# FINAL REPORT
# COMPUTERIZED GEOGRAPHIC INFORMATION SYSTEM
# TALKEETNA AND BELUGA SUBBASINS
# SUSITNA RIVER BASIN, ALASKA

ESRI
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Redlands, California 92373

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# COMPUTERIZED GEOGRAPHIC INFORMATION SYSTEM
# TALKEETNA AND BELUGA SUBBASINS
# SUSITNA RIVER BASIN, ALASKA

Prepared for:

U.S.D.A. Soil Conservation Service
U.S.D.A. Forest Service
Alaska Department of Natural Resources

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Table of Contents


| | Page |
|---|---|
| Introduction | i |
| I. Data Collection and Classification | |
| A. Introduction | I-1 |
| B. Methodology | I-2 |
| C. Data Structure and Classification | I-8 |
| Map No. 1 Integrated Terrain Units | I-10 |
| Map No. 2 Surface Hydrology | I-10 |
| Map No. 3 Points and Linear Features | I-10 |
| Map No. 4 Land Status | I-11 |
| II. Data Mapping | |
| A. Introduction | II-1 |
| B. Methodology | II-3 |
| C. Manuscript Mapping | II-9 |
| Map No. 1 Integrated Terrain Units | II-9 |
| Map No. 2 Surface Hydrology | II-10 |
| Map No. 3 Points and Linear Features | II-10 |
| Map No. 4 Land Status | II-11 |
| III. Data Automation | |
| A. Introduction | III-1 |
| B. Methodology | III-3 |
| C. Interpreted and Derived Data | III-8 |
| Interpretive Matrices | III-8 |
| Distance Searches | III-10 |
| IV. Computer Modeling | |
| A. Introduction | IV-1 |
| B. Methodology | IV-3 |
| C. Model Outlines | IV-7 |
| Soil Drainage | IV-9 |
| Soil Limitations for Dwellings | IV-10 |
| Range Resources | IV-11 |
| Specific Slope from Soils | IV-14 |
| Forest Resources | IV-15 |
| Groundwater Availability | IV-18 |
| Economic Agriculture/Forestry | IV-20 |
| Important Farmland | IV-23 |
| Important Grazing Lands (Potential) - Talkeetna Subbasin | IV-24 |

Table of Contents, continued


| | Page |
|---|---|
| IV. Computer Modeling, continued | |
| Land Capability for Accessed Large Lot Residential Development - Talkeetna Subbasin | IV-25 |
| Land Capability for Moderate/High Density Residential Development | IV-28 |
| Land Capability for Low Density Remote Residential Development | IV-31 |
| Erosion Potential | IV-35 |
| Moose Habitat | IV-36 |
| General Habitat | IV-38 |
| Wetlands Matrix - Talkeetna Subbasin | IV-41 |
| Wetlands II - Talkeetna Subbasin | IV-46 |
| Wetlands Matrix - Beluga Subbasin | IV-47 |
| Road Suitability - Talkeetna Subbasin | IV-51 |
| Colos - Talkeetna Subbasin | IV-55 |
| Road Suitability - Beluga Subbasin | IV-56 |
| V. Computer Mapping | |
| A. Introduction | V-1 |
| B. Methodology | V-2 |
| C. Legends and Statistics | V-6 |
| Legends - Talkeetna Subbasin | |
| Soil Drainage | V-8 |
| Soil Limitations for Dwellings | V-10 |
| Range Resources | V-11 |
| Slope | V-12 |
| Forest Resources | V-13 |
| Important Farmland | V-14 |
| Important Grazing Lands (Potential) | V-15 |
| Groundwater Availability | V-16 |
| Economic Agriculture/Forestry | V-17 |
| Capability for Large Lot Residential Development | V-18 |
| Capability for Moderate/High Density Residential Development | V-19 |
| Capability for Low Density Remote Residential Development | V-20 |
| Erosion | V-21 |
| Moose Habitat | V-22 |
| General Habitat I | V-23 |
| General Habitat II | V-25 |
| Wetlands I | V-26 |
| Wetlands II | V-28 |
| Road Suitability | V-30 |
| Colos | V-31 |

Table of Contents, continued


Page

V. Computer Mapping, continued

Legends - Beluga Subbasin

Soil Drainage V-32
Soil Limitations for Dwellings V-33
Range Resources V-34
Slope V-35
Forest Resources V-36
Important Farmland V-37
Groundwater Availability V-38
Economic Agriculture/Forestry V-39
Capability for Moderate/High Density Residential Development V-40
Capability for Low Density Remote Residential Development V-41
Erosion V-42
Moose Habitat V-43
General Habitat I V-44
General Habitat II V-46
Wetlands I V-47
Road Suitability V-49

