudflows and flash floods from an eruption of Mount Spurr could flow down across Capps Glacier picking up meltwater and continue down Beluga River valley as far out as Cook Inlet. Airborne ash can be transported great distances and produce physically uncomfortable conditions. For example the 1954 eruption of Mount Spurr showered ash on surrounding communities including Anchorage causing damage to aircraft and an expensive clean-up effort. The 1976 eruption of Mt. Augustine caused similar ash fall damage to the Cook Inlet area. Corrosive rains caused by acidic volcanic gases mixing with precipitation can fall on communities and cause damage. It is recommended that an integrated volcano monitoring and public warning system should be established for the Cook Inlet region.

Mass Wasting Hazards: Hazards related to mass wasting in the Mat-Su borough include landslides, avalanches, and rock glaciers. These phenomenon can be seismically induced or result from the particular rock structure, seasonal spring thaw and/or slope of the debris, rock or snow. Landslide describes the downhill movement of earth, rock, mud or debris. Avalanche refers to similar movements of snow and ice. Processes which trigger landslides are rainfall, erosion, earthquakes and man-induced cutting and filling. Mass movement phenomenon usually affect lower mountain slopes and the margins of valley floors and are especially active during periods of spring thaw.

Earthquake-induced landslides are potentially the greatest geologic hazard along the walls of the Matanuska Valley in the eastern portion of the Borough (Map D). Valley walls are greatly oversteepened and underlain by sedimentary rocks containing numerous incompetent shale units along which sliding may occur. The largest slides and the greatest numbers are in areas underlain by sedimentary rocks of Cretaceous and Tertiary age (Detterman, 1976, MP-738). The potential for destructive landslides is considered high in the vicinity of Hicks Creek. Some of the more prominent potential slides in the area are shown on the Geologic Hazards map and discussed below. Landslide deposits of Holocene and Pleistocene age are not shown on the hazards map. For the location and extent of these deposits, reference should be made to the surficial geology map by Detterman et al., 1976. Further detailed mapping may identify unconsolidated deposits on steep slopes which pose a landslide threat. Potential landslides are grouped according to the type of damage they could induce: drainage blockage and possible flood surge, highway closure, and communities threatened.

1. Drainage Blockage: There is a slide potential on Granite Creek which could block drainage and pose a threat to Sutton which is approximately 8 km (5 miles) southwest of this area. A potential blockage on the Chickaloon River occurs 3 miles north of Chickaloon. An enormous multiple landslide east of Puddingstone Hill is an old feature that dammed up Boulder Creek. The toe of the slide is being cut away by Boulder Creek and its surface morphology suggests that it may still be active (Detterman, 1976, MF-738). A large slide potential is indicated on the slope south of Watchtower Inn which could dam the Matanuska River.

2. Highway Closure: Numerous slides are possible near Castle at the base of Kings Mountain which could close the Glenn Highway. There is a high potential for the slope north of Long Lake to slide onto the highway. Several large multiple landslides have developed in the sedimentary rocks south of the Castle Mountain fault along Anthracite Ridge from milepost 90 to 94 on the Glenn Highway. At least two of these slides are still active. The potential is high for road closure along the Glenn Highway at Watchtower Inn and east for 2 miles to Pinochle Creek due to the underlying shale of the Matanuska formation which is very susceptible to landsliding.

3. Communities Threatened: There is a potential for a landslide near Jonesville. The communities of Sutton, Chickaloon, and Watchtower Inn are endangered by possible drainage blockage and flood outwash as mentioned above. Structural damage could occur at Castle due to its proximity to an unstable slope. More detailed mapping at specific sites may identify other potential slides. Numerous small slides were not mapped due to the map scale limitation.

Avalanche chutes are present on steep mountain slopes (30-40^{o}) but are most abundant in the north and east areas of the Borough coastal area and locally on Little Mount Susitna and Pioneer Peak. Other avalanche areas are expected on steep terrain throughout the Borough. Detailed aerial reconnaisance and aerial photographic interpretation in recommended to accurately identify those areas. Avalanche hazard is directly related to snow accumulation and steep slopes, those greater than 30 degrees. Spring runoff on southfacing slopes lubricates the surface of the slope and creates a high avalanche risk. Chutes are cut or modified by rapidly moving masses of snow, ice, rock and soil. Tongues of boulders or rock debris typically accumulate at the bottom of the chutes near the base of the valley walls. Extensively affected areas in the Central Alaska Range within the Borough boundary include Hidden River, Coffee River, Slide, Whistler and Alder Creeks. Extensive avalanche risk areas in the Talkeetna Mountains include Indian River, Chunila Creek, Talkeetna River, Disappointment Creek, Sheep River, Sheep Creek, and Kashwitna River. The avalanche risk zone occurs in a bank along the western slope of the Talkeetna Mountains bounded on the north by the Indian River and on the south by the Kashwitna River. Numerous avalanche chutes are located on the east side of Mt. Susitna and on the west side of Little Mt. Susitna. A large active avalanche chute also occurs along the Chugach Mountain front at Pioneer Peak on the Old Palmer Highway. Other active avalanche chutes are expected in the Chugach Mountains but have not been reported to date.

Rock glaciers are located on many floors of narrow mountain valleys in the Borough. Over 100 active and inactive rock glaciers were mapped by Nelson and Reed (1978) on the Talkeetna Quadrangle. These landforms are developed from talus and other mass wasting debris which form tongues of rock fragments moving slowly downslope. In some localities active rock glaciers are overriding inactive ones (Dean, 1980).

Recommended Further Study

Although surface mapping of the major fault traces in the Borough suggest Quaternary or Holocene activity, there is not documented record to confirm that any of the large historical earthquakes in the area were due to displacements on these faults. Continued seismic and tectonic study by the U.S. Geological Survey and State of Alaska Division of Geological and Geophysical Surveys (DGGS) should provide insight into the regional and local relationships of older seismic events with geologically younger faults. Detailed soils maps for the Mat-Su Borough coastal area are currently being compiled by the U.S. Soil Conservation Service (oral communication, Sterling Powell, April, 1981). The Susitna Area Plan which includes the Talkeetna and Willow Subbasins is soon to be published by the Alaska Department of Natural Resources (oral communication, Robert Loeffler, April, 1981). Results of the DGGS liquefaction study should be incorporated into the Coastal Management Program (oral communication, R. Updike, May , 1981). The current investigation by Woodward-Clyde Consultants regarding the Susitna Fault and other features at and near the Susitna Hydropower study should also be incorporated into the program. Continued synthesis of the most current research findings is an important task.

More detailed mapping of hazards on a site-specific basis using large scale maps is recommended for any detailed planning effort. The geologic hazards map compiled for the Mat-Su Borough Coastal Management Program are of a general nature and should not be used for site-specific planning. Hazardous areas designated should be avoided or special engineering measures taken to minimize the risks to life and property during future development.

HAZARDS OF HYDROLOGIC ORIGIN

The major river system in the Mat-Su Borough Coastal Management District include the Susitna, Matanuska, and Knik River systems. The Susitna River and its tributaries have a total drainage area of about 19,400 square miles (Corps of Engineers, 1977), much of which lies within the Mat-Su Borough. The Matanuska and Knik River systems have drainage areas of about 2,070 and 1,180 square miles, respectively. Associated with these major rivers, their tributaries, and other relatively small streams that discharge directly into Cook Inlet are hazards due to flooding, icings, and bank erosion.

Hydrologic Setting

Riverine flooding in the Mat-Su Borough is a result of excessive rainfall, rapid snowmelt, and the release of glacier-dammed lakes. Flooding is sometimes enhanced by ice or log jams blocking stream flow.

Rainstorms: Short, intense rainfalls can exceed the rate at which the rain can be absorbed into the soil; large volumes of water would run off the land surface into nearby streams, causing local flooding of areas bordering the stream. Similarly, if a rainstorm lasts for such a long time that the soils become saturated and can no longer absorb the rainfall, excess rainfall would run off, flooding streams. For example, an excess of one inch of rain running off of a one square mile area in six hours would cause an average discharge of 108 cfs (cubic feet per second) or 70 mgd (million gallons per day). Stream channels draining a one square mile area would generally be large enough to carry only a fraction of this amount of flow; thus, overbank flooding would result.

Snowmelt: Snowmelt floods occur when lengthening spring days cause many hours of solar radiation and warm temperatures to reach the saturated snowpack. Frozen soil underlying the snowpack accepts only a small portion of the melt water; the remainder runs off into streams causing snowmelt flooding. Snowmelt floods are typically of longer duration and have larger volumes of water than rainstorm-caused floods.

Glacier-Dammed Lake Releases: Glacier-dammed lake release flooding can be much larger than floods due to rainfall or snowmelt. Glacier-dammed lakes are formed when a glacier blocks the natural drainage channel creating a reservoir behind it. Such lakes may form in tributary valleys, main valleys, or within the glacier itself. The lakes typically fill to a certain level at which the water overtops the glacier or lifts the glacier sufficiently for flow to pass beneath. The flow of water on top of or beneath the glacier causes thermal and physical erosion of the ice, enlarging the drainage channel to allow high rates of flow to drain from the lake until, typically, the lake is empty. The slow flow of the glacier closes off the drainage channel, initiating the refilling process again. Glacier-dammed lake released may occur at a regular interval or they may be quite irregular. Maximum discharges may exhibit extreme variations as well. Some glacier-dammed lake releases are much smaller than rainfall or snowmelt floods and are not even noticed. Others are well in excess of normal flooding and can cause significant damage. Glacier advance or recession often causes a change in the characteristics of glacier-dammed lakes which it blocks; the lakes may get larger or smaller, may disappear altogether, or new lakes may form. Thus, glacier-dammed lakes are dynamic and their release floods are very difficult to predict for long range planning.

Icings: Icings (also called aufeis, naleds, and glaciation) are defined to be ice features that form from a series of overflow events which freeze on the icing surface, thereby thickening the icing. Icings typically develop in braided river floodplains, at culverts, and across roads, but they may occur anywhere in cold environments. Three requirements for icing formation are:

1. A water source in the form of springs, groundwater, or flow in a river channel;

2. A subsurface constriction such as bedrock, less pervous soil, or permafrost; and

3. A surface constriction such as the downward freezing of the active frozen soil layer or channel ice, or the icing itself.

Icings can form to over 10 feet thick and a square mile or more in area. Icings can be hazardous to travel is they form across roads, railroad tracks, or airport runways. Icings that form in culverts can block spring runoff and cause extensive flooding. Icings forming in stream channels reduce the capacity of the channel to carry flow, resulting in more extensive flooding than would otherwise have occurred during spring runoff. Icings can encroach on buildings as they grow, potentially causing damage to the structure or its contents.

Stream Bank Erosion: Stream bank erosion results from any single or combination of processes that include:

- High water velocities eroding and transporting the material from the site;
- Thawing of ice-rich soils, which, as a result, lose their structural stability and slide into the stream channel;
- Ice blocks being transported during breakup, gouging material from the banks;
- Wind-driven waves impacting the banks; and
- Winds drying out the soil and carrying away the dry soil particles.

Stream bank erosion can progress to a point where it undermines structures, roads, or railroads, causing extensive damage. Stream bank protection can be used to slow or stop the bank erosion process, but such protection may be very costly and it can cause increased bank erosion or bed scour elsewhere along the stream.

Hydrologic Hazards

Flood Magnitude: The quantity of water flowing past a given point in a specified unit of time is called the discharge; it is usually expressed in cubic feet per second (cfs), gallons per minute (gpm), or million gallons per day (mgd). Flood discharges on several streams in the Mat-Su Borough Coastal Management District have been calculated by the U.S. Geologic Survey from records of previous maximum known flood events and theoretical calculations (Table 14). Many of these maximum discharges are associated with a 1971 rainstorm that dropped from 3 to 6 inches of rain between the 5th and 11th of August (Lamke, 1972). The disharges from this storm are from 1.8 to 8.9 times the discharges that have a theoretical two percent probability of occurring in any year (Lamke, 1972). Thus, floods of this magnitude are likely to occur an average of less than once every 50 years over a long period.

A standard flood which is used for establishing floodplain boundaries for planning purposes is the 100 year flood. Such a flood would have a one percent chance of occurrence in any year, or a 26 percent change of occurring in a 30 percent period. It is thus advantageous to locate new construction out of the floodplain of a 100 year flood, or, if it is necessary to construct within the floodplain, locate the construction on fill or above the flood elevation. Estimated 100 year flood discharges for various streams in the Borough are given in Table 15. It is apparent from Table 15 that the discharge per unit area is larger for smaller drainage areas.

The flood magnitudes presented thus far have been mainly associated with rainfall or snowmelt-caused floods. One exception is the maximum known flood on Knik River near Palmer (Table 14) which was due to the release of Lake George, a glacial-dammed lake. Lake George is the largest, most known, and best documented glacier-dammed lake in the Borough, and probably all of Alaska. The following excerpt presents the characteristics of Lake George released (Post and Mayo, 1971):

> "Knik River - The Knik River near Palmer is famous for destructive outburst flooding from Lake George (No. 28), which in recent years has been the largest glacier-dammed lake in Alaska. Since 1918, at least, the lake emptied annually (Stone, 1963b), a pattern which continued until 1963 when no ice dam formed. Lake George again annually refilled and dumped between 1964 and 1966. The annual flooding of Knik River was so regular between 1918 and 1963 that flood experts, bridge maintenance crews, and tourists reserved a week

Maximum Known Flood Discharge on Streams in the Matanuska-Susitna Borough Coastal Management District (Lamke, 1979).

Station No.	Stream	Location: Latitude	Location: Longitude	Drainage Area (mi^2)	Period of Record (years/dates)	Date of Maximum Known Flood	Maximum Known Flood Discharge (cfs)	Maximum Known Flood Discharge (cfs/mi^2)
15281000	Knik R nr Palmer	61°30'18"	149°01'50"	1,180	42(1935-76)	July 18, 1958	355,000a	300
-	Kings R nr Sutton	61°43'58"	148°44'52"	151	Miscellaneous	Aug. 10, 1971	9,800	64.9
-	Granite C nr Sutton	61°46'46"	148°50'12"	52.5	Miscellaneous	Aug. 10, 1971	58,600b	1,120
15283500	Eska C nr Sutton	61°43'44"	148°54'31"	13.4	7(1965-69, 1971-76)	Aug. 10, 1971	1,680	125
-	Moose C nr Sutton	61°43'32"	149°03'00"	40.7	Miscellaneous	Aug. 10, 1971	18,000	442
15284000	Matanuska R at Palmer	61°36'34"	149°04'16"	2,070	26(1949-74)	Aug. 10, 1971	82,100b	39.7
-	Wasilla C nr Palmer	61°38'47"	149°11'45"	19.3	Miscellaneous	Aug. 10, 1971	700	36.3
15286000	Cottonwood C nr Wasilla	61°34'30"	149°24'35"	28.5	6(1949-54)	July 5, 6, 1949	55	1.93
15289800	Fishhook C nr Palmer	61°45'05"	149°13'40"	8.52	3(1963-66)	Aug. 23, 1963	960	113
15290000	Little Susitna R nr Palmer	61°42'32"	149°13'36"	61.9	26(1948-76)	Aug. 10, 1971	7,840	127
15292000	Susitna R nr Gold C	62°46'04"	149°41'28"	6,160	27(1949-76)	June 7, 1964	90,700	14.7
15292400	Chulitna R nr Talkeetna	62°33'31"	150°14'02"	2,570	17(1958-76)	July 20, 1967	75,900	29.5
15292700	Talkeetna R nr Talkeetna	62°20'49"	150°01'01"	2,007	13(1964-76)	Aug. 10, 1971	67,400	33.6
15292780	Susitna R nr Sunshine	62°10'35"	150°10'18"	11,500	Miscellaneous	Aug. 10, 1971	200,000	17.4
15292800	Montana C nr Montana	62°06'32"	150°03'12"	164	10(1963-72)	Aug. 10, 1971	6,970	42.5
15292900	Goose C nr Montana	62°03'42"	150°03'20"	14.5	9(1963-71)	June 1964	530c	36.5
15293000	Caswell C nr Caswell	61°56'55"	150°03'14"	19.6	14(1963-76)	Sept. 1965	207	10.6
15294025	Moose C nr Talkeetna	62°19'00"	150°26'30"	52.3	5(1972-76)	Aug. 22, 1972	1,850	35.4
15294300	Skwentna R nr Skwentna	61°52'23"	151°22'01"	2,250	17(1959-76)	June 25, 1971	50,000	22.2
15294350	Susitna R at Susitna Station	61°32'41"	150°30'45"	19,400	2(1974-76)	July 1, 1975	173,000	8.9

[a] Glacier dammed lake release flood.

[b] Rainfall flood was augmented by the release of stored water from an unnamed lake after embankment was breached.

[c] Floods from Sheep Creek overflow on 10 August 1971 reached 3,270 cfs in Goose Creek.

TABLE 14

Estimated 100 Year Flood Discharge for Streams in the Matanuska-Susitna Borough Coastal Management District.

Stream	Approximate Location	Drainage Area (mi^2)	100 Year Flood Discharge (cfs)	(cfs/mi^2)
Susitna R	at Talkeetna[a]	11,035	268,000	24.3
	at Gold Creek[b]	6,160	120,000	19.5
Matanuska R	nr Palmer[b]	2,070	49,100	23.7
Talkeetna R	at mouth[a]	2,015	97,000	48.1
Little Susitna R	nr mouth[c]	320	24,200	75.6
	at Parks Highway[c]	175	15,200	86.9
	at Wasilla-Fishhook R[d]	62	8,190	132
Willow Ck	at mouth[d]	258	16,900	65.5
Little Willow Ck	at Parks Highway[c]	157	12,300	78.3
Deception Ck	at mouth[d]	58	6,300	109

References:

a Corps of Engineers, 1972
b Lamke, 1979
c Soil Conservation Service, 1980
d Corps of Engineers, 1980b

TABLE 15

in July or August for the event. Because of this spectacle, the area has been designated as a National Landmark by the National Park Service. Since 1966, Knik Glacier has failed to form an ice dam and the lake has not filled. In this case, a period of regular lake dumping lapsed briefly and later ceased abruptly.

The peak discharges from 1949 to 1966 changed systematically rather than randomly as is usual for nonoutburst floods. From 1949 through 1961, there was a significant rise in the peak discharges; then during the later phase of the lake, 1962-66, the peak discharges were lower than during the preceding decade. The cause of these latter changes was undoubtedly due to a thinning of the ice at the glacier terminus. Lake George will reform in the future if Knik Glacier thickens and advances a small amount. Although this change is fairly likely, is cannot be predicted with assurance from the data presently available."

The maximum flood discharge per unit area of 300 cfs/mi^2 associated with the release of Lake George is roughly six times the value that would be expected for a 100 year flood on a river of that size. Other glacier-dammed lakes also affect streams in the Mat-Su Borough; these include Strandline Lake affecting the Beluga River in the southwest corner of the Borough, and many small unnamed lakes affecting the Matanuska, Skwentna, Yentna, Kahiltna, Tokositna, and Chulitna Rivers, (Geophysical Hazards Map, Map D). Strandline Lake released in mid-July 1979, causing large floods in the Beluga River; the magnitudes of this flooding is now known. The release history of the other glacier-dammed lakes affecting the Borough is unknown.

<u>Extent of Flooding</u>: The aerial extent of the lands affected by flood waters is related to the flood magnitude, the width and depth of the channel, topography adjacent to the channel, natural or man-made constructions in the channel or floodplain, and many other factors. As a result, detailed evaluation of floodplain limits can only be accomplished with detailed study of many of these factors. Some areas of the Mat-Su Borough Coastal Management District have been studies in detail (Corps of Engineers, 1972 and 1980b, Soil Conservation Service, 1980). Other areas have been looked at based on evidence of past flooding (Lamke, 1972, Corps of Engineers, 1964, Dean 1980, Krebs, 1978). Stream floodplains in the remainder of the basin are estimated in a very rough manner based on very little data and should be used only as a reminder of an existing flood hazard, the boundaries of which could be delineated only with more detailed studies. All three levels of detail of floodplain delineation are shown on the Geophysical Hazards Map, (Map D).

Detailed studies have been done for the Talkeetna and Willow areas. Results of the study of the Talkeetna area (Corps of Engineers, 1972) indicated that the majority of the Talkeetna townsite could be flooded by a flood with a one percent annual probability of occurrence. The 1971 flood peak lasted only a short time and flooded only the lower, abandoned parts of the community. A flood in 1942, however, caused severe damage in the community; floods of larger magnitude may occur in the future. Talkeetna has one of the highest potentials for flood damage due to its proximity to the confluence of three major rivers -- the Talkeetna, Susitna, and Chulitna Rivers.

Flood hazards in the Willow area are rated as low average (Corps of Engineers, 1980a). Willow Creek and its tributary Deception Creek were studied in detail (Corps of Engineers, 1980b), the results of which indicated that approximately 3900 acres (6 mi^2) of area in both basins are in the floodplain of the 100 year flood (one percent annual chance of occurrence). In the Willow Creek basin, only 1.5 percent of which is currently developed, average annual flood damages of over $600,000 are predicted (Corps of Engineers, 1980b). Future development in the area, such as the proposed Capital site, would likely increase the flood hazard potential and the amount of damages.

In another study (Soil Conservation Service, 1980), Little Willow Creek and lower Little Susitna River floodplains were delineated. The lower Little Susitna River study included the area from 2 miles upstream of the Parks Highway to its mouth. The 100 year floodplain included approximately 1,400 acres (2.3 mi^2) in the Little Willow Basin and 16,400 acres (25 mi^2) in the lower Little Susitna River study area. Average annual damages are estimated to be about $9,000. Damaging floods have occurred in 1955, 1959, 1969, 1971, and 1975; more extensive flooding can occur in the future.

A less detailed level of floodplain mapping was conducted for large areas of the Susitna River Basin (Krebs, 1978, Dean, 1980. This mapping was based on the analysis of aerial photography and Landsat imagery. The probability of occurrence of floods causing the indicated approximate flooding boundaries (Map D) is unknown; it may be much higher than the one percent probability associated with the boundaries resulting if development is planned near these approximate floodplain boundaries.

A summary of the August 1971 rainstorm-caused flood in southcentral Alaska is given by Lamke (1972). although heavy rains fell throughout the Borough, extensive flood damage was concentrated mostly in the Matanuska Valley; an estimated total of almost six million dollars of damage occurred there (Table 16). A brief descriptive summary of some of the areas most heavily damaged are described briefly below.

Estimated Flood Damage in the Matanuska Valley
Caused by Heavy Rains in August 1971 (Lamke, 1972)

Classification	Amount (dollars)
Highways (Federal Aid System)	2,000,000
Residences and Contents	1,422,000
Erosion of Land	1,000,000
Business Buildings and Contents	520,000
Local Roads	338,000
Dikes and Protective Works	177,300
Utilities, Wells, and Cesspools	161,000
Other Public Property	116,000
Miscellaneous	54,000
TOTAL	5,838,000

TABLE 16

An unnamed lake near Sutton breached its embankment, releasing flood waters into Granite Creek, a tributary of the Matanuska River. Heavy sediment loads were deposited between the mountains and the Glenn Highway along Granite Creek. Flood waters in Granite Creek washed out the Glenn Highway in several places. The Glenn Highway was also washed out by flood waters in Kings River, Eska Creek, and Moose Creek. In addition, local roads were washed out and homes, businesses, and farms were damaged in the Sutton area. Flooding also occurred in the Bodenburg Butte area when the Matanuska River overtopped and washed out the road that acted as a dike in that area. Although the probability of floods of such magnitude as this 1971 flood is low in any given year, floods of greater magnitude can occur.

A flood investigation for the Knik River was conducted (Corps of Engineers 1964) for the purpose of evaluating the feasibility of providing flood protection measures along this stream. The conclusions of the study were that such protection would not be economical. Damaging floods were found to occur only when Lake George, a glacier-dammed lake, released its waters; the largest such flow occurred in 1958 when a peak of 359,000 cps was recorded. Very little private property damage has been documented other than some damage to crops and cleared land. Some relatively minor road damage has resulted from some of the flooding. Although Lake George has not been dammed by the glacier since 1966, the potential exists for the glacier to advance, causing Lake George to once again become dammed and subsequently release causing extremely high flood magnitudes.

A general summary of the flood hazard potential of several communities in the Mat-Su Borough Coastal Management District (Corps of Engineers 1976 and 1980a) indicate that flood hazard potential is mostly due to stream overflow and local drainage problems (Table 17). The frequency of occurrence is generally low to low-average and the majority of the communities that were rated were given a low flood hazard rating. However, flood hazard potential changes as development occurs in the stream basins, making it necessary to revise the hazard assessment as development occurs in the basin.

Icings: Icings are a relatively localized hazard which have not been generally documented in the Mat-Su Borough Coastal Management District. Probably areas of extensive icing development have been mapped (Map D) in most of the Susitna River basin lying in the coastal area (Krebs, 1978, Dean, 1980). Many other areas in the Borough are likely to be affected by icings, including nonfloodplain areas.

Flooding enhanced by icings were included in the previous sections discussing flood hazards. Icing formation over roads, railroad tracks, or airport runways are poorly documented, but are likely to be a problem in some areas of the Mat-Su Borough coastal area. Since icings are such a local hazard, general mapping of all the hazard areas cannot be accomplished. Instead, developable areas should be investigated for potential icing problems on a site-specific basis.

Stream Bank Erosion: Similar to icings, bank erosion problems are quite localized and generally not well documented. Bank erosion problems are likely in certain locations along the major streams in the Borough. Communities with probably erosion hazards include Palmer, Sutton, Talkeetna, Wasilla, and Willow (Corps of Engineers, 1976). Developable areas should be evaluated on a site-specific basis for bank erosion hazards.

HAZARDS OF OCEANIC ORIGIN

The actual coastline of the Mat-Su Borough extends for approximately 37 miles along the extreme northern shore of Upper Cook Inlet and for 40 miles along the northwest shore of Knik Arm. Lying as is does at the head of Upper Cook Inlet, the natural forces that might be capable of producing significant hazards of an oceanic origin are those associated with that body of water. Because most of the

TABLE 17

Summary of Documented Flood Hazard Potential in Communities in the Matanuska-Susitna Borough Coastal Management District.

Community	Flood Hazard	Frequency of Occurrence	Type of Flooding: Stream Overflow	Ice or Log Jams	Icings	Local Drainage	Coastal	Percent of Community Affected	Data Source[a]
Alexander		Ave	X	X				20	1
Butte	High[b]		X						2
Houston	Low	Low	X		X				1,2
John F. Kennedey[c]			X			X	X		1,2
Moose Creek		Low-Ave	X			X			1
Palmer	Low	Low	X			X		10	1,2
Sutton	Low	Low	X					60	1,2
Talkeetna	High	High	X	X		X		30	1,2
		Low	X	X		X		80	3
Wasilla	Low	Low				X		10	1,2
Willow	Low-Ave	Low-Ave	X	X	X				1,2

[a] Data Source
1 Corps of Engineers, 1976
2 Corps of Engineer, 1980a
3 Estimated from Corps of Engineers, 1972

[b] High flood hazard applies to low lying areas only

[c] Village (formerly called Bay City) has been abandoned

available information pertains to Upper Cook Inlet as a whole, it is presumed for this discussion that such is adequate for making general statements for the Mat-Su Borough coastline. Of course, any truly site-specific needs must be fulfilled by more intensive examination of the forces in evidence at the location of interest.

In the following section, the oceanographic and meteorologic setting of Upper Cook Inlet is described with attention to circulation patterns, bathymetry, and climatic conditions. Those factors that most influence the character of circulation, coastal climate, and sediment transport are also discussed. Those factors are wind, tides, local bathymetry, and geomorphology. Oceanic hazards of potential concern are also discussed, including ice, seismicity, and storm. Of the latter, ice in the inlet has the greatest potential for causing coastal erosion and coastal flooding.

Oceanographic and Meteorologic Setting of the Upper Cook Inlet

Circulation: Circulation and local tidal currents are important oceanographic factors in Cook Inlet. Circulation patterns prevalent throughout the entire inlet are governed primarily by interaction between tides, Coriolis force, and the counterclockwise Alaska Current. Locally generated tidal currents are influenced by the bathymetry, morphology and fresh water influx characteristics of Upper Cook Inlet. Tidal currents tend to control the character of inlet circulation. Local currents are produced by wind stress, fresh water influx and ordinary convective and advective processes. These local currents are smaller in magnitude than locally-generated tidal currents. Wind-driven currents can add approximately 2-3 percent of the wind speed to tidal current velocities in some localities (Gatto, 1976).

Tides: Tides in the Upper Cook Inlet region are semi-diurnal in character. Tidal amplitudes are mixed, with two unequal high tides and two unequal low tides per tidal day (24 hours, 50 minutes). The mean diurnal tidal range varies from 13.7 ft. at the mouth of Cook Inlet to 29.6 ft. at the City of Anchorage, with maximum current speeds of about 3 knots. Flood currents occur more than 70 percent of the time (Gatto, 1976). Ebb currents are strong but have short duration. A large gyre develops in the region during the last half of ebb flow in Knik Arm, causing upstream flow along the east shore (Corps of Engineers, 1979).

Tides in Upper Cook Inlet are more dynamic, with extreme conditions producing currents of 4 knots, and sometimes 6 to 8 knots (Gatto, 1976). The funnel shape of Cook Inlet, coupled with exposure to the deep Pacific Ocean waters, permits the amplification that causes tidal ranges in the vicinity of Anchorage to rank among the largest in the world.

Current velocities are more than a function of tidal range and phase. They are also influenced by local shore configuration, bottom geometry and possibly wind effects in some shallow areas. Strong tidal currents and inlet geometry produce considerable cross currents and turbulence within the water column. Bottom current speeds of 1.2 to 1.8 knots can be estimated from the formation of sand bottom waves in the mud flats (Howard, et al., 1972). The high latitude (62^{o}N) results in strong Coriolis force which, coupled with inlet geometry, causes considerable cross currents at both ebb and flood tides. Water flow is turbulent throughout the entire water column (Wagner et al., 1969).

Bathymetry: Cook Inlet is a coastal plain estuary that is a shallow body of water extending inward from the ocean. Upper Cook Inlet begins at the West and East Forelands. The depths in the upper inlet are generally less than 120 feet. This area is characteristically defined as a shallow and narrow silt-laden basin. The inlet divides into two arms at its head called Knik and Turnagain Arms. Knik Arm is 45 nautical miles long, approximately 50 feet deep for half its length, and then rapidly shallows to a large mud flat. Large areas of Knik Arm are exposed at low tide. Knik Arm and a segment of Upper Cook Inlet from the southern, and only, coastal boundary of the Mat-Su Borough Coastal Management District.

Sediment Transport: Cook Inlet bottom sediment consists predominantly of cobbles, pebbles, and sand with minor proportions of silt and clay. Suspended sediments are mostly of glacial original. The highest concentrations of sediment have been recorded near the mouths of Susitna and Knik Rivers. The Matanuska and Knik Rivers are glacier-fed rivers that transport large quantities of suspended sediment into Knik Arm. The average total suspended sediment for the Matanuska and Knik Rivers is approximately 16 million tons for April to September (months of highest sediment load) (Howard, et al., 1972), while average load from October to March diminishes to 135,000 tons. The maximum daily suspended sediment load recorded for the Matanuska River is 1.3 million tons, and 2.0 million tons for Knik River (Howard, et al., 1972).

Approximately 10 million tons of suspended sediment or 60 percent of the material entering Knik Arm leaves the area in the highly turbulent waters and in the density currents moving along the bed. The other 40 percent of the suspended material is presumed to be deposited in the Knik-Matanuska River delta (Howard, et al., 1972). The greatest influence on sediment distribution in Cook Inlet is attributed to tidal currents. Distribution and character of sediments in the forelands is also influenced by ice rafting and by rivers. Turbid fresh water discharging into the inlet, particularly from the north and west, produces extensive sediment plumes. During the summer months and particularly during large floods, large amounts of gravel can be transported by river currents (Wagner, et al., 1969).

Climate: Meteorological conditions are modified by local geographic features. The Cook Inlet region is characterized by a transitional climatic zone. The Chugach Mountain Range blocks the maritime influence of Prince William Sound. The major river valleys of the Susitna, Copper, Matanuska, and Knik Rivers channel low-level movement of cold, dense air from ice field in the upper reaches of the Prince William Sound area. Storm tracks usually run to the northeast over Anchorage, while the predominant and most severe winds blow from the northeast (Howard, et al., 1972).

Winds: Winds move loose materials and cause wind stress on the water, producing a wind tide which promotes erosion by increasing the beach area that is exposed to wave action. Wind direction determines the initial direction of wave travel with bathymetric variation, capable of producing substantial alternation of wave direction and characteristics. These factors coupled with shorelike orientation, determine the direction of wave attack on the beach (Table 18). Winds in the Upper Cook Inlet region are generally moderate; however, they occasionally are very gusty during the winter months. Forty-two percent of the winds are northerly (NNW-NNE) while another 42 percent are southerly (SSW-SSE) (Table 18). High speed winds occur throughout the basin when as atmospheric pressure gradient is established over the entire inlet. Average winds speeds are low. Prevailing winds in December and January are northerly and have the lowest average wind speed (Gatto, 1976). Southerly winds prevailing in May and June have the highest average speed. Average daytime winds are approximately 10 to 20 percent greater than nighttime winds. Winds produced by cold air moving downslope from highland glaciers through adjacent valleys occur occasionally and are called "katabatic" winds. These winds can be very strong when the temperature differences between the land and inlet water are greatest (Gatto, 1976).

Calculated Wave Characteristics for Three Proposed Bridge Sites (III, IV, V) in Knik Arm (Howard, et al., 1972).

			CROSSING		
			III	IV	V
WIND (mph)		North	60	60	60
		South	45	45	45
FETCH	LENGTH (miles)	North	27.0	25.5	20.0
		South	5.0	6.5	12.0
	WIDTH (miles)	North	4.5	4.8	5.0
		South	2.2	2.8	3.0
	Width/Length	North	.167	.19	.25
		South	.44	.43	.25
F_E/F		North	.37	.39	.45
		South	.63	.62	.45
EFFECTIVE FETCH (F_E) (miles)		North	10.0	9.9	9.0
		South	3.1	4.0	5.4
SIGNIFICANT WAVE HEIGHT (feet)		North	8.0	8.0	7.8
		South	5.0	5.8	6.3
MAXIMUM WAVE HEIGHT (feet)		North	15.0	15.0	14.6
		South	9.4	10.8	11.8
MINIMUM TIME TO DEVELOP MAXIMUM WAVE (hours)		North	1.50	1.50	1.36
		South	0.72	0.88	1.01

Note:

Wave calculations are based on data from "Shore Protection Planning and design", U.S. Army Corps of Engineers - Technical Report No. 4, 1966, ASCE Transactions, 1959, and other sources.

Some values indicated in tabulations are shown to one or two decimal places for continuity of calculations. For the purpose of this study such accuracy is not warranted and in fact the data should not be interpreted to represent more than a preliminary approximation.

TABLE 18

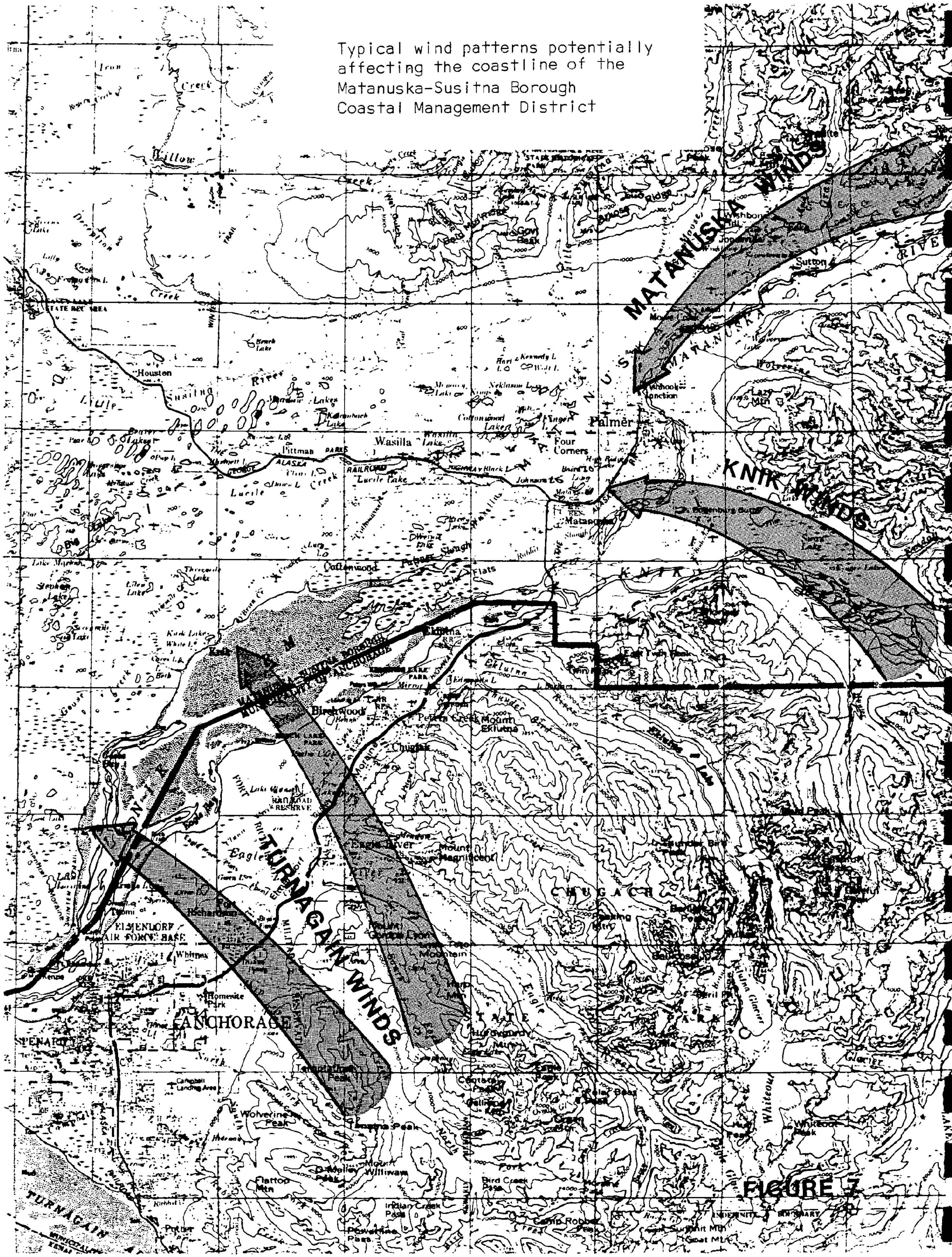
A strong gusty north wind called "Matanuska" may persist for 2 or 3 days at speeds of 20 to 45 mph. Wind speed can reach 40 to 60 mph for 6 hours or more, with short duration gusts of 80 to 90 mph. Strong northerly winds occur several times each winter originating in a rapidly increasing pressure gradient between the Gulf of Alaska and interior of the State. These winds start as low-level air movement from the Copper River Basin, moving westward through the Matanuska River Valley, turning southward near the Palmer area, and then flowing down Cook Inlet (Figure 7).

Southeast winds flowing over the Chugach Range are called "Knik Winds" when they blow across Knik Glacier and "Turnagain Winds" when they blow across Turnagain Arm (Figure 7) (Howard, et al., 1972). Wind speeds of 100 mph have been recorded at the west base of Chugach Mountain valleys (Eagle River, Peters Creek, Ship Creek) (Howard et al., 1972). These speeds diminish rapidly as the winds spreads over the flat land and Knik Arm. A maximum speed of 51 mph for the 19-year period, 1941 to 1959, was recorded at the Elmendorf weather station (Howard, et al., 9172). Anchorage weather bureau data show that 80 to 90 mph winds are capable of forming over the Knik Arm due to the lack of obstructions (Figure 7) (Howard, et al., 1972).

Oceanic Hazards

Ice: The highest concentrations of sea ice are formed north of the Forelands in Upper Cook Inlet and in the western portion of the Lower Cook Inlet. Several different types of ice are found, including sea ice, beach ice, stamukas, and estuary and river ice. Sea ice is formed by freezing of a thin crust on the surface of oceanic water. Each successive layer is formed on the bottom of the surface layer, building to thicknesses of as much as 8 feet thick and covering 3 to 4 tenths of the inlet (Howard, et al, 1972). Sea ice is more abundant in Cook Inlet than the other types of ice listed above.

Two forms of sea ice, floe ice and block ice are the most prevalent forms of ice found in this area. The movement of block ice and floes in Upper Cook Inlet is controlled by wind forces and tidal currents. Tides provide the major motivating force moving ice in Cook Inlet, but wind direction and duration can exert great control on the seaward migration of floes. Ice in the Upper Cook Inlet area moves seaward primarily due to prevailing winter winds which blow SSW down Knik and Turnagain Arms. Occasionally, ice held in Knik Arm is pushed out of the Arm within a 24 hours period by winds.



Typical wind patterns potentially affecting the coastline of the Matanuska-Susitna Borough Coastal Management District

FIGURE 7

Large floes are not formed in Knik Arm because of the large tidal currents and eddies. currents and eddies are also responsible for breaking up any floes that are carried into Turnagain Arm from Cook Inlet. Flood tides pick up the sheet ice, break it into small pieces, and deposit on the flats with some pieces stacked on top of others. High tides pick up these cakes of ice and carry them to midstream where current velocities are maximum. In midchannel, the cakes of ice are broken up and reconsolidated to form the floe or float ice. Ebbing tides carry floe ice south to the channel constriction at the Forelands. For the most part, floe travel is restricted to Upper Cook Inlet, although some do travel as far south as Ninilchik and Anchor Point.

Most ice blocks are formed as shore-fast ice or are built up on the periodically flooded mud flats in Upper Knik and Turnagain Arms. Ice blocks are formed over a shoreline area exposed at lower tide levels. The ice block increases in size by successive coating of ice during each tide cycle. The thermal balance of heat transfer into the atmosphere during low tide exposure, and heat flow into the soil from the warmer tidal water during high tide, control the depth of ice formations. Shoal areas at an elevation higher than the heat-balance zone are covered with solid ice. Higher current speeds tend to retard ice formation by altering heat flow and erosion rates.