Appendix A1. Data Classification and Coding - Talkeetna Subbasin A-1-1

Appendix A2. Data Classification and Coding - Beluga Subbasin A-2-1

Appendix B. Data Code Descriptions B-1-1

Appendix C. Data Sources and Mapping Methodology C-1

Appendix D1. Grid Multi-Variable File - Talkeetna Subbasin D-1

Appendix D2. Grid Multi-Variable File - Beluga Subbasin D-2

Appendix E1. Interpretive Soil Matrices E-1

Appendix E2. Interpretive Soil Matrices E-2

INTRODUCTION

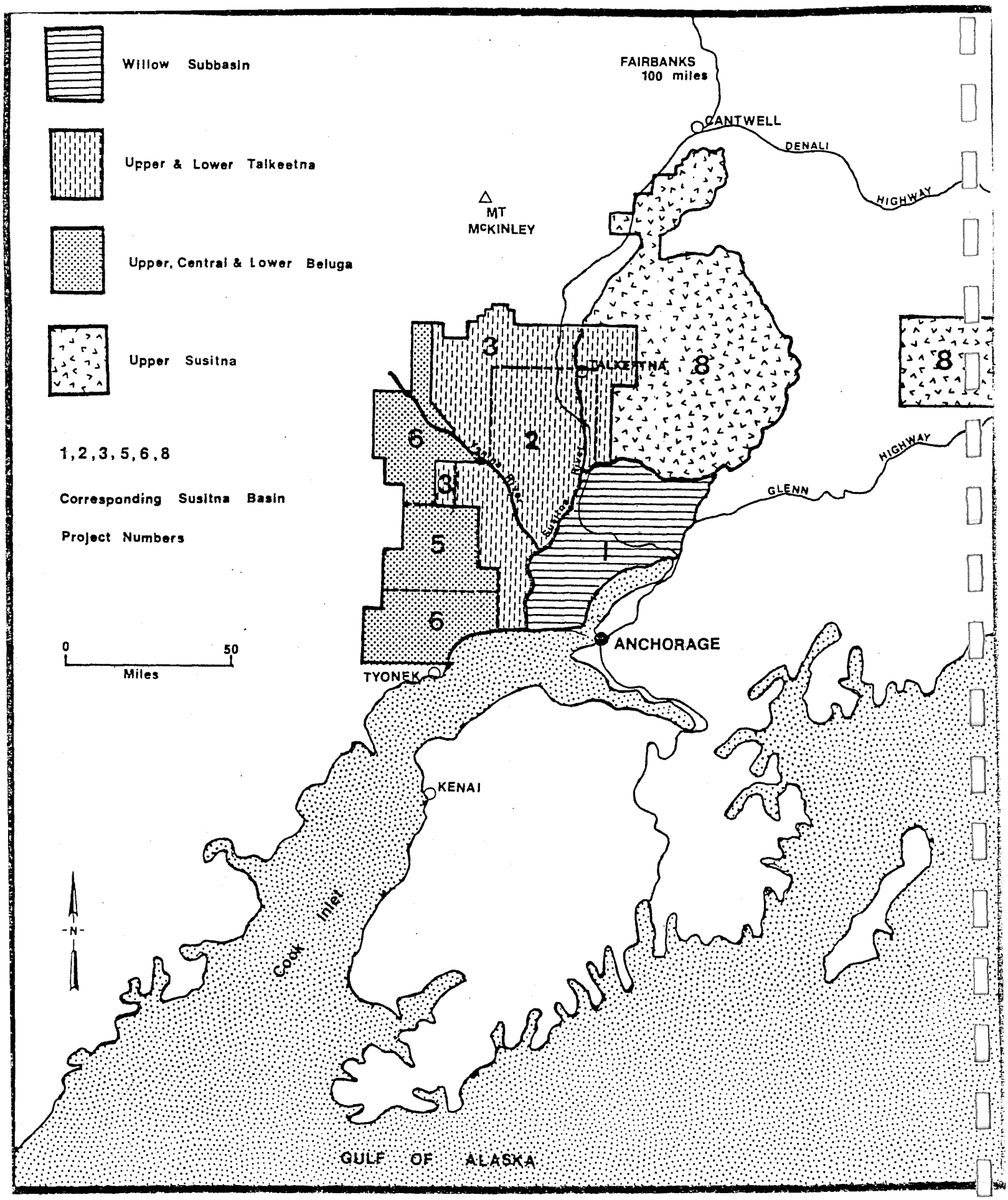
Environmental Systems Research Institute (ESRI) has developed an Automated Geographic Information System (GIS) and conducted a systematic land capability/suitability analysis for the Susitna River Basin in south central Alaska. This effort was sponsored by a number of agencies, including the National Aeronautics and Space Administration (NASA), the U.S. Department of Agriculture (USDA) and the Alaska State Department of Natural Resources (ADNR). It was carried out under a number of contracts. The first contract, which provided coverage for the Willow Subbasin and was described in detail in a final report entitled, Computerized Geographic Information System: Willow Subbasin, Susitna Basin, Alaska (February 1981), was administered by the NASA Ames Research Center. Subsequent efforts, most of which are described in this report, have been carried out under a number of different contracts with the U.S. Soil Conservation Service, the U.S. Forest Service and the Alaska State Department of Natural Resources. The work for the Talkeetna Subbasin was completed under two separate contracts with the USDA Soil Conservation Service. Contract No. 53-0436-9-39 provided coverage for the lower portion of the subbasin. Contract No. 53-0436-0-46 provided coverage for the upper portion. The work for the Beluga subbasin was completed under contracts with the Alaska Department of Natural Resources and the USDA Forest Service. Coverage for the central portion of the subbasin was provided through ADNR Contract No. GSC-360. Coverge for the upper and lower portions was provided through USDA Forest Service Contract No. 53-0109-1-00080. Mapping of the upland margins of the Susitna Basin was funded under a number of other contracts and purchase order. The maps

produced for an area of some 3,700 square miles in the Upper Susitna Basin were automated. The results of this latter effort, which was conducted at a different level of spatial resolution, are outlined in a separate report.

In many respects, the creation of the automated GIS for the Susitna River Basin represents the culmination of a resource inventory and analysis effort which commenced several years ago and which, among other things, involved the detailed mapping and field survey of soil and forest resources by the USDA Soil Conservation Service and Forest Service. These and other data were rectified, cross-compared, and composited by ESRI in the pre-automation process. Related areal phenomena such as geology, landform, slope, soils, and vegetation were cross-compared and composited in a single map overlay by a process termed, "Integrated Terrain Unit Mapping". This process imparted a higher level of spatial resolution, accuracy, and consistency to the mapped data than was generally inherent in the diverse source materials. The terrain unit map was composed of individual units, each of which encompassed a set of homogeneous characteristics. The numerous data planes represented on the map were segregated and mapped as independent phenomena after the process of automation was completed. It is important to note that the pre-automation compositing and integration process provides for a high level of technical and cost efficiency in the data automation effort. Once automated, all of the mapped data included in the system were put in an easily retrievable form for use by a wide range of agencies in long-term land inventory, planing, and management functions. In order to provide for the uniform analysis and display of data for each of the subbasins, ESRI staff merged the multiple data files created under four separate contracts into two

discrete and coherent sets of files: one for the Talkeetna Subbasin and the other for the Beluga Subbasin. Separate sets of files were created for the Willow Subbasin and the Upper Susitna Basin. In cooperation with State and Federal agency staff, ESRI subsequently employed the data bases in a systematic assessment of environmental opportunities and constraints in the subbasins and in a structured evaluation of the capability and suitability of the land for select uses. The development and application of these data bases represents one aspect of a transfer of GIS technology from ESRI to State and Federal agencies in Alaska. It provided an opportunity for professional and technical personnel from a number of these agencies to participate in all phases of data base design, implementation, and application. It also resulted in the creation of a number of unified data bases which have been installed on the ADNR computer facility in Anchorage and which, in the future, can serve both as the superstructure for the efficient storage and retrieval of environmental data for the area and as the context for its legible and systematic application to land planning and management functions.

The Susitna River Basin comprises an area of approximately 10,000 square miles. The regional map on the following page illustrates the general location and configuration of the Susitna Basin as well as the major subbasins within it. The Willow Subbasin, comprising an area of approximately 1,600 square miles is located in the Southeast. The Talkeetna Subbasin, comprising an area of some 3,200 square miles is located in the center. The Beluga Subbasin, extending over approximately 2,300 square miles, is located in the West. As indicated previously, the Talkeetna and

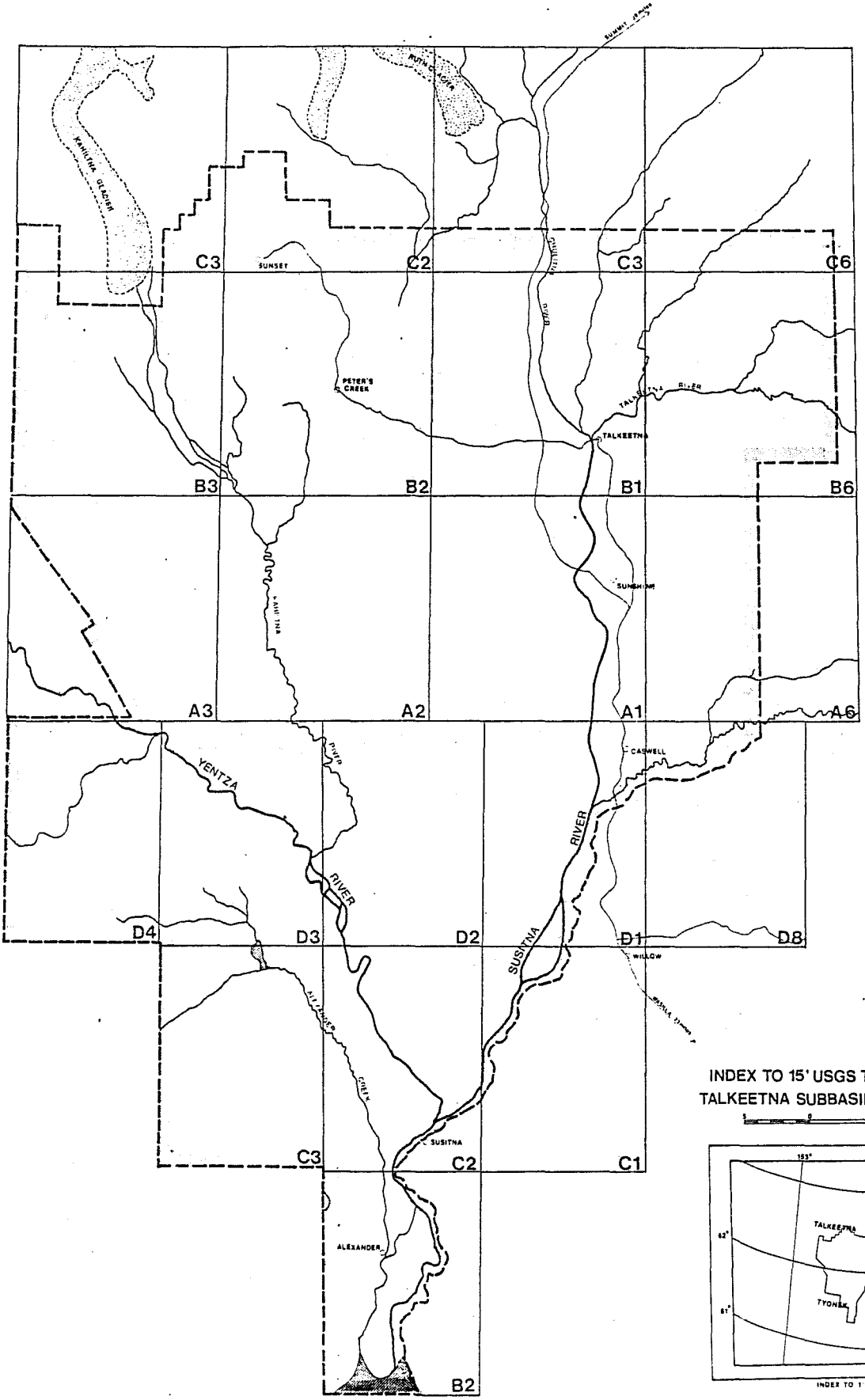



Willow, Talkeetna, Beluga, Susitna Subbasins

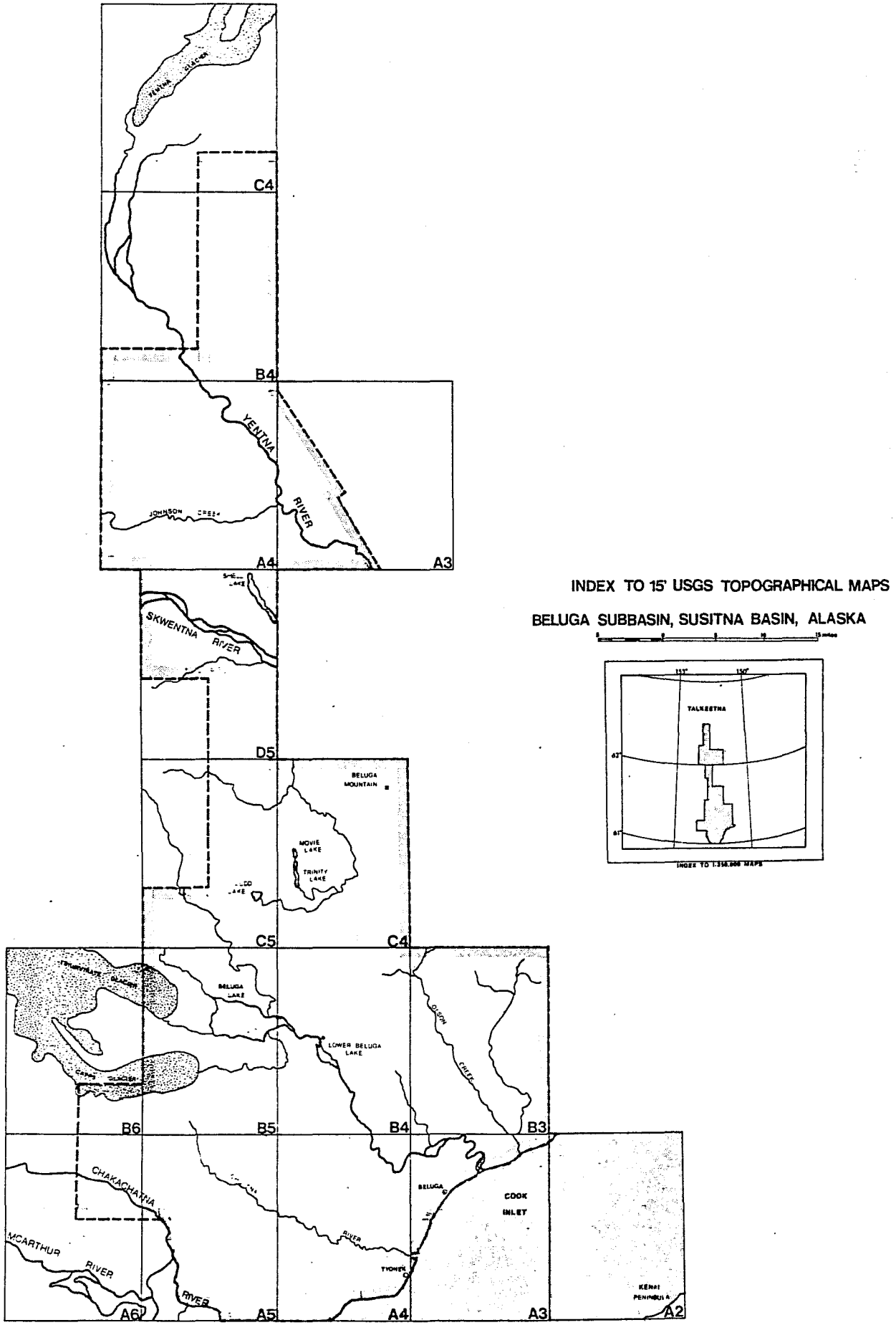
SUSITNA BASIN, ALASKA

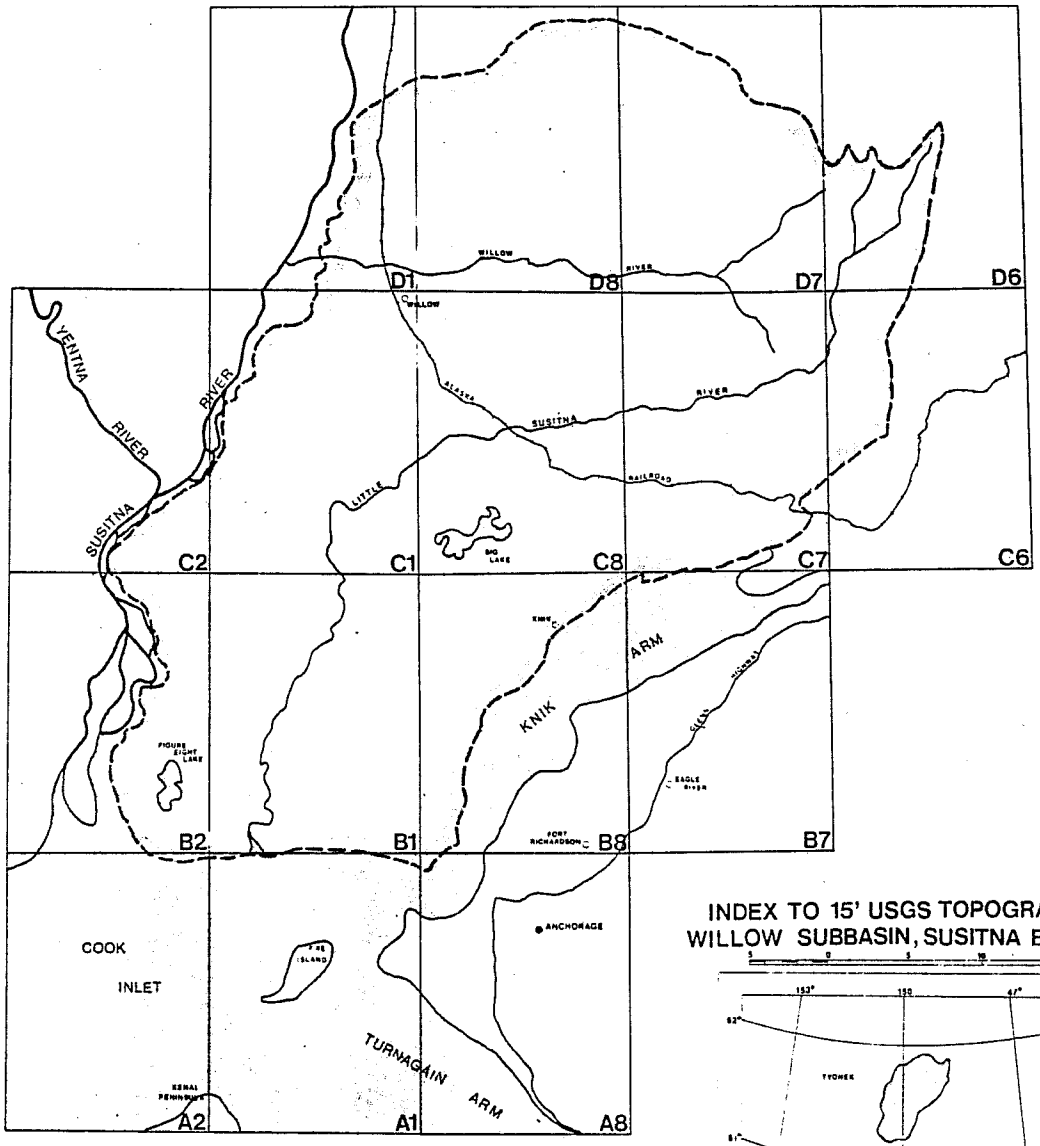
Beluga Subbasins were each mapped under two separate contracts. The boundaries of these contract areas, as well as the ESRI Susitna Basin project number, are illustrated on the accompanying map. The location of the area mapped and automated as part of the effort in Upper Susitna is also shown.

In all of the lowland portions of the Susitna Basin, detailed soil, vegetation, and land use investigations were conducted under a cooperative agreement between State and Federal Agencies. In the case of both the soils and vegetation surveys, the units delineated on aerial photographs were sampled and described through detailed field investigations. These data, as well as other more generalized data, were provided to ESRI for use in creating the GIS for the Basin. The diverse collateral