Beach ice forms on the mud flats when the ebbing tide exposed the mud to cold air, causing the upper layer of mud to freeze. Water overlying the frozen mud freezes on flood tide. Beach ice is eventually pulled away from the mud and carried out into the inlet, thereby assuming the character of sea ice.

Stamukas are stacks of layered ice, sometimes referred to as ice cakes, that have been beached and frozen to the mud flats in Cook Inlet. Ice floes contribute to the formation of these ice cakes. Ice floes become lodged on top of stamukas when the tide recedes. Overhanging pieces break off and produce ice cakes as great as 20 feet thick (Hutcheon, 1972). Estuary and river ice are produced by freezing of fresh water. Estuary ice is a thin crust of ice that forms over mud flats and shallows. River ice forms over shallows and shoals and remains in the rivers until spring breakup. River ice as thick as 6 to 7 feet is discharged in large quantities into the Upper Cook Inlet at breakup (Hutcheon, 1972).

Climatological conditions in the Port MacKenzie area generally product about two and one-half feet of floe ice during the ice season. However, the mean floe size for a 100-year recurrence period is three and one-half feet (ESL, 1978). Any floes forming or being carried into Cook

Inlet are broken up by large tidal variations and currents. Occasionally, floes reach 1000 feet in diameter. Ice coverage for the entire Cook Inlet reaches a maximum 30 to 40 percent (ESL, 1978).

Seismicity: The highly active Alaska seismic zone extends from Fairbanks in the interior to the Gulf of Alaska, thus encompassing the Cook Inlet region. Some of the greatest tectonic events in recorded history have occurred within this zone. Earthquake activity attributed to tectonic fracturing and displacement of the earth (faulting) begins when energy stored in crustal rocks reaches its maximum strain accumulation. Uplifting and subsidence of the ocean floor may result, producing long ocean waves called "tsunamis". Landslides and avalanches can also occur and can produce standing waves called "seiches" in adjacent water bodies. These phenomena are hazards of oceanic origin warranting consideration in the identification of areas susceptible to wave-induced coastal erosion. Both tsunami and seiche contribute to the occurrence of major coastal erosion and coastal flooding.

Storms: Storms are another hazard of oceanic origin that contribute to coastal erosion. Storm winds produce "sea waves" of significant height and intensity of which are capable of eroding and significantly altering beach formations. Identification of areas that are highly susceptible to sea wave induced coastal erosion is also necessary. Shorelines composed of loose gravel and fine-grained sand are generally vulnerable to significant wave damage, whereas, rocky headlands and high sea cliffs are not. Storm waves in Cook Inlet seldom exceed four feet (Plafker, 1972).

Geophysical Hazards Glossary

Advective process: Heat transfer by the horizontal motion of air.

Alluvial fan: A cone-shaped deposit of alluvium made by a stream where it runs out onto a level plain or meets a slower stream. The fans generally form where streams issue from mountains upon the lowland.

Andestic composition: Andesite - a type of volcanic rock composed essentially of andesine, a mineral containing sodium, calcium, aluminum, silicon and oxygen.

Arcuate fault system: Curved pattern defined by the surface expression of the faults.

Bathymetry: Study of the variation of depth of large water bodies.

Convective process: The molecular transfer of heat, density, or other fluid properties resulting from spacial variations in the property.

Drumlin: A streamlined hill or ridge of glacial drift with long axis paralleling direction of flow of former glacier.

Eolian: Applied to deposits arranged by the wind, as the sands and other loose materials along shores, etc.

Fluted ridge: Smooth gutterlike channels or deep smooth furrows worn in the face of ridges by glacial action.

Fluvial: Of, found in, or produced by a river.

Geomorphology: Study of the formation of the earth's topographic features.

Glaciolacustrine: Produced by or belonging to glacially formed lakes.

Glowing avalanche: A volcanic eruption feature; it is a highly heated mass of gas-charged lava which flows swiftly down a slope however slight the incline, by virture of its extreme mobility and propelled by gravity.

Gyre: A circular or spiral form, ring or vortex.

Icings: Ice masses formed by the freezing of continuous or periodic water overflow on a surface.

Lacustrine: Produced by or belonging to lakes.

Lineaments: Significant lines of landscapes which reveal the hidden architecture of the rock basement; they are structurally controlled.

Megathrust: Large scale thrust fault; thrust fault is a type of reverse fault in which the angle of dip of the fault plane is less than 45 degrees.

Paludal: Pertaining to swamps or marshes, and to deposits deposited in a swamp environment.

Periglacial: Refers to areas, conditions, processes, and deposits adjacent to the margin of a glacier.

Semi-diurnal tide: Tide that completes a full cycle twice per day; two high tides and two low tides are thus experienced each day.

Stamukas: Stacks of layered ice that have been beached and frozen to the beach; also referred to as ice cakes.

Subduction zone: Subduction: The dragging down or sinking into the mantle of the leading edge of a crustal plate.

Till: Nonsorted, nonstratified sediment carried or deposited by a glacier.

HUMAN AND CULTURAL RESOURCES

The first substantial settlement of the Mat-Su Valley region of Alaska occurred in 1935 with the formation of the Matanuska Valley colony. A group of approximtaely 200 families, primarily of Scandanavian descent, were relocated in the Mat-Su Valley from the depression and drought-stricken Midwest. The intent of the federal relocation program was to determine the feasibility of establishing a self-sustaining agricultural community in Alaska. For over twenty years, a farmers cooperative served as the nucleus for social, political, and economic development of the agriculturally dominant Mat-Su Valley region. Throughout the later half of the 1960's agricultural output began to fade. High competition, production costs, etc., have significantly reduced the amount of agricultural activity in the Borough to levels well below the peak years attained in the early sixties (Mat-Su Bor. Plan. Dept., 1980).

Despite the downturn in agriculture, the Mat-Su Borough population has increased 175.6 percent from 1970 to 1980 (U.S. Dept. of Commerce, 1981); housing and economic growth were equally rapid. This was largely due to the presence of the trans-Alaska pipeline project. The years following the pipeline have been characterized by high unemployment. In January 1980, Mat-Su Borough's 19.9 percent unemployment rate was rated the highest in the State; this trend continues (OEDP, Vol. II, 1980). Over 37 percent of the Mat-Su labor force has sought employment in Anchorage (OEDP, Vol. II, 1980).

The Mat-Su region is rich in natural resources, e.g., agricultural lands, timber, mineral resources (especially coal), but with the notable exception of tourist-related resources (lakes, marshes, wildlife areas), they do not figure prominently in the overall economy. The majority of the regional economy is based upon construction, retain trade, and tourist-related services.

The Borough is unable to provide complete services with the revenue it receives in the form of property taxes from its residents. Over 64 percent of the Borough's revenue is derived from State and federal sources. This is due, in part, to the nature of the tax base (90 percent residential, and only 10 percent commercial or industrial) and the high cost of maintaining public schools which demand 80 percent of the Borough budget.

The Matanuska-Susitna Borough is a second class borough; within its jurisdiction are three incorporated cities: Palmer (first class city), Wasilla (second class city), and Houston (second class city). There are eleven unincorporated communities within the Borough. They are: Willow, Big Lake, Knik, Butte, Talkeetna, Trappers Creek, Montana, Sutton, Chickaloon, Eureka, and Lake Louise. The remainder of the Borough's communities are considered unincorporated areas. Examples of unincorporated areas in the Borough include Point MacKenzie and Willow. The Point MacKenzie area, by virtue of its geographical location and potential as a deep water port, represents an area in which a great deal of industrial development is expected in the future. Willow was selected by Alaskan voters in 1974 to be the site of the new State capital. The anticipated move has met with a great deal of political controversy and delay resulting in much land and business speculation. In one year, there were 60 businesses which failed in the Willow area alone.

POPULATION

Distribution

Approximately 90 percent of the population of Mat-Su Borough is located within a 12.5 mile radius of Wasilla (Mat-Su Bor., 1978). Table 19 indicates the population distribution for the Borough in 1970 and 1980; locations of Census Bureau Enumeration Districts (ED) are displayed.in Figure 8.

The area between Palmer and Wasilla is relatively developed; the roads form a network over the many subdivisions from the foot of the Talkeetna Mountains to the Knik/Matanuska floodplain. The remaining ten percent of the populus is located in small communities or dispersed along highways, railroads, near mines, or unique natural or man-made features (Mat-Su Bor. Plan. Dept., 1978).

Growth

Since 1970, population growth in the Borough has averaged nearly 18 percent per year. During construction of the trans-Alaska pipeline in the early seventies, Anchorage and Fairbanks were major staging areas. Due to its proximity to Anchorage, population in Mat-Su Borough grew in similarly explosive proportions. From 1970 to 1975, population in Mat-Su Borough grew over 69 percent, from 6,509 to 11,039.

Table 19: Population Distribution in Mat-Su Borough 1970-80

(Source: U.S. Department of Commerce, Bureau of the Census, 1980 Advance Counts).

AREA	1970	1980	% CHANGE
Matanuska-Susitna Borough	6,509	17,938	175.6 %
Alexander Creek	--	11	--
Big Lake (CDP)	36	412	1044.4
Bodenburg Butte (CDP)	448	982	119.2
Chickaloon (CDP)	22	20	-9.1
Chulitna (CDP)	--	1	--
Curry (CDP)	--	2	--
Denali (CDP)	--	3	--
Houston (City)	69	393	469.6
Knik (CDP)	--	10	--
Montana (CDP)	33	40	21.2
Palmer (City)	1,140	2,143	88.0
Peters Creek North (CDP)	--	9	--
Petersville (CDP)	--	0	--
Skwetna (CDP)	--	22	--
Summit (CDP)	34	0	-100.0
Susitna (CDP)	--	0	--
Talkeetna (CDP)	182	265	45.6
Wasilla (City)	300	1,548	416.0
Willow (CDP)	38	134	252.6
ED 1152	--	17	--
ED 1153	--	5	--
ED 1154	--	22	--
ED 1155	--	22	--
ED 1156	--	13	--
ED 1157	--	12	--
ED 1158	--	156	--
ED 1159	--	385	--
ED 1160	--	117	--
ED 1161	--	25	--
ED 1162	--	221	--
ED 1163	--	22	--
ED 1164	--	113	--
ED 1165	--	145	--
ED 1166	--	443	--
ED 1167	--	2,968	--
ED 1168	--	4,224	--
ED 1169	--	1,424	--
ED 1170	--	187	--
ED 1171	--	823	--
ED 1172	--	291	--
ED 1173	--	27	--
ED 1174	--	5	--
ED 1175	--	15	--
ED 1176	--	48	--
ED 1177	--	31	--

Figure 8: Location of Enumeration Districts in Mat-Su Borough

(Source: Matanuska-Susitna Borough, Inc., Planning Commission.)

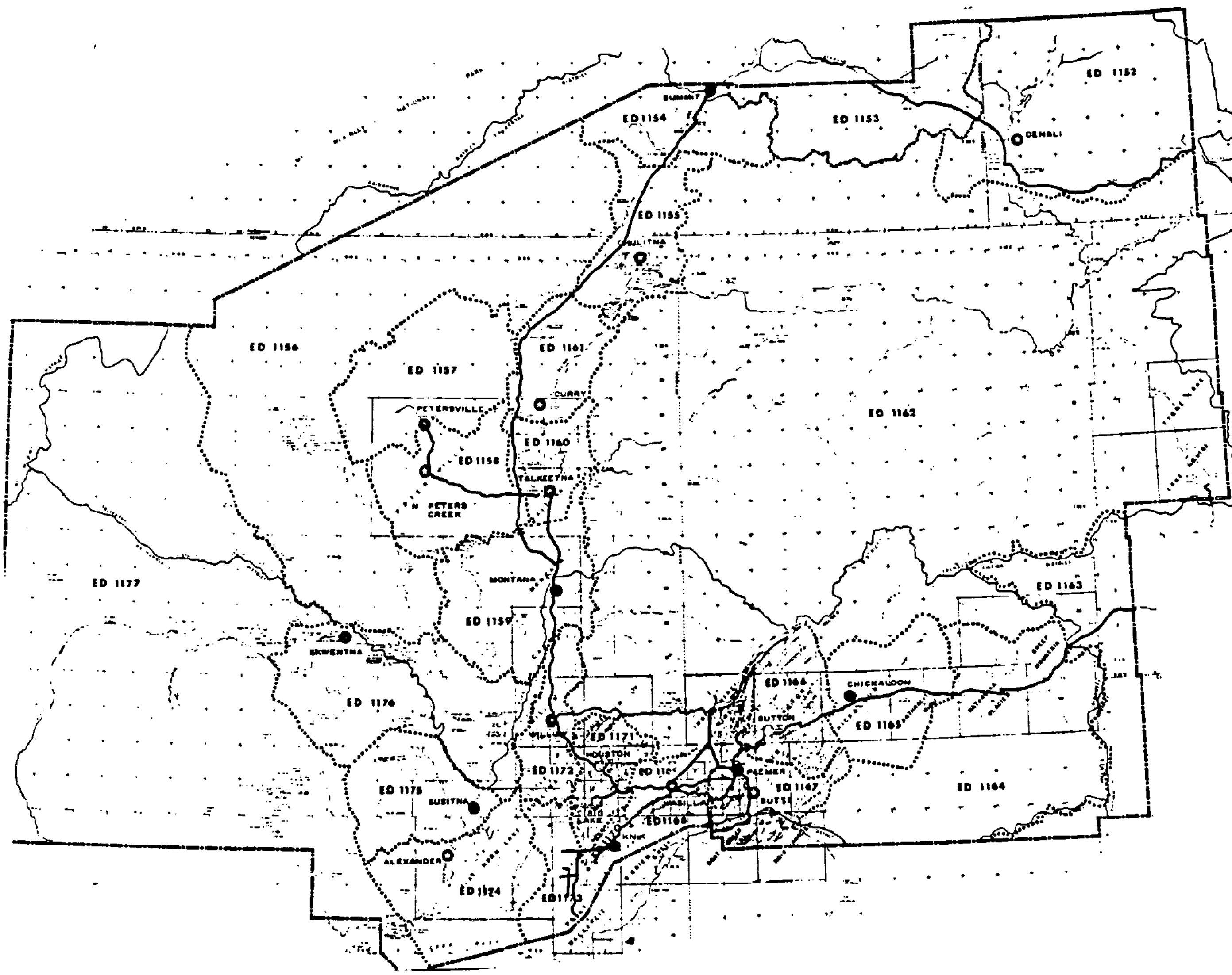


FIGURE 8

Table 20: Comparative Population Growth
(Source: U.S. Department of Commerce, Bureau of the Census, 1980 Advance Counts).

BOROUGH/CENSUS AREA	1970	1980	% Change
Matanuska-Susitna Borough	6,509	17,938	175.6
Alaska (State)	302,583	400,481	32.4
Aleutian Islands Census Area		7,768	
Anchorage Borough	126,385	173,017	36.9
Bethel Census Area		10,999	
Bristol Bay Borough	1,147	1,094	-4.6
Dillingham Census Area		4,616	
Fairbanks North Star Borough	45,854	53,983	17.7
Haines Borough		1,680	
Juneau Borough	13,556	19,528	44.1
Kenai Peninsula Borough		25,282	
Ketchikon Gateway Borough	10,041	11,316	12.7
Kobuk Census Area	4,434	4,831	9.0
Kodiak Island Borough	9,409	9,939	5.6
Nome Census Area	5,749	6,537	13.7
North Slope Borough		4,199	
Prince of Wales-Outer Ketchikon CA		3,822	
Sitka Borough		7,803	
Skagway-Yakutat-Angoon Census Area		3,478	
Southeast Fairbanks Census Area		5,770	
Valdez-Cordova Census Area		8,348	
Wade Hampton Census Area	3,917	4,665	19.1
Wrangell-Petersburg Census Area		6,167	
Yukon-Koyukuk Census Area		7,873	

New in-migration accounted for 54.9 percent of this growth (U.S. Dept. of Commerce, 1973). The 1980 Mat-Su population is 17,938, an increase of 175.6 percent over the 1970 figure, 62.5 percent over the 1975 figure (U.S. Dept. of Commerce, 1981).

As Table 19 indicates, the 175.6 percent overall increase does not reflect the enormous proportionate growth that some communities have experienced over the ten-year period, e.g., Big Lake, Houston, Wasilla, Willow.

Population growth in Mat-Su Borough and the State stabilized during the years immediately following the completion of the construction phase of the pipeline. It has since begun to grow more rapidly, though not at the rates characteristic of the pipeline "boom." Table 20 compares the ten-year growth of Mat-Su Borough to other boroughs and census areas in Alaska. Clearly, Mat-Su has experienced the highest growth rate of all other boroughs or census areas.

In 1980, Mat-Su Borough contained approximately 4.5 percent of the total population of Alaska, ranking 5th of 23 boroughs and census areas (U.S. Dept. of Commerce, 1981).

Demographic Data

The Matanuska-Susitna Borough is predominantly white, with a small Indian/Eskimo/Aleut population and very small black and Asian/Pacific Islander populations, (Table 21).

Table 21: Mat-Su Borough & Alaska by Race/Ethnic Background--1980

(Source: U.S. Dept. of Commerce, Bureau of Census, 1980 Advance Counts. 1981.)

REGION	TOTAL	WHITE	BLACK	AM. INDIAN ESKIMO, ALEUT	ASIAN PACIF. ISL.	OTHER	SPANISH ORIGIN
Alaska	400,481	308,455 (77.0%)	13,619 (3.4%)	64,047 (16.0%)	8,035 (2.0%)	6,325 (1.6%)	9,497 (2.4%)
Mat-Su Borough	17,766	16,796 (94.5%)	82 (0.5%)	684 (3.9%)	63 (0.4%)	141 (0.8%)	225 (1.3%)
Houston	370	347 (93.8%)	2 (0.5%)	15 (4.1%)	4 (1.1%)	2 (0.5%)	12 (3.2%)
Palmer	2,141	1,998 (93.3%)	40 (1.9%)	75 (3.5%)	11 (0.5%)	17 (0.8%)	40 (1.9%)
Wasilla	1,559	1,466 (94.0%)	6 (0.4%)	74 (4.7%)	4 (0.3%)	9 (0.6%)	22 (1.4%)

TABLE 21

The racial/ethnic mix has not changed appreciably since 1970. The proportion of whites in the population has increased slightly, about 3.3 percent (U.S. Dept. of Commerce, 1978).

In 1976, approximately 61 percent of the population was 19 years of age or older, 39 percent 18 years or younger (Mat-Su Bor. Plan. Dept., 1978). According to a housing study completed in 1980, the average age was 33. The same study showed the average respondent to have 13 years of formal education, and the male/female ratio to be approximately 1.03 males/female. Of the respondents 17 years of age and older, 80.8 percent were married, 12 percent were single, 4.8 percent divorced, 1.6 percent widowed, and 0.7 percent separated (OEDP, Vol. II, 1980).

ECONOMY

Regional Economic Climate

By virtue of its proximity to Anchorage, the Mat-Su Borough has realized much of the economic growth of that city. The five year period from 1972 through 1977 saw retail and wholesale sales, construction, etc., growing in great proportions at the State level (Table 22), and the Borough level (Table 23).

Since the completion of the trans-Alaska pipeline, the economy of Mat-Su Borough has been characterized by business failure, high unemployment, and high cost of living. Unemployment is due largely to a mis-match between supply and demand for labor skill, a consequence in part due to the reduced demand for particular skills associated with pipeline construction. Some business failures are related to the standstill of housing construction which resulted from the cessation of State housing funds. Other business failures are attributed to speculation in anticipation of a long-delayed decision involving the movement of the State capital to Willow. Additionally, high interest rates and lack of capital have inhibited many new business upstarts. At the present time, the Borough's tax revenues are not sufficient to pay for Borough services, nor are tax revenues increasing at an appreciable rate (OEDP, Vol. I, 1980).

A large portion of the Mat-Su economic base is construction, retain trade, and tourist-related services, (Tables 24 and 25). Resources such as agriculture, minerals, and timber currently play a relatively small role in the overall economy. Wasilla contains the largest number of business establishments, with Palmer being second (OEDP, Vol. II, 1980).

Table 22: ALASKA: Retail Sales 1972-77 (Millions of $)
(Source: U.S. Dept. of Commerce, Bureau of Census, City & County Data Book, 1977. (1978 Adapted.)

Establishment	1972	1977	%Change
Building Materials, hardware garden supply, mobile home	63	150	138.4 %
General merchandise group stores	114	227	99.6
Food Stores	175	427	144.5
Automotive Dealers	101	241	138.3
Gasoline Service Stations	53	103	93.1
Apparel and Accessory Stores	29	69	135.2
Furniture, home furnishings, and equipment stores	23	59	152.0
Eating and Drinking places	87	254	192.1
Drug and propriety stores	33	80	143.7
Misc. Retail Stores	92	221	141.8

TABLE 22

Table 23: MAT-SU: Retail Sales 1972-77
(Source: OEDP, Vol. II, p. 216)

	Current Dollar Value of Sales			"Real" Value of Sales**		% Change in "Real"
	1972 ($1,000's)	1977 ($1,000's)	% Change in Sales Vol. 1972-1977	[(1967=100)($1,000's)] 1972/CPI	1977/CPI	Sales Vol. 1972-1977
Total Sales	$13,168	$34,020	158	$11,362	$19,529	72
Building Materials, Hardware, Garden Supplies, Mobile Home Dealers	738	2,452	232	637	1,408	121
Genéral Merchandise Group Stores	1,584*	2,539*	60	1,367	1,458	7
Food Stores	2,832	8,732*	208	2,443	5,012	105
Automotive Dealers	893*	3,435	285	770	1,972	156
Gasoline Service Stations	2,680	4,804	79	2,312	2,758	19
Apparel and Accessory Stores	109	(D)	---	94	---	---
Furniture, Home Furnishings	131*	347	165	113	199	76
Eating and Drinking Places	1,835	4,022	119	1,583	2,309	46
Drug Stores and Proprietary Stores	265*	1,455*	449	229	835	265
Miscellaneous Retail Stores	1,779	4,281	141	1,535	2,458	60

TABLE 23

Table 24: Business Type & Location--Mat-Su Borough, 3/80

(Source: OEDP, Vol. II, p. 19, 20, 21)

Standard Industrial Classification Description	Number in Community*					
	Big Lake	Houston	Palmer	Talkeetna	Wasilla	Willow
Class Unknown	4		16	1	97	
AGRICULTURE, FORESTRY, AND FISHERIES						
Agricultural Production - Crops			4			
Agricultural Production - Livestock			8			
Agricultural Services			8			
Forestry	2		1			
Fishing, Hunting, and Trapping	1		1			
MINING						
Metal Mining			1			
Nonmetallic Minerals, Except Fuels			1			
CONSTRUCTION						
General Building Contractors	1		14	2	31	3
Heavy Construction Contractors	1		2		1	
Special Trade Contractors	17	3	34	1	59	1
MANUFACTURING						
Food and Kindred Products			2			
Apparel and Other Textile Products					1	
Lumber and Wood Products			3		3	
Furniture and Fixtures	1		3			
Printing and Publishing			1			
Petroleum and Coal Products			1			
Leather and Leather Products				1		
Stone, Clay and Glass Products	1		2	1		2
Fabricated Metal Products	1		6			
Transportation Equipment			2			
Instruments and Related Products			1			
Miscellaneous Manufacturing Industries						1
TRANSPORTATION AND PUBLIC UTILITIES						
Local and Inter-urban Passenger Transit			1			
Trucking and Warehousing			2			1
U.S. Postal Service	1					1
Water Transportation				2		
Transportation by Air			6	3		4
Transportation Services			4			
Communication	1		3	2		
Electric, Gas, and Sanitary Services			4	1		
WHOLESALE TRADE						
Wholesale Trade Durable Goods			6			
Wholesale Trade Nondurable Goods			5			
RETAIL TRADE						
Building Materials and Garden Supplies	3		8	4		3
General Merchandise Stores		1	4	1		1
Food Stores	3		5	3		1
Automotive Dealers and Service Stations	7	1	14	2		5
Apparel and Accessory Stores			5			
Furniture and Home Furnishing Stores				1		
Eating and Drinking Places	5	1	22	7		5
Miscellaneous Retail	6		22	1		3
FINANCE, INSURANCE, AND REAL ESTATE						
Banking			4	1	3	1
Credit Agencies Other than Banks			3		1	
Security Commodity Brokers and Services					1	
Insurance Carriers			2			
Insurance Agents, Brokers & Service			1		3	
Real Estate		1	11	1	27	2
Holding and Other Investment Offices			1		2	
SERVICES						
Hotels and Other Lodging Places	4		4	4	4	
Personal Services	2		23		12	1
Business Services			5		29	
Auto Repair, Services and Garages	2		20		8	1
Miscellaneous Repair Services	4		1		12	
Motion Pictures					1	
Amusement and Recreational Services	2		2	2	2	
Health Services			21		21	
Legal Services	1		7		7	
Educational Services			6	5	1	1
Social Services			1		3	
Museums, Botanical, Zoological Gardens			1		1	
Membership Organizations		1	4	1	6	1
Miscellaneous Services	2		20	1	22	
PUBLIC ADMINISTRATION						
Executive, Legislative and General		1	1			
Justice, Public Order and Safety			5	1		
Administration of Human Resources			3		4	
Environmental Quality and Housing			2			
Administration of Economic Programs			1	2		
National Security and International Affairs					1	
NONCLASSIFIABLE ESTABLISHMENTS						
Nonclassifiable Establishments	2		3		1	
	74	9	374	51	494	38

TABLE 24

Table 25: Gross Business Receipts--Mat-Su Borough, 3/80

(Source: OEDP, Vol. II, p. 30-32)

Standard Industrial Classification	Gross Business Receipts ($)		
Description	Palmer	Mat-Su Borough Excluding Palmer	Mat-Su Borough
Class Unknown		780,189	780,189
AGRICULTURE, FORESTRY, AND FISHERIES			
Agricultural Production Crops		138,543	138,543
Agricultural Services	79,938	302,641	382,579
Fishing, Hunting, and Trapping		675	675
MINING			
Oil and Gas Extraction		644,188	644,188
CONSTRUCTION			
General Building Contractors	1,109,617	6,637,279	7,746,896
Heavy Construction Contractors	223,482	7,745,989	7,969,471
Special Trade Contractors	2,172,247	7,929,961	10,102,208
MANUFACTURING			
Food and Kindred Products	898,459		898,459
Lumber and Wood Products		372,360	372,360
Furniture and Fixtures		89,823	89,823
Printing and Publishing	323,171	101,786	424,957
Rubber and Miscellaneous Plastic Products	106,117		106,117
Stone, Clay, and Glass Products	35,894	219,442	255,336
Primary Metal Industries		33,567	33,567
Machinery, Except Electrical	326		326
Miscellaneous Manufacturing Industries		82,145	82,145
TRANSPORTATION AND PUBLIC UTILITIES			
Trucking and Warehousing	60,590	362,185	422,775
Water Transportation	635,079		635,079
Transportation by Air	63,314	529,963	593,277
Pipelines, Except Natural Gas	54		54
Transportation Services	63,827		63,827
Communication	856,501	210,974	1,067,475
Electric, Gas, and Sanitary Services		30,936	30,936
WHOLESALE TRADE			
Wholesale Trade - Durable Goods	1,444,212	12,357	1,456,569
Wholesale Trade - Nondurable Goods	19,303	3,371,391	3,390,694
RETAIL GOODS			
Building Materials and Garden Supplies	1,194,878	3,419,550	4,514,428
General Merchandise Store	3,550,716	599,568	4,150,684
Food Stores	3,729,951	477,224	4,207,175
Auto Dealers and Service Stations	3,439,549	7,013,015	10,452,564
Apparel and Accessory Stores	111,698		111,698
Furniture and Home Furnishings Stores		113,490	113,490
Eating and Drinking Places	951,738	1,317,947	2,269,685
Miscellaneous Retail	4,002,368	2,163,759	6,166,127
FINANCE, INSURANCE, AND REAL ESTATE			
Credit Agencies Other Than Banks	163,378		
Real Estate	790,914	2,858,651	163,378
		94,165	3,649,565
SERVICES			
Hotels and Other Lodging Places	251,607	1,859,737	2,111,344
Personal Services	198,748	123,987	322,735
Business Services	1,017,261	810,622	1,827,883
Auto Repair, Services & Garages	242,975	647,279	890,254
Miscellaneous Repair Services	153,312	451,344	604,656
Amusement and Recreational Services	125,955	155,234	281,189
Health Services	253,532	743,689	997,221
Legal Services	190,843	186,095	376,938
Educational Services		3,546	3,546
Social Services	40,252	21,119	61,371
Museums, Botanical, Zoological Gardens		686	686
Membership Organizations	112,350		112,350
Miscellaneous Services	205,814	586,026	791,840
NONCLASSIFIABLE ESTABLISHMENTS			
Nonclassifiable Establishments		19,500	19,500
	28,824,970	53,263,027	82,087,997

TABLE 25

Proposed development action for the future centers around Point MacKenzie. The area is resource rich and transportation access potentials are high. Significant support has been demonstrated for the development of a major port facility and industrial park at Point MacKenzie.

Employment

Unemployment: The Mat-Su Borough has the highest unemployment rate of all boroughs in Alaska; in January of 1980, the Mat-Su Borough had an unemployment rate of 19.9 percent. Fairbanks was second with a rate of 13.5 percent. From 1975 through 1980, the Mat-Su Borough unemployment rate averaged 5.8 percentage points above the State average, and twice the Anchorage Division rate (Table 26) (OEDP, Vol. II, 1980).

Table 26: **Comparative Unemployment Statistics 1975-1979**

(Source: OEDP, Vol. II, p. 196, Adapted.)

Year	Civilian Labor Force	Total Employed	Unemployed	Rate (MAT-SU)	Anchorage Rate	State Rate
1975	4,784	4,253	531	11.1 %	5.9 %	6.9 %
1976	5,588	4,777	811	14.5	7.0	8.4
1977	6,741	5,746	995	14.8	7.1	9.2
1978	7,532	6,211	1,321	17.5	8.3	11.0
1979	7,424	6,262	1,162	15.7	7.0	8.9

TABLE 26

Following completion of the Alaska pipeline, unemployment has been a major problem in the Mat-Su Borough. Many workers have since sought employment in Anchorage while still living in the Mat-Su Borough. In 1970, 20 percent of the Borough labor force commuted to Anchorage; today the figure stands near 37 percent, nearly double the 1970 figures (OEDP, Vol. II, 1980). In late 1979, 13 of 14 workers in the Anchorage--Mat-Su labor force were from Anchorage, yet 1 of 6 unemployed workers was from Mat-Su Borough (OEDP, Vol. II, 1980).

The unemployment rate for whites, blacks, and Spanish-speaking people is roughly the same Statewide and in Anchorage; the unemployment rate for the group including American Indians, Alaska Natives, Asians and Pacific Islanders is over twice that for other groups, (Table 27).

Unemployment in the Borough experiences regular seasonal fluctuations. Unemployment is lowest between May and October as the summer months represent the tourist season; during the winter months, unemployment has been as high as 20 percent (January 1976 and 1979), (OEDP, Vol. II, 1980).

Table 27: Unemployment Breakdown by Race--1978
(Source: OEDP, Vol. II, p. 62. Adapted.)

Race	Unemployment Rate Anchorage	Unemployment Rate Alaska
White	9.6%	8.0%
Black	11.1	6.8
American Indian, Alaska Native, Asian, and Pacific Islander	22.9	14.3
Spanish Speaking	8.7	8.6
AVERAGE	11.1	8.3

TABLE 27

Much of the unemployment problem of the region is explained by a mis-match of labor supply and demand. According to the State job service center, the years following the completion of the trans-Alaska pipeline saw a surplus of job applicants for occupations for which a great pipeline-period demand had significantly tailed off. There is also a surplus of applicants with limited skills. Conversely, there is a surplus of openings among jobs requiring highly specialized skills. In December 1979, the Mat-Su Borough Employment Center in Wasilla reported a surplus of openings for cable splicers, cosmetologists/hairdressers, engineers, helicopter pilots, and programmers; a surplus of applicants was reported for heavy equipment operators, general laborers, carpenters, and clerical workers (OEDP, Vol. II, 1980). Table 28 indicates the ratio of applicants to job openings in 1979. Note that the overall ratio for the Mat-Su Borough is significantly higher than that for the State and Anchorage.

Job Participation: Table 29 displays an Alaska Department of Labor breakdown of job participation in Mat-Su Borough for July 1978 through June 1979. Excluded is agricultural employment, self-employment, domestic household employment, unpaid family employment, striking workers, and Mat-Su Borough residents working in Anchorage.

Table 28: Ratio of Applicants to Job Openings--1979
(Source: OEDP, Vol. II, p. 57-58. Adapted)

OCCUPATION	STATE	ANCHORAGE	MAT-SU
Professional, Technical	8.4	12.5	6.9
Clerical & Sales	4.5	4.3	6.9
Services	3.7	3.3	7.8
Farming, Forestry, Fishery	1.5	0.9	1.3
Processing	2.3	3.1	29.0
Machine Trades	16.2	10.8	43.0
Bench Work	6.5	4.5	---
Structural Work	5.3	5.4	6.5
Misc.	4.7	3.2	27.4
TOTAL	4.6	4.3	7.1

TABLE 28

Table 29: Employment by Industry in Mat-Su Borough
7/78 - 6/79
(Source: OEDP, Vol. II, p. 56. Adapted.)

INDUSTRY	# WORKERS	% OF TOTAL
Mining	--	--
Construction	212	7.0
Manufacturing	--	--
Transportation, Communication, Utilities	317	10.5
Wholesale Trade	50	1.7
Retail Trade	632	20.9
Finance, Insurance, Realty	135	4.5
Services	400	13.2
State & Local Government	1,101	36.4
Misc.	--	--
TOTAL:	3,021	

TABLE 29

Table 30 is based on a 1980 housing survey completed on 784 respondents in nine Mat-Su Borough communities and indicates job participation differences across the nine communities.

Table 30: Employment by Industry in Mat-Su Communities--1980

(Source: OEDP, Vol. II, p. 175. Adapted.)

	NORTH OF WILLOW	WILLOW	HOUSTON	BIG LAKE	KNIK	WASILLA	PALMER	BUTTE	IND MINE -SUTTON	MAT-SU BOROUGH	NUMBER OF RESPONDENTS
AGRIC/FISHING	0	2.6	0	1.8	2.4	0.9	4.2	5.7	0	2.4	19
MINING	0	13.2	15.8	0	0	6.6	4.7	4.3	11.1	5.6	44
CONSTRUCTION	23.1	7.9	26.3	16.4	7.3	19.6	12.7	14.3	16.7	15.9	125
MANUFACTURE	0	0	5.3	1.8	4.9	2.8	1.9	1.4	5.6	2.4	19
TRANS/UTIL/COM	7.7	10.5	10.5	20.0	14.6	8.8	11.3	12.9	11.1	11.1	87
WHOLE TRADE	0	2.6	0	1.8	9.8	3.5	1.9	2.9	0	2.9	23
RETAIL TRADE	7.7	7.9	5.3	23.6	14.6	11.4	8.5	12.9	11.1	11.4	89
FIRE	0	2.6	5.3	7.3	4.9	5.7	3.8	1.4	11.1	4.7	37
PROF. SERVICES	0	13.2	0	10.9	9.8	9.1	12.7	7.1	5.6	9.8	77
OTHER SERVICES	46.2	7.9	5.3	3.6	9.8	7.6	11.3	8.6	5.6	9.1	71
EDUCATION	7.7	13.2	10.5	3.6	0	12.3	8.5	4.3	11.1	9.2	72
FEDERAL GOVT	0	7.9	0	1.8	19.5	5.4	6.1	12.9	0	6.5	51
STATE GOVT	0	5.3	10.5	3.6	2.4	3.5	7.5	1.0	5.6	5.4	42
LOCAL GOVT	7.7	5.3	5.3	3.6	0	2.8	5.2	1.4	5.6	3.6	28

TABLE 30

Table 31: Place of Employment for Mat-Su Residents By Community (1980)

(Source: OEDP, Vol. II, p. 173)

COMMUNITY	PLACE OF EMPLOYMENT (%)			
	Local	Rest of Borough	Anchorage	Elsewhere
North of Willow	83 %	0 %	8 %	8 %
Willow	46	22	14	19
Houston	21	53	5	21
Big Lake	27	50	13	10
Knik	48	5	36	12
Wasilla	46	13	29	12
Palmer	57	12	21	11
Butte	45	12	31	12
Independence Mine-Sutton	36	21	14	29
MAT-SU BOROUGH	47.2	16.1	24.2	12.5

TABLE 31

Location of Employment: In 1980, approximately 37 percent of the Mat-Su workers commuted to and worked in Anchorage. Table 31 indicates the place of employment for 9 Mat-Su communities.

Income

Table 32 gives per capita income for the Mat-Su Borough, 1970 through 1979. Tables 33 and 34 indicate relative distribution of income in the Borough, based on a housing survey.

Following completion of the trans-Alaska pipeline construction, annual (per cap.) income fell steadily; from 1977 to 1978, annual per capita income fell from $9,032 to $8,803. Table 35 compares Mat-Su income to the rest of the United States; the presence of the pipeline clearly increased the ratio of Mat-Su income to U.S. income, from 0.95 (1969) to a peak of 1.38 in 1975. The ratio, although much lower at present, is still significantly higher than the pre-pipeline period (OEDP, Vol. II, 1980). In 1978, Mat-Su income per worker was lower than that for both Anchorage and the State as $1,377 per month per worker. That year average income per worker was $1,599 per month in Anchorage and $1,595 for the State (OEDP, Vol. I, 1980).

Table 36 gives entry wages for selected occupations statewide, in Anchorage, and in CETA Planning Region V which includes the Mat-Su Borough, the Anchorage Division, and part of the Aleutian Islands.