data which existed at scales ranging from 1:15,000 to 1:250,000 were re-scaled to a consistent scale, checked against aerial imagery, and rectified to a standard planimetric base as part of the process of GIS development. ESRI staff also used aerial imagery and topographic data to make original interpretations and delineations of other environmental phenomena, including stream and road networks, watershed boundaries, and average slope gradients. The first step in the development of the GIS was the creation of a set of stable base mylar basemaps of the region. These basemaps, corresponding to the map module structure shown on the Talkeetna Subbasin and Beluga Subbasin Index Maps on the following pages, were created at a scale of 1:63,360. An Index Map for the Willow Subbasin is included at the end of the series for reference. All data variables were scaled and rectified to the 1:63,360 basemap series. Approximatey fifteen general types of data and thirty-five specific classes of data were mapped for automation. All data were mapped in a form providing

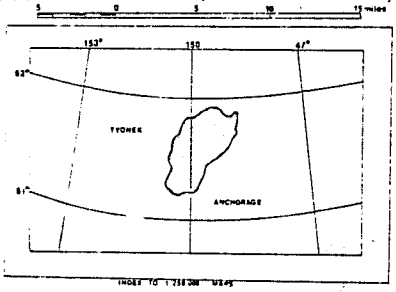



INDEX TO 15' USGS TOPOGRAPHICAL MAPS
TALKEETNA SUBBASIN, SUSITNA BASIN, ALASKA


INDEX TO 15' USGS TOPOGRAPHICAL MAPS
BELUGA SUBBASIN, SUSITNA BASIN, ALASKA
TALKEETNA
INDEX TO 1:250,000 MAPS
C4
B4
A4
A3
YENTNA RIVER
JOHNSON CREEK
SKWENTNA RIVER
D5
C5
C4
BELUGA MOUNTAIN
MOOSE LAKE
TRINITY LAKE
B6
B5
B4
B3
BELUGA LAKE
LOWER BELUGA LAKE
DIXON CREEK
CHAKACHATNA
MCARTHUR RIVER
BELUGA
COOK INLET
TYONEK
KENAI PENINSULA
A6
A5
A4
A3
A2