Table 32: **Mat-Su Borough Income, 1970-1979**

(Source: OEDP, Vol. II, p. 212)

Year	Total Personal Income ($ Millions)	Population	Income Per Capita	CPI-Anchorage	Real Income Per Capita**	% Change in Real Income
1970	$ 26.4	6,509	$4,056	109.6	$3,701	
1971	31.5	7,293	4,319	112.9	3,826	3.4
1972	36.3	8,310	4,368	115.9	3,769	(1.5)
1973	43.7	8,586	5,090	120.8	4,213	11.8
1974	57.7	9,787	5,896	133.9	4,403	4.5
1975	88.2	12,462	7,078	152.3	4,647	5.5
1976	113.9	14,010	8,130	164.1	4,954	6.6
1977	128.3	15,573	8,239	174.2	4,730	(4.5)
1978	125.0	15,400	8,117	186.8	4,345	(8.1)
1979	170.0*	18,536	9,170	206.2	4,447	2.3

*1979 Total Personal Income [Average household income ($30,627) ÷ average number of people per household (3.34)] x population (18,536)

**Real per capita income = per capita income ÷ (CPI/100).

TABLE 32

Table 33: Household Income--Survey Derived: Mat-Su Borough

(Source: OEDP, Vol. II, p. 177)

INCOME	PERCENTAGE	NUMBER
Under $2,500	1.7	10
2,500 - 4,999	1.8	11
5,000 - 7,499	4.5	27
7,500 - 9,999	4.7	28
10,000 - 12,499	5.0	30
13,500 - 14,499	4.2	25
15,000 - 17,499	5.7	34
17,500 - 19,999	4.7	28
20,000 - 22,499	4.3	26
22,500 - 24,999	5.9	35
25,000 - 27,499	5.4	32
27,500 - 29,999	3.5	21
30,000 - 32,499	8.2	49
32,500 - 34,999	5.5	33
35,000 - 37,499	4.7	28
37,500 - 39,999	4.2	25
40,000 - 44,999	6.5	39
45,000 - 49,999	4.8	29
50,000 - 54,999	5.7	34
55,000 - 59,999	2.2	13
60,000 - 69,999	3.7	22
70,000 - 79,999	1.5	9
80,000 - 89,999	0.8	5
90,000 - 99,000	0.2	1
100,000 and Over	0.7	4
Don't Know	--	14
Missing	--	67

$30,627 Mean
$29,048 Median
$18,761 Standard Deviation

TABLE 33

Table 34: Income By Community--Survey Derived: Mat-Su Borough

(Source: OEDP, Vol. II, p. 178)

Community	Average Annual Household Income	Average Number In Household	Per Capita Income	Number of Respondents
North of Willow	27,500	3.3	8,348	14
Willow	24,107	3.0	8,036	28
Houston	34,659	3.8	9,091	11
Big Lake	32,805	2.8	11,698	41
Knik	33,789	3.1	10,881	32
Wasilla	31,576	3.4	9,283	238
Palmer	29,761	3.3	8,903	157
Butte	30,424	3.8	8,013	59
Independence Mine-Sutton	25,833	2.9	8,774	18
No Response				81
MAT-SU BOROUGH	30,627	3.3	9,165	598

TABLE 34

Table 35: Mat-Su Income Vs. United States Income

(Source: OEDP, Vol. II, p. 35)

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Total Personal Income to Census Division Residents (millions of $$$)	22.3	26.4	31.5	36.3	43.7	57.7	88.2	113.9	128.3	125.0
Resident Population - Census Bureau Estimates: 1969-77 (thousands)	6.4	6.7	7.4	8.0	8.8	9.5	10.9	13.3	14.2	14.2
Census Division Per Capita Personal Income ($) (Line 1/Line 2-unrounded figures)	3,474	3,957	4,279	4,539	4,970	6,068	8,092	8,542	9,032	8,803
U.S. Per Capita Personal Income ($)	3,667	3,893	4,132	4,493	5,980	5,428	5,861	6,397	7,026	7,810
Ratio: Census Division Per Capita Income to U.S. Per Capita Income (Line 3/Line 4)	0.95	1.02	1.04	1.01	1.00	1.12	1.38	1.34	1.29	1.13

TABLE 35

Table 36: Average Entry Wages

(Source: OEDP, Vol. II, p. 40-42)

AVERAGE ENTRY WAGE DATA FOR SELECTED OCCUPATIONS

Occupation	Statewide Average Non-Union	Statewide Average Union	Anchorage Non-Union	Anchorage Union	Region V Non-Union	Region V Union
PROFESSIONAL AND TECHNICAL						
Buyer, Retail	9.97		8.93*		13.25*	
Accountant and Auditor	10.90		9.50		12.42*	
Pharmacist	11.58		12.50*		10.00*	
Nurse, Professional	7.16		8.39		9.37*	
Draftsman	9.23	13.39*	6.70			13.39*
Electrical and Electronic Tech.	11.18	13.02*	10.53	13.02*	11.28*	
Surveyor	17.76	15.29	11.47		12.58	
Dental Assistant	5.59		6.72		5.50*	
Airplane Pilot	12.12		9.35		15.97*	
SERVICES						
Janitors, Porters, & Cleaners	5.33	11.34	5.26		4.80	14.17*
Maid	4.66	7.47	4.66	5.04	4.19	9.45
Guards and Doorkeepers	6.37	7.38	8.00*	6.94*	5.15*	
Bartender	5.85	7.66	5.50*	7.41	6.41	7.53
Butcher, Meatcutter	7.49	9.30	9.18*		9.14	9.42
Waiter/Waitress	3.92	3.89	3.76	3.90	3.87	3.84
Cook, Short Order	4.36	5.37	3.63	6.98*	4.67	
Cook, Restaurant	6.67	6.91	7.30	7.20	5.54	6.83
Cook, Institutional	8.67	13.72	5.45*		6.00*	
Nurse Aide	5.39				6.37*	
MAINTENANCE AND PRODUCTION						
Mechanic Automotive	9.94	12.89	10.85	11.79*	10.39	
Diesel Mechanic	13.98	15.12	11.03	16.00	16.00*	15.05*
Marine Mechanic	8.19				11.33*	
Truck Driver	8.63	14.06	11.40	12.54*	11.72	14.35
Asbestos and Insulation Worker	11.63*	17.05*	9.75*	21.60*		12.50*
Carpenter	11.13	16.20	9.08	16.51	13.26	14.51
Delivery and Route Worker	7.27	12.61*	6.92	11.20*	8.54	13.31*
Dry Wall Applicator	15.00*				15.00*	
Electrician	13.56	17.88	9.88	18.95	13.49	15.73
Supervisor, Nonworking	11.57	15.24		14.29*	13.24	15.32*
MAINTENANCE AND PRODUCTION (Cont.)						
Glazier		17.14		18.07*		17.04*
Heavy Equipment Operator	13.97	15.16*	15.21	16.03	12.40	15.70*
Industrial Truck Operator	11.84*		14.84*		5.72	14.12*
Lineman	7.55	17.20		14.42*		18.43*
Apprentice		10.68*				11.60*
Machinist	9.59	13.75	7.50*		8.39	14.42*
Maintenance Repair, Gen. Util.	7.33	11.18	6.61	12.42	7.67	13.38
Millwright	11.82	13.75				12.50*
Plumber and/or Pipefitter	12.31	15.27	10.00	18.65*	16.60	
Rotary Drill Operator	13.22	19.05	8.25*	19.05		19.05*
Painter Maintenance	12.98	16.17	18.69*	18.00*	12.50*	
Welder's and Flamecutters	12.83	17.84	12.50*	17.90*	12.17	
Production Packager	5.24	6.54*	5.00*		4.62	7.41*
Bagger	3.52	3.54	3.49*		3.88*	
Fuel Pump Attendant	4.33		3.95*		4.08	
Stock Clerk, Sales	5.38	4.50	4.99		5.06	
Chainman, Rodman and/or Lightkeeper	9.30	13.53*	8.27		10.33	
Baker	5.25				6.25	
Wood Machinist	8.25*				10.00*	
Tester	8.94				7.56	
Fish Cleaner	4.78	4.54*			4.60	4.54*
Cannery Worker	5.09	8.91*	4.40*	13.00*	4.87	4.82
CLERICAL						
Bookkeeping/Bill. Mach. Operator	6.30		5.00*		6.08*	
Accounting Clerk	6.88	8.63*	5.61	8.50*	5.93*	8.75*
Bookkeeper Hand	6.72	6.10*	5.21	5.44*	5.76	
Cashier	5.60	6.16	7.66		5.38	7.14*
General Clerk, Office	5.67	7.45	5.36	7.32*	5.09	6.78*
Payroll and/or Timekeeping Clerk	8.20		6.55*		5.50*	
Receptionist	5.90		4.48*		6.10	
Secretary	7.36		6.05		7.35	
Ticket Agent	5.88	9.56	5.48	9.56*	5.00*	9.56*
Teller	4.88		5.10		5.04	
CLERICAL (Cont.)						
Typist	6.02		5.09		4.97	
Clerical Supervisor, Office or Plant	8.83	9.48*	6.86	9.48*	13.64*	
Production Clerk	12.50*				12.50*	
Shipping and/or Receiving Clerk	7.87	9.61	6.25	9.80*	4.31*	4.90*
Stock Clerk, Strm. or Whse.	5.71	10.94	7.11	10.57	5.27	12.05*
Dispatcher, Airplane	6.56	14.26*		14.26*	5.00*	
Transportation Agent	6.05	10.69	7.20*		3.50*	
SALES						
Sales Rep., Agent, or Associate	6.63		10.35		4.75*	
Sales Clerk	4.89	4.95	4.25	3.65*	4.19	6.24

TABLE 36

* Less than three firms provided wage data.

Cost of Living

The Bureau of Labor Statistics publishes a family budget for 40 major U.S. urban areas which includes cost of standard food, housing, transportation, clothing, personal care, medical care, social security, personal taxes, and other miscellaneous items. Three budgets are considered: Low, Medium, and High. The family for which the budget is developed consists of a 38-year old husband, a non-working wife, a boy of 13, and a girl of 8. Based on a national average index number of 100, Anchorage, Alaska is highest with an index number of 141. Honolulu, Hawaii is second with an index number of 124 (OEDP, Vol. II, 1980). Table 37 shows urban family budgets for Anchorage and four other U.S. cities for Autumn 1978; Table 38 itemizes the budget in Anchorage. Many of these high living expenses carry over into the Matanuska-Susitna Borough.

Table 37: Urban Family Budgets--Autumn 1978
(Source: OEDP, Vol. II, p. 45)

City	Lower Budget	Intermediate Budget	Higher Budget
Anchorage	$19,030	$26,329	$38,406
Seattle - Everett, WA	12,506	18,671	26,567
New York - N.E., N.J.	12,063	21,587	34,252
Minneapolis - St. Paul	11,421	19,389	28,629
Houston	10,906	17,114	24,787
Urban U.S.	11,546	18,622	27,420

TABLE 37

Table 38: Annual Budget for a 4-Person Family--Anchorage, Alaska 1978

(Source: OEDP, Vol. II, p. 46)

	Lower Budget			Intermediate Budget			Higher Budget		
	Cost	%	Index*	Cost	%	Index*	Cost	%	Index*
Food	4,547		127	5,641		122	6,944		120
Housing	4,828		216	6,817		163	9,809		155
Transportation	1,544		180	2,071		132	2,447		120
Clothing	1,030		122	1,419		117	1,949		110
Personal	364		121	545		135	836		147
Medical	1,818		171	1,820		170	1,884		169
Other Consumption	548		106	1,005		105	1,682		107
TOTAL CONSUMPTION	14,679		156	19,318		138	25,551		133
Other Items	660		--	996		--	1,682		--
Social Security & Disability	1,151		--	1,151		--	1,151		--
Personal Income Taxes	2,540		272	4,864		178	10,022		175
TOTAL BUDGET	19,030		165	26,329		141	38,406		140

* U.S. Urban Average Cost = 100.

TABLE 38

From 1968 through 1973, the growth of Anchorage narrowed the gap between its urban budget and the national average; particularly influential in this trend was the diversification of transportation and other urban services. The coming of the pipeline in 1974, however, widened the gap once again; demand for services increased drastically, and with increased demand came increased cost (OEDP, Vol. II, 1980). Similar trends were seen in the Mat-Su Borough, with housing, food, and taxes contributing the most toward the high cost of living. As Tables 39 and 40 indicate, family budget requirements are slightly higher in the Mat-Su Borough than in Anchorage; Mat-Su ranked 4th among 29 census divisions under Anchorage which had the lowest family budget in 1978 (Table 40).

Table 39: Mat-Su Borough Family Budget Requirements

(Source: OEDP, Vol. II, p. 47)

	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Family Budget Required in this Census Division for a Moderate Standard of Living ($)[a]	(------------Information Not Available						-------------)	24,029	24,975	27,374
Average U.S. Family Budget Required for a Moderate Standard of Living ($)[b]	10,064	10,664	10,971	11,446	12,626	14,333	15,318	16,236	17,106	18,622
Ratio: Census Division Family Budget Requirements to Average U.S. Family Budget Requirements	(-----------Information Not Available						-------------)	1.48	1.46	1.47

Notes: a. Figures are based on the Anchorage family budget figures adjusted by Alaska interregional living cost indexes prepared by the Institute of Social and Economic Research, University of Alaska, in cooperation with the Alaska School of Finance Study Staff. These indexes were published by the Center for Northern Educational Research, University of Alaska as Alaskan Interregional Cost Differentials.

b. These are average U.S. "Urban Family (Intermediate) Budget" figures published by the U.S. Bureau of Labor Statistics.

TABLE 39

Table 40: Family Budget Requirements Index for a Moderate Standard of Living--1978

(Source: OEDP, Vol. II, p. 48)

By Census Division
(Anchorage Census Division = 1.000)

Census Division	Index*
Aleutian Islands	1.300
Anchorage	1.000
Angoon	1.049
Barrow-North Slope	1.663
Bethel	1.550
Bristol Bay Borough	1.554
Bristol Bay	1.600
Cordova-McCarthy	1.148
Fairbanks	1.060
Haines	1.082
Juneau	1.002
Kenai-Cook Inlet	1.096
Ketchikan	1.010
Kobuk	1.596
Kodiak	1.126
Kuskokwim	1.711
MATANUSKA-SUSITNA	1.040
Nome	1.652
Outer Ketchikan	1.060
Prince of Wales	1.060
Seward	1.096
Sitka	1.042
Skagway-Yakutat	1.189
Southeast Fairbanks	1.060
Upper Yukon	1.449
Valdez-Chitina-Whittier	1.135
Wade-Hampton	1.688
Wrangell-Petersburg	1.056
Yukon-Koyukon	1.427

TABLE 40

Table 41 illustrates the most dramatic consequences of the high cost of living in Mat-Su Borough. Table 35 had shown that in 1978 the ratio of per capita income, Mat-Su Borough to U.S., was 1.13; when the cost of living is considered, however, the ratio drops to 0.77; the ratio of the Mat-Su Borough to Anchorage is lower, 0.69.

Table 41: Adjusted Per Capita Income--Mat-Su Borough
(Source: OEDP, Vol. II, p. 49)

	1976	1977	1978
Census Division Per Capita Income, Adjusted for Higher Family Budget Requirements	5,772	6,186	5,988
Ratio: Census Division Per Capita Income, Adjusted for Higher Family Budget Requirements, to U.S. Per Capita Income	0.90	0.80	0.77
Ratio: Per Capita Income in this Census Division, Adjusted for Family Budget Requirements, To Anchorage Per Capita Income	0.78	0.76	0.69

TABLE 41

Natural Resources

Agriculture: Studies indicate that approximately 2,907,000 acres of land in Southcentral Alaska have an agricultural potential; most of this land is in the Mat-Su Borough. Presently, 12,145 acres are in crops. Table 42 indicates U.S. Soil Conservation Service ratings for agricultural potential for all Alaskan land. No land is considered Class I, the highest rating, due to the severe climate (Mat-Su Bor. Plan. Dept., 1978).

Table 42: Soil Rating of Alaskan Land by U.S. Soil Conservation Service
(Source: Mat-Su Bor. Plan. Dept., 1978)

CLASS	DESCRIPTION	PERCENT OF LAND
Class I	Prime Agric. Land	0%
Class II + III	Suitable for Agriculture	31
Class IV	Marginal Use for Agric.	16
No Value	No. Agric. Use	54

TABLE 42

The period from 1910 through 1914 represented the first period of active agricultural homesteading in the Mat-Su Valley region. Significant commercial agricultural production did not develop until the 1950's and 60's after the 1949 establishment of the Alaska Agricultural Experiment Station in Palmer. The emphasis of the station was on milk, forage, potatoes, and vegetable production, and set the pace for a growing agricultural industry which peaked in 1961-62 (Mat-Su Bor. Plan. Dept., 1978). Since then, increasing costs, competition, taxes, plus a decrease in markets and the aging of farmers has led to a decrease in agricultural activitiy (OEDP, Vol. I, 1980). In 1965 there were 47 dairy farms, and 22 vegetable farms; by 1975 there were 12 dairy farms and 17 vegetable farms. The number of full time farmers dropped from 70 in 1965 to between 30 and 40 in 1979 (Mat-Su Bor. Plan. Dept., 1978 and OEDP, 1980).

Most farming currently takes place around Palmer and the Matanuska River Valley, and to the west along the Susitna, Kahiltna, and Yentna Rivers (OEDP, Vol. I, 1980). In 1979, the Mat-Su Borough produced 70 percent of the State's crops, 79 percent of the State's livestock and poultry, and 50 percent of the State's milk (OEDP, Vol. I, 1980). However, as recently as 1975, over 95 percent of all agricultural food products consumed in Alaska are imported from the continental United States (Mat-Su Bor. Plan. Dept., 1978). Table 43 indicates agricultural production in Mat-Su Borough from 1953 through 1975.

Mineral Resources: Table 44 summarizes deposits of non-energy minerals in the Mat-Su Borough. Additional scattered deposits include asbestos, clay, feldspar, fluorspar, garnet, gypsum, kyanite, light weight aggregate, mica, potassium, and talc, all of non-metallic classification, and arsenic, bismuth, cadmium, chromium, cobalt, manganese, tellurium, titanium, uranium-thorium, zinc, and zirconium, of metallic classification (OEDP, Vol. II, 1980).

Most of the region has a low potential for petroleum. Three non-producing gas fields exist in the Beluga River area at the north end of the Cook Inlet Oil Province (outside the Borough's southern boundary). The Mat-Su Borough is rich in coal reserves, however, and reserve estimates have been made for two coal fields. The Wishbone Hill District has an estimated 248-274 million short tons of coal reserves; the Broad Pass Field contains approximately 174 million short tons (OEDP, Vol. II, 1980).

Table 43: <u>Agricultural Production in Mat-Su Borough--1953-1975</u>

(Source: Mat-Su Bor. Plan. Dept., ~~p. 106~~)

	MILK (1000 POUNDS)	GRAIN (CWT)	HAY (TONS)	POTATOES (CWT)	VEGETABLES (CWT)	EGGS (DOZEN)	MEAT (POUNDS)
1953	6,185	NA	NA	102,840	11,980	149,600	199,010
1954	7,896	NA	NA	90,840	11,780	175,300	221,700
1955	9,120	NA	NA	78,820	11,560	167,100	266,800
1956	11,416	NA	NA	104,300	11,040	180,000	209,700
1957	12,141	NA	NA	99,460	14,240	166,100	262,100
1958	12,322	NA	NA	94,840	14,140	179,110	272,185
1959	12,733	NA	NA	83,060	14,820	210,301	291,100
1960	15,504	20,900	1,100	57,600	16,250	210,300	264,200
1961	17,900	20,400	2,300	63,200	14,080	244,000	302,200
1962	17,760	19,800	2,500	72,500	14,920	239,300	442,200
1963	17,740	22,100	700	77,400	14,670	252,600	402,500
1964	18,280	23,200	800	85,900	12,240	208,200	430,100
1965	16,345	16,900	1,600	65,500	8,650	336,300	501,700
1966	16,430	26,500	2,400	76,100	11,090	497,100	529,800
1967	16,496	24,700	1,200	76,000	13,390	539,000	467,000
1968	16,400	18,400	1,100	67,100	19,800	483,000	497,000
1969	16,250	6,900	900	45,600	11,540	352,000	415,000
1970	16,850	10,200	1,400	59,000	12,150	274,000	401,500
1971	15,570	9,100	1,600	55,700	13,150	318,000	326,400
1972	16,100	3,100	3,000	55,800	10,350	420,000	291,000
1973	16,650	8,200	3,100	63,000	10,250	419,000	253,300
1974	16,555	8,000	2,600	61,700	13,300	365,000	191,800
1975	15,460	26,300	6,400	64,000	10,970	254,000	198,000

TABLE 43

Table 44: <u>Summary of Mineral Resource Deposits in Mat-Su Borough</u>

(Source: Mat-Su Bor. Plan. Dept., p. 159-161)

Location	Deposits
MacLaren River Area	Gold/Copper/Silver
Susitna-Chulitna portion of the Yentna Mining District	Molybdenum/Gold/Copper/Lead/Silver/Antimony
Cantwell Area	Coal/Limestone
Upper Susitna River Area (Denali prospect)	Copper
Area Adjacent to McKinley Park Boundary & Chulitna River to SW of Cantwell	Antimony/Lead/Zinc/Copper/Gold
Petersville Area	Gold/ Copper/Tin/Platinum/Tungsten/Coal
Kahiltna River Drainage to S of Dutch Hills	Gold/Tungsten/Tin/Platinum
Beluga River Area @ SW Corner of Borough	Coal
Iron Creek Vicinity to E of Talkeetna	Iron/Copper/Gold
Willow Creek Mining District	Gold/Molybdenum/Nickel/Tungsten/Silver
Eureka Area (Nelchina Mining District)	Gold/Copper/Platinum
NW of Eureka (Nelchina Mining District)	Gold
Chugach Mountains to S of Matanuska River	Gold/Platinum/Copper
Little Susitna-Sutton Area	Coal
Kings River Drainage Area	Limestone
Lower Susitna River Drainage (Between Beluga River Fields & Houston & Little Susitna Occurrences)	Coal/Limestone
Lakes in Susitna & Matanuska Region	Lime

TABLE 44

Peat is a potential energy resource for the Mat-Su Borough. Extensive peat bogs up to 10 feet thick are found throughout Alaska; reserves are estimated to exceed several billion dry-weight tons according to a U.S. Department of Energy Peat Assessment Program in 1980. Peat has a heating value close to that of lignite, and today is used primarily as an agricultural soil conditioner (OEDP, Vol. II, 1980).

Due to topographic barriers and limited access routes, exploration and exploitation of mineral resources has been minimal. Only two non-energy mining companies exist, principally for cement manufacture. The Jonesville Mine used to supply coal to the Anchorage military bases until 1968; at that time, gas became available from the Cook Inlet at a lower cost. In 1976, only 1 small coal mine, the Premiere Mine, was in operation in the Mat-Su Borough, principally for supply to local residents for domestic use (Mat-Su Bor. Plan. Dept., 1978). Petroleum and gas production is minimal in the Borough today; presently there is not yet any commercial extraction of peat for energy purposes.

Timber: Table 45 contains a 1967 U.S. Forest Service estimate of potential commercial forest land in Alaska. Most of the 1,295,000 acres listed as commercial forest land lie in Matanuska-Susitna Borough, and the Susitna River valleys and deltas.

Table 45: U.S. Forest Service Estimate of Forest Land in Alaska -- 1967
(Source: Mat-Su Bor. Plan. Dept., 1978)

CLASSIFICATION	ACRES	% OF TOTAL
Commercial Forest Land (Capable of producing crops of industrial wood in excess of 20 cu. ft./yr.)	1,295,000	23%
Unproductive Forest Land	1,906,000	34
All Other Land	2,409,000	43

TABLE 45

Of the total commercial timber stands, 44 percent are birch, 35 percent are of the populus species (including quaking aspen, black cottonwood, and balsam poplar), and 21 percent are spruce, the only softwood commercial species. Mat-Su forests are not particularly dense; stands are interspersed with swampy areas. Additionally, tree species are small when compared to the coastal species (Mat-Su Bor. Plan. Dept., 1978). Table 46 summarizes known timber stands in the Mat-Su Borough.

Many of the timber lands are in State ownership. The State makes lands available at a fee considerably less than Washington and Oregon. However, there are several factors which have constrained the development of a major timber industry in the Mat-Su Borough, namely high logging, transportation, and milling costs. Additionally, much of the logging operation must be restricted to the winter months when swamps are frozen. Consequently, the timber industry operates sporadically. In 1976, there were a total of 9 sawmills, 15 logging companies, and 4 secondary users and dealers in the Borough (Mat-Su Bor. Plan. Dept., 1978).

Table 46: **Timber Stands of Commercial Value in Mat-Su Borough**

(Source: Mat-Su Bor. Plan. Dept., p. 152)

Location	Accessibility	Ownership	Acreage (Approx)	Volume
Knik Stands	Construction of approximately ten miles of main haul road will be necessary for removal of timber	State	38,400	6,600 M cu. ft. (Birch bolts) 2,100 M cu. ft. (Spruce bolts) 100 M cu. ft. (Aspen bolts)
Delta Island	Winter ice to nearby Fairbanks-Anchorage Highway	State	15,600	11,600 M cu. ft. (Cottonwood bolts)
Talkeetna Stands	Via trails and poor quality woods roads from highway. Short access roads would be needed.	Mainly State (private adjacent to road)	80,000	160,000 M bd. ft. (gross)
Peters Creek Road Stands	Scattered tracts accessible from points along Peters Creek Road	Mainly State (private adjacent to road)	100,000	200,000M bd. ft. (gross)

TABLE 46

Tourism: Outdoor recreation is the primary drawing force for the Mat-Su Borough's tourist industry. Hundreds of lakes, miles of river bank, and a great diversity of wildlife create a setting for hunting, fishing, boating, and camping. Fishing and boating are popular on many lakes; the community of Big Lake was originally a summer community of Anchorage residents. Hunters are attracted to the region by moose and caribou on land, and by various waterfowl found in the extensive tidal marshes bordering Cook Inlet. Other attractions include historic sites at Wasilla and Knik, skiing and snowmobiling, and scenic vistas found Borough-wide (Mat-Su Bor. Plan. Dept., 1978).

In 1964, tourists in the Mat-Su region originated from the following areas:

Anchorage	73%
Mat-Su	5
Other Alaska	6
Out of State	16

The out-of-state component has been increasing. In 1976, over 250,000 out-of-state tourists visited Alaska. Out-of-state tourists to the Mat-Su Borough typically consist of parties driving through the Borough along the Glenn Highway to or from Anchorage, parties visiting friends in Anchorage and on weekend excursions, or tour buses from Anchorage (in the summer), (Mat-Su Bor. Plan. Dept., 1978). Hunters using the Mat-Su Borough are principally from Anchorage; 60 percent of waterfowl hunters in Anchorage travel to the Borough for their hunting (Mat-Su Bor. Plan. Dept., 1978).

The Glenn and Parks Highways are the principal take-off points for hunting and most other activities. Consequently, most lodges, facilities, etc., are located at regular intervals along those routes (Mat-Su Bor. Plan. Dept., 1978). Other points of more specific location include public campgrounds, Nancy Lake Recreation Area, Denali State Park, Hatcher Pass, Talkeetna, Lake Louise and Glacier Park. Borough Recreation facilities are listed in Table 47.

Public Finance

The Mat-Su Borough is unusually dependent upon federal and State government revenues to support Borough services. The current sources of revenue are outlined in Table 48; federal and State monies comprise a full 64 percent of the Borough revenues.

Table 47: Mat-Su Borough Recreational Facilities

(Source: Mat-Su Bor. Plan. Dept., p. 187)

INVENTORY OF ACREAGE AND FACILITIES MATANUSKA - SUSITNA BOROUGH AS OF 6/30/73	Acreage by Time-Distance Classification: Neighborhood	Community	Metropolitan	Extended Trip	Total Acreage	Quantity and Capacity of Recreation Facilities: Ice Skating Areas	Picnic Units	Camp Units	Trail Miles	Alpine Ski Slopes and Lifts	Sledding Hills and Ski Jumps	Swimming Beaches and Pools	Boat Launching & Mooring Spaces	Nature Centers	Game Areas	Other	Total Capacity	Support Facilities: Road (Miles)	Parking Spaces	Lighted Areas	Water Supply	Sanitary
MATANUSKA GLACIER W/S				231	231			6 24									24	2				2
LONG LAKE				372	372			8 32					1 80				122				1	4
BONNIE LAKE				68	68			8 32					1 60				92		15			2
KING MOUNTIAN				20	20		2 8	12 48									56	3	1			dbl 1
MOOSE CREEK			40		40			8 32									32	2			spring 1	2
FINGER LAKE			47		47			36 144					10 160				304	8	40		pressure 1	8
ROCKY LAKE				19	19			10 40					1 8				48	2			1	4
BIG LAKE EAST				19	19			14 56				1	1 60				116	3	15		1	6
BIG LAKE SOUTH				16	16		6 24	13 52					1 60				136	2	15		1	6
NANCY LAKE WAYSIDE				35	35		35 140	30 120					1 100				340	9	42		pressure 1	4
NANCY LAKE REC. AREA	(UNDEVELOPED)			22,685	22,685																1	dbl 5
WILLOW CREEK				60	60			17 68									68	2				4
DENALI PARK	(UNDEVELOPED)			282,000	282,000																	
DENEKE	79				79		23 92	75 262									354				1	1
WASILLA CENTENNIAL	25				25		5 20	4 14									34					1
HOUSTON CAMPGROUND	-		80		80		8 32	42 147									179					1
CHRISTENSON LAKE				5	5		3 35					1 100	1 -				135					1
PALMER TODDLER	15			-	15		2 40										40					
TALKEETNA RIVERSIDE	2				2		3 12	15 53					1 -				65					1
TALKEETNA TRIANGLE	.25				25		3 20										20					
KNIK WAYSIDE			40		40		-					1 100					100					
FISH CREEK			5		5		3 18	6 21									39					1
ESKA LAKE			10		10		2 18					1 100					118					
TOTAL	14 15		222	305,530	305,766		9[illegible] 459	215 1145				4 300	18 528				2,412	84	167		10	55

TABLE 47

Table 48: Mat-Su Borough Revenues
(Source: OEDP, Vol. I, P. 12)

SOURCE	PERCENT OF TOTAL
State Government	58%
Federal Government	5
Property Tax	27
Misc. Local Revenue	9
Service Areas	1

TABLE 48

Approximately 90 percent of the Borough's growth is residential; 10 percent is commercial or business-related. Consequently, there is little movement toward a diversified tax base and accompanying increased self-sufficiency. There are problems on the expenditure side of the public finance problem as well. Table 49 indicates the breakdown by percentage of Mat-Su Borough expenditures.

Table 49: Mat-Su Borough Expenditures
(Source: OEPD, Vol. I, P. 13)

EXPENDITURE	PERCENT OF TOTAL
Schools	80%
General Government	15
Non-Areawide Services	3
Service Areas	2

TABLE 49

In the 48 continental United States, schools typically demand 60 percent of a given county budget. Transportation costs are largely responsible for pushing the Mat-Su Borough school budget to an 80 percent share. It costs an average of $1,500 to send one child to school for one year in the Mat-Su Borough. The average family home in the Borough is assessed at $60,000 and pays $570 to the Borough per year in property taxes. The average family has between 1 and 1.5 school-age children, a per-family Borough deficit of between $930 and $1,690 per year (OEDP, Vol. I, 1980).

Palmer is the only first-class city in the Borough, and as such has tax levying powers. In addition to property tax, Palmer levies a 2 percent sales tax.

Table 50 gives average per capita debt to the Borough. Municipal property tax rates for all service areas and cities are listed in Table 51.

Table 50: General Obligation Bonded Debt--Matanuska-Susitna Borough

(Source: OEDP, Vol. II, p. 75)

	Palmer City	Borough	Total
Full Value* Determination 1-1-79	57,824,900	928,420,000	928,420,000
Civilian Population 7-1-79	2,056	23,177	23,177
General Obligation Bonded Debt 7-1-79	2,315,278	52,455,000	54,770,278
Per Capita Debt	1,126	2,263	2,363
Per Capita Valuation	28,125	40,058	40,058
Debt % to Valuation	4.00	5.65	5.9

* Second class cities without debt or for which no valuation data is available are excluded.

** The Alaska Statutes 29.53.060 defines "full and true value" as the estimated price which the property would bring in an open market and under the ten prevailing market conditions in a sale between a willing seller and a willing buyer, both conversant with the property and with prevailing general price levels."

Table 51: Municipal Tax Rates for Matanuska-Susitna Borough

(Source: OEDP, Vol. II, p. 68-71)

MATANUSKA-SUSITNA BOROUGH[a]

(Mills)

SERVICE AREA	CLASS[b]	TAX CODE AREA	1977	1978	1979
Wasilla Fire	(SA)	01	.90	.50	.60
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill and Library				.10	.20
TOTAL			11.60	7.80	8.00
Butte Fire	(SA)	02	.70	.50	.80
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill and Library			.20	.10[c]	.20
TOTAL			11.40	7.80	8.20
Greater Palmer	(SA)	03			.50
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill and Library			.20	.10[c]	.20
TOTAL			10.70	7.30	7.90
Sutton Fire	(SA)	04	1.80	1.40	2.00
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill and Library			.20	.10[c]	.20
TOTAL			12.50	8.70	9.40
Palmer	(HR)	05	5.00		5.00
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill				.10	
TOTAL			15.50	7.30	12.20
Other Area		06			
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill and Library			.20	.10[c]	.20
TOTAL			10.70	7.30	7.40
Talkeetna Flood Control	(SA)	07	2.00		1.40
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill and Library			.20	.10[c]	.20
Fire					.60
TOTAL			12.70	7.30	9.40
Garden Terrace Estates	(SA)	08	4.50	9.00	
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill and Library			.20	.10[c]	.20
Fire					.60
Roads					2.00
TOTAL			15.20	16.30	10.00
Midway	(SA)	09	.90	5.00	
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill and Library			.20	.10[c]	.20
Fire					.60
TOTAL			11.60	12.30	8.00
Woodside Estates	(SA)	10	.90	.50	
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill and Library			.20	.10[c]	.20
Fire					.60
TOTAL			11.60	7.80	8.00
Wilderness Valley	(SA)	11	.90	.50	
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill and Library			.20	.10[c]	.20
Fire					.60
TOTAL			11.60	7.80	8.00
Houston	(2nd)	12			
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill				.10	
TOTAL			11.50	7.30	7.20
Wasilla	(2nd)	13	.90	.50	1.00
Administration			3.54	1.15	1.35
Schools			6.96	6.05	5.85
Land Fill				.10	
Fire					.60
TOTAL			11.40	7.30	8.80
Fairview Road	(SA)	14			
Administration				1.15	1.35
Schools				6.05	5.85
Land Fill and Library				.10	.20
Fire					.60
TOTAL				7.30	8.00
Caswell Lakes	(SA)	15			
Administration				1.15	1.35
Schools				6.05	5.85
Land Fill and Library				.10	.20
TOTAL				7.30	7.40
South Colony Road	(SA)	16			
Administration				1.15	1.35
Schools				6.05	5.85
Land Fill and Library				.10	.20
Fire					.50
TOTAL				7.30	7.90
Knik Road	(SA)	17			
Administration				1.15	1.35
Schools				6.05	5.85
Land Fill and Library				.10	.20
TOTAL				7.30	7.40
Trapper Creek Road	(SA)	18			
Administration					1.35
Schools					5.85
Land Fill and Library					.20
TOTAL					7.40
Lazy Mountain Road	(SA)	19			
Administration					1.35
Schools					5.85
Land Fill and Library					.20
Fire					.50
TOTAL					7.90
Greater Willow Road	(SA)	20			
Administration					1.35
Schools					5.85
Land Fill and Library					.20
TOTAL					7.40
Big Lake Road	(SA)	21			
Administration					1.35
Schools					5.85
Land Fill and Library					.20
TOTAL					7.40
Lake Fire Service	(SA)	22			
Administration					1.35
Schools					5.85
Land Fill and Library					.20
Fire					1.50
TOTAL					8.90
North Colony Road	(SA)	23			
Administration					1.35
Schools					5.85
Land Fill and Library					.20
TOTAL					7.40
Talkeetna Fire Service	(SA)	24			
Administration					1.35
Schools					5.85
Land Fill and Library					.20
Fire					.60
TOTAL					8.00

[a] Second Class Borough

[b] SA: Service Area
HR: Home Rule
2nd: Second Class

[c] Land fill only.

TABLE 51

COMMUNITY STRUCTURE

Approximately 90 percent of the Mat-Su population is located within a 12.5 mile radius of Wasilla, (see section on population). The remaining 10 percent is located in various communities scattered throughout the Borough. The definition of communities is somewhat arbitrary; some are historic sites of larger settlements which are now partially or totally abandoned (Mat-Su Bor. Plan. Dept., 1978).

The northeast portion of Borough is largely uninhabited. Transportation routes, housing, and other developments parallel the Matanuska and Susitna Rivers. The completion of the Parks Highway in 1971 allowed access to the northern lands west of the Susitna River (Mat-Su Plan. Dept., 1978).

Public Administration

The Mat-Su Borough is a second class borough under Title 29 of the State Statutes of Alaska. As such, it has powers of administration, taxation, planning/zoning, education, and parks/recreation. It can provide services including solid waste disposal, libraries, and any other services a Class One Borough can provide through the formation of "Service Areas." The Mat-Su Borough has established service areas, primarily for road maintenance and fire protection services (OEDP, Vol. II, 1980).

The executive function of the Borough is served by a mayor, elected at large. The legislative function is served by a five-member assembly, elected by the district. A full-time manager is in charge of administrative direction.

The Borough has four departments: (1) Finance, (2) Public Works, (3) Assessment, and (4) Planning. The Borough also contains a School District Administrative District, distinct from the other four departments. Palmer is the seat of the Mat-Su Borough government (OEDP, Vol. II, 1980).

There are three incorporated cities in the Mat-Su Borough:

- o Palmer: First Class City, Home-Rule
- o Wasilla: Second Class City
- o Houston: Second Class City

Unincorporated communities are defined as populated places accessible by road:

- Willow
- Big Lake
- Knik
- Butte
- Talkeetna
- Trappers Creek
- Montana
- Sutton
- Chickaloon
- Eureka
- Lake Louise

The remainder of the Mat-Su Borough communities are considered as unincorporated areas (OEDP, Vol. II, 1980).

Housing

Distribution: In 1980 the Census counted a total of 10,075 housing units in the Mat-Su Borough; this was a 138.7 percent increase over the 4,221 housing units counted in 1970 (U.S. Dept. of Commerce, 1981). Table 52 details the 1970/1980 housing counts; refer to Figure 8 for Enumeration District (ED) boundaries. As with population, the majority of the housing units are located within the Wasilla/Palmer area.

Housing Characteristics: One housing study indicated that 83 percent of units in the Borough were single-family homes, 5.3 percent multi-family homes, 11.3 percent mobile homes, and 0.4 percent other homes. Approximately 52 percent of the Borough's multi-family homes are located in the Palmer area, 37 percent in the Wasilla area. Mobile homes are located primarily on individually owned lots near roads; there are only a few mobile home parks, most near or in Palmer. Nearly one fifth of the housing stock in the Mat-Su Borough is recreation-related (OEDP, Vol. II, 1980). Table 53 lists housing characteristics by housing type.

The average Mat-Su home has 5.3 rooms, 2.6 bedrooms,and 1.4 bathrooms. Over 90 percent of all homes have a kitchen sink with piped water, a range/stove, a refrigerator, hot and cold piped water, a flush toilet, and a bath tub/shower. Log cabins typically lack several of these features (OEDP, Vol. II, 1980).

Table 52: Housing Distribution in Mat-Su Borough

(Source: U.S. Dept. of Commerce, Bureau of Census, 1980 Advance Counts)

AREA	1970	1980	% CHANGE
Matanuska-Susitna Borough	4,221	10,075	138.7
Alexander Creek		6	
Big Lake (CDP)		571	
Bodenburg Butte (CDP)		346	
Chickaloon (CDP)		11	
Chulitna (CDP)		7	
Curry (CDP)		2	
Denali (CDP)		5	
Houston (City)	48	234	387.5
Knik (CDP)		6	
Montana (CDP)		23	
Palmer (City)	379	842	122.2
Peters Creek North (CDP)		6	
Petersville (CDP)		6	
Skwetna (CDP)		14	
Summit (CDP)		0	
Susitna (CDP)		8	
Talkeetna (CDP)		155	
Wasilla (City)		693	
Willow (CDP)		165	
ED 1152		22	
ED 1153		21	
ED 1154		37	
ED 1155		70	
ED 1156		33	
ED 1157		31	
ED 1158		107	
ED 1159		279	
ED 1160		93	
ED 1161		31	
ED 1162		458	
ED 1163		44	
ED 1164		95	
ED 1165		134	
ED 1166		168	
ED 1167		1134	
ED 1168		1570	
ED 1169		624	
ED 1170		146	
ED 1171		898	
ED 1172		488	
ED 1173		225	
ED 1174		14	
ED 1175		7	
ED 1176		111	
ED 1177		110	

TABLE 52

Table 53: Mat-Su Housing Characteristics by Housing Type (1980)

(Source: OEDP, Vol. II, p. 78)

Single Family

28.3%	One Story
24.9	One Story w/Basement
23.4	Split Level
15.5	Two Story
6.2	Log Cabins
1.7	Other Cabins

Multi-Family

58.0 %	Duplexes
6.1	Row

Mobile Homes

82.9%	Singlewide
12.2	Doublewide
4.9	Travel Trailers

TABLE 53

The average year of construction for Mat-Su homes is 1970-71. The median year is 1975. In 1980, approximately 13.3 percent of the housing stock was built before 1960, 39.4 percent between 1960 and 1975, and 47.3 percent after 1975 (OEDP, Vol. II, 1980).

Wood is used for home heating in 48.9 percent of Mat-Su homes, (15.2 percent use wood exclusively); 21.9 percent use only electricity, 21.4 percent use electricity and wood, 22.4 percent use oil only, and 12.4 percent use oil and wood. Coal and propane are used to a lesser degree. (Fuel oil is the dominant fuel in Palmer and Butte, electricity in Wasilla and Houston.) Approximately 42.9 percent of Mat-Su homes have built-in electric heating, 15.5 percent central air, and 15.1 percent circulating water, and 37.4 percent a fireplace or stove (OEDP, Vol. II, 1980).

Household Size: The average household size is 3.4 individuals; the median size is 3.18, (1980). This includes 2.04 adults and 1.29 children per household. Single person households comprise 9.8 percent of the housing stock (OEDP, Vol. II, 1980).

Ownership and Payment: Table 54 indicates the owner/renter distribution for different housing types in the Borough. The median payment in 1980 for those making payments was $400/month. Single- family homes averages $436/month, multi-family homes $350/month, mobile homes $255/month (or $379/month including land payments). Of those making payments, 54.3 percent paid under $450/month, 78 percent of those with multi-family homes paid under $450/month, and 100 percent of those with mobile homes paid under $450/month (OEDP. Vol. II, 1980).

Table 54: Owner/Renter Distribution 1980--Mat-Su Borough
(Source: OEDP. Vol. II, P. 79)

Mode of Ownership	Total	Single Family	Multi-Family	Mobile Home
Rental	13.6	9.7	63.2	15.5
Rent free, not owning	2.9	2.5	2.6	4.8
Total own	83.4	87.8	34.2	79.7
Purchasing	(49.5)	(54.2)	(23.7)	(32.1)
Own outright	(33.9)	(33.6)	(10.5)	(47.6)

TABLE 54

Transportation

Roads: The Mat-Su Borough contains 746 miles of State-maintained primary and secondary roads. The two principal roads in the Borough are the Glenn Highway which runs east and west, and the Parks Highway, which runs north and south. The two routes join south of Palmer, cross the Matanuska and Knik Rivers, and continue into Anchorage (OEDP, Vol. II, 1980). Completion of the Parks Highway in 1971 was an important step in land transportation by allowing access to the north half of lands west of the Susitna River (Mat-Su Bor. Plan. Dept., 1978). Other major roads include the Old Palmer-Wasilla Highway, the Old Glenn Highway, Big Lake Spur, Talkeetna, and Trunk Road. The following are routes either proposed or on which construction is underway:

- Point MacKenzie Road: To open up access to Pt. MacKenzie for industrial and agricultural development.
- Wasilla Bypass: Bypass of Wasilla on Parks Highway.
- Capital City Access: For new capital at Willow (proposed).
- Tokositna Visitors Center: State DOT project to provide arterial access to a proposed major recreation complex within Denali State Park, serving Mt. McKinley.
- West Big Lake Arterial: Artery from W. Big Lake to Parks Highway.
- Tyoner Road: Extension from Pt. MacKenzie Road to Beluga coal region.

The highways are important for general automobile access throughout the Borough, for tourist activities, and for employment-related commuting. Since bus transportation is limited to charters (and tour buses in the summer), commuting to and from Anchorage is done by automobile. Table 55 indicates that 94 percent of Mat-Su residents (17 and over) visit Anchorage at least once per month. Table 56 indicates that shopping is the primary drawing force of Anchorage, followed by employment, for driving trips.

It was estimated that approximately 22 percent of Mat-Su residents car pool regularly when travelling to and from Anchorage. Interest was expressed for a van-pooling program though none have been initiated at this point. A pilot proposed commuter bus program will have buses travel from the Borough into Anchorage for a tie-in with a "People-Mover" service there (OEDP, Vol. II, 1980).

The highways of Mat-Su are also critical for the flow of commodities, a great portion of which occurs by truck (OEDP, Vol. II, 1980).

Table 55: Frequency of Trips to Anchorage (1980)
(Source: OEDP, Vol. II, p. 100)

FREQUENCY	PERCENT (17 & older)
Daily	17%
4-5 Trips/Week	10
2-3 Trips/Week	6
1 Trip/Week	14
1 Trip/Month	29
Seldom/Varies	6

TABLE 55

Table 56: Primary Reason for Anchorage Trips (1980)
(Source: OEDP, Vol. II, p. 101)

REASON	PERCENT
Shopping	37%
Shopping/Social	7
Shopping/Business	5
Employment	24
Business	15

TABLE 56

Railroads: The Alaska Railroad is the only railroad serving Alaska and the Mat-Su Borough region; it is also the only federally-operated railroad in the United States. One main line runs north and south through the Borough, roughly paralleling the Parks Highway. A spur serves Palmer and its industrial park. The railroad has been historically important in the development of the Borough. Many small towns have developed around important locations along the rail route. The primary function of the railroad in the Borough is the delivery of goods, particularly gravel and timber (Mat-Su Bor. Plan. Dept., 1978). A passenger service is provided, however, and allows access to Denali National Park; for residents who live beyond the end of the roadways and scheduled stopping points, the train still stop on request. A future spur is planned into Pt. MacKenzie to support industrial and agricultural development there (OEDP, Vol. II, 1980).

Air Transportation: There are approximately 30 small air fields which have been classified for public use in the Mat-Su Borough. Approximately 14 others are restricted or are in poor or uncertain condition. Lakes and other bodies of water are used for float planes, or ski planes in the winter months, this is a primary means of access for Anchorage recreational visitors (Mat-Su Bor. Plan. Dept., 1978). The largest airport is the Palmer Municipal Airport, which has a 5,000 foot runway capable of accommodating Hercules 130 aircraft as part of general access to the Palmer Industrial Park. Elsewhere, air transportation is considered equally important in transportation of passengers and cargo. It is expected that an airport will be built on Point Mackenzie to supplement service currently being handled by Anchorage International Airport, (and to support its own industrial development), (OEDP, Vol. II, 1980).

Water Transportation: There is no substantial use of waterways for anything other than pleasure craft in the Mat-Su Borough at this time. However, feasibility studies are underway on possible commuter service by hoovercraft via Knik Arm to Anchorage. Additionally, Anchorage is the principal port in the area for cargo-bearing ships; the Mat-Su Borough wishes to share some of this traffic. A major port facility is planned for Point Mackenzie as part of the overall development plan there (OEDP, Vol. II, 1980).

Trails: Undeveloped roads, ski paths, trails, snowmachine paths are all important in providing secondary access to points in the region.

Community Services

Table 57 summarizes community services in the Mat-Su Borough.

Education: There are 12 elementary schools, 2 junior high schools, and 3 high schools in the Mat-Su Borough (Table 57). Approximately 1 of 3 graduating high school students enters the labor pool; in 1980, 250 students graduated from high school (OEDP, Vol. II, 1980). Table 58 lists enrollment for Mat-Su Borough schools, 1973 through 1978. In addition to public elementary and high schools, there is a vocational training and trade school, in which 238 were enrolled in school year 1979-1980. The Matanuska-Susitna Community College, a branch of the University of Alaska, had an enrollment of 1,177 that same year (OEDP, Vol. II, 1980).

Table 57: Mat-Su Borough Public Facilities

(Source: OEDP, Vol. II, p. 107)

	Talkeetna-Chugach Mountains	Upper Susitna - Denali Highway	McKinley - Denali	Willow	Wasilla	Trapper Creek	Talkeetna	Sutton	Skwentna & Bush	Point MacKenzie	Palmer	Knik - Settlers Bay	Montana	Houston	Eureka/Glacier View	Capital City	Butte	Big Lake	PUBLIC FACILITIES
1980				*	*	*	*	*	*		*				*		*	*	Elementary School
					*						*		*						Jr. & Sr. High Schools
			*	*	*	*	*	*	*		*			*		*	*	*	Government Offices
					*						*								Clinic/M.D. Office
											*								General Hospital
											*								Nursing Home
			*	*	*	*	*	*			*			*	*				Rescue Units
						*	*				*							*	Police/Trooper Station
											(*)					*			Jail
																			Temporary Detention Facility
											*								Court Facilities
											*								Civil Defense H.Q.
					*		*	*			*			*			*		Fire Station
	*		*				*				*							*	Park System
				*	*		*	*			*								Library
											*								Pub. Sewer & Water Systems
																			Solid Waste Transfer Sta.
	*			*	*		*	*							*		*	*	Sanitary Landfill
				*	*	*	*	*			*	*	*	*			*	*	Electrical Power
				*	*	*	*	*		*	*	*	*	*	*	*	*	*	Telephone Service

TABLE 57

Table 58: Mat-Su Public School Enrollment
(Source: OEDP, Vol. II, P. 100)

Level	73-74	74-74	75-76	76-77	77-78	78-79	79-80
Elementary (1-6)	1396	1520	1673	1590	1803	2019	2139
High School (7-12)	1101	1194	1262	1601	1790	1852	1881
Total	2497	2714	2935	3191	3593	3871	4494

TABLE 58

Health Care: Valley Hospital in Palmer is the only major hospital facility in the Borough. It is a 35-bed hospital, 19 acute care beds, and 6 long-term beds. There are 3 public health centers in the Borough, 1 in Palmer, 2 in Wasilla (OEDP. Vol. II, 1980).

Public Safety: There are 14 State Troopers in the Mat-Su Borough: 7 in Palmer, 2 in Wasilla, 1 in Big Lake, 1 in Trapper Creek, and 4 Borough-wide troopers who enforce Fish and Wildlife regulations. Palmer maintains a city police force of 7 police officers and 5 civilian support personnel. Six fire stations are located throughout the Borough in Sutton, Palmer, Butte, Wasilla, Houston, and Talkeetna (OEDP, Vol. II, 1980).

Utilities: The Borough maintains 9 sanitary landfills, 11 community sewerage systems, and 22 community water systems (OEDP, Vol. II, 1980).

RESOURCE ANALYSIS AND COASTAL SENSITIVITY

NATURAL RESOURCES AND COASTAL HABITAT ANALYSIS

Resource analysis focuses upon human utilization of the resources in the coastal habitats. Factors which enhance or detract from this use are presented. Typically, the factors reflect the domino effect of changes in the habitat resulting in aberations to wildlife and fish populations thereby affecting the human utilization of the populations. Each habitat type will be examined with respect to human use and potential problems.

OFFSHORE AND ESTUARINE AREAS

Human utilization of offshore resources is presently very limited. Future utilization of resources could change due to implementation of proposed projects such as the construction and operation of port facilities at Point Mackenzie. It is premature at this time to attempt an assessment of the effects of offshore resources of this project.

Harvesting of marine mammals has been of limited and minimal importance in the offshore area.

A small commercial fishery has operated in the area offshore of Susitna Flats. The activity has been limited to about ten set gill net sites that are fished from June 25 to August 15. During this period, typically, two twelve-hour fishing periods have been held each week. Management activities of salmon stocks in the Borough are primarily effected through the control of escapements from the drift gill net fishing in central Cook Inlet (Bill Donaldson, personal communication, 1981). Salmon escapements are discussed in the section on rivers, streams, and lakes.

HIGH VEGETATED BANKS

There is little wildlife use of the bluff habitat, and similarly there is presently little human use of this habitat. In the future, potential development of commercial and industrial facilities in the Point Mackenzie area could possibly affect wildlife use of this habitat.

WETLANDS AND TIDEFLATS

The primary human uses of wetlands and tideflats are hunting for waterfowl and moose and trapping of furbearing mammals. Key issues are increased hunter access to disperse hunting pressure, effects of methods of increasing access on waterfowl, moose and their habitats, and the effects of agrarian activities on drainage in this habitat.
Utilization of resources in the wetland habitat is well documented for the refuges along the coast. Other wetlands within the 1000' contour have not been examined as thoroughly. As a result, this section focuses on resource use of the wetlands and tideflats within the refuges. The analysis of upland wetlands is subsumed under the general upland habitat use section.

Waterfowl

Primary use of Refuge wetlands is for waterfowl hunting; 59 percent of all recreation days spent in Matanuska-Susitna Refuges is related to this sport (Table 59). Other uses include game hunting, trapping (although this typically occurs within the riverine habitat), and enjoying nature (Sellers 1979). Level of effort in Matanuska-Susitna Refuges for waterfowl hunting is high; Susitna Flats and Palmer Hay Flats rank first and second in the State for the number of days spent hunting per year (Table 60). By 1980, use of Susitna Flats for waterfowl hunting exceeded 5000 hunter days per year (ADF&G).

Duck harvests from Susitna Flats Refuge rank highest in the State. Palmer Hay Flats duck harvests are typically second (Table 61). Goose harvests are likewise productive (Table 62). Susitna Flats ranks among the top ten goose harvest areas in the State (Timm 1974 through 1978).

Issues related to waterfowl populations, wetland habitats, and waterfowl hunting are common to all three Refuges.
Hunting pressure is concentrated, temporarily and spatially. Duck hunting season typically extends between September 1 and December or January; however, one third to one half the hunting effort is expended between September 1 and September 10 (Timm 1978, Timm and Sellers 1979). Due to limited access within the Palmer Hay Flats Refuge and the surrounding area, hunting is usually restricted to the Duck Flats and Cottonwood Creek areas which are accessible by road. These two areas accounted for 540 hunters on opening day in 1979 and 1980 (Sellers 1979). Access in Goose Bay is limited to roads along the northern and western boundaries. Since Susitna Flats is accessible only by boat or plane, hunters concentrate around landing sites rather than along road access points.

Recreational Use of Cook Inlet State Game Refuges.

Activity	% of total rec. days	Susitna Total Days	Susitna Ave. Days Per User	Susitna % of all respondents* using the refuge/activity	Palmer Hay Flats Total Days	Palmer Hay Flats Ave. Days Per User	Palmer Hay Flats % of all respondents* using the refuge/activity	Goose Bay Total Days	Goose Bay Ave. Days Per User	Goose Bay % of all respondents* using the refuge/activity
Hunt Waterfowl	59	898	11	76	277	7	32	88	6	14
Hunt Other Game	4	51	6	8	25	4	6	2	2	1
Sport Fish	11	129	6	18	93	8	10	10	5	1
Comm. Fish	6	100	33	3	10	10	0	10	10	0
Enjoy Nature	13	233	10	22	40	3	13	10	1	6
Trapping	7				150	38				

*111 Responses received in time for tabulation.

TABLE 59

TABLE 60

Waterfowl Hunter Days and Average Harvest Per Day on Cook Inlet Refuges, 1971-1976, calculated for Statewide Waterfowl Hunter Mail Surveys.

Refuge	Hunter Days						1971-1976 average	Percent of State waterfowl hunter days 1971-1976	Average ducks/ day/ hunter	Average geese/ day/ hunter
	1971	1972	1973	1974	1975	1976				
Susitna Flats	3885	3798	7060	3763	3112	5280	4473	7.9	2.3	0.05
Palmer Hay Flats	3081	3561	4861	4162	4292	4945	4150	7.3	1.5	0.02
Goose Bay	-	-	984	342	161	601	522	0.9	1.6	0.0

TABLE 61

Cook Inlet Refuge duck harvest 1971-1976 calculated from statewide waterfowl hunter mail surveys and 1977-1979 calculated from USFWS parts collection survey.

Refuge	Duck Harvest 1971	1972	1973	1974	1975	1976	1971-1976 average	Percent of State Duck Harvest 1971-1976	1977	1978	1979	1977-1979 average	Percent of Statewide Duck Harvest 1977-1979
Susitna Flats	7442	9696	16835	6750	9485	11836	10266	12.6	13917	16283	13182	14461	12.7
Palmer Hay Flats	5854	4677	7879	5458	7114	6326	6218	7.4	11406	3306	1261*	5324	4.9*
Goose Bay	NS	NS	2238	287	351	510	846	0.9	1570	367	459	799	0.7

NS = Not Surveyed

* USFWS evidently attributed harvest from Palmer Hay Flats to Upper Cook Inlet Figures.

Source: Timm 1977, 1978, 1980, and Timm and Sellers 1979.

Cook Inlet Refuge Goose Harvest 1971-1976 calculated from statewide waterfowl hunter mail survey and 1977-1979 calculated from USFWS part collection survey.

Refuge	Goose Harvest 1971	1972	1973	1974	1975	1976	1971-1976 average	Percent of State Goose Harvest 1971-1976	1977	1973	1979	1977-1979 average	Percent of Statewide Goose Harvest 1977-1979
Susitna Flats	699	357	1030	224	173	418	478	3.3	NS	766	438	602	4.1
Palmer Hay Flats	45	65	257	112	173	72	121	0.8	NS	0	0		
Goose Bay	NS	NS	0	0	0	0	0	0.0	NS	NS	NS		

NS = Not Surveyed

Source: Timm 1977, 1978, 1980, and Timm and Selers 1979.

TABLE 62

Results of survey of opinion on the use of mechanized vehicles in refuges.[1]

RESPONSE (%)

Type of Use	Susitna Flats			Palmer Hay Flats			Goose Bay		
	Air Boat	ATV	Air Plane	Air Boat	ATV	Air Plane	Air Boat	ATV	Air Plane
1978 Survey:									
Unrestricted	42	31	68	33	19	52	40	25	54
Restricted	28	35	32	30	50	26	20	50	8
Prohibited	27	34	0	36	31	23	40	25	38
Number of Responses from N = 111	74	86	80	33	32	31	15	16	13
1979 Survey:									
Unrestricted	44	30	60	36	21	53	41	24	53
Restricted	30	36	34	31	50	24	18	52	7
Prohibited	26	34	0	33	29	24	41	24	40
Number of Responses from N = 117	77	92	83	36	38	34	17	21	15

1 Source: Sellers 1979; Timm, unpublished data.

TABLE 63

In response to the problems of concentrated activity generated by limited access, providing additional access has been identified as a possible management action. User response to improved access is divided. Those opposed to increased access note the destruction of habitat associated with road construction, and increased user pressures on the resources associated with greater numbers of users taking advantage of better access. Those favoring increased access emphasize the benefits of better distribution of the hunting effort and the desire to attain favorable hunting positions easily (Sellers 1979).

Controversy also surrounds the desirability of restricting or prohibiting alternative modes of transportation (Table 63). Most respondents agreed that use of all terrain vehicles for access should be restricted. Over 50 percent of questionnaire respondents favor unrestricted use of aircraft. No other transportation mode is as universally accepted.

In spite of general approval of unrestricted use of aircraft, low flying air traffic disturbs waterfowl. The following effects of low flying aircraft have been identified:

1. Geese are more sensitive to disturbance than ducks;
2. Helicopters create a greater reaction than do planes flying at the same altitude;
3. Ducks in particular can become accustomed to aircraft flying above 400' provided there is no direct association with harassment (Sellers 1979).

In the Coffee Point area the following adverse impacts have been linked to aircraft use for hunting:

1. Some frightened geese leave Palmer Hay Flats early for their southern migration;
2. Feeding patterns shifted to nocturnal activity;
3. Daylight activities are limited to inaccessible areas on the inlet or mudflats;
4. Disturbed geese tend to form larger flocks;
5. Interference with other hunter's use of the area and the goose resource (Sellers 1979).

The sensitivity of waterfowl to aircraft has implications for development of airstrips and landing patterns within the Borough. Five hundred feet has been established as the minimum altitude for aircraft over the Susitna Flats Refuge (ADF&Ga).

Furbearers

Comparatively low levels of trapping for furbearing mammals has occurred in this habitat (Table 59). It is anticipated that little potential exists for conflicts to arise due to trapping. For the same reason, it is unlikely that increased hunter access will adversely affect trapping.

Moose

Moose hunting likewise causes little conflict with waterfowl activity. In the Palmer Hay Flats, moose hunting typically occurs in the eastern portion of the Refuge, an area not used extensively by waterfowl. Similarly, moose hunting along the western portion of Goose Bay is separated from most waterfowl use. Moose hunting in Susitna Flats is limited. Poor access combined with poor hunting conditions discourages most hunting except in the northern portions of the Refuge, e.g., the islands north of Big Island, mainland river bars, and wooded areas along the Susitna River. Access is limited to boats. Hunting pressure also occurs along the Little Susitna River north of Gay's Airfield and around Horseshoe Lake (ADF&G 1980a, undated a, undated b).

Natural tidal erosion is causing wetlands to drain in all three Refuges. Alaska Department of Fish and Game is considering steps to mitigate some of the damage (ADF&G 1980a). Any activity which would accelerate wetland drainage or intercept incoming nourishment should be examined closely to prevent damage to the wetlands.

Changes in habitat use outside the wetlands may also have an effect on wetlands and associated organisms. For example, agricultural uses proposed may increase grain resources for waterfowl and other birds. Removal of mature forests for agricultural purposes may also increase moose habitat and therefore increase needs for calving areas within the Refuges.

Access, Industry, and Agriculture

Road developments such as those proposed for developing the Beluga Coal Field, the Point Mackenzie industrial complex and agricultural project and for providing access to private property within Refuges may alter wetland drainage patterns. Refuge management plans recognize the need to monitor these activities to avoid adverse impacts.

RIVERS, STREAMS, AND LAKES

Utilization of living resources within the rivers, streams and lakes habitat centers on use of fishery resources. Secondary uses involve moose hunting particularly along and on the Susitna River, waterfowl hunting, particularly in the Jim-Swan lakes areas, and trapping small furbearers which occurs on rivers, streams and lakes throughout the Borough (Ritchie 1981, ADF&G Resource Maps, ADF&G 1980).

Conflicts with these uses could arise due to increased road access, development of hydroelectric power, logging, and agricultural, recreational and urban development.

Fishing utilization within the Borough is typically recreational. The Susitna River drainage provides the second most important recreational fishing rivers and streams in the State (Governor's Committee 1980). Catch statistics for 1978 indicate that heavily fished rivers and lakes (greater than 1,000 days fished) are the Deshka River, Lake Creek, Alexander Creek, Chuit River, Clear (Chunilna) Creek, Little Willow Creek, Rabbit Slough, Kepler Lake Complex, Lucille Lake, Big Lake, and the Nancy Lake Recreation area. Areas with more than 10,000 days fished include Finger Lake, Little Susitna River, Sheep Creek, Willow Creek and Montana Creek (Tables 64, 65, 66) (Mills 1980).

Rivers, streams and lakes throughout the Borough provide good harvests of coho salmon, Dolly Varden, and grayling. King salmon are caught primarily on drainages on the west side of the Susitna River, especially the Deshka River and Alexander Creek. The west side drainages also provide the greatest pink and chum salmon catches; Willow and Montana Creeks are prime producers of pinks and Lake Creek is a prime producer of chum. Drainages between and including the Little Susitna River and Knik Arm provide the largest harvests in the Borough for landlocked salmon, sockeye salmon and rainbow trout. Finger and Lucille Lakes has the highest catch of landlocked salmon; the Little Susitna River has the highest catch of sockeye salmon and the Big and Kepler Lakes have the highest harvest of rainbow trout (Tables 64, 65, 66).

Management goals are detailed for the Susitna Flats Refuge. Here, management goals indicate a desire to increase salmon escapement on the Susitna River to the following levels: sockeye, 200,000; chum, 200,000; coho 100,000; pink (odd year) 75,000; pink (even year) 1,000,000; and king 60,000. Other salmon and sport fish stocks in Refuge streams are to be maintained at 1980 levels (ADF&G 1980a).

Knik Arm Drainage* Sport Fish Harvests and Effort by Fishery and Special, 1978.

Location	Days Fished	King Salmon	Silver Salmon	Land-Locked	Red Salmon	Pink Salmon	Coho Salmon	Rainbow Trout	Dolly Varden Arctic Char	Lake Trout	Grayling	Burbot	Other
Little Susitna River	12,127	93	4,865	0	859	1,517	956	886	570	0	54	9	759
Wasilla Creek (Rabbit Slough)	3,446	47	2,112	0	0	279	59	45	325	0	0	0	0
Finger Lake	11,502	0	0	8,588	0	0	0	0	0	0	0	0	0
Kepler Lake Complex	5,730	0	0	298	0	0	0	5,180	0	0	985	0	0
Lucille Lake	4,803	0	0	4,963	0	0	0	0	0	0	0	0	0
Big Lake	9,865	0	0	226	0	0	0	0	0	0	0	0	0
Nancy Lake Recreation Area, including Nancy Lake	7,647	0	0	262	14	0	0	1,853	18	127	0	145	0
Others	20,420	0	918	4,547	366	46	117	10,330	1,636	380	1,374	280	36
GRAND TOTAL	75,540	140	7,895	18,884	1,239	1,842	1,132	23,139	7,982	507	2,413	452	795

TABLE 64

TABLE 65

East Side Susitna Drainage* Sport Fish Harvests and Effort by Fishery and Special, 1978.

Location	Days Fished	King Salmon	Silver Salmon	Land-Locked	Red Salmon	Pink Salmon	Coho Salmon	Rainbow Trout	Dolly Varden Arctic Char	Lake Trout	Grayling	Burbot	Other
Willow Creek	22,682	47	905	0	56	18,901	2,458	913	280	0	208	9	27
Montana Creek	25,762	408	2,451	0	85	15,619	4,429	1,193	633	0	958	9	27
Clear (Chunilna) Creek	5,040	12	2,200	0	28	2,074	1,912	1,501	1,817	0	859	27	0
Sheep Creek	11,869	256	478	0	14	6,981	1,697	470	108	0	461	18	9
Little Willow Creek	5,687	0	151	0	28	3,142	1,015	334	63	0	334	0	0
Others	14,970	163	2,388	2,368	56	3,994	2,692	1,519	2,739	877	3,770	208	90
GRAND TOTAL	86,010	886	8,573	2,368	267	50,711	14,203	5,930	5,640	877	6,600	271	153

* East Side Susitna Drainage (Area M): All East side drainages of the Susitna River below its confluence with the Oshetna River. Fish taken while fishing from the East bank of the Susitna River are included in this area.

Source: Mills 1980.

TABLE 66

Modified West Side Cook Inlet-West Side Susitna River Drainage* Sport Fish Harvest and Effort by Fishery and Species, 1978.

Location	Days Fished	King** Salmon	Silver Salmon	Red Salmon	Pink Salmon	Chum Salmon	Rainbow Trout	Dolly Varden	Lake Trout	Grayling	Burbot	Other
Deshka River	9,111	850	1,798	0	697	0	3,634	0	0	579	0	72
Lake Creek	8,767	326	2,212	254	2,833	1,015	2,721	154	36	2,115	45	18
Alexander Creek	6,914	769	2,401	183	1,146	215	2,640	136	0	1,871	0	181
Talachulitna River	732	12	88	141	31	234	0	235	0	99	0	0
Chit River	1,185	408	277	0	155	0	443	461	0	0	0	0
Theodore River	905	58	101	0	449	0	226	353	0	0	0	0
Lewis River	172	12	0	0	46	0	54	27	0	0	0	0
Shell Lake	302	0	0	28	0	0	27	0	45	0	0	0
Whiskey Lake	129	0	0	28	0	0	0	0	0	0	0	0
Hewitt Lake	172	0	0	0	0	0	127	0	0	0	0	0
Judd Lake	151	0	0	70	0	0	0	371	0	0	0	0
GRAND TOTAL	29,340	2,435	6,877	714	5,357	1,464	9,872	1,737	81	4,664	45	271

Razor Clams Total Digging Days: 800 Total Clams Taken: 39,175f

* Modified West Side Cook Inlet-West Side Susitna River Drainage (Area N): All West Side Susitna River drainages and all West Side Cook Inlet waters southward to Cape Douglas. Fish taken while fishing from the west bank of the Susitna River are included in this area. Excludes unidentified lakes and streams since they contain harvests which may be outside the Matanuska-Susitna Borough.

** Kings less than 20 inches.

Source: Modified from Mills 1980.

Alaska Department of Fish and Game also developed criteria to prioritize stream systems. Any system supporting anadromous fish populations is classified a priority system. Stream systems satisfying any of three additional criteria are classified as high priority. These criteria include:

a. Streams with salmon escapements greater than 1000;
b. Streams supporting spawning populations of less abundant species, such a coho and chinook, and
c. Streams needed to preserve suitable habitat for all life cycle stages (ADF&G 1980b).

Access is a key factor in recreational fishing. Increasing road access will have immediate localized effects due to increased fishing effort of selected sites and possible environmental changes caused by road construction. Adverse effects of road construction (i.e., increased siltation of stream beds and restricted movement of anadromous fish) can be foreseen and mitigated. Fish stocks can be managed and supplemented through stocking programs.

Less localized effects are also possible. These are easier to assess in areas which have road access than in areas where access is limited. In the latter case, a true assessment of the productivity in the area is often lacking and an awareness of change in the system may not be timely.

In addition to access, several other activities such a hydroelectric projects, logging, and urban, recreational and industrial developments may have an impact on fisheries productivity and resource use. These activities would create changes in stream flow regimes, remove foliage from stream banks, increase surface runoff and/or introduce large amounts of sediment or other foreign materials into the streams. Some of these effects can be mitigated with policies addressing setback requirements or timing of activities, compensation techniques such as replacing stream bank foliage or creating settlement systems before runoff enters the stream.

Setback recommendations for various types of activities are currently used by the State Department of Natural Resources for State land. Recommended setbacks include:

a. 200' for public recreation lands, private recreation lands. A minimum buffer is considered adequate to control septic systems, pollution from fueling operations, and the need for stream bank stabilization projects.

b. 400' for agricultural lands, grazing lands and timberlands. The setback would mitigate problems derived from agricultural runoff and the removal of stream vegetation through grazing or timber harvesting.

c. 800' for commercial-industrial lands, material and mineral lands, residential lands, and reserved use lands. Problems encountered by these developments include adding excessive siltation, creating fish traps or blocking fish migrations, shifting river channels, adding toxic pollutants and disturbing animal migrations and human recreation (ADF&G 1980b).

Some changes in the classification scheme have been proposed. Among the alternations are adding greenbelts, watershed lands, and wildlife habitat land to the most restrictive setback category. The rationale supporting these setbacks reflects the need or desirability to provide utmost separation of possible infringements from the more critical uses o the riverine systems (ADF&G 1980b) More limited setbacks have been used on private lands to protect anadromous fish streams.

IMPORTANT UPLAND HABITAT

Upland game activities occurring in the Matanuska-Susitna Borough are often extensions of activities along river corridors and in wetland habitats. As a result, sharp distinction in uses among the three habitats are frequently inappropriate.

The Matanuska-Susitna Borough contains portions of three Game Management Units (GMU), 13E, 14A and B, and 16A and B. GMU 14A includes most of the Matanuska-Susitna highway area. The southern boundary is Knik Arm and Cook Inlet, the western boundary is the Susitna River; the northern boundary is Willow and Peters Creek east to the headwaters of the Chickaloon River, which is the eastern boundary. GMU 14B lies north of 14A up to the northern bank of the Talkeetna River. GMU 16 lies west of the Susitna River, extends north to the Mt. McKinley border and south to Redoubt Bay. GMU 16A was separated from 16B to better manage the area which has road access. GMU 16A follows the east bank of the Kahiltna to the confluence with the Yentna, continuing down the eastern bank of the Yentna to the Susitna River.

It is apparent that these boundaries include substantial upland habitat outside the coastal management boundary and in some cases outside the Borough. Although the statistics cover a greater area, the natural resource maps and hunter mode of transportation indicate that the majority of the moose hunting (outside GMU16B) occurs near the road system within the 1000' contour (Table 67). Resource maps and limited access indicate much of the black bear harvest likewise occurs within the coastal zone. Upland bird hunting is not documented for the Matanuska-Susitna Borough.

Between 1970 and 1980 GMU 14A had the largest single moose harvest. Thereafter the harvest fell to approximately 300 per year. GMU 16 has consistently been the most productive; particularly subunit 16B. Most successful hunters in GMU 16B fly in (Table 68). Resource maps indicate several river systems such as Alexander Creek, Yentna River and Skwentna River are prime harvest areas. Other prime areas include the Matanuska Valley, Knik Arm, Kahiltna Flats, Black Creek, Cache Creek, 20 Mile Slough, the areas around and between Beluga Mountain and Mount Susitna, Sunflower Basin, and the Kahiltna-Peters Hills area. Much of these latter sites, however, are outside the coastal management boundary.

Various factors influence the size and location of the harvest. Among these are weather conditions, harvest practices, and access. In 1970-71 hunters shifted from the Peters and Dutch Hills areas to the Susitna River due to snow conditions. Harsh winter conditions in 1970-71 continued to figure prominently in harvest statistics in subsequent years due to reduced populations resulting from large natural winter kills (Tables 69 and 70). For example, 161 moose were found dead from Alexander Creek and the Susitna River north to Talkeetna. Calf mortality on the Susitna River between Bell Island and Talkeetna, and in the Alexander/Sucker Creeks areas was 88.5 percent and in GMU 14B, 115 moose were driven down to the valley where they were killed by trains. This figure compares with 81 taken by hunters that winter (McKnight 1973a). Not until mild winters in recent years have the populations recovered (Table 69).

Special harvest restrictions exclusive of the relatively consistent restrictions on seasons and bag limits also influence level and areas of effort. For example, low harvests in GMU 16A in 1979-80 partially reflects restrictions on antlerless harvests within three miles of the road (Hinman 1980b). It is also speculated that the majority of the antlerless moose taken in GMU 14A are from the valley floor population which as accessible by highway; the number of antlerless moose permitted to be harvested could be increased if they were taken elsewhere in the unit (Hinman 1980b). General level of effort is also affected by regulations and anterless seasons. It has been observed that the number of hunters who participated in recreational and subsistence hunting in 1971 doubled from the 1970 figure in GMU 14A due to an antlerless harvest season (McKnight 1974b).

Table 67: Fish and Wildlife Habitats, and Recreational Reservations on Public Lands in the Upper Cook Inlet lease sale area.

Name		Type of Easement
1.	Little Susitna River	½-mile recreational corridor
2.	Susitna River	½-mile fish and wildlife habitat corridor (all contained within Susitna Flats Refuge)
3.	Theodore River	½-mile recreational corridor (all contained within Susitna Flats Refuge)
4.	Chuitna River	200 feet; no development setback on both stream banks
5.	Yentna & Swentna Rivers	½-mile recreational and fish and wildlife habitat corridor
6.	Alexander Creek (and Sucker Creek)	½-mile recreational corridor
7.	Lake Creek	½-mile recreational corridor

Source: Governor's Committee 1980.

Table 68: Moose Harvest in GMU's (14a, 14b, 16a, 16b) during 1970 to 1979.

Year	Number of Hunters	Number of Moose Harvested	Estimated Moose Population	Percent of Unit Harvest
1970	2603	1283	5079	25
1971	3738	1853	4832	38
1972	1699	964	3836	25
1973	3896	1367	4733	29
1974	3160	754	4297[a]	18
1975	1975	435	1108[a]	39
1976	3311	708	1358[a]	52
1977	4593[b]	987	3872[a]	25
1978	4654	1277	3960[a]	32
1979	2961	933	3570	26

a Only portions of GMU's censused.

b Data extrapolated to correct for missing reminder letters.

Source: McKnight 1973a, 1974b, Hinman 1980b.

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852

Verified Moose Mortality (excluding hunting) in Alaska's Game management Subunit 14A during the period June 1 - May 31, 1972 to 1979.

	ROAD KILL						INCIDENTAL/TRAIN KILL						ILLEGAL KILL						WINTER KILL						TOTAL
	*Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	
1972-73	4	20	6	4	2	36	0	2	0	2	1	5	3	31	2	6	7	49	0	0	0	0	0	0	90
1973-74	2	17	7	5	2	33	1	4	2	6	1	14	1	37	2	2	7	49	1	1	2	3	0	7	103
1974-75	8	28	10	13	4	63	5	16	6	7	1	35	5	24	3	3	5	40	0	0	3	4	0	7	145
1975-76**	0	20	5	3	1	29	1	2	0	1	1	5	1	8	1	0	3	13	0	1	0	0	0	1	48
1976-77**	7	28	6	15	0	56	1	4	0	1	1	7	9	6	0	0	0	15	0	1	0	1	0	2	80
1977-78**	9	34	6	17	1	67	0	1	2	0	2	5	2	2	0	0	2	6	0	1	0	0	0	1	79
1978-79	15	42	8	30	13	108***	3	3	1	1	4	12	4	7	1	3	28	43	0	1	1	0	7	9	172

* Ad.M = Adult Male; Ad.F = Adult Female; Calf M = Calf Male; Calf F= Calf Female; ? = Unknown Sex or Age Tot. = Total.

** A reduced effort was made to document moose mortality these years. Mortality along the Alaska Railroad Tracks was not tallied during the springs of 1976 through 1978.

*** Increased snow depth in early winter therefore moved down earlier. Comparable to 1971-72 season when 109 road killed moose were tallied.

PREPARED BY: Jack C. Didrickson, Game Biologist III.

TABLE 69

Verified Moose Mortality (excluding hunting) in Alaska's Game management Subunit 14B during the period June 1 - May 31, 1972-73 through 1978-79.

	ROAD KILL						INCIDENTAL/TRAIN KILL						ILLEGAL KILL						WINTER KILL						TOTAL
	*Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	Ad. M.	Ad. F.	Calf M	Calf F	?	Tot.	
1972-73	1	0	0	0	2	3	0	4	2	1	3	10	0	0	0	0	1	1	0	0	0	1	0	1	15
1973-74	1	3	0	1	1	6	0	1	0	0	0	1	1	1	0	0	0	2	0	0	0	0	0	0	9
1974-75	1	0	2	0	2	5	4	16	2	8	19	49	0	1	0	1	0	2	0	0	1	1	0	2	58
1975-76**	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2
1976-77	1	2	3	0	1	7	0	1	0	0	1	2	0	2	0	0	0	2	0	0	0	0	0	0	11
1977-78	0	2	0	1	2	5	0	0	0	0	5	5	0	0	0	0	4	4	1	0	0	0	0	1	15
1978-79	6	16	1	10	8	41	21	39	11	9	91	171	1	4	0	0	0	5	0	0	0	0	2	2	219

* Ad.M = Adult Male; Ad.F = Adult Female; Calf M = Calf Male; Calf F= Calf Female; ? = Unknown Sex or Age; Tot. = Total.

** A reduced effort was made to document moose mortality this period; moose mortality along the Alaska Railroad tracks was not tallied during the spring 1973, 1975, and 1976.

PREPARED BY: Jack C. Didrickson, Game Biologist III.

TABLE 70

One final influence alluded to earlier is the effect of access on hunting. Limited access has been cited in all four subunits as effecting harvests. For example, in GMU 14A antlerless harvests could be increased, as noted above, if other areas of the unit were hunted. In GMU 14B access is considered difficult because there is only one road on the far western boundary and an abundance of spruce timber stands limits the number of suitable landing areas for air access (Hinman 1980b). Even the rationale for subdividing GMU 16 was based on access. GMU 16A was separated from GMU 16 so the road system in the Peter and Dutch Hills area could be managed independently from that portion of the unit with no road access (GMU 16B). Within GMU 16A limitations on access were identified as a partial explanation for the low 1979-80 harvest. In the area between the Kahiltna and Yentna Rivers access is virtually impossible during September. As a result a special bull-only season held in November is under consideration.

Modes of access are shifting. Access statistics for moose hunting are available for GMU 16 from 1972 through 1980. The high percent of aircraft use reflects the preponderance of harvests from 16B which is essentially inaccessible by highway vehicles. Aircraft use in combination with boat and all terrain vehicles use has increased considerably (Hinman 1979). In addition, boat use increased sharply after 1976 when the lower portion of 16A was opened for an antlerless season (Hinman 1980).

Game management practices for other mammals have also made a difference in some areas. For example, aerial harvests of wolves were stopped in 1972. Although this made no difference in GMU 14 harvests, harvests in GMU 16 were halved. Prime harvest areas in 1972 were the Knik River drainage and Kings River drainage (McKnight 1974c). Bounty on wolverine in GMU 14 was stopped in 1968. After three years of no records, harvests in 1971-72 indicated reduced effort. Interest subsequently returned. Harvest data for 1972-73 indicate 36 were taken and in 1979-80 fifty-five were harvested. No comparable slump was noted in GMU 16 (McKnight 1974c). Wolf harvests occur primarily in February and March (McKnight 1974e). Conflicts between wolves and livestock were noted in GMU 14A and B. Normally these conflicts are rectified by directing trappers and fur hunters to the area (Hinman 1979). Wolverine harvests are slightly less concentrated in span from December through March. There are no indications in the literature that access or habitat changes are critical factors in wolf and wolverine harvests.

Black bear harvests in GMU 14 and 16 reached new highs in 1980. Eighty-nine were taken in GMU 14 primarily between Willow Creek and the Little Susitna River, and along the Knik river (ADF&G Resource Maps). The previous record was set in 1975 when 80 black bear were taken (Hinman 1981). In GMU 16, 243 black bear were taken in 1980, double the harvest of 1979 and the largest harvest since the sealing program began in 1973 (Hinman 1980a and ADF&G Palmer Game Office, unpublished 1980 date).

There is no closed season for black bear. Over 50% of the harvest, however, occurs in the fall (between July 1 and December 31). Larger fall harvests reflect bear taken as chance encounters or additions to the bag during established ungulate hunting seasons (Hinman 1980a). Since black bear vulnerability may largely be associated with sightability, spring harvests typically occur after black bear leave the den but before deciduous foliage appears. harvests which take place outside ungulate seasons or after foliage appears primarily results from food-seeking bears encountering human habitats (Hinman 1978).

Guidelines have been published to guide development in areas of extensive wildlife habitat (ADF&G 1980b).Four elements to guide development and mitigation measures to be considered in guiding development include:

- Effects of development on critical wildlife habitat;
- Creation of buffer zones between wildlife habitat and development;
- Timing of activities;
- Effects of access.

Critical upland habitats are those associated with heavy wildlife use, especially those areas meeting particular seasonal or life cycle needs, such as winter or summer forage areas, calving areas, denning areas, and migration corridors (ADF&G 1980b). Winter habitat is usually the most limited and any loss may have severe effects. In many instances, mitigation measures may offset loss of habitat; for example, forage may be improved elsewhere to compensate.

Imposing buffer zones between developments and valuable habitat is often a useful technique to separate human activities from wildlife areas (ADF&G 1980b). Of particular importance for upland game would be the separation of agricultural areas from areas of heavy wildlife use in order to reduce crop damage as well as to protect wildlife. Commercial, industrial and residential uses also create problems to a greater or lesser degree depending upon the amount of noise,. introduction of foreign substances and habitat alteration associated in the development.

Timing activities to coincide with periods of low use by wildlife provides another means for meshing human and wildlife use of upland habitats to the maximum extent possible, periods of high human use activity such as during construction should be scheduled to avoid periods of peak wildlife use.

Development in new areas will necessitate access and increase road traffic. The implications for wildlife are three-fold. First, roadways will alter existing vegetative patterns - either increasing forage potential for moose by replacing mature forests with new vegetation along the road or reducing forage by replacing prime habitat with pavement. Second, increases in road traffic may have a double impact. It may drive away certain species which are intolerant of human activity. Roads often provide forage attracting moose. A comparison between road kills of moose in Palmer with that in Talkeetna indicates heavy traffic volumes combined with areas of winter forage lead to a high number of road kills (Tables 69 and 70). Last, hunting pressures can be affected in two ways; increased road access will enable more hunters to participate and the increased pressure should be better distributed.

RESOURCE ANALYSIS AND COASTAL SENSITIVITY

PHYSICAL CHARACTERISTICS AND RESOURCES ANALYSIS

WATER RESOURCES

Surface water and ground water resources in the Mat-Su Borough are largely untapped. Lakes and streams can provide large quantities of water throughout the year. The composite flow average for the Chulitna, Susitna, and Talkeetna Rivers is 24,000 cfs (cubic feet per second) or 15,000 mgd (million gallons per day) (Fuelner 1971). The Matanuska River near Palmer averages 3,857 cfs or 2,500 mgd.

Ground water is plentiful in the aquifer along the Susitna and its tributaries. Future water needs for communities such as Palmer, Wasilla, Houston, Willow, Sunshine, Montana, and Talkeetna could be supplied from this aquifer. Wells, or galleries located in the aquifer should yield 1,000 gpm or greater. Wells placed in former drainage channels and buried valleys distant from active streams should yield up to 500 gpm (Fuelner 1971).

The area of the district excluding the high yield aquifer along the Susitna and its tributaries presents less promising water yields. No widespread aquifer system is known to exist in this area. Wells usually yield between 10 and 50 gpm (Feulner 1971). Most of the larger communities within the Borough are located in this area.

- Palmer - To meet increased demands for water in Palmer it will be necessary to drill wells north of town or in abandoned channels south of town, or installing a gallery adjacent to Matanuska River east of town. The ground water source near Fishhook Road appears to be intermittent. Some wells in the area have dried up or yield only a minimum amount of water. Other wells in the area are providing adequate quantities of water.

- Wasilla - There is an adequate supply of ground water available near Wasilla, although the water is close to the surface and contamination of the shallow ground water aquifer and lakes is possible. Wells were contaminated by adjacent septic tanks in 1970 (Fuelner 1971).

- Houston - The supply of ground water available to Houston is sufficient to meet the present and projected future needs of its population.

- Willow - Willow water supplies would have to be increased if the State Capital is moved to the areas.

- Big Lake - Big Lake wells yield fairly large quantities of water. There is a potential for contamination with increased settlement in the area. Additional water can be obtained just north of the community.

- Montana - Montana has an abundant water supply.

- Sunshine - Sunshine also has an adequate supply of ground water available.

- Talkeetna - Talkeetna water is plentiful, but precaution should be taken to protect the ground water supply from contamination. Private sewer systems back up during spring break-up causing well contamination. Contamination is attributed to the lack of a community sewage facility. Residents use septic tanks which discharge into shallow aquifers which drain into a nearby lake. The coliform count in the lake could become a health problem as permanent settlement at the east end of the lake intensifies.