INDEX TO 15' USGS TOPOGRAPHICAL MAPS
WILLOW SUBBASIN, SUSITNA BASIN, ALASKA



optimal representation of their natural configuration. Areal phenomena, such as soil and vegetation units were mapped as polygons. Terrain unit polygons had a minimum resolution ranging from 2 acres for the Talkeetna Subbasin to 5 acres for the Beluga Subbasin. Areal units smaller in size were not captured as discrete units. Linear phenomena such as roads and streams were mapped as lines. Small scale phenomena such as excavation sites were mapped as points. Related data variables were composited on the same map sheet as re-scaled boundaries were being rectified and redrawn. A number of manually drafted mylar sheets, termed map manuscripts, were drawn for each of the 36 map modules comprising the Talkeetna and Beluga Subbasins. These manuscripts and the data types which they encompass are outlined below:

MANUSCRIPT #1 - INTEGRATED TERRAIN UNIT MAP

- Slope
- Landform
- Surficial Geology
- Bedrock Geology
- Economic Geology
- Geologic Hazards
- Soil
- Land Use
- Vegetation

MANUSCRIPT #2 - SURFACE HYDROLOGY MAP

- Stream Courses
- Watersheds

MANUSCRIPT #3 - POINTS AND LINEAR FEATURES MAP

#3A Natural Lines

#3B Cultural Points and Lines

MANUSCRIPT #4 LAND STATUS MAP

Congressional Townships

Ownership

All of the manuscripts were manually delineated and subsequently automated at a scale of 1:63,360. The Integrated Terrain Unit Maps were created through a process which involved spatial integration, as well as compositing. In the preparation of these maps, interrelated data variables were cross-compared, as well as checked against the imagery and basemaps. Where appropriate, boundary descrepancies were reconciled. In effect, the cartographic inaccuracies inherent in the collateral information because of varying scales, projections, spatial resolutions, and final graphic liberties were corrected and resolved in the process of comparison to the imagery, cross-comparison to related data variables, and rectification to the planimetrically accurate basemap series. These manuscripts, like the others, were comprised of a series of consecutively numbered units delineated on a mylar sheet registered to the basemap modules. They were accompanied by code sheets which expressed the attributes of each unit by means of numeric code.

The mapped data were automated by a process of x,y coordinate digitizing. The automation procedures provided for the accurate capture of the natural form of the mapped data. The computerized data files, composed of polygons, line segments, and points, were used to create a number of plotter drawn maps of the area as well as to create a parallel set of data files in a grid format. A uniform ten acre grid was laid atop each of the original data

files for the Talkeetna and Beluga subbasins, and the data values were transferred into and recorded by individual grid cell. These grid cell data banks, ultimately formatted as two grid multi-variable files, were used to produce grid map atlases of the subbasins which displayed both basic and interpreted environmental phenomena. It is important to note that once map data existed in a computerized form, they could be accurately displayed at a variety of different scales. Most of the final products of the study were produced at a scale of 1:63,360. The following computer maps which illustrate some of the basic information coded into the GIS were produced for the Talkeetna and Beluga Subbasins:

COMPUTER MAPS
BASIC AND INTERPRETED ENVIRONMENTAL CONDITIONS

| Pen Plotter Maps | Talkeetna | Beluga |
|---|---|---|
| Vegetation | X | X |
| **Line Printer Maps** | | |
| Soil Drainage | X | X |
| Soil Limitations for Dwellings | X | X |
| Range Resources | X | X |
| Soil Slope | X | X |
| Forest Resources | X | X |
| Important Farmland | X | X |
| Important Grazing Lands | X | |

The computerized data bank for each of the subbasins was subsequently used to evaluate and assess environmental conditions in relation to certain potential uses. A series of theoretical models were constructed to assess natural opportunities and constraints and to evaluate the capability and suitability of land for select uses. The overall format for the analyses

generally followed that developed as part of the Willow effort, wherein ESRI staff worked with representatives from select State and Federal agencies in structuring the overall flow of the analyses. Conceptual models designed by the appropriate individuals and agencies were ultimately provided to ESRI. Participating agencies included Alaska Department of Natural Resources, Alaska Department of Fish and Game, U.S. Soil Conservation Service, U.S. Forest Service, and U.S. Fish and Wildlife Service. The models, comprised of selected, prioritized and ranked factors, were programmed by ESRI staff. Their application to the computerized data resulted in the sequential overlay of each of the select variables and the automatic calculation of mathematical values for each segment of the study area. In general, each of the models underwent several iterations before being finalized. The map output from each model was evaluated by agency staff in the field. Where appropriate, the models were modified. It is important to note that the data bases which have been developed in the course of these efforts have been installed on a computer facility in Alaska and that additional modeling and mapping applications by the appropriate agencies can be made. The following computer maps were produced. They illustrate the results of the models which were developed.

COMPUTER MAPS

MODELED ENVIRONMENTAL CONDITIONS

| Settlement | Talkeetna | Beluga | Same Model Format |
|---|---|---|---|
| Capability for Access Large Lot Residential Development | X | | |
| Capability for Moderate/High | | | |

| | | | |
|---|---|---|---|
| Density Residential Development | X | X | X |
| Capability for Low Density Remote Residential Development | X | X | X |
| Other | | | |
| Groundwater Availability | X | X | X |
| Economic Agriculture/Forestry | X | X | X |
| Erosion Potential | X | X | X |
| Moose Habitat | X | X | X |
| General Habitat I | X | X | X |
| General Habitat II | X | X | X |
| Wetlands I | X | X | X |
| Wetlands II | X | | |
| Road Suitability | X | X | |
| Colos | X | | |

This report is designed to provide an overview of the methodology and results of the study. It is accompanied by a series of appendices which enumerate and document the data types, data sources, mapping methodology, and final computer data files. The report is divided into five chapters, one dealing with each major phase of the effort. Four appendices are used to supplement and complement the basic volume. These are subdivided, where appropriate, in order to account to some differences in the data banks and maps among the contracted efforts.