GEOPHYSICAL HAZARDS ANALYSIS

GEOLOGIC HAZARDS

Constraints of geologic origin fall into three categories: (1) seismic, (2) volcanic, or (3) mass wasting restrictions. The restrictions generally fall into the categories of no development in or adjacent to the hazards and/or using adequate design techniques to minimize adverse affects from the hazard. Site specific studies would be needed to adequately address these constraints when planning future developments.

Seismic Constraints

Several major faults either border or cross the Mat-Su Borough Coastal Management District and the southcentral area of Alaska, which is one of the most seismically active areas in the world. One of the strongest earthquakes in recorded history struck southcentral Alaska in march of 1964; the magnitude of which was 8.4 on the Richter Scale. The quake was centered in the Prince William Sound area, approximately 175 km (100 miles) southeast of the Mat-Su Borough. For engineering design purposes, preliminary maximum credible earthquake (PMCE) events of magnitude (M_s) 7.4 on the Castle Mountain, and (M_s) 8.5 on the Denali faults should be considered. Another major source of seismic energy in the Borough is the Benioff zone which has an estimated PMCE to be a magnitude (M_s) 8.5 event (WWC, 1980). Construction within the anticipated ground rupture zone on these or other active fault traces should consider the consequences of faulting. The width of ground rupture along a fault is a site-specific function; ruptures could range in width from a few feet to several hundred feet. Refer to the Geophysical Hazards Map for the general location of reported active faults (Map D). Refer to the Geologic Hazards Map for the general location of the fault system (Map D). Liquefaction potential is high on the floodplains of the Susitna, Little Susitna, Matanuska and Knik Rivers. The combination of fine-grained deposits and high water table magnifies this potential. Specific site response to ground shaking, however, is also dependent on a number of other factors such as duration of shaking, response spectra, earthquake magnitude and intensity, depth of focus and building design and construction. Alluvial fans on the Chugach Mountain fronts in Knik Valley showed severe cracking as a result of the 1964 earthquake (oral communication, R. Updike 1981). Since these areas may appear attractive to development, proper engineering design needs to be considered in view of the liquefaction potential. Flood potential also needs to be addressed in these areas.

In areas of peat bogs and silt fans, ground shaking can be amplified. The morainal and glaciolacustrine deposits blanketing the Susitna River Basin in general are poor foundation material except where locally high in gravel and sand content. Since they are normally poorly drained, with high water and ice content, the deposits are frost susceptible and may tend to settle differentially if thawed. In the case of peat bogs, development in these areas usually involved stripping off the organic mat which them promotes thawing of the underlying soils. This thawing in turn can cause differential settlement.

Volcanic Constraints

In the area south and west of Mount Susitna, and Little Mount Susitna volcanic hazards pose constraints on development. Violent directed explosions, flash floods, ash fall, landslides, and mudflows among other phenomena could damage nearby developments. An approximate 35 mile radius of destruction can be set based on past examples of andesitic volcanic eruptions. Lahars, which are volcanic mudflows, can reach speeds of up to 100 mph and travel great distances. Since these mudflows follow the valleys, their path can be predicted with fair certainty by analyzing the topography. The extent and volume of the flow, however, is much more difficult to predict (G. A. Macdonald, 1972). The presence of Capps Glacier on the north flank of Mount Spurr sets the stage for flash flooding in the event of an eruption. Some possible alleviating measures are available given the cooperation of nature and proper design. Mudflows of relatively small volume can be contained in properly designed reservoirs. Other possibilities are diversion barriers and artificial structures to serve as refuge. Small glowing avalanches can be constrained in reservoirs provided the velocity of the flow reaching the dam is not too great. Ash fall can be shoveled off roof tops to prevent collapse and dust filters installed in aircraft or other engines.

In the event that at a violent directed explosion or explosively generated glowing avalanche is feared the best approach is to evacuate the entire circumferential area (G. A. Macdonald, 1972).

Mass Wasting Constraints

Mass wasting presents a viable constraint on development in the Borough. Landslides occur in abundance along the walls of the Matanuska Valley in the southeastern portion of the Borough. A combination of geologic conditions contribute to the high landslide risk in the area. Valley walls are greatly oversteepened as a result of scour and erosion by Pleistocene glaciation. Numerous incompetent shale layers in the Chickaloon and Matanuska Formations in the valley walls provide classic slide plane surfaces (Detterman, eta al. 1976). In addition, the rocks in the area are highly fractured and sheared due to their proximity to the Castle Mountain and Border Range fault zones. Development on or near the toe of landslide deposits may reactivate the slide and should be avoided.

Site specific examinations should be made prior to development on or near slopes steeper than 35 degrees in the slide prone Matanuska Valley. Avalanche chutes are generally a phenomenon of the steep, higher mountainous areas, but as development progresses into these areas careful planning and site specific mapping needs to be done. The area on the east side of Mount Susitna and one the west side of Little Mount Susitna is avalanche prone. Other areas of extensive avalanche occurrence are in the Central Alaska Range from Hidden River to Alder Creek and in the Talkeetna Mountains from Indian River to Kashwitna River (Map D). Pioneer Peak along the old Palmer highway on the southside of Knik River Valley is a large, active avalanche chute. Activities in the avalanche prone areas should be restricted particularly during times of high avalanche risk; characteristically during spring thaw.

Rock glaciers occur on the drainage divide between Hidden River and Eldridge Glacier in the northern portion of the Borough. More rock glaciers may exist in other narrow mountain valleys in the Talkeetna and Chugach mountains but have not been documented. Development should be avoided on or near the base of these slowly moving rock slides.

HYDROLOGIC HAZARDS

Hazards of hydrologic origin include riverine flooding, icings, and stream bank erosion. Consideration of these hazards places a constraint on development. The amount of constraint associated with these hydrologic hazards depends on the overlap of the site specific boundaries of the proposed development with the site specific hazard boundaries. Lacking such site specific information, a general discussion of the types of constraints imposed by hydrologic hazards follows.

Riverine Flooding Constraints

Development within the floodplain of a 100 year recurrence interval flood should be restricted to minimize the potential for flood damage. Floods have the potential to damage or carry away roads, buildings, or automobiles, and have often caused injury or death to people or animals in their path. The 100 year recurrence interval flood has a one percent chance of occurrence in any given year.

All streams in the Matanuska-Susitna Borough Coastal Management District have 100 year floodplains associated with them. Only a few of these have been studied in sufficient detail to delineate their boundaries (Preliminary Management Areas, Map F). Boundaries that are shown as approximate or estimated should be studied in detail if development is proposed in the vicinity of the boundaries.

In certain areas having limited available space, a floodway concept can be implemented. A floodway is the portion of the 100 year floodplain that must be maintained undeveloped to ensure that the water level of the 100 year recurrence interval flood does not rise more than a specified level (usually 1 ft) if the remainder of the floodplain were completely developed (Figure 9). Such a concept allows development in the floodway fringe (area between the 100 year floodplain and floodway boundaries), but such development should be done on fill or on pilings that keep the property above the flood level of the 100 year flood. Property that already exists in the 100 year floodplain should be protected from flood waters; publications describing flood proofing techniques are available through the U.S. Army Corps of Engineers District Office in Anchorage.

The 100 year floodplain boundaries may change over time. The two primary causes of change are increased levels of hydrologic data and degree of development in the basin. Even the detailed floodplain delineation studies are based on estimates of the magnitude of the 100 year recurrence interval flood. Estimates of such floods in Alaska are typically based upon only a few years of discharge measurements, and often these measurements are on a different stream or too far upstream or downstream on the study stream. Thus, as additional years of data are made available, the magnitude, and thus the floodplain boundaries, of the 100 year flood may change; such a change may be an increase or decrease from the current values, but would not normally be substantial.

Increased development in the floodplain typically decreases the natural storage and retention properties of the natural conditions. Wetlands, lakes, vegetation, and slight depressions have the capability to store and delay runoff so that floods last for a long time and have relatively low magnitudes. As development occurs, these storage and retention features are replaced by buildings and pavement from which runoff is rapid. Thus, floods last for shorter periods and have increased peaks as development continues.

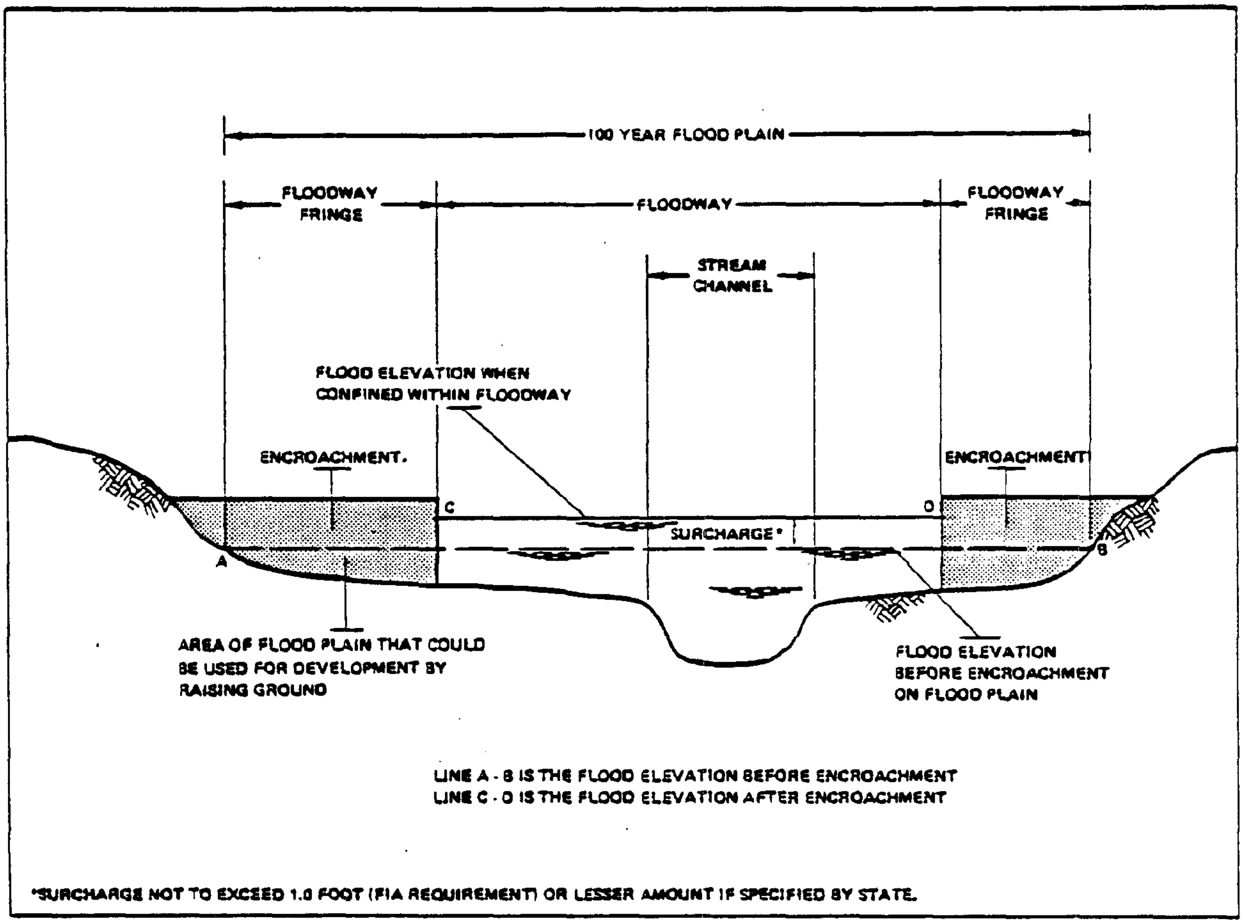


Figure 9: Schematic diagram illustrating the concept of a floodway (from Flood Insurance Study - Guidelines and Specifications for Study Contractors, by Flood Insurance Administration, October 1977).

Because of the increased flooding as a basin is developed, structures built adjacent to the present 100 year floodplain may be in the 100 year floodplain within a decade if substantial development occurs. To prevent this occurrence, present floodplain studies can be based on an ultimate development hypothesis, although numerous uncertainties would be involved in such a study.

Icing Constraints

The location and size of icings is very site specific; icings also change in size from one year to the next as a result of different climatic conditions controlling their formation. Site specific studies are warranted to identify the potential for icings at any development site in the Borough. The existence of icings in an area does not preclude development of the area; the design of the development should include consideration of the icing conditions. Such design conditions are site specific. For example, the construction of a road across an area of probably icing formation should consider using culvert designs which minimize icing formation. Another situation would be the construction of a structure in an area of potential icing development; subsurface drainage devices could be used to transmit the ground water around the structure, thus reducing the potential for icing development upslope from or at the structure.

Stream Bank Erosion Constraints

Development is areas subject to stream bank erosion should be restricted. An undeveloped area should be retained, whose width is equal to or greater than the estimated amount of bank erosion over the design life of the development. Such a study is very site specific. If such an area is not retained, loss of the development may result.

If maintenance of an undeveloped area is not possible, bank protection schemes may be used. Such schemes include a wide range of techniques which should be professionally designed to be effective and to minimize adverse effects elsewhere along the stream.

OCEANIC HAZARDS

Hazards of oceanic origin that potentially can affect the Matanuska-Susitna Borough coastline include ice, seismicity, and storms. There is currently very little development along this coastline. Consideration of the potential hazards associated with the coastline should be included in any analysis of development potential of the area. Site specific data should be collected in any such analysis, since the available data base is primarily related to the opposite coastline of Knik Arm and Upper Cook Inlet from the Matanuska-Susitna Borough Coastline.

Ice Constraints

Constraints associated with the ice hazard include restrictions on development adjacent to the coastline and special design considerations for structures built in Upper Cook Inlet or Knik Arm waters. Ice floes that are moved by tides and winds can gouge shorelines, causing shoreline erosion, and can exert significant forces on offshore structures. The rate of erosion would have to be evaluated on a site specific basis based on field data. Field data also would be needed to quantity the ice forces associated with offshore structures. Stamukas, shorefast ice, and beach ice can remove surface layers of beach material if the ice if lifted by high tides and transported away by tidal currents or winds. Such material removal may impact nearshore development projects.

Seismicity Constraints

Constraints associated with the seismic hazard include those to minimize damage from coastal erosion and flooding. Tsunamis and seiches can cause significant wave-induced erosion and flooding. Further study is needed to quantify this hazard for use in site specific planning near the Mat-Su Borough Coastal Management District coastline.

Storm Constraints

As with other coastal hazards, erosion and flooding may result from storm driven waves. Developments planned adjacent to the coast on offshore should consider the impacts of this hazard. Further study is required to quantify this hazard for the Mat-Su Borough Coastal Management District coastline.

Summary of Geophysical Hazards

The constraints to development associated with geophysical hazards can be classified into two general categories: (1) avoidance of the hazard area, and (2) designing to minimize damage associated with the hazard (Table 71). In most

Table 71: Summary of Basic Development Constraints Associated with Geophysical Hazards in the Matanuska-Susitna Borough Coastal Management District.

Hazard	Avoid Hazard Area	Design for Hazard[a]
GEOLOGIC-SEISMIC		
- Fault traces	X	X
- Liquefaction	X	X
- Ground shaking		X
- Frozen soils		X
GEOLOGIC - VOLCANIC		
- Directed explosions	X	
- Glowing avalanche	X	X
- Flash floods	X	
- Mudflows	X	X
- Landslides	X	
- Ash fall		X
GEOLOGIC - MASS WASTING		
- Landslides	X	X
- Avalanches	X	X
- Rock glaciers	X	
HYDROLOGIC - FLOODING		
- Within floodway	X	
- In floodway fringe	X	X
HYROLOGIC - ICINGS		
- All locations	X	X
HYDROLOGIC - BANK EROSION		
- All locations	X	X
OCEANIC - ICE		
- Coastal erosion	X	X
- Coastal flooding	X	X
OCEANIC - SEISMIC		
- Coastal erosion	X	X
- Coastal flooding	X	X
OCEANIC - STORMS		
- Coastal erosion	X	X
- Coastal flooding	X	X

[a] When both avoidance and design options are identified, avoidance is preferred.

cases, avoidance of the hazard is the best approach. When the hazard is to widespread that it cannot be avoided, or when the proposed development cannot be relocated, projects should be designed to minimize the impacts of the hazard.

HUMAN AND CULTURAL RESOURCE POTENTIALS

POPULATION

Population growth in the Matanuska-Susitna Borough will continue its recent gradual growth rate unless affected by two major factors: the capital move and resource development.

Original studies associated with capital relocation estimated that a new community of 30,000 would be established at the Deception Creek site near Willow by 1992 (ESL, 1978). More recent estimates have proposed a "bare bones" capital of 3,000 individuals, which would conservatively place an associated population increase at under 10,000. The timing, size, and certainty of a capital move are not clear at this time.

Resource development likely to induce population growth include coal, hydroelectric power generation projects, timber, and agriculture. Production from coal fields in the western Kenai Peninsula and Matanuska-Susitna Boroughs could result in the establishment of one or more new communities of 3,000 people in that area (Holmes and Narver, personal communication). Construction of the Susitna Hydroelectric Project would create a short-term construction-related population increase, and probably contribute to long-term growth by providing cheaper power for industrial and residential development. At this point in time neither timber or agriculture appear to have a growth potential that would induce a major population increase.

Population growth is likely to occur in settled areas at existing communities and along the highway system. Two exceptions to this pattern are a capital relocation and development of coal resources in the western portion of the Borough.

ECONOMY

As with population, changes in the Borough's economy are tied to the capital relocation and resource development. The capital relocation would cause a direct increase in regional government employment, and induced increases in transportation and service sectors. It might create temporary employment for currently under-employed construction-related skills, but would not result in long-term employment for these skills.

Resource development potential remains uncertain. Attempts to re-establish the local agricultural economy have centered around the Point MacKenzie Dairy Project. The recent land lottery for this project is currently in litigation, and this agricultural project may not result in measurable economic benefits for several years. The development of coal and mineral resources holds the highest economic potential. Increasing power generation demands, the political instability of petroleum resources, labor unrest in coal exporting nations, and comparable transportation costs are making Alaskan coal competitive in export markets. The Beluga coal fields, and neighboring deposits in the Matanuska-Susitna Borough are attractive because of large reserves of surface mineable coal and proximity to tidewater. Development could lead to construction of one or more marine export terminals and development of a transportation infrastructure connecting the coal fields and terminals with the Parks Highway and Alaska Railroad. Substantial construction and operations employment, and tax revenues would be generated by development of coal resources.

The recently-held Upper Cook Inlet State oil and gas lease sale is more likely to find natural gas deposits than oil (Simpson, Usher, Jones, 1979). Additional gas finds will probably be utilized for power generation and domestic consumption. Scattered but small scale mining activities will continue to take place. The more promising mining districts include the Yentna Mining District and Valdez Creek-Talkeetna Mineral belt (Simpson, Usher, Jones, 1978). While no major mineral development projects have been proposed, the potential for such projects is good.

The Borough has sizeable timber resources, but its commercial value is generally considered low. High logging, transportation, and milling cost will continue to constrain development. The chip market, for which the majority of Matanuska-Susitna timber is best suited for, is relatively unstable and has not supported Alaskan logging-shipping operations consistently. However, in Southcentral Alaska, small scale production of finished dimensional lumber for local construction has been increasing.

The recreation/tourism industry is one of the Borough's more promising industries, and the Borough has recently initiated a Recreation-Tourism Feasibility Study aimed at capturing a greater share of this industry. Increasing Southcentral population growth will increase the demand on Borough attractions and facilities to the point that new recreation access and facilities need to be developed. By actively prioritizing facility construction and promotion activities, the Borough might capture a greater share of conventions, package tour operators, and non-Alaskan tourism.

The Borough's public finance characteristics (expenditures outweighing revenue generated and dependence on intergovernmental transfers) will continue unless major industrial development occurs that generates revenues in excess of demands for services. Capital relocation without industrial development may be a mixed blessing in that, with State property exempt form taxation, residential property tax revenue by itself may be insufficient to meet expenditures for meeting service demands. The concentrated population, and hence concentration of services, may mitigate this impact. Development of major, capital intensive resource development by private entities hold the most promise for improving Borough finances. Development of coal resource currently have the highest potential for increasing Borough revenues.

COMMUNITY STRUCTURE

The distribution and characteristics of housing are tied to population, economic growth, income, and lifestyle. Housing distribution patterns around major communities and transportation corridors are likely to continue, dependent on major resource development, capital relocation and State land disposals. These activities will concentrate new housing in specific areas not currently connected with Borough road and service systems. Income and lifestyle characteristics of Borough residents will continue to support growth of mobile home and rural housing.

Resource development and the capital relocation will have two impacts on housing characteristics. Quantities of temporary, construction housing will be required at development sites, possibly accompanied by a demand for multi-family rental units in major communities for construction labor families. Permanent employment for resource development and the capital relocation will increase demands for single-family housing.

Projected transportation requirements can be divided into two major categories: those supporting resource development and those supporting population growth. With regard to resource development, Point MacKenzie development, the Knik Arm Crossing, and access to western coal fields are the primary potential transportations needs. Feasibility studies on developing a port facility at Point

MacKenzie hinges on coal, mineral, and petrochemical resource transportation requirements, with potential lesser demands from timber and agriculture. Port development would be accompanied by connection to existing rail and highway systems. In addition to exporting resource products the Port would function as a local and regional container port for commodity import.

The Knik Arm Crossing has been proposed for several years as a means of facility residential development of the Mat-Su Borough, opening up the resources of western Mat-Su Borough, and shortening travel time to Interior Alaska. Design and cost questions on the crossing have yet to be resolved. However, construction of the crossing will also facilitate development of Port MacKenzie.

Providing transportation access to the Beluga Coal Fields area hinges entirely on the coal development schedule. Coal development could support both rail and road access extensions.

Population growth, particularly in more isolated areas such as the capital site and State land dispersal areas, will require development of secondary access to existing road systems. Because the capital site is concentrated in one areas, provision of access presents few problems. However, isolated development of land disposal sites could increase existing Borough access problems associated with construction and maintenance of road access to rural subdivisions. Whether this responsibility rests with the State, Borough of private owners will remain à highly contested subject.

Distribution of demand for community services is likely to remain a major problem for the Matanuska-Susitna Borough, unless major capital intensive private development significantly increases Borough revenues.

If scattered, gradual residential growth continues, service demand will accrue to existing facilities and distribution systems, and costs of services to low density areas will remain high. Major development such as the capital move, development of Point MacKenzie, and coal resource development will create site specific demands for education, health care, public safety and utilities services, and also increase regional demand from induced population growth. Specific, concentrated development will require new facilities and distribution system expansion to those locations affected, such as Point Mackenzie and the capital site. Induced demand will most likely impact existing facilities and distribution systems, possibly necessitating increases in capacity by facility expansion or new construction.

COASTAL AREA LAND STATUS

One aspect of the resource analysis is the examination of major land and resource ownership and management responsibilities within or adjacent to the Borough. The importance of such a land status determination allows for a clear understanding of ownership and management responsibilities in coastal areas over which Borough coastal management program policies apply.

When determining land status, one fact that must be kept in mind is that land ownership patterns throughout all of Alaska are in a state of flux as a result of incomplete implementation of federal and State laws. The coastal area of the Mat-Su Borough is no exception to this.

State Land

Throughout Alaska's history, the Territory of Alaska, the University of Alaska, and the State of Alaska have acquired land from the federal public domain through various federal land grants. One of the first of these federal land grants was the Act of 1915 (P.L. 330). This Act granted all vacant surveyed township sections 16 and 36 to the Territory of Alaska for the benefit of the common school fund. The income derived from these lands were placed in a trust with only the earnings being used to benefit the schools. In 1978, the Alaska Legislature redesignated the "school sections" as general State land removing the trust land designation. The legislature now provides for a percentage (½%) of the State resource revenues to feed the school trust fund in place of school trust land revenues.

The Act of 1929 (P.L. 679) granted 100,000 acres of surveyed, non-mineral, vacant, unappropriated and unreserved land to the University of Alaska. These lands, like the school lands, where trust lands with only the earnings being used to benefit the University. Through the Act of 1929, the University of Alaska acquired title to land within the coastal area of the Mat-Su Borough. Much of the University land has been leased under State of Alaska leasing laws.

The Mental Health Grant Act of 1958 (P.L. 830) granted a sizeable area of land, 1,000,000 acres, to the State for the purpose of establishing another trust fund to benefit the funding of mental health costs in Alaska. Like the school trust lands, the land trust designation for mental health lands was removed by the Alaska Legislature in 1978. The legislature now provides for a percentage (1½%) of the State resource revenues to feed the mental health trust fund in place of mental health trust land revenues.

The Alaska Statehood Act of 1959 (P.L. 85-508) transferred the largest amount of land from federal to State ownership. Section 6(b) of the Alaska Statehood Act provided for a grant of 102,550,000 acres to the State of Alaska. Much of the uplands in the Mat-Su coastal area were selected under this authority and patented to the State. The selection process for State land contains three district steps prior to final acquisition of the federal patent by the State. The process includes selected lands, tentative approved selected lands, and patented lands. Selected and tentative approved selected status on a tract of land does not necessarily mean that the State will get the final patent.

In addition to the lands granted to the State under the Alaska Statehood Act, the Submerged Lands Act of 1953 (P.L. 85 303 and 508) conveyed all tidelands, submerged lands, and shorelands under all navigable waters to Alaska upon statehood. These lands are available for lease only and cannot be sold under existing State law. Only those persons using such tidelands and cities existing prior to statehood were given a preference to purchase.

Borough Land

The Mat-Su Borough was incorporated in 1964 and received the right to select up to 10% of the vacant, unappropriated, unreserved State land within the Borough's boundary. The Municipal Land Entitlement Act of 1978 (AS 29,18.201-.213) has since restricted Borough land entitlement to a maximum of 355,210 acres of State land. Borough lands within the Mat-Su coastal area are divided into selected lands, tentative approved lands, and patented lands. The tentative approved lands lack the patent document for technical resons only (e.g. lack of exterior boundary survey). Conditional disposals of tentative approved lands can be made with prior approval of the Department of Natural Resources. Approved selections on surveyed land is only waiting for the State's patent document processing to be completed. Pending unapproved selections are in the adjudication process and could be denied if the Borough has over selected its entitlement.

Borough title does not include the mineral rights to the land or title to any navigable water bodies. The State also retains public access to and along all water bodies. With the exception of some school sites and administrative facilities, all of the Borough land was acquired from the State.

Private Land

Private land ownership in the Mat-Su coastal area, other than Native land, has evolved through federal land allocation laws, State land sales and Borough land sales. The most prominent federal program was the Homestead Act. Fee ownership gained through the federal homesteading procedure passed the most complete bundle of rights to the private land owner. The federal patent usually included the mineral rights to the land. In 1958, the Homestead Act was changed to reserve the mineral rights from homestead entries in Alaska. The State has since acquired those reserved mineral rights under the homestead lands where there is a mineral potential. Private lands obtained through State and Borough land sales do not include mineral rights which were retained by the State.

Native Land

The Alaska Native Claims Settlement Act (ANCSA) of 1971 (P.L. 92-203) provided for a land settlement to the Native villages within the Mat-Su coastal area. ANCSA and a subsequent amendment (Terms and Conditions for Land Consolidation and Management in the Cook Inlet Area) provides for federal and State land to satisfy the village and region entitlements. Most of the lands conveyed to Native corporations have been identified, however, litigation is pending for many of the acres selected by Eklutna, Inc. As a result, dual ownership occurs for much of the land south of the Knik River area including the Duck Flats in the Palmer Hay Flats State Game Refuge (T16N, R1-4E, S.M.). The Alaska National Interest Lands Conservation Act (P.L. 96-487) that became law in December, 1980 provides for the State and Eklutna, Inc. to exchange lands to allow for Native selections in the Jim-Swan Lakes area to the Knik/Matanuska River Floodplain (T17N, R3E, S.M.).

Permits, Claims, and Leases

All of the tide and submerged lands along Knik Arm in the Mat-Su coastal area have been filed on for offshore prospecting. Most of the activity is in the permit application stage and the balance in terminated permits. An offshore prospecting permit is an exclusive mining right to all of the locatable minerals found offshore. The permit must be approved before any exploration work can be done. If the permittee finds any minerals, the permit must be converted to a lease before any mining is done. The Department of Natural Resources has not approved any permits since about 1975 and does not intend to process any until new regulations are adopted.

As mentioned earlier, the State retains the mineral rights to all land sold or conveyed. If the State has not closed the mineral estate to location or entry, the right to prospect and stake claims on the disposed surface estate still exists. In such instances, the prospector is subject to damage claims of the surface estate. Mining claims on both State and federal land must be filed with the mineral estate owner in addition to filing the claim in the appropriate recording district. This requirement became effective in 1974 on State lands and in 1976 on federal lands. Both federal and State land records now reflect claim locations. A number of mining claims have been filed along rivers in the western portion of the Susitna Flats State Game Refuge.

There are a small number of shore fishery leases in the tidal areas west of the Susitna River. The shore fishery lease gives the leaseholder a priority area for setting nets during salmon runs. Shore fishery leases are issued by the Department of Natural Resources. The possessory interest of a lease must be considered by any competing use in the area.

All land in State ownership in the Mat-Su coastal area, both onshore and offshore, is available for oil and gas leasing. Very little interest has ever been shown in the eastern portion of the Mat-Su coastal area. The upcoming oil and gas lease sales for Upper Cook Inlet held in May, 1981 did not include any new areas. Areas that are currently not under lease, mostly because of expired leases, have been offered for lease in the past. To date, the only commercial quantity of gas found is in the vicinity of Theodore Creek located west of the Susitna River.

PRELIMINARY MANAGEMENT AREA CLASSIFICATION

Based on the resource analysis, portions of the Mat-Su Borough Coastal Management District have been classified as Development, Conditional Development, and Conservation. This classification is intended to guide resource use and activities within the coastal management area (Preliminary Management Areas, Map F).

DEVELOPMENT AREAS

Development areas have been identified within the Matanuska-Susitna Coastal Management District where economic and coastal development are overriding objectives and are not subject to constraints created by geophysical hazards, biological resources, coastal habitat, recreation, land ownership, coastal access, and air/water quality concerns. Economic and coastal developments are preferential uses for these areas.

CONDITIONAL DEVELOPMENT AREAS

Conditional development areas within the Mat-Su Coastal Management District are identified where coastal development may be subject to constraints created by biological resource needs, geophysical hazards, coastal habitat, recreation, land ownership, coastal access, and air/water quality. No activities and development should necessarily receive preferential status in conditional development areas. Activities and development within conditional development areas are subject to coordination with the Planning Department and appropriate State and federal agencies. The Coastal Management Program will identify potential constraints on activities and development within conditional development areas.

CONSERVATION AREAS

Conservation areas within the Mat-Su Coastal Management District have been identified based on overriding geophysical hazards, biological resource, coastal habitat, recreation, and air/water quality concerns. Activities and development within conservation areas should be limited to those identified as preferential uses for these areas.

Map F shows preliminary management area classifications. At this point in program preparation, there is insufficient information to allow exact classification into management categories. For example, flood plains have been identified, but not enough data exists to separate floodways (conservation) from floodway fringe (conditional development). Many areas have been placed in the Conditional Development classification until more information is collected.

In general, resource use and activities were classified, on a preliminary basis, as follows:

Conservation

- biology - critical wetland habitat (State Refuge and ADF&G Designation); anadromous fish streams
- geophysical hazards - avalanche chutes and run-out zones
- cultural - State Parks and Recreation Areas

Conditional Development

- biology - all non-critical wetlands; winter moose habitat and migration corridors

- Geophysical hazards - mass wasting areas; floodplains, identified active and inactive faults, steep coastal bluffs

Development

- all areas not contained in Conservation and Conditional Development areas

This is a first cut at identifying important resource values and constraints to coastal development. The data is not available at this time to map all hazardous areas or important biological areas. Therefore, areas are shown as Development for general guidance only and should not be construed as lacking hazards or other resource values.

SUBJECT USES

SUBJECT USES

Subject uses include all land and water uses and activities within the Mat-Su Borough coastal boundary which are dependent upon access to coastal waters or have a significant impact on coastal habitats, fish and wildlife, natural resources, economic development potentials, cultural and aesthetic values, and the quality of life in the Borough. A thorough determination of subject uses and activities occurring in the coastal area will facilitate the development of comprehensive coastal management policies and effective implementation procedures.

Mat-Su Borough coastal management subject uses, identified below, are based on the findings of the resource inventory and analysis. The land and water uses and activities that are subject to the Mat-Su Borough Coastal Management Program include, but are not limited to, those activities occurring in the Borough for which the Alaska Coastal Policy Council has developed standards (6 AAC 80.040-.150). These subject uses will be updated, refined, and evaluated through a matrix analysis during Phase II (July through December 1981) of program development.

A. Coastal Development.

   1. Residential development.

   2. Commercial development.

   3. Industrial development (e.g., port facility).

   4. Development of public facilities.

   5. Agricultural expansion and development.

B. Recreation.

   1. Consumptive recreation.

      a. Hunting, primarily waterfowl and game (e.g. moose, black bear).

      b. Fishing.

2. Non-consumptive recreation.

   a. Hiking.

   b. Camping.

   c. Photography and wildlife viewing.

   d. Skiing, snowmobiling, and dog mushing.

3. Tourism.

   a. Structures and facilities necessary to support tourism (e.g., hotels, restaurants, lodges, resorts, etc.).

4. State Parks, game refuges, campgrounds, waysides, and scenic viewpoints.

C. Energy Facilities.

1. Oil and gas activities (e.g., exploration, development, production, conversion, storage, transfer, processing, transportation of oil and gas, etc.).

2. Petroleum refineries, gasification plants, and transshipment facilities for the exportation of energy products (e.g., Point MacKenzie Industrial Port area).

3. Hydroelectric facilities serving the region (e.g., Susitna Dam Project).

D. Transportation and Utilities.

1. Highways, railways, airfields and port facilities.

2. Power transmission lines, telephone lines, water lines, and sewer lines serving a local area.

3. Water treatment, sewage transfer, sewage treatment, and solid waste disposal facilities.

E. Sport and Commercial Fisheries and Seafood Processing.

1. Hatcheries and related facilities.

2. Boat ramps.

F. Timber Harvesting and Processing.

1. Harvesting activities (e.g., construction of logging roads, harvesting of timber, disposal of logging debris (slash), construction of logging camps, reforestation, and maintenance of logged areas).

2. Processing activities (e.g.. sawmills, pulp mills, and timber export facilities).

G. Mining and Mineral Processing.

1. Coal mining activities (e.g. development, production, transportation, exportation, and reclamation).

2. Sand and gravel extraction.

3. Placer mining.

H. Subsistence.

1. Customary and traditional use of wild and renewable resources for direct personal or family consumption.

I. Coastal Habitats.

1. Maintain and enhance important habitats and fish and wildlife populations.

J. Air, Land, and Water Quality

1. Maintain and enhance the high air and water quality in the Borough.

K. Historical, Prehistoric, and Archaeological Resources.

1. Maintain and enhance historical or culturally significant resources, structures, or locations.

The appropriateness of the above identified subject uses, in particular Mat-Su Borough coastal settings, will be reviewed in conjunction with the results of the resource analysis during Phase II (July through December 1981) of program development. Coastal resource sensitivity and use capability criteria which were developed during the resource analysis will be utilized to geographically classify the Mat-Su Borough coastal area into development, conditional development, and conservation categories.

The subject uses presented in this chapter will be evaluated through a matrix analysis and shown as either being fully compatible, compatible, neutral, or not compatible with the different geographic classifications (e.g., development, conditional development, and conservation) of the Borough coastal area. Such a matrix analysis evaluation will facilitate the determination of policy (proper and improper uses and policy statements) for a specific subject use or activity in a predetermined classified coastal area (e.g., residential development in a conditional development area).

AREAS WHICH MERIT SPECIAL ATTENTION

AREAS WHICH MERIT SPECIAL ATTENTION (AMSA)

Inherent in the Alaska Coastal Management Act and the Alaska Coastal Management Program is the realization that all coastal areas and resources are not homogenious. As a result of unique aesthetic, ecological, recreational, geophysical or industrial values present, certain coastal areas and resources warrant additional "special" management efforts above that provided for most coastal areas and resources. These areas where a demonstrated need for special management efforts exist are known as "areas which merit special attention" (AMSA).

The Alaska Coastal Management Act defines areas which merit special attention as:

> "... a delineated geographic area within the coastal area which is 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 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..."

Criteria used as a basis for designating a coastal area as an area which merits special attention include:

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

- Areas of substantial recreational value or opportunity;

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

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

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

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

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

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

- Potential estuarine or marine sanctuaries.

The responsibility of designating areas which merit special attention to be included in a district program rests with the district and appropriate State agencies. To date, five coastal areas within the Mat-Su Borough have been identified for designation as areas which merit special attention (Figure 10, Map G).

- Point MacKenzie Industrial Port Site;

- Knik/Matanuska River Floodplain;

- Susitna Flats State Game Refuge;

- Goose Bay State Game Refuge; and

- Palmer Hay Flats State Game Refuge.

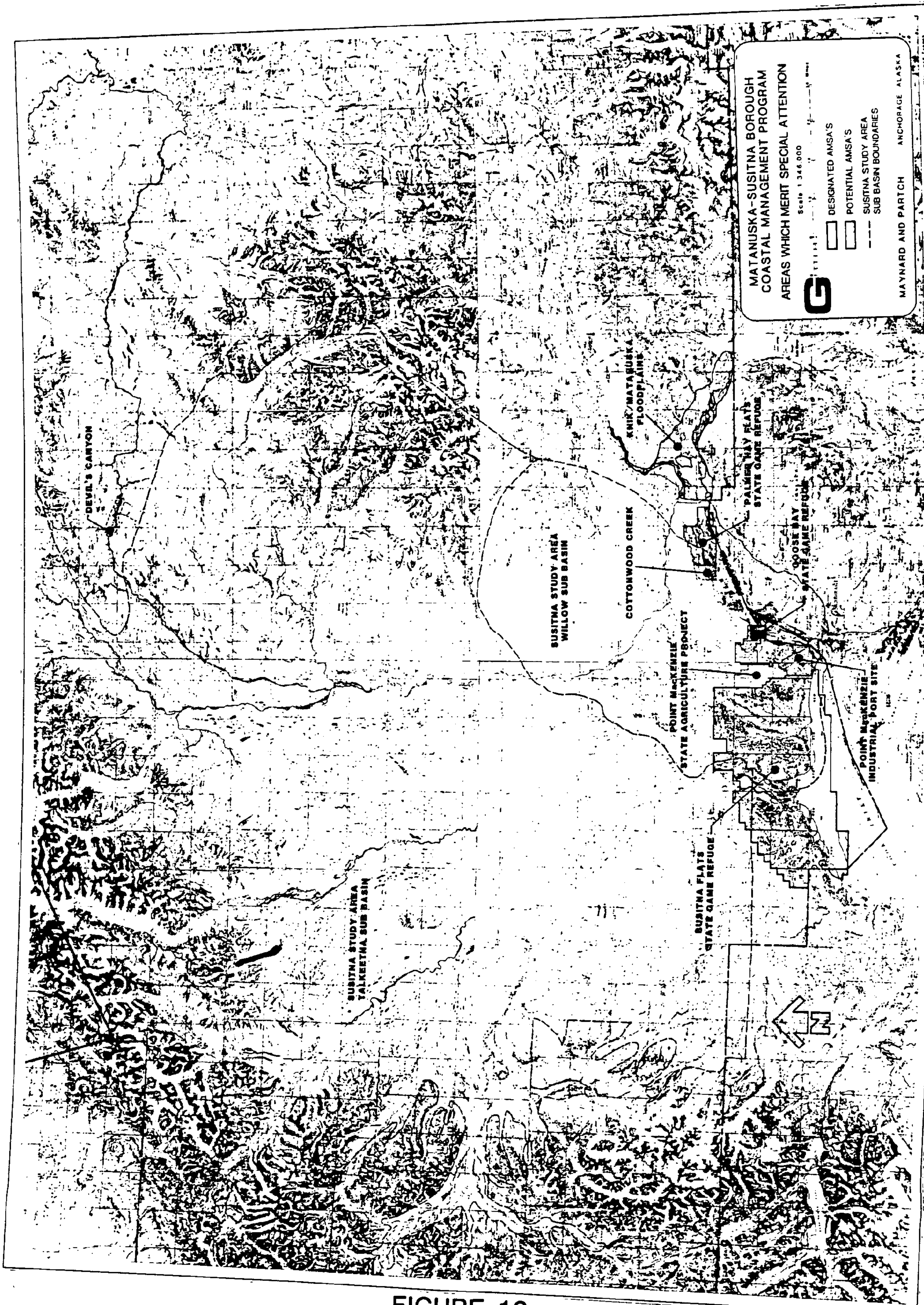
In accordance with Alaska Coastal Management Program Standard 6 AAC 80.150, the following information is to be provided for each area which merits special attention designated in a district coastal management program.

- The basis or bases for designation under AS 46.40.210(1) and 6 AAC 80.150(b);

- A map showing the geographic location, surface area and, where appropriate, bathymetry of the area;

- A description of the area which includes dominant physical and biological features;

- The existing ownership, jurisdiction, and management status of the area, including existing uses and activities;



MATANUSKA-SUSITNA BOROUGH
COASTAL MANAGEMENT PROGRAM
AREAS WHICH MERIT SPECIAL ATTENTION
Scale 1:346,000
DESIGNATED AMSA'S
POTENTIAL AMSA'S
SUSITNA STUDY AREA SUB BASIN BOUNDARIES
MAYNARD AND PARTCH
ANCHORAGE ALASKA
DEVIL'S CANYON
SUSITNA STUDY AREA WILLOW SUB BASIN
COTTONWOOD CREEK
KNIK/MATANUSKA FLOODPLAINS
PALMER HAY FLATS STATE GAME REFUGE
GOOSE BAY STATE GAME REFUGE
POINT MacKENZIE STATE AGRICULTURE PROJECT
POINT MacKENZIE INDUSTRIAL PORT SITE
SUSITNA FLATS STATE GAME REFUGE
SUSITNA STUDY AREA TALKEETNA SUB BASIN
N

FIGURE 10

- o The existing ownership, jurisdiction, and management status of adjacent shoreland and sea areas, including uses and activities;

- o Present and anticipated conflict among users and activities within or adjacent to the area, if any; and

- o A proposed management scheme which includes a description of proper and improper uses and activities of land and water within the area, a statement of policies which will be applied in managing the area, and an identification of the authority which will be used to implement the management scheme.

Management schemes for areas which merit special attention must preserve, protect, enhance, or restore the value or values for which the area was designated. The three State Game Refuges are designated as areas which merit special attention because of their extraordinary value to fish and wildlife habitats and populations and due to the intense public recreational usage of such fish and wildlife resources within the refuges. To avoid any duplication of management efforts, the Alaska Department of Fish and Game will be responsible for developing management schemes for the refuges in accordance with the enabling refuge legislation. Importance will be given to managing the refuges under the multiple-use concept which recognizes that the refuges were classified to protect and manage more than one resource and more than one public use.

The following describes the five areas which merit special attention within the Mat-Su Borough.

AREA WHICH MERITS SPECIAL ATTENTION #1

1. Name: Point MacKenzie Industrial Port Site

2. Primary Values and Bases for Designation:

   a. Primary Values: Port facility, water-dependent and water-related industry.

   b. Bases for Designation: AS 46.40.210(1)(D).

   The primary value of the Point MacKenzie Industrial Port Site AMSA designation is to preserve adequate acreage for a commercial deep water port facility on Knik Arm. Priority will be given to water-dependent and water-related industrial facilities which are developed to support the port facility.

The basis for this AMSA designation under the Alaska Coastal Management Act and Program include:

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

3. Geographic Location and Description:

   a. Coastal Region: Upper Cook Inlet Coastal Region

   b. Local Orientation: Matanuska-Susitna Borough

   c. Area: Approximated 26,000 acres

   d. Coordinates: 61° 16' 57" N, 149° 55' 20" W.

   e. USGS Quadrants: 1:250,000 Anchorage and Tyonek; 1:63:360 Anchorage A-8, B-8, and Tyonek A1, B1.

The Point MacKenzie Industrial Port Site is located near the mouth of Knik Arm in Upper Cook Inlet. The entire Point MacKenzie Industrial Port Site area is located within the boundaries of the Matanuska-Susitna Borough. The Point MacKenzie area is bounded on the north by the Goose Bay State Game Refuge, on the east and south by the waters of Knik Arm and Upper Cook Inlet respectively, on the west by the Susitna Flats State Game Refuge, and on the northwest by the Point MacKenzie State Agricultural Project. The proposed Point MacKenzie Industrial Port Site is located approximately four miles northwest, across Knik Arm, from the Port of Anchorage (T14N, R4W, SM, Sections 24 and 25).

The main topographic feature in the Point MacKenzie area is the Elmendorf Moraine, resulting in 50 to 100 foot bluffs near the head of Knik Arm. Mudflats, lowland coastal marshes, bogs, small lakes, low shrubs and mixed lowland forests are found throughout the Point MacKenzie area. Waterfowl and wildlife are present in the area but not in the abundance found in adjoining State Game Refuges. The major rivers near the area are the Little Susitna River and Goose Creek which lie approximately ten miles west and north of the Point MacKenzie area, respectively. Major lakes in the area include Lake Lorraine, Lost Lake, and Twin Island Lake.

4. Existing Ownership, Jurisdiction and Management:

   a. Ownership Priority and Management: Mixed Borough, State, and private ownership and management.

Ownership of land throughout the Point MacKenzie area is predominately mixed with Borough, State, university, private, and Native corporation holdings. Borough-patented lands are concentrated along Knik Arm in the immediate vicinity of the industrial port site (T14N, R4W, SM, Sections 24 and 25). Borough-selected lands and Borough tentative-approved lands are found extensively throughout the Point MacKenzie area.

University holdings are contained within the large block of Borough-patented land adjacent to Knik Arm. Smaller private and Native holdings are found immediately north and south of the actual industrial port site location. Additional private holdings are found in the Twin Island Lake and Lost Lake areas and along the southern tip of the Point Mackenzie area. State public domain and State agricultural lands are found primarily in the western portion of the Point MacKenzie area, adjacent to the Susitna Flats State Game Refuge.

5. Present Uses and Activities, Anticipated Conflicts:

Present land uses in the general Point MacKenzie area consists of scattered homesites, recreational sites, and a few airstrips. Construction efforts are currently underway for extension of a road to the Point MacKenzie area from Knik Arm Road.

Point MacKenzie has long been considered by the Borough as the logical site for a large-scale industrial port complex serving the Matanuska-Susitna Borough, South Central Alaska, and the Interior. Development at Point MacKenzie, when it occurs, will probably result in the development of a new town around the industrial port complex on Knik Arm. The industrial port complex and adjacent town would serve as the major regional export facility for resources such as coal, timber, ore, and petroleum products, and as the major import facility for equipment and supplies to the Interior.

The Dow-Shell Group is currently considering Point MacKenzie as one of the six possible locations for a petrochemical facility in Alaska. Should the Dow-Shell Group decide to locate at Point MacKenzie, a number of new and largely permanent jobs would develop for residents of the Matanuska-Susitna Borough. The Dow-Shell Group estimates employment during the construction phase could exceed 2,400, while employment during the operation phase of the initial plants would number about 1,000 (Dow-Shell Group).

In addition to a petrochemical facility at Point MacKenzie, a West German firm is seriously considering

Point MacKenzie as an export center for Beluga coal. The unnamed firm has indicated that low grade Beluga coal could be utilized in a coal-fired generation plant at Point Mackenzie, providing electricity to industries in the area, while high-grade Beluga coal would be exported to foreign markets.

Anticipated conflicts will most probably arise over impacts on air and water quality attributed to the development of an industrial port complex at Point MacKenzie. Operation of a coal-fired generation plant and a petrochemical facility at Point MacKenzie could most seriously affect air quality standards in the Anchorage metropolitan area, four miles southeast of Point MacKenzie. In addition, development of a town, support facilities, and new transportation routes (e.g. Knik Arm crossing) in the Point MacKenzie area may place increased recreational and developmental pressures on fish and wildlife habitats and resources in the area and in adjacent State Game Refuges.

6. Proposed Management Scheme:

A proposed management scheme for the Point MacKenzie Industrial Port Site will be formulated during Phase II of coastal management program development (July through December 1981). The management scheme developed will include:

a. A statement of proper and improper uses in the area;

b. A statement of policies to be applied in managing the area; and

c. An identification of the authority to implement the management scheme.

AREA WHICH MERITS SPECIAL ATTENTION #2

1. Name: Knik/Matanuska River Floodplain

2. Primary Values and Bases for Designation:

a. Primary Values: Flood hazard, natural habitat characteristics.

b. Bases for Designation: AS 46.40.210(1)(A), (B),(C),(F), and (G).

The primary value of the Knik/Matanuska River Floodplain AMSA designation is to acknowledge severe flood hazard potential along the Knik/Matanuska River Floodplain. Flat topography makes this area highly susceptible to flooding. The potential exists for severe floods resulting from the outburst of glacial-dammed Lake George. From 1918 through 1966, except for 1963, Lake George has flooded the Knik River annually. Since 1966, the Knik Glacier has failed to form an ice dam and no glacial outburst flooding has occurred, however, a series of positive ice balances may stimulate the glacier to advance and dam the lake. In addition, the Knik/Matanuska River Floodplain contains areas of essential habitat for waterfowl and wildlife resources and areas of substantial recreational opportunities for residents of the Mat-Su Borough and South Central Alaska.

The bases for this AMSA designation under the Alaska Coastal Management Act and Program include:

- o Areas of unique, scarce, fragile, or vulnerable national habitat, cultural value, historical significance, or scenic importance;
- o Areas of high natural productivity or essential habitat for living resources;
- o Areas of substantial recreational value or opportunity;
- o Areas of significant hazard due to storms, slides, floods, erosion or settlement; and
- o Areas needed to protect, maintain, or replenish coastal land and resources, including coastal floodplains, aquifer recharge areas, beaches, and offshore sand deposits.

3. <u>Geographic Location and Description</u>:

a. Coastal Region: Upper Cook Inlet Coastal Region.

b. Land Orientation: Matanuska-Susitna Borough.

c. Area: Approximated 54,000 acres.

d. Coordinates: Knik/Matanuska River 61° 30' 00" N, 149° 15' 00" W.

e. USGS Quadrants: 1:250,000 Anchorage; 1:63,360 Anchorage B5, B6, and C6.

The Knik/Matanuska River Floodplain is a large coastal lowland floodplain situated at the head of Knik Arm. The two major rivers, the Knik and Matanuska River share a common floodplain which is approximately five miles wide at the point of entry into Knik Arm. Both rivers originate at glaciers and carry large volumes of glacial sediment into Knik Arm and Upper Cook Inlet, resulting in extensive mud and tideflats at the head of Knik Arm.

The extent of the Knik/Matanuska River Floodplain AMSA boundaries are contiguous with the known 100-year floodplain for the Knik and Matanuska River (U.S. Department of Housing, 1980, Flood Hazard Boundary Maps) and extend up the Knik River to the Mat-Su Borough Boundary and up the Matanuska River to near Sutton. The western boundary of the Knik/Matanuska River Floodplain AMSA is approximated by the Glenn Highway.

Included within the Knik/Matanuska River Floodplain is the area known as the Jim-Swan Lakes. This is a wetlands area with several large shallow lakes in various stages of succession. The Knik/Matanuska River Floodplain, including the Jim-Swan Lakes area, contains valuable natural habitat for fish, waterfowl and wildlife. The floodplain area is also one of the fastest growing regions of the Mat-Su Borough, containing residential development, farms, and the major transportation corridor between Anchorage and the Interior.

4. <u>Existing Ownership, Jurisdiction and Management:</u>

   a. Ownership Priority and Management: State, private, Borough mixed ownership, and Native selected.

The Federal Submerged Lands Act of 1953 (PL85-303 and 508) conveyed all tidelands, submerged lands and shorelands under all navigable waters to the State of Alaska upon statehood. Therefore, the submerged lands and shorelands of the Knik and Matanuska River, are considered State public domain and cannot be sold. State interest lands are found in the Jim-Swan Lakes area east of Bodenburg Butte and State park lands (Chugach State Park) are found south of the Knik River.

Extensive private holdings exist throughout the Palmer and Bodenburg Butte area with smaller private holdings south of the Knik River. Borough tentatively-approved and Borough-patented lands occur throughout the floodplain area with the largest holding of Borough-patented land located adjacent to the south shore of the Matanuska River, east of Bodenburg Butte.

Native selected lands are extensive throughout the floodplain area. The Alaska Native Claims Settlement Act and a subsequent amendment (Terms and Conditions for Land Consolidation and Management in the Cook Inlet Area) provided for federal and State lands to satisfy Native village and region entitlements. Litigation is pending for many of the acres selected by Eklutna, Inc., resulting in dual State-Native ownership for much of the land in T16N, R1E-R4E, S.M. (this area includes most of the Knik River south to the Mat-Su Borough Boundary). In addition, the Alaska National Interest Lands Conservation Act (PL 96-487) provides for the State of Alaska and Eklutna, Inc. to exchange lands to allow for Native selections in T17N, R3W, S.M. (this includes the Jim-Swan Lakes area).

5. Present Uses and Activities, Anticipated Conflicts:

Present uses in the Knik/Matanuska River Floodplain are diverse and include recreational uses, agricultural uses, residential development and expansion, transportation corridor usage, and mineral extraction (gravel) among other uses. Recreational uses in the Knik/Matanuska Floodplain area include waterfowl hunting, moose hunting, fishing, trapping, boating, viewing, and photography. Winter recreation in the area includes snowmachine use, cross country skiing, and dog sled use.

Anticipated conflicts will arise as a result of increased development in the area. The Knik/Matanuska River Floodplain area is one of the fastest growing areas in the Mat-Su Borough. The area's close proximity to Anchorage makes it attractive for residential development. Any development occurring in the Knik/Matanuska River Floodplain area must recognize the flood hazard that exists with development in this area. The potential for renewed advance of the Knik Glacier and glacial outburst flooding from Lake George is currently uncertain. Further, the flat topography of the floodplain area makes it susceptible to seasonal flooding.

6. Proposed Management Scheme:

A proposed management scheme for the Knik/Matanuska River Floodplain area will be formulated during Phase II of coastal management program development (July through December 1981). The management scheme developed will include:

a. A statement of proper and improper uses in the area;

b. A statement of policies to be applied in managing the area; and

c. An identification of the authority to implement the management scheme.

AREA WHICH MERITS SPECIAL ATTENTION #3

1. Name: Susitna Flats State Game Refuge

2. Primary Values and Bases for Designation:

   a. Primary Values: Protect, maintain, and enhance wetland habitat.

   b. Bases for Designation: AS 46.40.210(1)(A), (B),(C), and (G).

   The primary value of the Susitna Flats State Game Refuge AMSA designation is to protect, maintain and enhance the Susitna Flats Refuge fish and wildlife populations and habitats in concert with other components of the ecosystem and to assure the capability of providing sustained opportunities for public recreational uses under aesthetically-pleasing conditions. Included is the provision for certain commercial uses of the refuge which do not adversely affect fish and wildlife resources or the public usage of such resources.

   The bases for this AMSA designation under the Alaska Coastal Management Act and Program include:

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

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

   o Areas of substantial recreational value or opportunity; and

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

3. Geographic Location and Description:

   a. Coastal Region: Upper Cook Inlet Coastal Region.

b. Land Orientation: Matanuska-Susitna Borough.

c. Area: 301,950 acres.

d. Coordinates: Susitna River 61° 17' 23" N, 150° 34' 05" W.

e. USGS Quadrants: 1:250,000 Tyonek; 1:63,360 Tyonek A1, A2, A3, B1, B2, and B3.

The Susitna Flats is an expansive coastal lowland on the northwest side of Upper Cook Inlet. The refuge is located predominantly within the Matanuska-Susitna Borough and encompasses some 301,950 acres of which 22 percent is subtidal, 11 percent is occasionally flooded salt marsh and meadow, and 67 percent is a combination of lakes, bogs, low shrub, and mixed lowland forest. The State Game Refuge extends for approximately 35 miles from Point MacKenzie westward to past the Beluga River. The mouth of the Susitna River, 24 miles west of Anchorage, divides the refuge in half. The eastern half of Susitna Flats is bisected by the Little Susitna River while the western half is transected by the Ivan, Lewis, Theodore and Beluga Rivers.

The Susitna Flats lowland coastal marshes are important resting and staging areas for waterbirds during spring and fall migrations. In addition, the Susitna Flats area provides for fishing and hunting, particularly waterfowl, moose, and bear hunting, and viewing, photography and other seasonal recreational opportunities. To ensure protection and adequate management of the Susitna Flats, the Alaska State Legislature created the Susitna Flats State Game Refuge in 1976.

4. <u>Existing Ownership, Jurisdiction and Management:</u>

a. Ownership Priority and Management: State of Alaska, Alaska Department of Fish and Game.

The Susitna Flats State Game Refuge is State owned and managed by the Alaska Department of Fish and Game. Private inholdings do exist within the refuge. The legislation which established the Susitna Flats State Game Refuge prohibits State aquisition of private inholdings by eminent domain and ensures access to inholdings by private property owners. The Alaska Department of Natural Resources was given authority under AS 44.62 to adopt zoning regulations when necessary to ensure the intended uses of the refuge are maintained.

5. <u>Present Uses and Activities, Anticipated Conflicts:</u>

The Alaska Department of Fish and Game is legislatively mandated to protect, maintain, and enhance the fish and wildlife resources and habitats of the Susitna Flats State Game Refuge while providing for public recreational uses of the same fish and wildlife resources and habitats. Examples of public usage of the refuge include waterfowl hunting, big game hunting, sports fishing, commercial fishing, trapping, viewing and photography, and other recreational activities. The intensity of public usage of the refuge varies directly with access limitations to certain portions of the refuge. As road transportation and access to the Susitna Flats area increases, public recreational opportunities in, and usage of, the refuge will increase accordingly.

In addition to the public recreational uses of the refuge, oil and gas exploration and development activities are currently underway in western portions of the refuge. Oil and gas lease sales for the Susitna Flats were held prior to the passage of legislation establishing the refuge. Exploration and development activities operate under the terms of pre-existing leases and have resulted in a number of test wells and all-weather road systems in the western portion of the refuge. Oil and gas exploration and development activities on the Susitna Flats is likely to increase in the future as a result of State oil and gas lease sales in Upper Cook Inlet in May, 1981. Future lease agreements are expected, if found compatible with the multiple-use management concept of the refuge.

Anticipated conflicts may arise over different proposed developmental scenarios for lands and water systems near or adjacent to the Susitna Flats State Game Refuge. Development of the Beluga Coal Field and related transportation corridors, the Point MacKenzie Industrial Port and associated residential development, the Point MacKenzie State Agricultural Project, and the Susitna Dam Project could all have significant impacts on fish and wildlife resources in the refuge and public usage of those resources.

6. Proposed Management Scheme:

To avoid duplication of management efforts, the Alaska Department of Fish and Game will be responsible for developing a management scheme for the Susitna Flats State Game Refuge in accordance with the enabling refuge legislation. Importance will be given to managing the refuge under the multiple-use concept which recognizes that the refuge was classified to protect and manage more than one resource and more than one public use.

AREA WHICH MERITS SPECIAL ATTENTION #4

1. Name: Goose Bay State Game Refuge

2. Primary Values and Bases for Designation:

   a. Primary Values: Protect, maintain, and enhance wetland habitat.

   b. Bases for Designation: AS 46.40.210(1)(A), (B),(C), and (G).

The primary value of the Goose Bay State Game Refuge AMSA designation is to protect, maintain, and enhance the Goose Bay Refuge fish and wildlife populations and habitats in concert with other components of the ecosystem and to assure the capability of providing sustained opportunities for public recreational uses under aesthetically-pleasing conditions.

The bases for this AMSA designation under the Alaska Coastal Management Act and Program include:

- Areas of unique, scarce, fragile, or vulnerable natural habitat, cultural value, historical significance, or scenic importance;
- Areas of high natural productivity or essential habitat for living resources;
- Areas of substantial recreational value or opportunity; and
- Areas needed to protect, maintain, or replenish coastal land or resources, including coastal floodplains, aquifer recharge areas, beaches, and offshore sand deposits.

3. Geographic Location and Description:

a. Coastal Region: Upper Cook Inlet Coastal Region.

b. Land Orientation: Matanuska-Susitna Borough.

c. Area: 13,262 acres.

d. Coordinates: Goose Creek 61° 22' 30" N, 149° 52' 57" W.

e. USGS Quadrants: 1:250,000 Anchorage and Tyonek; 1:63,360 Anchorage B-8 and Tyonek B-1.

Goose Bay and the wetlands adjacent to Goose Creek are located along the western shore of Knik Arm, 12 miles north of Anchorage and 30 miles southwest of Palmer. The Goose Bay State Game Refuge is located entirely within the boundaries of the Matanuska-Susitna Borough and encompasses some 13,262 acres.

The lowland coastal marshes of the Goose Bay area are important resting and staging areas for waterfowl and shorebirds during spring and fall migrations. In addition, the Goose Bay area is an important recreational area for viewing, photography, waterfowl hunting, and other uses. To ensure protection and adequate management of the Goose Bay area, the Alaska State Legislature created the Goose Bay State Game Refuge in 1975.

4. Existing Ownership, Jursidiction and Management:

a. Ownership Priority and Management: State of Alaska, Alaska Department of Fish and Game.

The Goose Bay State Game Refuge is State owned and managed by the Alaska Department of Fish and Game. Private, university, and federal holdings do exist within the refuge, however, refuge restrictions only apply to State-owned land and adjacent waters in the refuge.

5. Present Uses and Activities, Anticipated Conflicts:

The Alaska Department of Fish and Game is legislatively mandated to protect, maintain, and enhance the fish and wildlife resources and habitats of the Goose Bay area while providing for public recreational uses of the same fish and wildlife resources and habitats. Examples of public usage of the refuge include viewing, photography, waterfowl hunting, and other recreational activities.

Anticipated increased public usage of the refuge is likely to occur as a result of development of an industrial port complex at Point MacKenzie and the Point MacKenzie State Agricultural Project.

6. Proposed Management Scheme:

To avoid duplication of management efforts, the Alaska Department of Fish and Game will be responsible for developing a management scheme for the Goose Bay State Game Refuge in accordance with the enabling refuge legislation. Importance will be given to managing the refuge under the multiple-use concept which recognizes that the refuge was classified to protect and manage more than one resource and more than one public use.

AREA WHICH MERITS SPECIAL ATTENTION #5

1. Name: Palmer Hay Flats State Game Refuge

2. Primary Values and Bases for Designation:

    a. Primary Values: Protect, maintain, and enhance wetland habitat.

    b. Bases for Designation: AS 46.40.210(1)(A), (B),(C), and (G).

The primary value of the Palmer Hay Flats State Game Refuge AMSA designation is to protect, maintain, and enhance the Palmer Hay Flats Refuge fish and wildlife populations and habitats in concert with other components of the ecosystem and to assure the capability of providing sustained opportunities for public recreational user under aesthetically-pleasing conditions.

The bases for this AMSA designation under the Alaska Coastal Management Act and Program include:

- o Areas of unique, scarce, fragile, or vulnerable natural habitat, cultural value, historical significance, or scenic importance;
- o Areas of high natural productivity or essential habitat for living resources;
- o Areas of substantial recreational value or opportunity; and

- o Areas needed to protect, maintain, or replenish coastal land or resources, including coastal floodplains, aquifer recharge areas, beaches, and offshore sand deposits.

3. Geographic Location and Description:

a. Coastal Region: Upper Cook Inlet Region

b. Land Orientation: Matanuska-Susitna Borough

c. Area: 25,340 acres.

d. Coordinates: Palmer Slough 61° 30' 00" N, 149° 25' 00" W.

e. USGS Quadrants: 1:250,000 Anchorage; 1:63,360 Anchorage B-7 and C-7.

The Palmer Hay Flats is a large coastal lowland area along the north shore of Knik Arm, 10 miles southwest of Palmer and 28 miles northeast of Anchorage. The refuge is located predominantly within the Matanuska-Susitna Borough and encompasses some 25,340 acres, nearly all of which is coastal marsh and shrub-bog habitat. The Palmer Hay Flats State Game Refuge is bounded on the east by the Matanuska and Knik River Floodplains, on the south by Knik Arm and on the west and north by Borough and private property.

The Palmer Hay Flats lowland coastal marshes are extremely important resting and staging areas for waterfowl and shorebirds during spring and fall migrations. In addition, the Palmer Hay Flats area provides for excellent fishing in Rabbit Slough and Wasilla Creek, waterfowl hunting throughout the entire refuge, and unmatched opportunities for wildlife and waterfowl viewing and photography. To ensure protection and adequate management of the Palmer Hay Flats, the Alaska State Legislature created the Palmer Hay Flats State Game Refuge in 1975.

4. Existing Ownership, Jurisdiction, and Management:

a. Ownership Priority and Management: State of Alaska, Alaska Department of Fish and Game.

The Palmer Hay Flats State Game Refuge is State owned and managed by the Alaska Department of Fish and Game, however, the refuge legislation includes uplands that have not been conveyed to the State. Uplands within T16N, R1E, S.M. have been selected by Eklutna, Inc. and include most of the area known as Duck Flats. Final refuge boundary determinations will depend upon negotiations between the State and Eklutna, Inc. Other State lands adjacent to the refuge have been classified as to their habitat resource importance, however, no legislation has been introduced to include these areas in the refuge.

Refuge restrictions apply to State-owned land and adjacent waters in the refuge. The Mat-Su Borough has long recognized the importance of the Palmer Hay Flats as a recreational area. In 1974, the Borough Assembly adopted the Hay Flats Recreational Area Special Use District. This district includes an area larger than the State Game Refuge and affects the use of private land adjacent to the refuge. Permitted users within the Hay Flats Recreation Area Special Land Use District includes single-family residences, raising of vegetables, produce, and fruit crops, and home occupations and campgrounds.

5. <u>Present Uses and Activities, Anticipated Conflicts:</u>

The Alaska Department of Fish and Game is legislatively mandated to protect, maintain, and enhance the fish and wildlife resources and habitats of the Palmer Hay Flats State Game Refuge while providing for public recreational uses of the same fish and wildlife resources and habitats. Recreation is the major use of the Palmer Hay Flats area, examples of which include waterfowl hunting, fishing, birding, viewing, and photography.

As a result of good access and close proximity to the Anchorage metropolitan area, the Palmer Hay Flats State Game Refuge receives a higher intensity of usage when compared with Susitna Flats and Goose Bay State Game Refuges. This intensity of usage of the Palmer Hay Flats area will increase in the future as a result of development at, or adjacent to, Point MacKenzie and other places in the Borough. The potential impacts of increased recreational use include modifications to terrain, disturbance of wildlife, reduction of aesthetic resources and conflicts with other resource users (Knik Arm Wetlands Study 1981).

6. <u>Proposed Management Scheme:</u>

To avoid duplication of management efforts, the Alaska Department of Fish and Game will be responsible for developing a management scheme for the Palmer Hay Flats State Game Refuge in accordance with the enabling refuge legislation. Importance will be given to managing the refuge under the multiple-use concept which recognizes that the refuge was classified to protect and manage more than one resource and more than one public use.

The identified AMSA's discussed in this chapter will be further studied and evaluated by the Borough and appropriate State agencies during Phase II (July through December 1981) of program development to insure that the intent of and criteria for AMSA designation, as defined by the Alaska Coastal Management Act, are realized. In addition to the already identified AMSA's, potential AMSA's will also be examined during Phase II of program development. Examples of potential AMSA's include, but are not limited to, the following:

- Devil's Canyon Hydroelectric Site;
- Point MacKenzie State Agricultural Project Area; and
- Cottonwood Creek area.

POLICY DEVELOPMENT

POLICY DEVELOPMENT

The citizen and his/her government are often frustrated with the process of community development shaped by forces seemingly out of control. Community concerns are gradually translated into a program of plans and a seeking out of policy development processes that can better respond to the expressed needs to manage community growth for the collective best interests. Policy development is a key aspect of the Matanuska-Susitna Borough Coastal Management Program; for policy is the connection between community goals and objectives, resource inventory and analysis, and the implementation strategy. Policy is the means for the Borough to evaluate the suitabilities of certain proposals for land and water uses and activities in the context of the coastal management effort.

Clearly there is a community view of the Mat-Su Borough scene. This view includes perceptions of the benefits and problems accruing from resource development and establishes an intuitive basis for evolving community goals, objectives, and policies.

Commonly held community views, goals, and objectives are important to policy planning in the following ways:

- They provide a sound basis for the coordination of efforts to improve the Mat-Su Borough community.
- They provide guidelines for both public and private development decisions affecting the community's future.
- They provide an opportunity to combine decision impacts for the general benefit of the community.
- They become the basis for developing and selecting policies and programs for community development with measured results.

Community reviews are most often evolved from the observable and experiential results of social physical and economic conditions in the community. The daily experiences in peoples lives are variously accumulative stimuli that identify problems and concerns and prioritize them through frequency and degree of impact on individuals, their families, employment or businesses.

The policy planning process must acknowledge the centrality of this phenomenon in community decision making and provide a carefully constructed interaction between individual citizens and groups, policy makers and deciders, and planners and agency actualizers. This transactive interchange assumes an equality of importance to the various facets of the process as indicated by the figure following.

A carefully constructed transactive interchange between the interest forces creates a seedbed for policy development and planning that can be mutually beneficial and serve the broad interests of the Borough. The planning commission plays a very important role in the initial phases of policy development. The commission is the interface between the community view and the technical issues and facts that shape the art of the possible. They also are the official advisors of the Borough assembly and can set the tone for policy planning and resource development and management.

The precursory factors that begin to shape the Coastal Management Plan and program for the Borough are the range of technical realities and existing conditions reflected in the resource inventory and analysis. Portions of the Matanuska-Susitna Borough have characteristics that are suitable for urban and industrial development, whereas other land areas have material features that cannot accommodate such development. The process of sensitivity and suitability analysis make is possible for the Borough to determine dominant and subordinate land uses for the various coastal enviroments found within the Borough; within specific geographic areas identified for development, conditional development, and conservation policy decisions.

Resource analysis and the development of coastal sensitivity criteria was a key step in determining the demands on and capability of the coastal sector. It provided a base for development of proper policies and a management framework using the following technical approach:

- o Review the resource analysis prepared midway in the phase, and incorporation of appropriate studies and reports that have been released by the Borough since the first year progress report.

- o Examination and summary of the impacts of population projections, facilities demands, recreation needs, housing requirements and the affects on future coastal land use patterns.

- o Development of criteria for determining the coastal resource sensitivity and use capabilities.

COASTAL MANAGEMENT
POLICY DEVELOPMENT

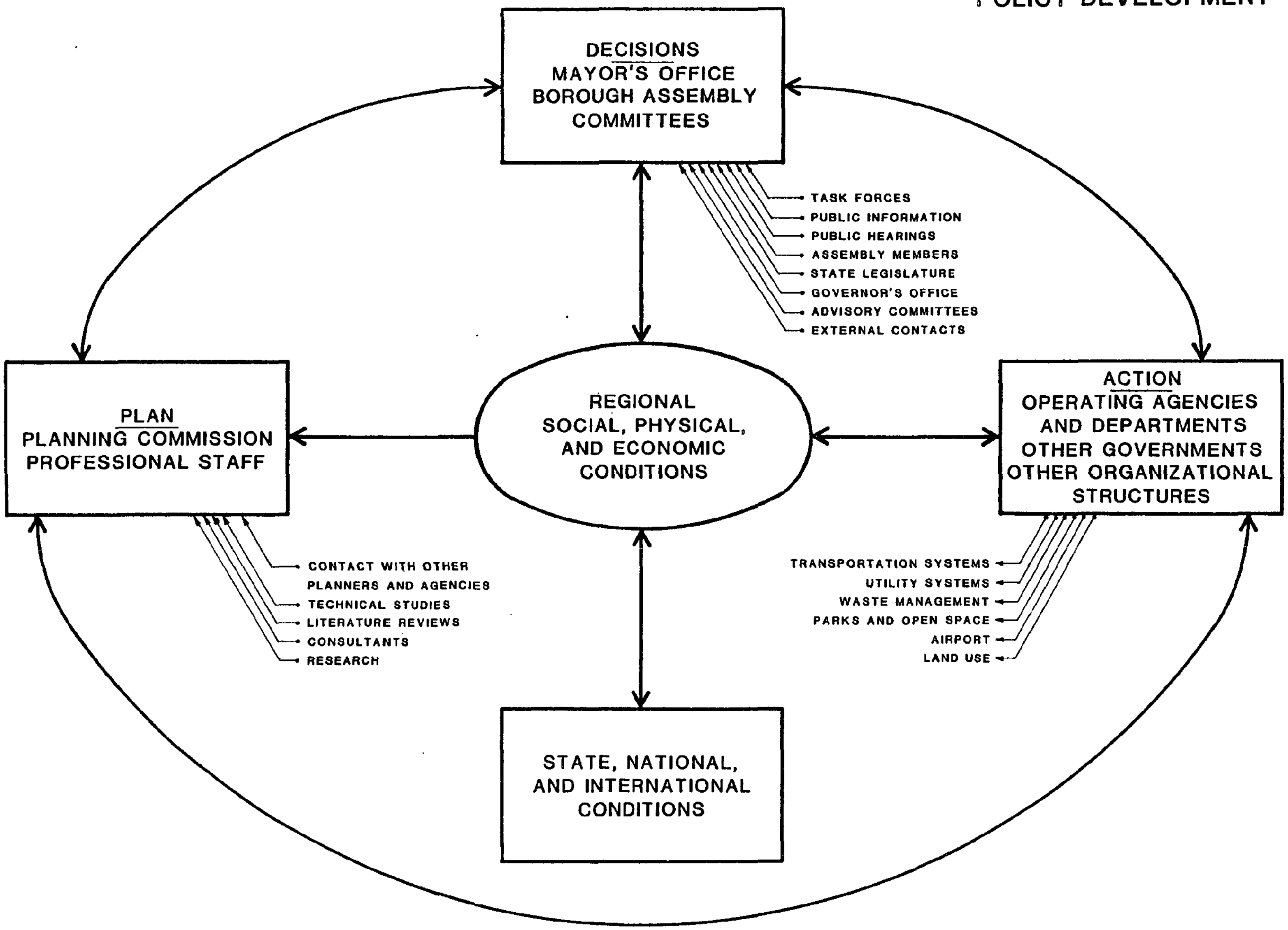


FIGURE 11

- Classification of the Matanuska-Susitna Borough Coastal Area into geographic categories of Development, Conditional Development, and Conservation, based upon balancing use suitabilities, constraints, and uses of State concern.

The criteria for classifying the Borough coastal area from the bases of resource sensitivity and use capabilities included in the following:

<u>Conservation Areas</u>

- Conservation areas within the Matanuska-Susitna Coastal Management District shall be established where <u>overriding</u> geophysical hazards, biological resources, coastal habitats, recreation, and air/water quality concerns exist.

- Activities and development within conservation areas shall be limited to those identified as preferential uses for these areas.

<u>Conditional Development Areas</u>

- Conditional development areas within the Matanuska-Susitna Coastal Management District shall be established where coastal development may be subject to constraints created by biological resource needs, geophysical hazards, coastal habitat, recreation, land ownership, coastal access, and air/water quality.

- No activities and development shall necessarily receive preferential status in Conditional Development areas.

- Activities and development with Conditional Development Areas shall be subject to coordination with the Borough Planning Commission, Planning Department, and appropriate State and federal agencies.

- The Matanuska-Susitna Borough shall identify potential constraints on activities and development within Conditional Development Areas in the Mat-Su District Coastal Management Program.

<u>Development Areas</u>

- Development Areas shall be established within the Matanuska-Susitna Coastal Management District where economic and coastal development objectives are not subject to constraints created by geophysical hazards, biological resources, coastal habitat, recreation, land ownership, coastal access, and air/water quality concerns.

- Economic and coastal developments are preferential uses for these areas.

The final Mat-Su Coastal Management Program should include a summary of the policies that will be applied to land and water uses and activities and the process that will be used to determine whether specific proposals will be allowed. The Alaska Coastal Policy Council has focused upon these processes in consistency determinations having recommended that performance standards used for the program implementation be clearly and precisely written so they can be readily understood by the public. Further, that Borough policies be presented in an overall framework of State and federal policies so that reviewers will be able to ascertain how all the policies interact and complement one another.[1] The further development and detailing of Borough policies is a significant aspect of Phase II effort.

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[1] Alaska Coastal Policy Council, Resolution Number Fourteen, March 5, 1980.

CITIZEN PARTICIPATION

CITIZEN PARTICIPATION

The Matanuska-Susitna Borough approach to citizen participation encompasses both public involvement and program coordination elements. Through creation of the Citizen/Agency Joint Forum, the Borough brought together the broad public policy interests of the community and the operational concerns of local, State, and federal agencies with coastal management program responsibilities. The Citizen/Agency Joint Forum has encouraged input, understanding, and feedback through a participation process that facilitates discussion, technical review, evaluation, and coordination of program elements. Future workshops and public hearings will be utilized by the Borough Planning Commission and Joint Forum to present and discuss implementation measures and the Draft Coastal Management Program and Plan.

The Citizen/Agency Joint Forum has carried out four important functions during Phase I program activities. These include the following:

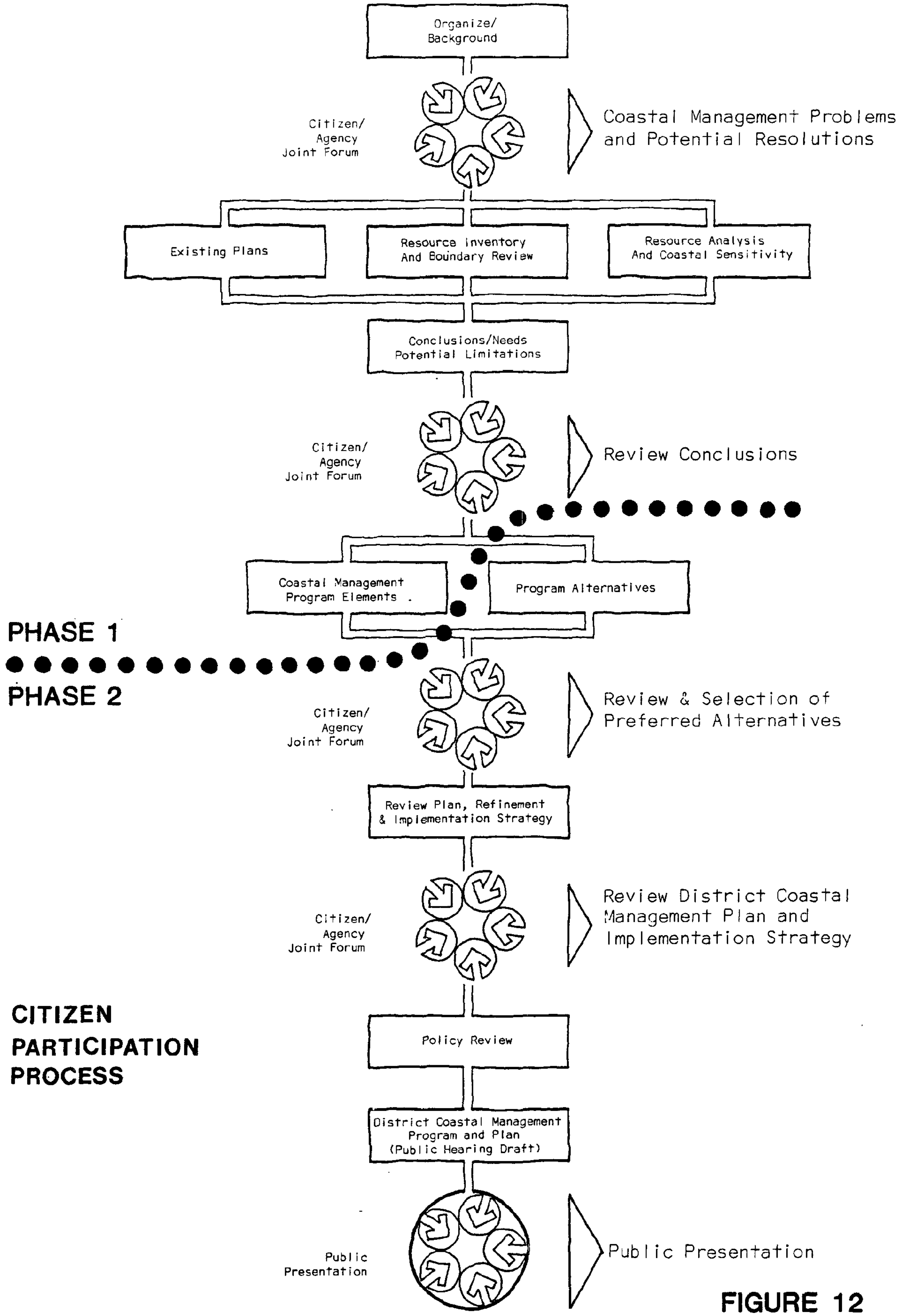
- The Forum reviewed and evaluated previous Borough policies, goals, and objectives as a means of assembling a statement of current issues, goals and objectives that reflect the concerns of Borough residents and government agencies regarding coastal development.

- The Forum has looked upon the participation functions as an educational process through promoting an understanding of the characteristics, values and roles of the coastal area; wherein, Borough residents can view the coastal management program as a means of managing activities within the coastal area to meet the public' good through the encouragement of sound development procedures, protection of environmental quality, and maximizing development potentials for the community's economic well being.

- The Forum has educated the study team while serving the ongoing study review process. Local familiarity with data and perceptions keep the study on track to meet public and agency concerns.

o Through encouraging input, understanding, and feedback, the Forum facilitates the administration of the District Coastal Management Program through participation in its development.

The Citizen/Agency Joint Forum is helping the community to understand, participate in, and support the coastal management planning process. In the Appendix following are the technical details of Forum proceedings as the Phase I reviews and analyses advanced. These processes of program development will continue throughout Phase II.