The first chapter, entitled Data Collection and Classification, describes the general procedures employed to collect the data, and structure a conceptual framework for interpretation, mapping, automation, and analysis. The essential focus of the chapter is an outline of the form in which related data variables are composited on the same map and the general way in which data are classified. The classification scheme is of essential importance with respect to all potential applications of the system. It sets both the upper and lower limits of the potential applications of the system. The

second chapter, entitled Data Mapping, describes the general sources for the interpretation and mapping of data as well as the processes used to composite, and, in some cases, integrate data onto map manuscripts for automation. The third chapter, entitled Data Automation, deals with the processes used to accurately translate the spatial configuration and numeric codes of mapped data into a machine readable form. In addition, it includes outlines and descriptions of data interpretations and derivations which were made an integral part of the data bank and which, in effect, supplement and complement the data types and classes outlined in Chapter I. The fourth chapter, entitled Computer Modeling, deals with theoretical models which were developed to assess natural opportunities and constraints and to evaluate land capability and suitability in the region. An outline is provided for each of the models. The fifth chapter, entitled Computer Mapping, provides an outline and description of all of the computer maps which were developed for the Talkeetna and Beluga Subbasins. It is focused on a series of legend sheets which identify the data displayed on each of the maps comprising the ESRI atlas of the region. It stands somewhat in parallel with Chapter I, the former outlining the essential components of the incipient data bank, the latter the visible record of it and its application.

# Chapter I

## Data Collection and Classification

Introduction
Methodology
Data Structure and Classification
  Map No. 1 Integrated Terrain Units
  Map No. 2 Surface Hydrology
  Map No. 3 Points and Linear Features
  Map No. 4 Land Status

# I. DATA COLLECTION

## A. Introduction

At the outset of this study, the specific data necessary for the desired analyses were determined. The collection of data was structured by this determination. The first step in the process required a decision as to the general types of data needed. The analyses to be performed for the River Basin Planning Study and other projected efforts required information on such diverse environmental considerations as geology, landform, soils, vegetation, hydrology, land use, land ownership, roads, infrastructure and administrative entities. Data were then collected for each of these general considerations. These data were in two forms: collateral data - previously mapped or delineated information which, with necessary rescaling and spatial rectification and adjustment, was utilized directly for mapping; and interpreted data - photointerpreted from a variety of sources by the study team. The third major step in the data collection process was the development of a data classification system which wuld provide for consistent interpretations and designations for the data. This system subdivided each of the general types of data into specific variables and in turn classified the information into specific levels or categories. For example, landforms were divided into eight general classes and forty-one specific types. Finally, a set of basemaps were created which were used for the rectification and mapping of all of the requisite data.

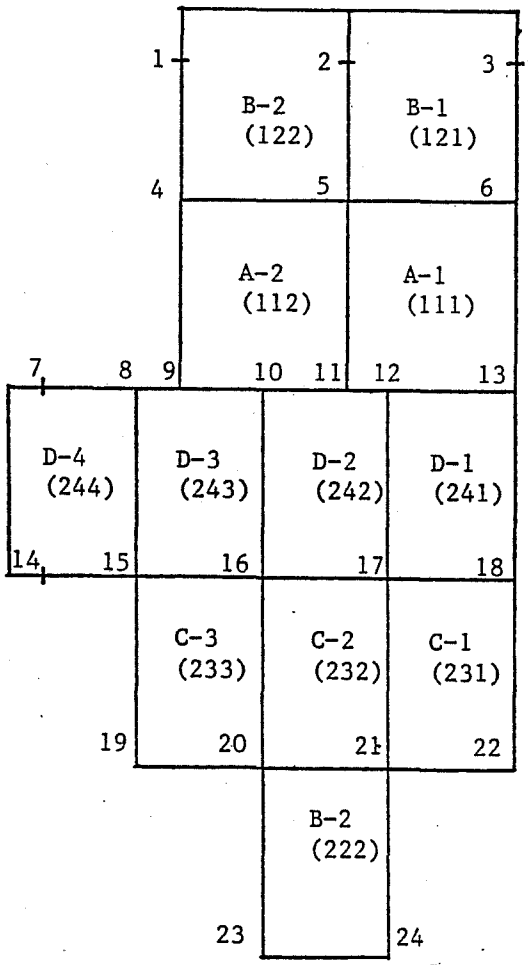
B. Methodology

The initial determination of data needs guided the data collection effort. Most of the data used in the studies were obtained by ESRI directly from the U.S. Soil Conservation Service, Anchorage and the Alaska Department of Natural Resources. Prior to the development of the Willow data base, ESRI staff specialists spent time in Alaska assembling data and conducting a field reconnaissance of the Basin. The latter effort was conducted in order to familiarize the ESRI study team with the general environment of the area, to check the collateral data, and to identify and describe the representative patterns or signatures on the aerial imagery. The staff specialists acquired the topographic maps, color infra-red aerial imagery, detailed soil maps, detailed vegetation maps, land use and recreation maps, landform maps, and a variety of other topical maps and reports which were subsequently used in the interpretation and mapping effort.

Once these materials were obtained, inventoried, and reviewed, necessary revisions were made to the original categorization of the data in order to most efficiently capture the data. Four manuscript maps were outlined for compositing and delineating the assembled data. A detailed classification scheme was then developed. It is described in the following section of this chapter. Explanations and descriptions of the collateral and interpreted information used to map each of the data variables are provided in the following chapter and in Appendices A and B.

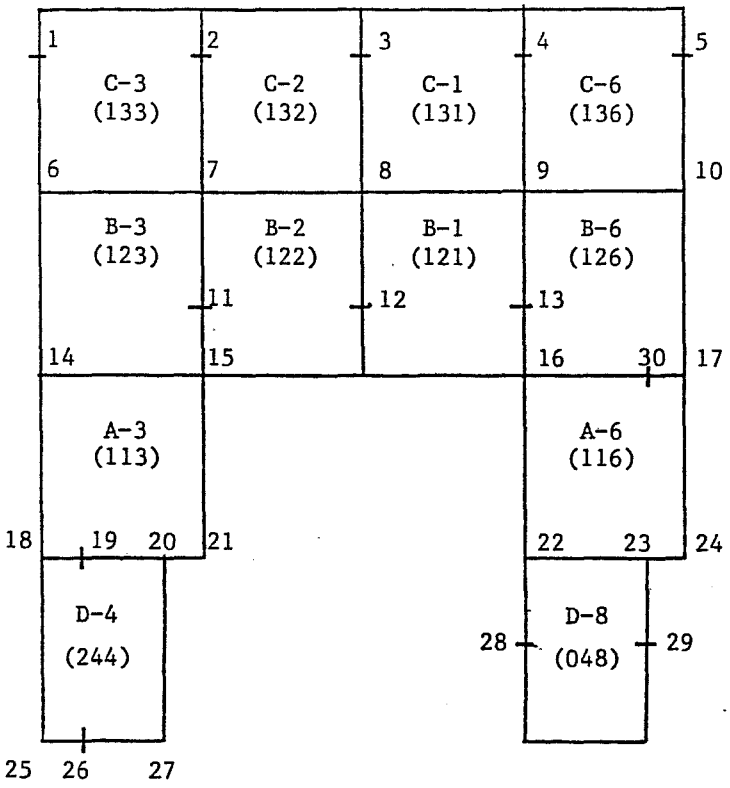
Following the initial phases of data collection, a set of

consistently scaled basemaps of the subbasin were formatted on translucent mylar. United States Geological Survey 15-minute quadrangle maps, at a scale of 1:63,360, were selected as the basemap modules for both subbasins. Twenty-one maps were needed for Talkeetna Subbasin and fifteen maps were needed for Beluga Subbasin. These were printed on frosted Ammonia-Mylar, a stable-base material which does not stretch or shrink appreciably. In order to ensure accurate and consistent registration, four tic marks were placed on each basemap module. Thereafter, every overlay manuscript which was drafted was registered to these tic marks. For Talkeetna Subbasin, two tic identification schemes, one for the Lower Talkeetna Subbasin project, one for the Upper Talkeetna Subbasin project, were used. For Beluga Subbasin, two tic identification schemes, one for the Central Beluga Subbasin study, and one for the Upper and Lower Beluga Subbasin study were also used. On the following pages, the structure of the base maps, the module numbers, the location and numbering of the tics, and their geographic coordinates are identified.