Organize/ Background
Citizen/ Agency Joint Forum
Coastal Management Problems and Potential Resolutions
Existing Plans
Resource Inventory And Boundary Review
Resource Analysis And Coastal Sensitivity
Conclusions/Needs Potential Limitations
Citizen/ Agency Joint Forum
Review Conclusions
Coastal Management Program Elements
Program Alternatives
PHASE 1
PHASE 2
Citizen/ Agency Joint Forum
Review & Selection of Preferred Alternatives
Review Plan, Refinement & Implementation Strategy
Citizen/ Agency Joint Forum
Review District Coastal Management Plan and Implementation Strategy
CITIZEN PARTICIPATION PROCESS
Policy Review
District Coastal Management Program and Plan (Public Hearing Draft)
Public Presentation
Public Presentation

FIGURE 12

APPENDIX

MATANUSKA-SUSITNA BOROUGH
COASTAL MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM

AGENDA

Wednesday, February 4, 1981
7:00 P.M.
Assembly Chambers

I. Call to Order - Introductions.

II. Forum Organization and Activity.

III. Matanuska-Susitna Borough Coastal Management Program.

IV. Previously Defined Problems, Needs, Goals and Objectives.

V. Boundary Identification, Definition and Awareness.

VI. Adjournment.

Maynard and Partch

An Alaskan Corporation

800 F Street
Anchorage, Alaska 99501
907/276-4218

February 2, 1981

MEMORANDUM

TO: Matanuska-Susitna Borough
Citizen/Agency Joint Forum

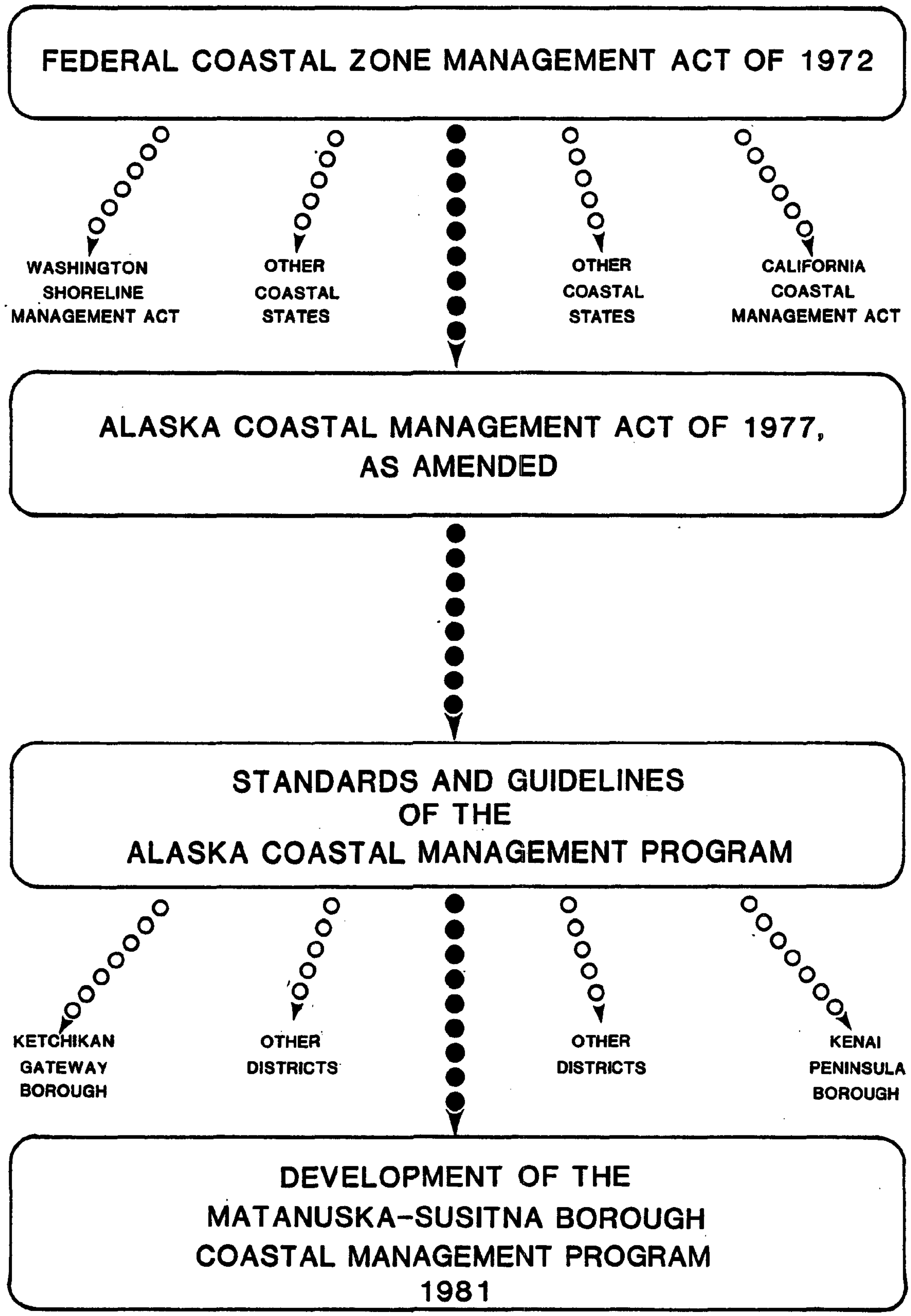
SUBJECT: Background Information for the Mat-Su Coastal Management Program

FROM: Stuart Denslow

The citizen participation process is a most important ingredient in shaping the goals, objectives, and program for coastal management in the Mat-Su Borough. The materials attached provide background information on the forum organization and activities; the overall coastal management program; previously defined Mat-Su Borough needs, goals, and objectives; and a brief look at coastal boundary identification and definition.

During our organization session, further detail will be provided to assist you with your deliberations. May we suggest that you place these materials in your workbook for future reference in meetings ahead.

Thank you for your assistance.


FEDERAL COASTAL ZONE MANAGEMENT ACT OF 1972
WASHINGTON SHORELINE MANAGEMENT ACT
OTHER COASTAL STATES
OTHER COASTAL STATES
CALIFORNIA COASTAL MANAGEMENT ACT
ALASKA COASTAL MANAGEMENT ACT OF 1977, AS AMENDED
STANDARDS AND GUIDELINES OF THE ALASKA COASTAL MANAGEMENT PROGRAM
KETCHIKAN GATEWAY BOROUGH
OTHER DISTRICTS
OTHER DISTRICTS
KENAI PENINSULA BOROUGH
DEVELOPMENT OF THE MATANUSKA-SUSITNA BOROUGH COASTAL MANAGEMENT PROGRAM 1981

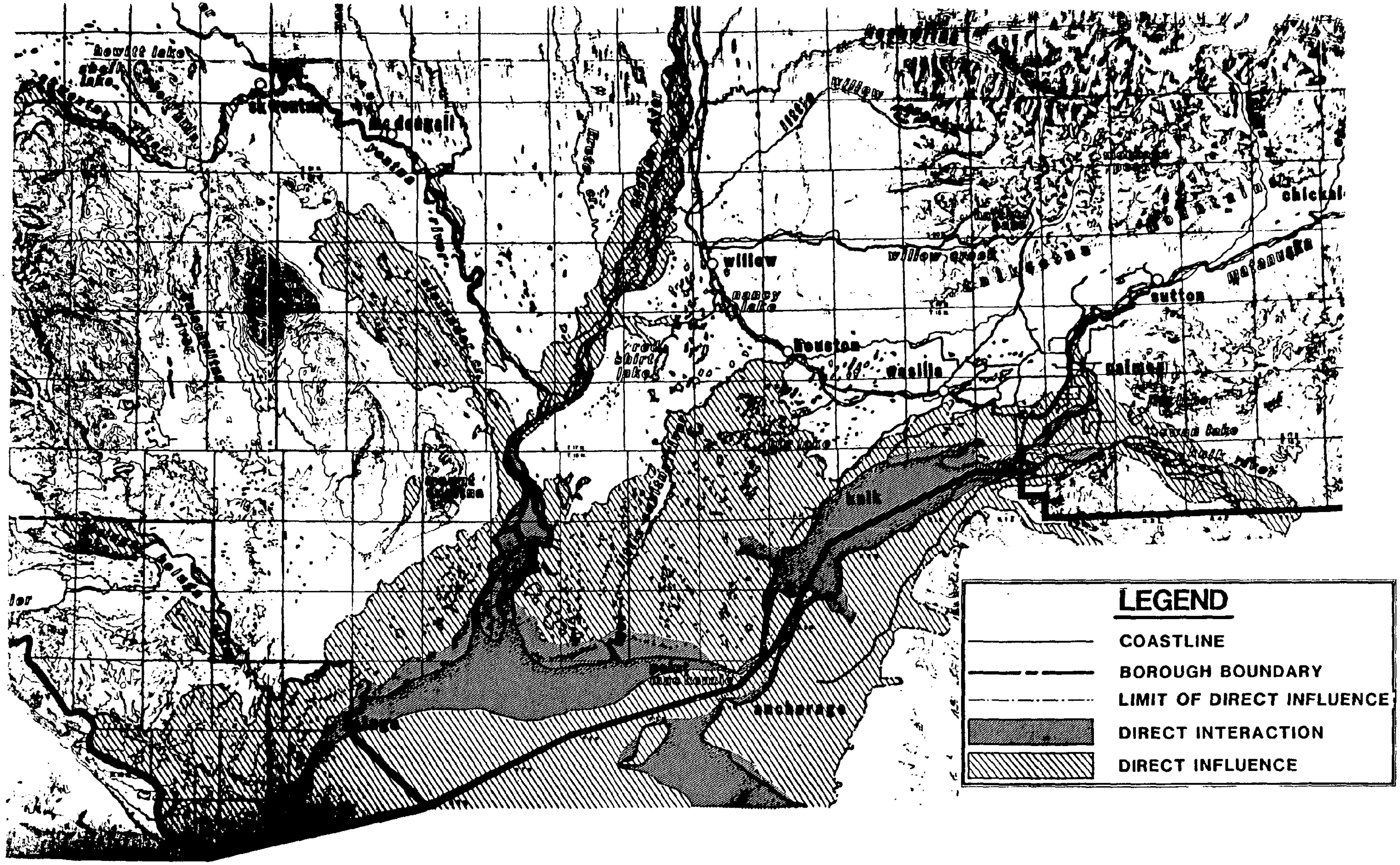
CITIZEN PARTICIPATION

- ASSEMBLING GOALS AND OBJECTIVES THAT REFLECT THE CONCERNS OF BOROUGH RESIDENTS AND GOVERNMENT AGENCIES REGARDING COASTAL DEVELOPMENT.

- AN EDUCATIONAL PROCESS PROMOTING AND UNDERSTANDING THE CHARACTERISTICS, VALUES AND ROLES OF COASTAL AREAS.

- PROVIDE BOROUGH RESIDENTS AND AGENCY PERSONNEL THE OPPORTUNITY TO SHARE DATA AND IDEAS THAT MIGHT OTHERWISE BE OVERLOOKED BY THE STUDY TEAM.

- BY ENCOURAGING INPUT, UNDERSTANDING, AND FEEDBACK, CITIZEN PARTICIPATION FACILITATES THE ADMINISTRATION OF THE BOROUGH COASTAL MANAGEMENT PLAN AND PROGRAM IN THE YEARS AHEAD.


LEGEND
COASTLINE
BOROUGH BOUNDARY
LIMIT OF DIRECT INFLUENCE
DIRECT INTERACTION
DIRECT INFLUENCE
hewitt lake
willow
nancy lake
houston
wasilla
sutton
matanuska
palmer
knik
anchorage
willow creek
red shirt lake
chickal

The biophysical coastal area boundaries for upper Cook Inlet are defined as follows:

Area of Direct Interaction

A. Landward Limit

Landward, the area of direct interaction is defined by saltwater intrusion into marshes and rivers and areas of active coastal erosion such as the bluffs fronting Turnagain and Knik Arms. 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. Coastal bluffs experiencing rapid erosion range in height from several meters (less than 10 ft) to over 30 m (greater than 100 ft). Salt spray, ice coating, intertidal spawning, vegetation transitions and important wildlife habitat also occur within the area of direct interaction.

B. Seaward Limit

Seaward, the area 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 region which is actively perturbed by tidal currents, ice scour, breaking waves, sediment dynamics and freshwater dilution.

Area of Direct Influence

A. Landward Limit

The landward area of direct influence in upper Cook Inlet is defined where the bulk of anadromous fish spawning and rearing takes place, where some 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 includes all coastal drainages, their primary tributaries, and adjacent wetlands to the 305 m (1,000 ft) contour. The zone extends up the main-stem of the Susitna River to include Devil's Canyon. Important uplands which directly support or impact coastal processes are also included within the area of direct influence. The upland extent of direct influence is best defined by the 61 m (200 ft) contour in the Mat-Su Valley, 122 m (400 ft) contour in the upper Kenai Lowlands and Tyonek area, the 305 m (1,000 ft) contour in the greater Anchorage area, Turnagain watersheds, and Trading Bay region and the ridgeline of steep coastal mountains in Turnagain Arm.

B. Seaward Limit

Seaward, the area direct influence includes the marine waters of Cook Inlet extending south to Kalgin Island. Turbulent mixing between marine and fresh water takes place in the vicinity of Kalgin Island. The characteristic marine waters of upper Cook Inlet which include high turbidity and low salinity interface with the waters of lower Cook Inlet in this region. This is also the average southern limit of upper Inlet sea ice.

Area of Indirect Influence

A. Landward Limit

The landward area of indirect influence extends to include the margins of glaciers, the headwaters of coastal drainages in the Cook Inlet Basin and their adjacent wetlands. This region includes the limits of spawning and rearing areas for anadromous fish, important waterfowl habitat, important upland big game and small mammal habitat and the inland extent of foreseeable uses which may have a direct and significant impact on the coastal waters.

B. Seaward Limit

Seaward, the area of indirect influence includes all of Cook Inlet and the Gulf of Alaska to the limits of important migrations of anadromous fish, marine mammals and waterfowl dependent on the coastal area of upper Cook Inlet for a portion of their life histories.

General Description - The upper Cook Inlet region is a large basin enclosed by the Alaska Range, Talkeetna Mountains and Chugach Mountains to the west, north and east, respectively. The southern physiographic boundary of upper Cook Inlet is generally placed at East and West Forelands although the typical coastal environment of this region extends south to the vicinity of Kalgin Island.

The marine environment is strongly influenced by the discharge of three major drainage systems. The Susitna, Matanuska and Knik rivers. About one-hundred other rivers, streams and tributaries empty into upper Cook Inlet. This large freshwater input contributes to a dramatic lowering of salinity during the summer months. Many of the rivers and tributaries originate at glaciers located in the surrounding mountain ranges. The sedimentary products of these glaciers combine with terrestrial erosion to produce rivers which are heavily laden with silt and debris. The marine waters of upper Cook Inlet can be characterized as highly turbid, well-mixed and low in salinity.

The shoreline is chiefly composed of high eroding bluffs of unconsolidated glacial till and low coastal marshes and bogs. Turnagain Arm has a steep mountainous shoreline. Extensive tidal flats produced by river-induced sediments occur throughout upper Cook Inlet. The tidal range averages 8.5 m (28 ft). Sea ice is usually present between November and April.

Marine plants and animals have adapted to the stressed environment of this region by rapid growth during the summer months and the utilization of detrital nutrients for growth and reproduction. The numerous coastal salt marshes are highly productive environments important to reproduction and rearing of birds, fish and mammals. In addition, coastal marshes function as critical molting and staging areas for fall and spring migrations of water birds. The numerous lowland lakes and bogs in this region also provide nesting and rearing habitat for water birds, fish and small mammals.

Upper Cook Inlet serves as a migratory pathway for anadromous fish on their way to spawning areas in clear water tributaries. Young salmon rear in streams and lakes before beginning their seaward migration. Beluga whales and harbor seals are the only marine mammals present and seasonally migrate in to feed on eulachon (hooligan) and salmon during the summer.

Portions of the upper Cook Inlet region have been heavily impacted by both natural and man-made changes during recent years. Urbanization of the Anchorage area and 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 primarily due to the loss of habitat in conjunction with increased hunting and fishing pressure. The 1964 earthquake produced dramatic changes to the coastal environment. Subsequent land subsidence, saltwater intrusion and flooding in some areas has altered coastal marshes, aquifers, spawning areas, soils, and wildlife habitat. The environment and ecology of the upper Cook Inlet region will remain in a high dynamic state due to recent and continuing impacts.

COMMUNITY AND BOROUGHWIDE GOALS AND OBJECTIVES

LAND USE/ENVIRONMENT

GOAL

- THE DEVELOPMENT OF BOROUGH LAND USE MUST CONSIDER THE PROTECTION OF NATURAL RESOURCES BALANCED AGAINST THE NEED FOR ECONOMIC DEVELOPMENT.

OBJECTIVES

- ENCOURAGE THE PRESERVATION OF SITES AND STRUCTURES OF HISTORIC OR ARCHAEOLOGICAL SIGNIFICANCE.

PROTECT EXISTING DEVELOPMENT INSOFAR AS IS COMPATIBLE WITH OTHER COMMUNITY GOALS.

ENCOURAGE AESTHETICALLY PLEASING AND ENVIRONMENTALLY HARMONIOUS DEVELOPMENT.

EMPHASIZE OPEN SPACE IN DEVELOPMENT.

- DEVELOP LOW DENSITY, RUSTIC RESIDENTIAL AREAS EXCEPT IN COMMUNITY OR NEIGHBORHOOD CORES.

- DEVELOP A RELATIVELY COMPACT COMMUNITY OR NEIGHBORHOOD CORE AREA FOR LOCATION OF COMMUNITY COMMERCIAL SERVICES, PUBLIC FACILITIES AND HIGHER DENSITY RESIDENTIAL AREAS.

DEVELOP AND MAINTAIN CLEAN, QUIET, AND SAFE RESIDENTIAL AREAS.

PROMOTE A LAND USE PATTERN WHICH INTERRELATES EFFICIENTLY AND AVOIDS CONFLICTS AMONG FUNCTIONS.

PROTECT RESIDENTIAL AREAS FROM INFLUENCES WHICH WOULD DISTURB THEIR STABILITY OR CHARACTER.

PROVIDE FOR THE DEVELOPMENT OF ADEQUATE, APPROPRIATE AND CONVENIENT COMMERCIAL SERVICES.

- PROVIDE ADEQUATE AND APPROPRIATE INDUSTRIAL AREAS.

- GUIDE NEEDED DEVELOPMENT INTO AREAS WITH WHICH IT WILL BE ENVIRONMENTALLY COMPATIBLE.

PROVIDE FOR A VARIETY OF HOUSING TYPES AND PRICES IN APPROPRIATE AREAS.

- PROVIDE FOR THE PROTECTION AND CONSERVATION OF THE NATURAL ENVIRONMENT AND ITS RESOURCES.

- PROTECT SCENIC VALUES AND TAKE ADVANTAGE OF THEM IN DEVELOPMENT PLANNING.

- PRESERVE NATURAL AREAS OF UNUSUAL VALUE FOR THE BENEFIT OF ALL.

COMMUNITY AND BOROUGHWIDE GOALS AND OBJECTIVES

PUBLIC FACILITIES

GOAL

- TO PROVIDE A SYSTEM OF PUBLIC FACILITIES AND SERVICES WHICH ARE INTERRELATED AT THE BOROUGHWIDE 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.

OBJECTIVES

PROVIDE ADEQUATE AND APPROPRIATE PUBLIC EDUCATIONAL FACILITIES.

PROVIDE FOR ADEQUATE AND APPROPRIATE HEALTH SYSTEMS.

PROVIDE FOR ADEQUATE AND APPROPRIATE CRIMINAL JUSTICE.

PROVIDE FOR ADEQUATE AND APPROPRIATE FIRE PROTECTION.

- PROVIDE FOR ADEQUATE AND APPROPRIATE DEFENSE AGAINST NATURAL DISASTER.

- PROVIDE FOR ADEQUATE AND APPROPRIATE OUTDOOR RECREATIONAL OPPORTUNITIES.

- PROVIDE FOR EFFICIENT AND ENVIRONMENTALLY COMPATIBLE POWER AVAILABILITY.

- PROVIDE FOR ADEQUATE AND APPROPRIATE COMMUNICATIONS.

PROVIDE FOR ADEQUATE AND APPROPRIATE CULTURAL FACILITIES.

PROVIDE FOR ADEQUATE FACILITIES FOR THE PROVISION OF GOVERNMENTAL SERVICES.

- PROVIDE FOR ADEQUATE AND APPROPRIATE SOLID WASTE MANAGEMENT.

- PROVIDE FOR ADEQUATE, SAFE AND HIGH QUALITY WATER SUPPLY.

- PROVIDE FOR ADEQUATE, SAFE AND FEASIBLE SANITARY SEWAGE DISPOSAL.

- ENSURE PUBLIC ACCESS TO ALL SIGNIFICANT NATURAL AREAS (NOT NECESSARILY ROAD ACCESS).

MINIMIZE DIRECT AND INDIRECT COSTS TO THE PUBLIC IN THE PROVISION OF PUBLIC FACILITIES AND SERVICES.

COMMUNITY AND BOROUGHWIDE GOALS AND OBJECTIVES

TRANSPORTATION

GOAL

- 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.

OBJECTIVES

- PROVIDE FOR SAFE, EFFICIENT AND LOGICAL ARTERIAL, COLLECTOR AND LOCAL ROAD NETWORK.
- PROVIDE FOR "ALTERNATIVE" MODES OF PERSONAL TRANSPORTATION, SUCH AS AIR, WATER, FOOT, SNOWMACHINE, DOGSLED OR BICYCLES AS APPROPRIATE AND NEEDED.
- MAXIMIZE EFFICIENCY, SAFETY AND SCENIC ASPECTS OF MAJOR ARTERIAL ROUTES.

PROMOTE THE DEVELOPMENT OF CONVENIENT MODES OF PUBLIC TRANSPORTATION.

COMMUNITY AND BOROUGHWIDE GOALS AND OBJECTIVES

POPULATION/ECONOMY/GOVERNMENT

GOAL

- THE ROLE OF GOVERNMENT IS TO ACHIEVE A HARMONIOUS RELATIONSHIP BETWEEN POPULATION GROWTH, ECONOMIC DEVELOPMENT AND NATURAL RESOURCE UTILIZATION.

OBJECTIVES

- ENCOURAGE DEVELOPMENT OF THE TOURIST INDUSTRY.
- ENCOURAGE OUTDOOR RECREATION DEVELOPMENT AS A BASIC INDUSTRY.
- ENCOURAGE AND PROTECT AGRICULTURE.
- ENCOURAGE THE DEVELOPMENT OF FORESTRY INDUSTRY.
- ENCOURAGE THE DEVELOPMENT OF THE MINERAL EXTRACTION INDUSTRY.
- ENCOURAGE THE DEVELOPMENT OF MANUFACTURING INDUSTRY.
- PROVIDE FOR AN ECONOMY BASED PREDOMINATELY ON SUBSISTENCE (LIVING OFF THE LAND).

DISCOURAGE INTENSE DEVELOPMENT.

DEVELOP A SYSTEM OF COORDINATION AND COMMUNICATION BETWEEN LOCAL COMMUNITIES AND BOROUGH GOVERNMENT.

ACHIEVE A PROPER BALANCE BETWEEN GOVERNMENT SERVICES AND LEGITIMATE INDIVIDUAL PURSUITS.

Maynard and Partch

An Alaskan Corporation

800 F Street
Anchorage, Alaska 99501
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SUMMARY
ORGANIZATIONAL MEETING
MAT-SU BOROUGH
COASTAL MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM
WEDNESDAY, FEBRUARY 4, 1981

This was the initial meeting of the Mat-Su Borough Citizen/Agency Joint Forum. The Maynard and Partch consultant team was represented by Stuart Denslow and Michael McGuiness. The Mat-Su Borough Planning Department was represented by Rodney Schulling and Rick Feller. There were eight members of the Citizen/Agency Joint Forum in attendance.

The meeting consisted of an audio-visual presentation on coastal management in the Mat-Su Borough given by the Maynard and Partch consultant team. A brief question and answer period followed the presentation. The four main topics covered during the presentation were:

1) Citizen/Agency Joint Forum Organization and Activities.

2) Development of the Mat-Su Borough Coastal Management Program.

3) Mat-Su Borough Goals and Objectives.

4) Mat-Su Borough Coastal Boundaries and Definitions.

The background informational packet provided to each Forum member is included as an Appendix to this summary.

1. <u>Forum Organization and Activity</u>: The Citizen/Agency Joint Forum organization and activities were discussed in light of the public participation requirements of the Alaska Coastal Management Program and the Citizen Participation Process flow diagram included in the informational packet. Four main objectives of citizen participation in program development were highlighted. The Citizen/Agency Joint Forum will be called upon at critical stages of program development to analyze, evaluate and make decisions on key components of the coastal program.

2. <u>Mat-Su Borough Coastal Management Program</u>: Development of a district coastal management program was looked at in the context of the State Coastal Management Act and the Federal Coastal Zone Management Act. This was followed by a discussion on the technical and procedural requirements for Mat-Su program development, as set out by the standards and guidelines of the Alaska Coastal Management Program. The intent was to make Forum members aware of the procedural requirements and steps necessary in developing a district coastal program and plan.

Briefly, some of the key components looked at for proper program development include:

1) A review of existing plans -- e.g. Mat-Su Borough Comprehensive Development Plan;

2) the resource inventory, both natural resources and cultural resources;

3) the coastal boundary review and determination;

4) the resource analysis of inventory data and mapping of sensitive coastal areas;

5) the identification of overall coastal needs, goals, and objectives of the Borough;

6) the determination of subject uses and proper and improper uses within the Mat-Su coastal area;

7) the development of program policy, alternatives, and implementation strategies;

8) policy review and program refinement; and

9) the public hearing on the draft program and plan.

Citizen participation and input was stressed at all phases in program development.

3. <u>Borough Goals and Objectives</u>: Previously identified Borough goals and objectives from the Comprehensive Development Plan and the Annual Report of the Mat-Su Coastal Management Program were discussed. Acknowledged is the fact that a significant set of goals have already been prepared or adopted and objectives appropriate to those goals have been developed. The Citizen/Agency Joint Forum will be called upon to further identify, analyze, and refine goals and objectives specific to that portion of the Borough identified as the coastal zone. This activity will be the subject of the next Citizen/Agency Joint Forum workshop.

4. <u>Coastal Boundary Review and Definitions</u>: Interim coastal boundaries for the Mat-Su Borough were briefly examined in light of Alaska Department of Fish and Game's definition for the zones of direct interaction and zones of direct influence.

   Pointed out was the fact that final coastal boundary determination would depend upon the results of the resource inventory, resource analysis, and coastal goals and objectives.

Cassette tape of presentation available from Maynard and Partch or Mat-Su Borough Planning Department upon request.

MAT-SU BOROUGH COASTAL MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM
WORKSHOP ON COASTAL NEEDS, GOALS, AND OBJECTIVES

DATE:	Wednesday, March 4, 1981
TIME:	6:00 - 9:00 PM
PLACE:	Mat-Su Borough Assembly Chambers

AGENDA

1. An overview of coastal issues in the Mat-Su Borough.
2. In-depth analysis of major coastal issues by workshop groups.
3. Review Mat-Su goals and objectives in relation to major coastal issues - workshop groups.
4. Report findings, goals, and objectives to citizen/agency joint forum - workshop groups.
5. Coastal management boundary review as time allows.
6. Scheduling of next meeting.
7. Adjournment.

Maynard and Partch

An Alaskan Corporation

800 F Street
Anchorage, Alaska 99501
907/276-4218

February 23, 1981

MEMORANDUM

TO: Matanuska-Susitna Borough
Citizen/Agency Joint Forum

SUBJECT: Citizen/Agency Joint Forum
Workshop on Mat-Su Coastal
Needs, Goals, and Objectives

FROM: Consultant Team

Citizen participation and input on overall Mat-Su coastal needs, goals, and objectives is vital at this phase in coastal program development. A statement of overall coastal needs, goals, and objectives, together with the findings of the resource inventory and analysis, will serve as a foundation for policy development program review and future workshops.

To assist in your preparation for this workshop discussion, the materials attached include a brief explanation of "What is Coastal Management" and "Why is Coastal Management Needed," definitions of coastal needs, goals, and objectives as they relate to program development, and a list of potential coastal management issues that may be important to the Mat-Su Borough.

Thank you for your assistance. We look forward to working with you on March 4th, 6:00 PM, at the Borough Assembly Chambers.

WHAT IS COASTAL MANAGEMENT?

Coastal management is a joint effort by local, State, and Federal governments and the private sector to manage coastal resources and to promote their wise and balanced use and development. Citizen participation in local program development will result in a coastal management plan tailored to meet the resource utilization and economic development needs specific to the Mat-Su Borough.

WHY IS COASTAL MANAGEMENT NEEDED?

The Mat-Su Borough contains a wealth of natural and cultural resources which support a variety of uses, some examples of which include residential, commerical, industrial, public facility and port development uses, timber harvesting, mineral processing, tourism, recreation, agriculture, hunting, fishing, oil and gas activities, subsistence, and transportation uses. Demands on the coastal resources of the Borough will increase in the future. This will result in heightened tension and conflict between the numerous and diverse user groups over a finite amount of coastal area. Coastal management program development will assure a balanced utilization of Borough coastal resources through a decision-making process that takes into account knowledge of coastal resources and environments, sound planning principles, and the social and economic aspirations of Borough residents.

COASTAL NEEDS, GOALS, AND OBJECTIVES

An issue or need is anything which concerns the Borough or could affect the livability, vitality, and economic well-being of the Borough.

A goal is a future vision or general end which the Borough aspires to achieve.

An objective is a target which provides specific incremental direction to help the Borough achieve identified goals.

The first step in the development of the Mat-Su Borough Coastal Management Program is the identification of overall coastal issues, needs, goals, and objectives that reflect the concerns of Borough residents. Citizen participation and input is essential at this early phase of program development. The identified coastal goals and objectives will provide the foundation upon which coastal development policies and implementation strategies are based. The citizen/agency joint forum will serve as the principal body for providing citizen participation and input into program development.

The citizen/agency joint forum is composed of a representative cross section of Borough, community, agency, and private sector interests. The intent of the workshop is to identify a set of goals and objectives that are mutually acceptable to all interests within the Borough. The stated goals and objectives will then guide future aspects of coastal program development.

POTENTIAL MAT-SU COASTAL MANAGEMENT ISSUES

Below is a preliminary list of potential coastal management issues that may be pertinent to the economic growth, social well-being, and future of the Mat-Su Borough. The Maynard and Partch consultant team and the Mat-Su Borough Planning Department urge members of the citizen/agency joint forum to review these coastal management issues prior to the March 4, 1981 Workshop on Overall Coastal Management Needs, Goals, and Objectives.

Please feel free to identify additional coastal management issues of concern to you, your community, business, agency, or any private sector interests you may represent. This list is meant only to stimulate your thinking on coastal management issues and to serve as a starting point in developing coastal management goals and objectives for the Borough.

1. Issue: Ecomonic instability and high unemployment in the Mat-Su Borough.

2. Issue: Point MacKenzie industrial area and port facility.

3. Issue: Development of a town and industrial support facilities at Point MacKenzie.

4. Issue: Inexpensive and environmentally safe electrical power -- e.g. Susitna Dam Project.

5. Issue: Increased agriculture and dairy products production -- e.g. Point MacKenzie Agricultural Project.

6. Issue: Protection of prime agricultural lands from subdivision.

7. Issue: Mining and mineral activities in the Borough -- e.g. coal mining, placer mining, sand and gravel extraction, and oil and gas lease sales.

8. Issue: Environmental impacts from increased oil and gas activities and coal development and exportation.

9. Issue: Timber harvesting and processing in the Borough.

10. Issue: Development in known geophysical hazard areas -- e.g. areas of active coastal erosion, flood plains, and fault areas.

11. Issue: Development of water treatment, sewage treatment and other utilities -- e.g. central community water and sewage systems vs. private well and septic systems.

12. Issue: Development of public facilities -- e.g. schools, public buildings, cultural facilities and recreation facilities.

13. Issue: Improvement and maintenance of transportation facilities -- e.g. highways, secondary roads and collector roads.

14. Issue: State Capital move from Juneau to Willow.

15. Issue: Close proximity of the Borough to the Municipality of Anchorage.

16. Issue: Development of a Knik Arm bridge crossing.

17. Issue: Conflicting user demands on a limited amount of coastal land.

18. Issue: State land disposals in the Borough.

19. Issue: Protection and enhancement of important land and water habitat, and fish and wildlife resources for this and succeeding generations.

20. Issue: Preservation of cultural resources which depict Alaska's heritage.

21. Issue: Protection of unique and beautiful scenic vistas and natural attractions in the Borough.

22. Issue: Tourism expansion in the Borough.

23. Issue: Recreational opportunities in the Borough for residents, expecially along the coast.

24. Issue: Increased public access to natural areas, coastline and major rivers, streams and lakes, either by car or trail systems.

25. Issue: State and Federal agency regulatory control over development in coastal areas.

26. Issue: Promotion of a subsistence lifestyle in those communities identified for such a lifestyle.

27. Issue:: Preservation of high air and water quality in the Borough.

28. Issue: Protection and enhancement of prime anadromous spawning streams.

Maynard and Partch

An Alaskan Corporation

800 F Street
Anchorage, Alaska 99501
907/276-4218

SUMMARY
WORKSHOP ON COASTAL NEEDS, GOALS, AND OBJECTIVES
MAT-SU BOROUGH
COASTAL MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM
WEDNESDAY, MARCH 4, 1981

This was the second meeting of the Mat-Su Borough Citizen/Agency Joint Forum. The Maynard and Partch/Woodward-Clyde consultant team was represented by Stuart Denslow, Michael McGuiness, and John Isaacs. The Mat-Su Borough Planning Department was represented by Rodney Schulling and Rick Feller. Forum members in attendance were Jim Bird, Jack Corey, Bud Goodyear, Mitch Henning, James Herman, Barbara Lacher, Al Larson, Bob Lundell, Elsie O'Bryan, and Guy Wooding.

Bud Goodyear and Jim Bird were nominated and appointed as co-chairpersons of the Citizen/Agency Joint Forum.

The intent of the workshop session was to establish a dialogue between Forum members on coastal management issues, needs, goals, and objectives. Topics highlighted during the workshop session included:

- Mat-Su Borough coastal boundaries.
- Review of coastal issues in the Mat-Su Borough.
- Coastal management goals and objectives.

The background information packet provided to each Forum member is included as an Appendix to the Summary.

1. <u>Mat-Su Borough Coastal Boundaries</u>: Concern was raised over the interim Mat-Su coastal boundaries evolved by the Alaska Department of Fish and Game and approved by the Mat-Su Borough Assembly. Forum inquiries focused on how definite coastal boundaries were and whether the coastal boundaries could be changed.

   The consultant team pointed out that the interim coastal boundaries are subject to change. Final coastal boundaries will be adjusted to reflect the results of the resource inventory and analysis and local desires, as expressed through a statement of coastal management goals and objectives. Further discussion on coastal boundaries was deferred until resource inventory and resource information is made available.

2. <u>Review of Coastal Issues in the Mat-Su Borough</u>: The consultant team provided Forum members with a list of 28 potential coastal management issues pertinent to the economic growth, social well-being, and future of the Borough. The issues were extrapolated from previous Borough discussions, documents, reports, and newspaper articles.

   Each of the issues were read aloud and commented upon by the Forum. The Forum determined further evaluation of the issues is necessary prior to establishing priorities to be used in developing a statement of Borough coastal management goals and objectives.

3. <u>Coastal Management Goals and Objectives</u>: A definitional example of an issue, goal, and objective was provided by the consultant team. Forum members briefly discussed previously identified Borough goals and objectives from the Comprehensive Development Plan (May 1978). The Forum consensus was that development of Mat-Su Borough coastal management goals and objectives are of high importance and warrant more time, research, evaluation, and discussion by members of the Forum. Members agreed to additional Forum workshop sessions, exclusive of the consultant team, in order to evolve a responsible statement of coastal management goals and objectives for the Borough. Monday, March 9, 1981 is scheduled as the next meeting date for the Citizen/Agency Joint Forum.

   Conference with the consultant team will proceed once the Forum has established a statement of coastal management goals and objectives for the Borough.

Cassette tape of workshop session available from Mat-Su Planning Department upon request.

MATANUSKA-SUSITNA BOROUGH
COASTAL ZONE MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM

AGENDA

Thursday, April 2, 1981

6:30 P.M.

Assembly Chambers

I. Call to order.

II. Minutes of previous meeting.

III. Discussion of Mat-Su Preliminary Boundary Definition.

IV. Discussion of Comprehensive Listing of Revised Issues, Goals, and Objectives

Maynard and Partch

An Alaskan Corporation

800 F Street
Anchorage, Alaska 99501
907/276-4218

April 2, 1981

MEMORANDUM

TO: Matanuska-Susitna Borough
Citizen/Agency Joint Forum

SUBJECT: Preliminary Coastal Management
Boundary Definition

FROM: Stu Denslow

Inland and seaward coastal boundaries outline the area in which the Matanuska-Susitna Borough will manage uses and activities that have, or are likely to have, a direct and major effect on coastal waters.

Areas of Direct Interaction and Direct Influence

6 AAC 85.040. "A district should first obtain the legal description of its corporate limits (that is, the area over which the district has direct control). Second, within its corporate limits, a district must adopt boundaries for the coastal area. At the start of its program, a district must base its coastal area boundaries on the Biophysical Boundaries for Alaska's Coastal Zone and must include the zone of direct interaction and direct influence. The zone of direct interaction is that portion of the coastal area where physical and biological processes are a function of the direct contact between land and sea. The zone of direct influence is that portion of the coastal area which is next to the zone of direct interaction and is therefore influenced by that interaction."

* "District" means Matanuska-Susitna Borough

Final boundary modification criteria

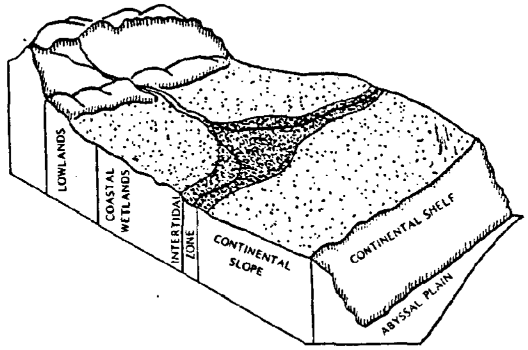
A district may change the boundaries of its coastal area if the new boundaries

- extend inland and seaward as far as is needed to manage uses and activities that have or are likely to have a direct and major effect on coastal waters; and

- include all transitional and intertidal areas, salt marshes, salt-water wetlands, islands, and beaches. (In some cases, inland portions of islands may be excluded if the islands are quite large.)

Thus, districts may draw boundaries which coincide with their political jurisdiction, watersheds, or other natural or man-made features, but only if the new boundaries meet these two conditions.

"At the start of its program, a district must base its coastal area on . . . the zone of direct interaction and direct influence."



DIRECT INTERACTION

The portion of the coastal zone where physical and biological processes are a function of direct contact between land and sea has been defined as the zone of direct interaction.

This zone extends landward to the limit of waves, surf, tides, storm surges, and tsunami energy dissipation; to the limit of active calving of tidewater glaciers, coastal erosion, and mass wasting; to the limit of ice shove onto beaches; to the limit of critical shoreline habitat (e.g. seabird rookeries, marine mammal hauling out and pupping areas) and to the limit to which man-made structures along the shore are directly impacted by the dynamics of oceanic processes.

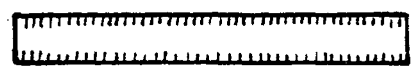
The zone extends seaward to the outer limit of the breaker zone generated by large waves, to the nearshore limit of initial mixing of land runoff and sea water, to the nearshore area within which benthic algae are anchored to the sea floor, to where ice scours the nearshore sediments, to where pack ice grinds against fast ice, to the seaward limit of seasonal beach drift and to the seaward extent of concentrated utilization of nearshore waters by nesting seabirds and marine mammals. This zone also includes nearshore rearing areas for anadromous fish, and nearshore spawning and rearing areas for marine fish and invertebrates.

DIRECT INFLUENCE

The portion of the coastal zone extending seaward and landward from the zone of direct interaction has been termed the zone of direct influence. While this zone is not subjected to the dynamics of land/sea energy dissipation characteristic of direct interaction, it is closely affected and influenced by the close proximity between land and sea.

Landward, the zone extends to areas where coastal plant communities directly reflect the saltiness, high precipitation, or moderate temperatures of the ocean (e.g. wet tundra, marshes, Sitka spruce-hemlock forests and highbrush and floodplain alder and willow thickets), where shorebirds and waterfowl nest and feed in coastal wetlands, where certain marine mammals (e.g. belukha whales, harbor seals) frequently range inland via river systems, where anadromous fish such as salmon migrate up rivers to spawn, and where breakup conditions along the shore will induce extensive flooding of coastal lowlands.

Seaward, the zone extends to the offshore lands and waters of continental shelf where waves begin to "feel bottom" and refract in response to bathymetric features, where the brackish water initially formed nearshore seasonally controls the density structure of nearshore waters, where nutrient rich deep waters are "upwelled" along the coast, and to the extent marine species such as king crab, herring, pollock, or halibut will migrate seasonally or during a portion of their life history after utilizing the shoreline or nearshore environment for spawning or early rearing.



INDIRECT INFLUENCE

The outer portions of the coastal zone have been termed the zone of indirect influence. This zone extends to the limit where land/sea biological and physical processes are still identifiable. Within this outer zone human use activities may have a direct and significant impact on coastal processes.

Landward, this zone extends to the limit of overwintering in riverine springs by fish stocks which utilize the nearshore brackish waters in summer, and the extent of coastal watersheds which support stream habitats for anadromous fish and control the chemical and physical nature of estuaries.

Seaward, the zone of indirect influence is not easily delineated as the migrations of many coastal species are of hemispheric or global proportions. Natural phenomenon, such as the shoreward edge of oceanic boundary currents from which the net transport is directed towards the coast, and the seaward extent of a freshening of oceanic surface waters marking the transition between brackish/oceanic planktonic forms are taken as transitional criteria delineating the seaward extent of this outer zone.

Maynard and Partch

An Alaskan Corporation

800 F Street
Anchorage, Alaska 99501
907/276-4218

April 2, 1981

MEMORANDUM

TO: Matanuska-Susitna Borough
Citizen/Agency Joint Forum

SUBJECT: The Comprehensive Listing of Revised Issues, Goals, and Objectives

FROM: Stu Denslow

During your meeting of March 23, 1981, certain additions, deletions, and/or changes were made to the Preliminary Listing of Issues, Goals and Objectives reflecting several Borough sources previously identified. At your request, the alterations and changes have been incorporated into a revised listing representing your decisions and the "thirteen points" referenced in your meeting minutes of March 9, 1981. The points were as follows:

1. Conformance with local community plans.
2. The plan should be updated at a minimum of once every five years.
3. Management of natural resources.
4. Promote tourism.
5. Develop agriculture and forest.
6. Encourage economic development.
7. Develop mining potential.
8. Flood Control.
9. Develop hydroelectric power potential.
10. Knik Arm crossing.
11. Develop an energy policy.
12. Develop appropriate transportation.
13. Facilitate permitting for facilities development and transportation corridors.

The resulting revised issues, goals, and objectives are attached.

MATANUSKA-SUSITNA BOROUGH
COASTAL MANAGEMENT PROGRAM

REVISED ISSUES, GOALS AND OBJECTIVES

CITIZEN/AGENCY JOINT FORUM
April 2, 1981

- ISSUE: Management and Local Control

GOAL: To maximize local Borough control over coastal management issues through the implementation of an approved coastal management program and through Memorandums of Agreement with state agencies.