LOWER TALKEETNA TICS - 6,000,000 Subtracted from Northing

| TIC ID | LATITUDE, D | M | S | LONGITUDE, D | M | S | NORTHING, METERS | EASTING, METERS | ZONE NO | SPHEROID CODE |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 62 | 25 | 0.000 | 151 | 0 | 0.000 | 921996.5 | 603313.3 | 5 | 0 |
| 2 | 62 | 25 | 0.000 | 150 | 30 | 0.000 | 922895.6 | 629133.2 | 5 | 0 |
| 3 | 62 | 25 | 0.000 | 150 | 0 | 0.000 | 923994.6 | 654947.6 | 5 | 0 |
| 4 | 62 | 15 | 0.000 | 151 | 0 | 0.000 | 903434.7 | 603887.4 | 5 | 0 |
| 5 | 62 | 15 | 0.000 | 150 | 30 | 0.000 | 904337.5 | 629850.9 | 5 | 0 |
| 6 | 62 | 15 | 0.000 | 150 | 0 | 0.000 | 905441.0 | 655808.7 | 5 | 0 |
| 7 | 62 | 0 | 0.000 | 151 | 20 | 0.000 | 875099.5 | 587292.1 | 5 | 0 |
| 8 | 62 | 0 | 0.000 | 151 | 7 | 30.000 | 875397.4 | 598201.5 | 5 | 0 |
| 9 | 62 | 0 | 0.000 | 151 | 0 | 0.000 | 875592.9 | 604746.9 | 5 | 0 |
| 10 | 62 | 0 | 0.000 | 150 | 45 | 0.000 | 876021.7 | 617836.7 | 5 | 0 |
| 11 | 62 | 0 | 0.000 | 150 | 30 | 0.000 | 876501.0 | 630925.2 | 5 | 0 |
| 12 | 62 | 0 | 0.000 | 150 | 22 | 30.000 | 876759.6 | 637469.0 | 5 | 0 |
| 13 | 62 | 0 | 0.000 | 150 | 0 | 0.000 | 877611.0 | 657098.0 | 5 | 0 |
| 14 | 61 | 45 | 0.000 | 151 | 20 | 0.000 | 847255.7 | 588006.6 | 5 | 0 |
| 15 | 61 | 45 | 0.000 | 151 | 7 | 30.000 | 847555.2 | 599005.4 | 5 | 0 |
| 16 | 61 | 45 | 0.000 | 150 | 45 | 0.000 | 848183.2 | 618801.3 | 5 | 0 |
| 17 | 61 | 45 | 0.000 | 150 | 22 | 30.000 | 848925.4 | 638594.4 | 5 | 0 |
| 18 | 61 | 45 | 0.000 | 150 | 0 | 0.000 | 849781.9 | 658384.2 | 5 | 0 |
| 19 | 61 | 30 | 0.000 | 151 | 7 | 30.000 | 819714.1 | 599807.3 | 5 | 0 |
| 20 | 61 | 30 | 0.000 | 150 | 45 | 0.000 | 820345.7 | 619763.6 | 5 | 0 |
| 21 | 61 | 30 | 0.000 | 150 | 22 | 30.000 | 821092.1 | 639717.2 | 5 | 0 |
| 22 | 61 | 30 | 0.000 | 150 | 0 | 0.000 | 821953.4 | 659667.4 | 5 | 0 |
| 23 | 61 | 15 | 0.000 | 150 | 45 | 0.000 | 792509.0 | 620723.7 | 5 | 0 |
| 24 | 61 | 15 | 0.000 | 150 | 22 | 30.000 | 793259.6 | 640837.2 | 5 | 0 |