OBJECTIVES: Minimize the impact from state and federal regulations in order to foster commercial and industrial development and utilization of Borough natural resources.

Simplify present application procedures to encourage development of Borough natural resources through timely processing of applications.

Provide for a local permit coordinator to aid the public in various permitting procedures.

Encourage public agencies to obtain all required permits for contracts prior to the granting of contracts to private firms.

Promote a harmonious relationship between population growth, economic development, and natural resource utilization.

Review and update the Borough's coastal management program every five years.

Provide for conformance of coastal management program with local community plans.

- ISSUE: <u>Natural Resource Utilization</u>

  GOAL: To provide for balanced conservation, utilization and development of Borough natural resources (e.g. fish and wildlife, timber, minerals, water, etc.), in a manner which enhances the livability and quality of life in the Borough.

  OBJECTIVES: Plan for natural resource utilization in a manner which will provide the maximum long-term benefit to the Borough and residents.

  Facilitate and provide for increased mining and mineral processing, including oil, gas, and coal exploration and development activities in coastal areas.

  Facilitate and provide increased timber harvesting and processing in coastal areas.

  Facilitate and provide for increased usage of land for agricultural and dairy production purposes.

  Protect and enhance fish and wildlife and recreational resources.

- ISSUE: <u>Land Use and User Demands</u>

  GOAL: To accommodate multiple uses and activities in coastal areas, recognizing the finite amount of coastal land in the Borough.

  OBJECTIVES: Give priority to water-dependent and water-related uses in areas reserved for coastal industrial development (e.g. Point MacKenzie).

  Manage and dispose of Borough selected lands for the greatest benefit to the Borough and its residents.

  Accommodate the development of compact community or neighborhood core areas for location of community commercial services and public facilities.

Provide for adequate and appropriate industrial areas.

Accommodate mining and mineral processing, including oil, gas, and coal exploration and development in coastal areas.

Accommodate transportation and utility corridors in coastal areas.

Accommodate timber harvesting and processing in coastal areas.

Accommodate agriculture expansion in coastal areas.

Accommodate recreational activities (e.g. hunting, fishing, hiking, viewing, etc.) and tourism in coastal areas.

Provide for the protection and conservation of natural areas in the Borough.

Preserve natural and scenic areas of unusual value for the benefit of all.

Preserve sites and structures of historic and archaeological significance.

- ISSUE: <u>Economic Stability</u>

GOAL: To stimulate balanced economic development and growth in the Mat-Su Borough based upon sound planning and utilization of Borough resources.

OBJECTIVES: Provide for a broad base of economic development and activities, thereby avoiding seasonal fluctuations in employment.

Encourage development of Point MacKenzie Industrial Port Site.

Encourage timber harvesting and processing.

Encourage mining and mineral processing, including oil, gas, and coal development.

Encourage expansion of tourism, tourist related facilities, and outdoor recreational services (e.g. hunting guides).

Encourage expansion of dairy and agricultural production.

Encourage the location and development of manufacturing industry in the Borough.

- ISSUE: Transportation

GOAL: To improve and develop a Borough transportation system which is safe, efficient, and balanced.

OBJECTIVE: Provide for development of arterial, collector, and local road networks.

Provide for "alternative" modes of personal transportation, such as air, water, snowmachine, dogsled, or bicycles.

Maximize efficiency, safety, and scenic aspects of major arterial routes.

Promote the development of convenient modes of public transportation.

Plan for and develop rail and road system to service Point MacKenzie Industrial Port Site.

- ISSUE: <u>Point MacKenzie Industrial Port Site</u>

GOAL: Plan for and develop an industrial and deep water port complex, support facilities, and adjoining townsite at Point MacKenzie.

OBJECTIVES: Provide for an economic and political atmosphere in the Borough that is receptive to the needs of industrial development at Point MacKenzie.

Plan for and develop rail and highway transportation corridors to service the Point MacKenzie Industrial Port Site.

Designate the Point MacKenzie location as an Area Meriting Special Attention, where development of facilities is dependent upon the utilization of, or access to, coastal waters.

Encourage development of a Knik Arm bridge crossing.

Give priority to water-dependent and water-related development in the Point MacKenzie Industrial Port Site area.

- ISSUES: <u>Public Facilities and Utilities</u>

GOAL: To minimize direct and indirect costs to the public in the provision of public facilities and services.

OBJECTIVES: Provide for adequate and appropriate defense against natural disasters and geophysical hazards (e.g. floods).

Provide for adequate and appropriate outdoor recreational opportunities (e.g. campgrounds, boat launches, etc.).

Plan for and develop efficient and environmentally compatible power generation and availability.

Provide for adequate and appropriate communications.

Provide for adequate and appropriate solid waste management.

Provide for adequate, safe, and high quality water supply.

Provide for adequate, safe, and feasible sanitary sewage.

Ensure public access to all significant natural areas (not necessarily road access).

Maynard and Partch

An Alaskan Corporation

800 F Street
Anchorage, Alaska 99501
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SUMMARY
WORKSHOP ON COASTAL ISSUES, GOALS, AND OBJECTIVES
MAT-SU BOROUGH
COASTAL MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM
THURSDAY, April 2, 1981

This was the third meeting of the Citizen/Agency Joint Forum with the Maynard and Partch/Woodward-Clyde consultant team. The consultant team was represented by Stuart Denslow, Michael McGuiness, and John Issacs. The Mat-Su Borough Planning Department was represented by Rodney Schulling. Forum members in attendance were Jay Bergstrand, Larry Engel, Bud Goodyear, Jim Hermon, Barbara Lacher, Bob Lundell, and Myron Stevens.

The intent of the workshop session was for the consultant team to present a revised issues, goals, and objectives statement to the Citizen/Agency Joint Forum for review. Topics highlighted during the workshop session included:

- Acceptance of Minutes
- Mat-Su Borough Coastal Boundaries
- Revised Issues, Goals and Objectives

The background informational packets provided to each Forum member is included as an Appendix to the Summary. In addition, minutes from the Citizen/Agency Joint Forum meeting of March 9, 1981 and March 23, 1981 are also included.

1. ACCEPTANCE OF MINUTES: The Citizen/Agency Joint Forum reviewed and accepted the minutes from the two previously held meetings on March 9, 1981 and March 23, 1981.

2. MAT-SU BOROUGH COASTAL BOUNDARIES: John Issacs of the consultant team briefly reviewed the biological and physical parameters upon which coastal boundaries are established. Pointed out was the fact that the interim coastal boundaries, established by ADF&G, could be reasonably adjusted to reflect the results of the resource inventory and analysis and local desires, as expressed through a coastal management issues, goals, and objectives statement.

Forum members voted and accepted, subject to change, the interim coastal boundaries recommended by the Mat-Su Borough Assembly in the Annual Progress Report of the Mat-Su Borough Coastal Management Program, June 1979. In addition, Forum members asked the consultant team to request the presence of Debra Clausen, ADF&G, and Ed Busch, ADCRA, at their next meeting.

3. <u>REVISED ISSUE, GOALS, AND OBJECTIVES:</u> Stuart Denslow presented the Citizen/Agency Joint Forum with a revised coastal management issues, goals, and objectives statement based upon work accomplished at the March 9, 1981 and March 23, 1981 meetings of the Citizen/Agency Joint Forum.

   The revised coastal management issues, goals, and objectives statement was reviewed and approved by the Citizen/Agency Joint Forum. Bud Goodyear will present the revised coastal management issues, goals, and objectives statement to the Mat-Su Borough Assembly for review and comment on April 7, 1981.

   Forum members discussed the coordination of the Coastal Management Program effort with the overall Borough Comprehensive Development Plan. In addition, the Forum members expressed the desire to consider either expanding the boundaries of the Coastal Management Program study to encompass the entire Borough <u>or</u> bringing the timeline of the pending Comprehensive Development Plan into pace with the chronology of the Coastal Management Program. After discussion, the consultant was requested to draft a letter and work program outline that would enable the Borough to accomplish the latter.

The Citizen/Agency Joint Forum scheduled their next meeting for April 20, 1981. Tentative agenda topics include a further discussion of a preliminary coastal boundary determination and a review of the resource inventory - land status for the Mat-Su Borough. Debra Clausen, ADF&G, and Ed Busch, ADCRA, have been contacted and will attend the April 20, 1981 meeting.

MATANUSKA-SUSITNA BOROUGH
COASTAL ZONE MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM

AGENDA

Monday, April 20, 1981

6:30 P.M.

Assembly Chambers

I. Call to Order.

II. Minutes of Previous Meeting.

III. Discussion on Mat-Su Preliminary Coastal Boundaries.

   A. Debra Clausen, Alaska Department of Fish and Game.

   B. Ed Busch, Alaska Department of Community and Regional Affairs.

IV. Discussion of Resource Inventory - Land Status for the Mat-Su Coastal Area.

V. Discussion of Policy and Technical Coordination of the Mat-Su Comprehensive Development Plan and the Coastal Management Program Element thereof - Consultant Letter responding to Forum Request of April 2.

Maynard and Partch

An Alaskan Corporation

800 F Street
Anchorage, Alaska 99501
907/276-4218

April 16, 1981

MEMORANDUM

TO: CITIZEN/AGENCY JOINT FORUM

FROM: STUART O. DENSLOW

SUBJECT: Resources Inventory and Analysis in Coastal Management

Concurrent with your discussions on community issues, goals, and objectives, the consultant team has been engaged in resource inventory and analysis activities that will provide you with essential technical data for determining demands on, and the capabilities of, the coastal district. This information also provides a base for the development of proper policies and a management framework for the Borough's coastal program.

In the next few weeks, we will be presenting the results of the resource inventory and analysis in a systematic order ranging from land ownership and management, biological resources, physical characteristics and geophysical hazards, through coastal habitat opportunities and constraints and the sensitivities of the Matanuska-Susitna Borough coastal area for development, conditional development, and conservation.

Due to its critical importance to related resource inventory and analysis features, the following presentation of land ownership and management become the important starting point for your examination of the coastal environment.

MATANUSKA-SUSITNA BOROUGH
COASTAL MANAGEMENT PROGRAM
COASTAL AREA - LAND STATUS

The Alaska Coastal Management Program specifies that each district conduct a resource inventory as part of their procedural requirements for coastal management program development. The findings of the resource inventory will be described and presented in a manner that will aid coastal management program policy development and implementation procedures.

One aspect of the resource inventory is the inventory of major land and resource ownership and management responsibilities within or adjacent to a district. The importance of such a land status determination allows for a clear understanding of ownership and management responsibilities in coastal areas over which district coastal management program policies apply.

When determining land status, one fact that must be kept in mind is that land ownership patterns throughout all of Alaska are in a state of flux as a result of incomplete implementation of federal and state laws. The coastal area of the Mat-Su Borough is no exception to this.

STATE LAND

Throughout Alaska's history, the Territory of Alaska, the University of Alaska, and the State of Alaska have acquired land from the federal public domain through various federal land grants. One of the first of these federal land grants was the Act of 1915 (P.L. 330). This Act granted all vacant surveyed township sections 16 and 36 to the Territory of Alaska for the benefit of the common school fund. The income derived from these lands were placed in a trust with only the earnings being used to benefit the schools. In 1978, the Alaska Legislature redesignated the "school sections" as general state land removing the trust land designation. The legislature now provides for a percentage ($\frac{1}{2}$%) of the state resource revenues to feed the school trust fund in place of school trust land revenues.

The Act of 1929 (P.L. 679) granted 100,000 acres of surveyed, non-mineral, vacant, unappropriated and unreserved land to the University of Alaska. These lands, like the school lands, were trust lands with only the earnings being used to benefit the University. Through the Act of 1929, the University of Alaska acquired title to land within the coastal area of the Mat-Su Borough. Much of the University land has been leased under State of Alaska leasing laws.

The Mental Health Grant Act of 1958 (P.L. 830) granted a sizeable area of land, 1,000,000 acres, to the state for the purpose of establishing another trust fund to benefit the funding of mental health costs in Alaska. Like the school trust lands, the land trust designation for mental health lands was removed by the Alaska Legislature in 1978. The legislature now provides for a percentage (1½%) of the state resource revenues to feed the mental health trust fund in place of mental health trust land revenues.

The Alaska Statehood Act of 1959 (P.L. 85-508) transferred the largest amount of land from federal to state ownership. Section 6(b) of the Alaska Statehood Act provided for a grant of 102,550,000 acres to the State of Alaska. Much of the uplands in the Mat-Su coastal area were selected under this authority and patented to the state. The selection process for state land contains three distinct steps prior to final aquisition of the federal patent by the state. The process includes selected lands, tentative approved selected lands, and patented lands. Selected and tentative approved selected status on a tract of land does not necessarily mean that the state will get the final patent.

In addition to the lands granted to the state under the Alaska Statehood Act, the Submerged Lands Act of 1953 (P.L. 85-303 and 508) conveyed all tidelands, submerged lands, and shorelands under all navigable waters to Alaska upon statehood. These lands are available for lease only and cannot be sold under existing state law. Only those persons using such tidelands and cities existing prior to statehood were given a preference to purchase.

BOROUGH LAND

The Matanuska-Susitna Borough was incorporated in 1964 and received the right to select up to 10% of the vacant, unappropriated, unreserved state land within the Borough's boundary. The Municipal Land Entitlement Act of 1978 (AS 29.18.201-.213) has since restricted Borough land entitlement to a maximum of 355,210 acres of state land. Borough lands within the Mat-Su coastal area are divided into selected lands, tentative approved lands, and patented lands. The tentative approved lands lack the patent document for technical reasons only (e.g. lack of exterior boundary survey). Conditional disposals of tentative approved lands can be made with prior approval of the Department of Natural Resources. Approved selections on surveyed land is only waiting for the state's patent document processing to be completed. Pending unapproved selections are in the adjudication process and could be denied if the Borough has over selected its entitlement.

Borough title does not include the mineral rights to the land or title to any navigable water bodies. The state also retains public access to and along all water bodies. With the exception of some school sites and administrative facilities, all of the Borough land was acquired from the state.

PRIVATE LAND

Private land ownership in the Mat-Su coastal area, other than Native land, has evolved through federal land allocation laws, state land sales and Borough land sales. The most prominent federal program was the Homestead Act. Fee ownership gained through the federal homesteading procedure passed the most complete bundle of rights to the private land owner. The federal patent usually included the mineral rights to the land. In 1958, the Homestead Act was changed to reserve the mineral rights from homestead entries in Alaska. The state has since acquired those reserved mineral rights under the homestead lands where there is a mineral potential. Private lands obtained through state and Borough land sales do not include mineral rights which were retained by the state.

NATIVE LAND

The Alaska Native Claims Settlement Act (ANCSA) of 1971 (P.L. 92-203) provided for a land settlement to the Native villages within the Mat-Su coastal area. ANCSA and a subsequent amendment (Terms and Conditions for Land Consolidation and Management in the Cook Inlet Area) provides for federal and state land to satisfy the village and region entitlements. Most of the lands conveyed to Native corporations have been identified, however, litigation is pending for many of the acres selected by Eklutna, Inc. As a result, dual ownership occurs for much of the land south of the Knik River area including the Duck Flats in the Palmer Hay Flats State Game Refuge (T16N, R1-4E, S.M.). The Alaska National Interest Lands Conservation Act (P.L. 96-487) that became law in December, 1980 provides for the state and Eklutna, Inc. to exchange lands to allow for Native selections in the Jim-Swan Lakes area of the Knik/Matanuska River Floodplain (T17N, R3E, S.M.).

PERMITS, CLAIMS, AND LEASES

All of the tide and submerged lands along Knik Arm in the Mat-Su coastal area have been filed on for offshore prospecting. Most of the activity is in the permit application stage and the balance in terminated permits. An offshore prospecting permit is an exclusive mining right to all of the locatable minerals found offshore. The permit must be approved before any exploration work can be done.

If the permittee finds any minerals, the permit must be converted to a lease before any mining is done. The Department of Natural Resources has not approved any permits since about 1975 and does not intend to process any until new regulations are adopted.

As mentioned earlier, the state retains the mineral rights to all land sold or conveyed. If the state has not closed the mineral estate to location or entry, the right to prospect and stake claims on the disposed surface estate still exists. In such instances, the prospector is subject to damage claims of the surface estate. Mining claims on both state and federal land must be filed with the mineral estate owner in addition to filing the claim in the appropriate recording district. This requirement became effective in 1974 on state lands and in 1976 on federal lands. Both federal and state land records now reflect claim locations. A number of mining claims have been filed along rivers in the western portion of the Susitna Flats State Game Refuge.

There are a small number of shore fishery leases in the tidal areas west of the Susitna River. The shore fishery lease gives the leaseholder a priority area for setting nets during salmon runs. Shore fishery leases are issued by the Department of Natural Resources. The possessory interest of a lease must be considered by any competing use in the area.

All land in state ownership in the Mat-Su coastal area, both onshore and offshore, is available for oil and gas leasing. Very little interest has ever been shown in the eastern portion of the Mat-Su coastal area. The upcoming oil and gas lease sales for Upper Cook Inlet in May, 1981 do not include any new areas. Areas that are currently not under lease, mostly because of expired leases, have been offered for lease in the past. To date, the only commercial quantity of gas found is in the vicinity of Theodore Creek, located west of the Susitna River.

EXPLANATORY NOTES ON LAND STATUS

MATANUSKA-SUSITNA BOROUGH

COASTAL MANAGEMENT PROGRAM

LEGEND

State Public Domain

State Game Refuge

State Park or Recreation Area

State Agricultural Land Area

State Interest Land

Borough Selected Land

Borough Tentative Approved Land

Borough Patented Land

Private Ownership - General

Private Ownership - Native Corporations

University Land

Federal Land - Public Domain

Federal Land - State Selected

Refuge and Park Boundaries ------

NOTE: Smallest parcel of land distinguishable at 1:250,000 scale is 40 acres.

State land within the Mat-Su coastal area is divided into six categories:

1. State Public Domain
2. State Game Refuge
3. State Park or Recreation Area
4. State Agricultural Land Area
5. State Interest Land
5. University Land

Three of the state land categories, state game refuge, state park or recreation area, and state agricultural land area are self-explanatory in their use and management. State public domain is state-owned land for which no specific classification exists. Included as state public domain are tidelands, submerged lands, and shorelands under all navigable waters that were conveyed to the State of Alaska by the Submerged Lands Act upon statehood.

State interest lands include state forest lands, recreational lands, and wildlife habitat lands that are not within the boundaries of an established park or refuge. The classification as state interest lands is intended to preclude any disposal in fee ownership. Mineral leasing, permits, and timber sales are allowed on state interest lands if found compatible with specific land classifications. State interest lands classification is an administrative process that can be changed with the identification of new information and objectives.

University lands are considered trust lands. The income obtained from leases on university land is placed in a trust and the earnings utilized to benefit the University of Alaska. The Department of Natural Resources is in charge of leasing university lands in accordance with state leasing laws.

Borough land within the Mat-Su coastal area is divided into three categories:

1. Borough-Selected Lands
2. Borough Tentative-Approved Lands
3. Borough-Patented Lands

The maximum amount of state land that the Borough is entitled to receive is 355,210 acres. To obtain state land, the Borough must go through the process of selecting and surveying vacant state land, receiving title to the land after the state determines the land is available.

Private land within the Mat-Su coastal area is divided into two categories:

1. General Private Ownership ▲

2. Native Corporation Ownership △

General private ownership has evolved through several federal land allocation laws (Homestead Act), state land sales, and Borough land sales. Native ownership has evolved as a result of the Alaska Native Claims Settlement Act (ANCSA). ANCSA and a subsequent amendment (Terms and Conditions for land Consolidation and Management in the Cook Inlet Area) provides for federal and state land to satisfy village and region entitlements. Within the Mat-Su coastal area, the major Native regional corporation landowner is Cook Inlet Regional Corporation while the primary Native village landowner is Eklutna Incorporated.

Federal land within the Mat-Su coastal area is extremely limited and subject to selection by both the state and native villages.

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SUMMARY
WORKSHOP ON COASTAL BOUNDARIES - LAND STATUS
MAT-SU BOROUGH
COASTAL MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM
MONDAY, APRIL 20, 1981

This was the fourth meeting of the Citizen/Agency Joint Forum with the Maynard and Partch/Woodward-Clyde consultant team. The consultant team was represented by Stuart Denslow and Michael McGuiness. The Mat-Su Borough Planning Department was represented by Rick Feller. Forum members in attendance were Jim Bird, Russ Cotton, Larry Engel, Bud Goodyear, James Herman, Bob Hurley, Barbara Lacher, Bob Lundell, Elsie O'Brian, and Myron Stevens. Ed Busch and Lamar Cotton, Alaska Department of Community and Regional Affairs (ADCRA) and Debra Clausen, Alaska Department of Fish and Game (ADF&G) were in attendance at the meeting.

The intent of the workshop session was for staff of ADCRA and ADF&G to answer Forum questions regarding coastal boundaries and to present agency positions with respect to the Mat-Su coastal boundary. Topics highlighted during the workshop session included:

- Acceptance of Minutes
- Mat-Su Borough Coastal Boundaries
- Resource Inventory - Land Status in the Mat-Su Coastal Area
- Policy and Technical Coordination between Mat-Su Coastal Management Program and Mat-Su Comprehensive Development Plan.

The background informational packets provided to each forum member is included as an Appendix to the Summary. In addition, minutes from the Citizen/Agency Joint Forum meeting of April 2, 1981 are also included.

1. ACCEPTANCE OF MINUTES: The Citizen/Agency Joint Forum reviewed and accepted the minutes from the April 2, 1981 meeting.

2. MAT-SU BOROUGH COASTAL BOUNDARIES: Debra Clausen, ADF&G, made a presentation on ADF&G interim coastal boundaries in the Mat-Su Borough. Biological and physical processes which were taken into account when setting the boundary were discussed (e.g. areas of anadromous spawning and rearing). Ms. Clausen responded to questions from the Forum regarding ADF&G's rationale for utilizing the 200-foot contour as the

landward extent of the zone of direct influence within the Mat-Su Borough. Ms. Clausen provided the Forum with a set of coastal biophysical boundary maps for the Mat-Su Borough.

Ed Busch, ADCRA, discussed the flexibility that local districts have in approaching coastal boundary determinations based upon the findings of the resource inventory and analysis and expressed local goals and objectives. Mr. Busch explained that while local districts have great discretion in determining coastal boundaries, such discretion must be tempered with proper justification for coastal boundaries based on the standards and guidelines of the Alaska Coastal Management Program. Both Ms. Clausen and Mr. Busch responded to Forum questions relating to interpretation of standards and guidelines of the Alaska Coastal Management Program.

3. <u>RESOURCE INVENTORY - LAND STATUS IN THE MAT-SU COASTAL AREA</u>:

Michael McGuiness, of the consultant team, made a presentation on land status and ownership within the Mat-Su coastal area. Federal land grants, federal acts, state acts, state land sales, borough land sales, and native entitlements were discussed and their associated impacts on land status and ownership within the Mat-Su coastal area examined. Land status and ownership information was presented on 1:250,000 coastal area base map. Finer detailed information on land status is available at 1:63,360.

4. <u>POLICY AND TECHNICAL COORDINATION BETWEEN MAT-SU COASTAL MANAGEMENT PROGRAM AND MAT-SU COMPREHENSIVE DEVELOPMENT PLAN</u>:

In response to Stuart Denslow's letter to Jim Bird and Bud Goodyear regarding policy and technical coordination of the Mat-Su Comprehensive Development Plan and the Mat-Su Coastal Management Program, the Citizen/Agency Joint Forum voted to adopt Option 2 and coordinate work programming of the coastal program with the comprehensive plan. The Forum agreed to proceed with the pace of the coastal management program, as currently scheduled, and coordinate with the Planning Commission and Comprehensive Development Plan when appropriate.

The Citizen/Agency Joint Forum scheduled their next meeting for May 11, 1981. Tentative agenda topic will deal with the coastal resource inventory and analysis. Casette tape of presentation available from Mat-Su Borough Planning Department upon request.

MATANUSKA-SUSITNA BOROUGH
COASTAL MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM

AGENDA

Monday, May 11, 1981
6:30 PM
Assembly Chambers

I. Call to Order

II. Minutes of Previous Meeting

III. Discussion and Presentation of further Resource Inventory and Analysis.

   a. Biological Resources

   b. Geophysical Characteristics

   c. Human and Cultural Resources

Memorandum

Woodward-Clyde Consultants

To: CITIZEN/AGENCY JOINT FORUM

From: Larry A. Rundquist
Maureen McCrea

Office: Anchorage - ESD

Date: May 11, 1981

Subject: Resources Inventory and Analysis for Coastal Management Program

The purpose of this memorandum is to outline the results of the inventory and analysis of the biological resources, physical characteristics, and geophysical hazards. The inventory and analysis were based upon data from the literature and agency data; no field studies were conducted to verify, update, or expand the available information. Your comments or observations, in verbal or written format, can provide valuable current information for this purpose.

LAR/jb
Attachments

Natural Resource Inventory

I. Coastal Habitats: Eight habitats were identified by the Coastal Policy Council for classifying all coastal areas.

A. Offshore/Estuarine: All waters and submerged lands beyond mean lower low tide to the offshore Borough limits.

B. Wetlands and Tideflats: Wetlands include permanently moist, shallow submerged lands, such as marshes, wet tundra, swamps, and bogs. Tideflats include habitat alternately covered and uncovered by seawater.

C. Rocky Islands and Seacliffs: Vegetated high banks above mean higher high tide.

D. Rivers, Streams, and Lakes: Includes all freshwater surface systems within the coastal management boundary.

E. Important Upland Habitats: Those areas above mean higher high tide within the 1000' contour of the Borough.

F. Barrier Islands and Lagoons and High Energy Coasts: Two additional systems identified by the Coastal Policy Council for inclusion in coastal management programs are not applicable in the Borough.

II. Primary Fish and Wildlife Habitat: Areas of focus include:

Birds: primarily waterfowl;
Mammals: primarily black bear and moose;
Fish: primarily salmon.

A. Offshore/Estuarine:

1. Mammals: beluga whales and harbor seals.

2. Fish: Anadromous fish (salmon and smelt) en route to rivers.

B. Wetlands and Tideflats:

1. Birds: Waterfowl concentrations among greatest in Cook Inlet. Primarily duck use but also used extensively by several species of geese, swans, sandhill cranes and several species of loons.

2. Mammals: Moose and black bear are most prevalent large mammals. Muskrats are the most abundant furbearer.

C. High Banked Shorelines:

1. Birds: Waterfowl extend use of Palmer Hay Flats into this area.

2. Mammals: Moose utilize the upland area.

D. Rivers, Streams, and Lakes:

1. Anadromous Fish: All five species of salmon spawn within the Borough's coastal zone. Almost all rivers and streams are suitable. The Susitna River and tributaries to it are the most important producers of pink, chum, and king salmon in Cook Inlet. Smelt spawning also occurs, primarily in the Knik and Susitna Rivers.

2. Resident Fish: Major species include rainbow trout, lake trout, Arctic grayling, Dolly Varden/Arctic char, northern pike, burbot, and several species of whitefish.

3. Birds: Bird use is poorly documented. Bald eagle nesting occurs but is officially documented at only the confluence of Moose Creek and the Yentna River.

4. Mammals: Black bear use it for spring and summer forage. Moose utilize riparian areas for calving and winter forage.

E. Important Upland Habitats:

1. Birds: Agricultural areas provide forage for the waterfowl, particularly sandhill cranes and geese. Upland game birds, particularly grouse and ptarmigan, utilize grain fields and willow thickets among other upland areas. Passerine diversity is greatest in uplands, particularly aboundant are thrushes, warblers, and dark-eyed juncos.

2. Mammals: Summer range for moose is extensive. Black bear are most abundant in timbered areas and areas with dense alder growth.

P H Y S I C A L C H A R A C T E R I S T I C S

WATER RESOURCES

Availability - The availability of water in most of the Coastal Management District is generally good. Constraints placed upon development due to water limitations within the District is not anticipated.

Surface Water Inventory - There are ample surface water supplies in the District. The quality of the water is good with the exception of the sediments that are carried by the glacial-fed rivers. Problems of developing this supply include:

- water is continually flowing; dam would be needed for storage if sufficient storage in tanks is not available
- availability fluctuates seasonally with low flow periods in the winter
- water intakes may be abandoned or clogged if the stream shifts

Existing lakes can possibly be used for a water supply.

Groundwater Inventory - Groundwater supplies are best near the Susitna River and many of its tributaries, but wells yielding 10 to 50 gpm can be anticipated near most of the communities in the District. An advantage of using well water, which most communities are currently using, is that the groundwater is contained in a natural storage reservoir and does not fluctuate substantially over the year. Groundwater quality is generally good, with the exception of a high iron content in much of the District and some areas with high sulfate, boron, and/or nitrate concentrations. Wastewater must be handled properly to prevent contamination of groundwater supplies.

G E O P H Y S I C A L   H A Z A R D S

Purpose - To identify and delineate geophysical hazards for incorporation into the planning of development projects to minimize property damage and personal harm.

Categories Addressed

- Geologic
  - Seismic
  - Volcanic
  - Mass Wasting
- Hydrologic
  - Flooding
  - Icings
  - Bank Erosion
- Oceanic
  - Ice
  - Seismic
  - Storms

Hazard Maps - The geophysical hazards are mapped on two maps with scales of 1:250,000. The mapping is not adequate for site specific work; refer to the referenced sources if detail is required. In most cases, detailed studies should be conducted to identify and delineate specific hazards in areas to be developed.

Geophysical Hazards Constraints - The constraints to development associated with geophysical hazards can be classified into two general categories: (1) avoidance of the hazard area, and (2) designing to minimize damage associated with the hazard (Table 71). In most cases, avoidance of the hazard is the best approach. When the hazard is so widespread that it can not be avoided, or when the proposed development can not be relocated, projects should be designed to minimize the impacts of the hazard.

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SUMMARY
WORKSHOP ON RESOURCE INVENTORY
MAT-SU BOROUGH
COASTAL MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM
MONDAY, MAY 11, 1981

This was the fifth meeting of the Citizen/Agency Joint Forum with the Maynard and Partch/Woodward-Clyde consultant team. The consultant team was represented by Stuart Denslow, Michael McGuiness, Maureen McCrea, and Larry Rundquist. The Mat-Su Borough Planning Department was represented by Rodney Schulling, Rick Feller and Lila Hemphill. Forum members in attendance were Jay Bergstrand, Larry Engel, Bud Goodyear, James Herman, Bob Hurley, Barbara Lacher, Al Larson, Bob Lundell, Gary Silvers, and Vern Urgerecht.

The intent of the workshop session was for the consultant team to continue presentation of resource inventory data to Forum members. Topics highlighted during the workshop session included:

- o Acceptance of Minutes
- o Resource Inventory - Habitat Classifications in the Mat-Su Coastal Area.
- o Resource Inventory - Fish and Wildlife Resources in the Mat-Su Coastal Area.
- o Resource Inventory - Geophysical Characteristics in the Mat-Su Coastal Area.
- o Discussion on Resource Inventory Maps

The background informational packet provided to each Forum member is included as an appendix to this Summary.

1. <u>ACCEPTANCE OF MINUTES</u>: The Citizen/Agency Joint Forum reviewed and accepted the minutes from the April 20, 1981 meeting.

2. <u>RESOURCE INVENTORY - HABITAT CLASSIFICATIONS IN THE MAT-SU COASTAL AREA</u>: Dr. Maureen McCrea, of the consultant team, made a presentation on the different habitat classifications found in the Mat-Su coastal area. Dr. McCrea pointed out that the Alaska Coastal Policy Council directs coastal districts to identify, if applicable, eight different and distinct habitat types for coastal management. Five of the eight

habitat types are found in the Mat-Su coastal area and include:

a. Offshore/Estuarine (This includes offshore areas and estuary habitats identified in 6 AAC 80.130 of the Alaska Coastal Management Program).

b. Wetland and Tideflats.

c. Vegetated High Banks (Substituted for rocky islands and seacliffs identified in 6 AAC 80.130 of the Alaska Coastal Management Program).

d. Rivers, Streams and Lakes.

e. Important Upland Habitats.

3. <u>RESOURCE INVENTORY - FISH AND WILDLIFE RESOURCES IN THE MAT-SU COASTAL AREA</u>: Dr. Maureen McCrea, of the consultant team, made a presentation on fish and wildlife found within the Mat-Su coastal habitat types. Literature and studies on fish and wildlife species were concentrated on the following categories:

   a. Birds (primarily waterfowl in wetlands and tideflats, with game birds and passerines found in upland habitat types).

   b. Mammals (beluga whales and harbor seals found in offshore areas, black bear, moose, and small furbearers found in other habitat types).

   c. Fish (primarily the five species of salmon; smelt, trout, grayling and other species of fish).

4. <u>RESOURCE INVENTORY - GEOPHYSICAL CHARACTERISTICS IN THE MAT-SU COASTAL AREA</u>: Dr. Larry Rundquist, of the consultant team, made a presentation on physical characteristics and geophysical hazards found in the Mat-Su coastal area. The main physical characteristic discussed was water resources, including surface water and groundwater availability. A question was raised as to the availability of water in the Point MacKenzie area, in quantities suitable for supporting a petrochemical industry. Dr. Rundquist pointed out that site specific water resource information in the Point MacKenzie area is limited and new data will result from test wells planned to be drilled in the area by the Borough.

   Geophysical hazards are identified in the coastal management process to assist the planning of development projects in order to minimize property damage and personal harm. Geophysical hazards discussed included:

a. Geologic (including seismic, volcanic, and mass wasting).

b. Hydrologic (including flooding, icings, and bank erosion).

c. Oceanic (including ice, seismic, and storms).

Dr. Rundquist pointed out that development in certain hazard areas should be either avoided or design measures taken to minimize damage associated with a particular hazard. A summary table of the basic development constraints associated with geophysical hazards in the Mat-Su Borough was provided to all Forum members.

5. <u>DISCUSSION ON RESOURCE INVENTORY MAPS</u>: Fish and wildlife and geophysical hazard maps were reviewed by Forum members and questions regarding the maps answered by members of the consultant team. A concern was raised by a number of Forum members over the limited amount of site specific information available for much of the Mat-Su coastal area. Stuart Denslow, of the consultant team, pointed out that the findings of ongoing studies in the Borough (e.g. Susitna Study by DNR) will be incorporated into the resource inventory as the information becomes available.

   Concern was also raised over the criteria that the U. S. Army Corps of Engineers would utilize to evaluate a wetlands permit in an area for which there is no specific biological or geophysical data available. Barbara Lacher, of the Forum, made a motion to request a representative of the U. S. Army Corps of Engineers to be present at their next meeting. The Forum also requested Jim Bird (Forum member) to report at their next meeting on the actions of the Borough Port Development Committee.

The Citizen/Agency Joint Forum scheduled their next meeting for May 26, 1981. Tentative agenda topics will continue with the resource inventory and will include the balance of the natural resources and human and cultural resources. The consultants will contact the U. S. Army Corps of Engineers and request a Corps Of Engineers representative at the next meeting. Cassette tapes of the meeting are available from Mat-Su Borough Planning Department upon request.

MATANUSKA-SUSITNA BOROUGH
COASTAL MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM

AGENDA

Tuesday, May 26, 1981
6:30 P.M.
Assembly Chambers

I. Call to Order.

II. Minutes of Previous Meeting.

III. Discussion with Larry Reeder, Compliance Section, U.S. Army Corps of Engineers.

IV. Presentation and Discussion of Resource Inventory and Analysis.

  a. Geophysical Characteristics.

  b. Human and Cultural Resources.

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SUMMARY
WORKSHOP ON RESOURCE INVENTORY
MAT-SU BOROUGH
COASTAL MANAGEMENT PROGRAM
CITIZEN/AGENCY JOINT FORUM
TUESDAY, MAY 26, 1981

This was the sixth meeting of the Citizen/Agency Joint Forum with the Maynard and Partch/Woodward-Clyde consultant team. The consultant team was represented by Stuart Denslow, Michael McGuiness, and Jon Isaacs. The Mat-Su Borough Planning Department was represented by Rodney Schulling and Lila Hemphill. Forum members in attendance were Jim Bird, Bud Goodyear, Barbara Lacher, Bob Lundell, and Guy Woodings. Larry Reeder, Regulatory Functions Branch, U.S. Army Corps of Engineers, Alaska District, was in attendance at the meeting.

The intent of the workshop session was for the U.S. Army Corps of Engineers (COE) representative to answer Forum questions regarding COE jurisdiction over wetlands in the Mat-Su Borough and review procedures for wetland permits. Topics highlighted during the workshop session included:

- Acceptance of Minutes.
- Wetlands in the Mat-Su Borough - Role of the U.S. Army Corps of Engineers.
- Resource Analysis and Geographic Classifications of Mat-Su Borough Coastal Area.

Mr. Reeder, of the U.S. Army Corps of Engineers, provided Forum members with several COE publications, including the <u>Regulatory Program of the Corps of Engineers</u>, <u>Permit Program Guide for Applicants</u>, and <u>Protecting Alaska's Waters</u>.

1. <u>ACCEPTANCE OF MINUTES</u>: The Citizen/Agency Joint Forum reviewed the minutes from the May 11, 1981 meeting, noted some minor type errors, and accepted the minutes.

2. <u>WETLANDS IN THE MAT-SU BOROUGH - ROLE OF THE U.S. ARMY CORPS OF ENGINEERS</u>: Larry Reeder, U.S. Army Corps of Engineers, made a presentation on COE jurisdiction over navigable waters and wetlands of the United States. Mr. Reeder stated that the primary features of the Corps' permit program are governed by Section 10 of the River and Harbor Act of 1899 and Section 404 of the Clean Water Act.

The River and Harbor Act of 1899 established the Corps' authority as a regulatory agency. The law was passed to insure that water commerce routes would be kept operable and free of obstructions to navigation. Section 10 of the Act required that a permit be obtained from the Corps for dredging and for construction of piers and structures in navigable waters.

Increased public awareness in the environment, the passage of the National Environmental Policy Act of 1970 (NEPA), and a series of court decisions directed the Corps to evaluate permit application in terms of the more broader public interest, including affects on fish and wildlife, water quality, recreation, flood control, and economics.

The Federal Water Pollution Control Act of 1972 (FWPCA) expanded the Corps' jurisdiction to include navigable waters of the United States plus their adjacent wetlands. Section 404 of the FWPCA made it illegal to place fill or dredged materials in navigable waters without a Corps permit. The Clean Water Act of 1977 superceded the FWPCA and incorporated Section 404 with minor revisions. The Clean Water Act expanded Corps jurisdiction to include all headwater streams with a normal flow of at least five cu. ft. per second, lakes larger than five acres with a surface outlet into navigable waters, and adjacent wetlands associated with streams and lakes.

Mr. Reeder opened the discussion for questions and answers. When asked about the attributes of preserving wetlands in their natural state, Mr. Reeder responded by identifying seven intrinsic values of wetlands, examples of which include:

- Flood protection by providing a reservoir for flood waters;
- Controlled release of flood waters;
- Purification of surface waters;
- Support for natural ecosystems for fisheries, invertebrates, and shellfish;
- Serve as recharge areas for water supply;
- Support nesting and resting areas for waterfowl and shorebirds and habitat for moose, bear, and other mammals; and
- Serve as initial indicators of water and air pollution in a given area.

When asked about Corps methodology for wetland determination, Mr. Reeder responded that the Corps identifies areas as either wetlands or nonwetlands by looking at three key elements; soils, vegetation, and hydrology. In Alaska, all three elements must indicate the presence of wetlands before the Corps identified an area as a wetland. The Corps does its own wetland identification and delineation in Alaska and bases such identification on aerial photographs, ground proofing of aerial photos, USGS maps, soils data, hydrologic data, and on-site surveys.

When asked about Corps permits required for placer mining operations, Mr. Reeder responded that placer mining operations generally do not require a permit from the Corps unless there is a diversion structure or settling pond involved in the operation. Mr. Reeder did point out that a placer mining operation would probably require a Section 402 permit from EPA or the Alaska Department of Environmental Conservation.

When questioned about the advantages of an approved coastal management program, Mr. Reeder responded on how the consistency and predictability of the program would facilitate proposed development in the Mat-Su Borough coastal area (e.g. Point Mackenzie Industrial Port). From the Corps' perspective, a Memorandum of Agreement based on an approved coastal management program would greatly assist the Corps' review process on development projects requiring a Corps permit. A proposed project which is consistent with the local coastal management program would still have to go through the Corps' review process, however, the time for such a review process would be shortened substantially.

3. Resource Analysis and Geographic Classification of Mat-Su Borough Coastal Area: Jon Isaacs, of the consultant team, discussed the methodology utilized for classifying the Mat-Su Borough coastal management area based on local needs, resource sensitivity, and other factors such as public safety. The Mat-Su Borough coastal area will be classified into Conservation, Conditional Development, and Development categories.

The Conservation classification will include those areas of the coast where either geophysical hazards or critical biological resources, coastal habitats, recreation areas, and areas of air and water quality are present. Activities and development within conservation areas will be limited to preferential uses such as game refuges or uses designed to protect the public safety.

The Conditional Development classification includes those areas of the coast where coastal development may be subject to constraints created by biological resources, geophysical hazards, coastal habitats, land ownership, coastal access, and air and water quality.

There will be no preferential uses in conditional development areas. Activities and development within a conditional development area shall be subject to coordination with the Borough Planning Department and appropriate State and federal agencies.

The Development Classification include those areas of the coast where economic and coastal development objectives are not subject to constraints created by geophysical hazards, biological resources, coastal habitats, and other factors. Economic and coastal development are the preferential uses for development areas.

The Citizen/Agency Joint Forum scheduled their next meeting for June 15, 1981. Tentative agenda topics will include presentation of the Mat-Su Borough Coastal Management Program, Phase I Completion Report, and discussion on areas which merit special attention in the Mat-Su Borough coastal management area. Cassette tapes of workshop sessions available from the Mat-Su Borough Planning Department upon request.

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MAPS

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