UPPER TALKEETNA TICS - 6,000,000 Subtracted from Northing

| TIC ID | LATITUDE, D | M | S | LONGITUDE, D | M | S | NORTHING, METERS | EASTING, METERS | ZONE NO | SPHEROID CODE |
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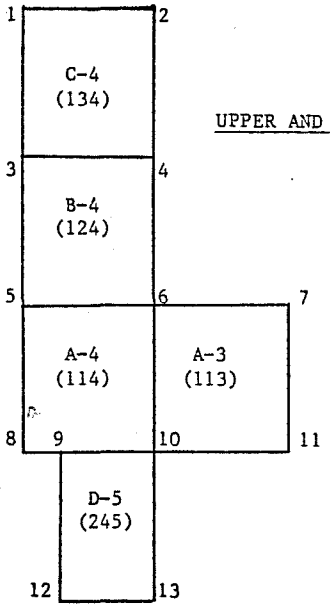
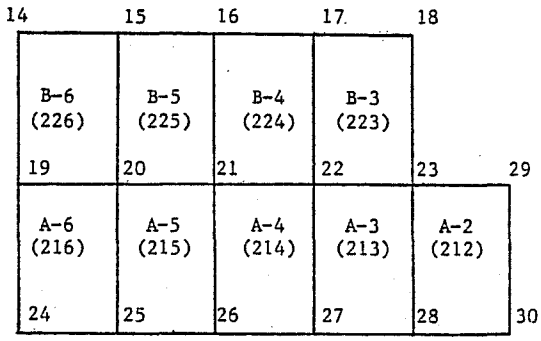
| 2 | 62 | 40 | 0.000 | 151 | 0 | 0.000 | 949839.8 | 602450.6 | 5 | 0 |
| 3 | 62 | 40 | 0.000 | 150 | 30 | 0.000 | 950733.5 | 628054.7 | 5 | 0 |
| 4 | 62 | 40 | 0.000 | 150 | 0 | 0.000 | 951825.8 | 653653.3 | 5 | 0 |
| 5 | 62 | 40 | 0.000 | 149 | 30 | 0.000 | 953116.8 | 679245.0 | 5 | 0 |
| 6 | 62 | 30 | 0.000 | 151 | 30 | 0.000 | 930579.6 | 577273.4 | 5 | 0 |
| 7 | 62 | 30 | 0.000 | 151 | 0 | 0.000 | 931277.5 | 603026.0 | 5 | 0 |
| 8 | 62 | 30 | 0.000 | 150 | 30 | 0.000 | 932174.8 | 628774.0 | 5 | 0 |
| 9 | 62 | 30 | 0.000 | 150 | 0 | 0.000 | 933271.6 | 654516.4 | 5 | 0 |
| 10 | 62 | 30 | 0.000 | 149 | 30 | 0.000 | 934567.9 | 680252.1 | 5 | 0 |
| 11 | 62 | 20 | 0.000 | 151 | 0 | 0.000 | 912715.5 | 603600.5 | 5 | 0 |
| 12 | 62 | 20 | 0.000 | 150 | 30 | 0.000 | 913616.5 | 629492.2 | 5 | 0 |
| 13 | 62 | 20 | 0.000 | 150 | 0 | 0.000 | 914717.8 | 655378.3 | 5 | 0 |
| 14 | 62 | 15 | 0.000 | 151 | 30 | 0.000 | 902732.6 | 577919.5 | 5 | 0 |
| 15 | 62 | 15 | 0.000 | 151 | 0 | 0.000 | 903434.7 | 603887.4 | 5 | 0 |
| 16 | 62 | 15 | 0.000 | 150 | 0 | 0.000 | 905441.0 | 655808.7 | 5 | 0 |
| 17 | 62 | 15 | 0.000 | 149 | 30 | 0.000 | 906745.1 | 681759.8 | 5 | 0 |
| 18 | 62 | 0 | 0.000 | 151 | 30 | 0.000 | 874886.5 | 578564.1 | 5 | 0 |
| 19 | 62 | 0 | 0.000 | 151 | 15 | 0.000 | 875214.5 | 591655.9 | 5 | 0 |
| 20 | 62 | 0 | 0.000 | 151 | 7 | 30.000 | 875397.4 | 598201.5 | 5 | 0 |
| 21 | 62 | 0 | 0.000 | 151 | 0 | 0.000 | 875592.9 | 604746.9 | 5 | 0 |
| 22 | 62 | 0 | 0.000 | 150 | 0 | 0.000 | 877611.0 | 657098.0 | 5 | 0 |
| 23 | 62 | 0 | 0.000 | 149 | 40 | 0.000 | 878463.2 | 674542.9 | 5 | 0 |
| 24 | 62 | 0 | 0.000 | 149 | 30 | 0.000 | 878922.9 | 683264.1 | 5 | 0 |
| 25 | 61 | 45 | 0.000 | 151 | 30 | 0.000 | 847041.4 | 579207.1 | 5 | 0 |
| 26 | 61 | 45 | 0.000 | 151 | 15 | 0.000 | 847371.3 | 592406.2 | 5 | 0 |
| 27 | 61 | 45 | 0.000 | 151 | 7 | 30.000 | 847555.2 | 599005.4 | 5 | 0 |
| 28 | 61 | 55 | 0.000 | 150 | 0 | 0.000 | 868334.6 | 657527.1 | 5 | 0 |
| 29 | 61 | 55 | 0.000 | 149 | 40 | 0.000 | 869188,4 | 675019.6 | 5 | 0 |
| 30 | 62 | 15 | 0.000 | 149 | 40 | 0.000 | 906288.1 | 673110.3 | 5 | 0 |




UPPER AND LOWER BELUGA SUBBASIN - BASEMAPS/MOD#S/TICS




BELUGA TICS - 6,000,000 Subtracted from Northing

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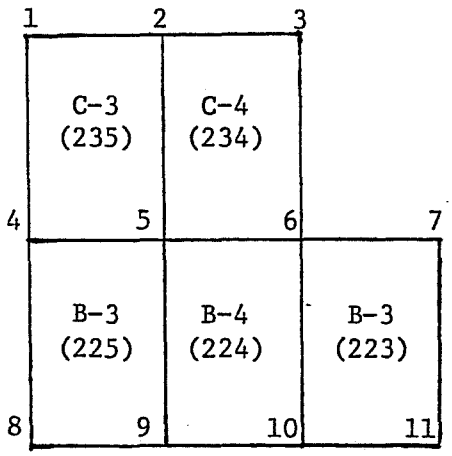
|---|---|---|---|---|---|---|---|---|---|---|
| 01 | 62 | 45 | 0.000 | 152 | 0 | 0.000 | 957932.1 | 551085.8 | 5 | 0 |
| 02 | 62 | 45 | 0.000 | 151 | 30 | 0.000 | 958427.5 | 576625.9 | 5 | 0 |
| 03 | 62 | 45 | 0.000 | 152 | 0 | 0.000 | 930081.1 | 551517.5 | 5 | 0 |
| 04 | 62 | 30 | 0.000 | 151 | 30 | 0.000 | 930579.6 | 577273.4 | 5 | 0 |
| 05 | 62 | 15 | 0.000 | 152 | 0 | 0.000 | 902231.1 | 551948.2 | 5 | 0 |
| 06 | 62 | 15 | 0.000 | 151 | 30 | 0.000 | 902732.6 | 577919.5 | 5 | 0 |
| 07 | 62 | 15 | 0.000 | 151 | 0 | 0.000 | 903434.7 | 603887.4 | 5 | 0 |
| 08 | 62 | 0 | 0.000 | 152 | 0 | 0.000 | 874382.0 | 552377.9 | 5 | 0 |
| 09 | 62 | 0 | 0.000 | 151 | 52 | 30.000 | 874489.2 | 558924.7 | 5 | 0 |
| 10 | 62 | 0 | 0.000 | 151 | 30 | 0.000 | 874886.5 | 578564.1 | 5 | 0 |
| 11 | 62 | 0 | 0.000 | 151 | 0 | 0.000 | 875592.9 | 604746.9 | 5 | 0 |
| 12 | 61 | 45 | 0.000 | 151 | 52 | 30.000 | 846641.8 | 559407.0 | 5 | 0 |
| 13 | 61 | 45 | 0.000 | 151 | 30 | 0.000 | 847041.4 | 579207.1 | 5 | 0 |
| 14 | 61 | 30 | 0.000 | 152 | 15 | 0.000 | 818508.3 | 539926.2 | 5 | 0 |
| 15 | 61 | 30 | 0.000 | 151 | 52 | 30.000 | 818795.4 | 559888.1 | 5 | 0 |
| 16 | 61 | 30 | 0.000 | 151 | 30 | 0.000 | 819197.2 | 579848.6 | 5 | 0 |
| 17 | 61 | 30 | 0.000 | 151 | 7 | 30.000 | 819714.1 | 599807.3 | 5 | 0 |
| 18 | 61 | 30 | 0.000 | 150 | 45 | 0.000 | 820345.7 | 619763.6 | 5 | 0 |
| 19 | 61 | 15 | 0.000 | 152 | 15 | 0.000 | 790661.3 | 540246.2 | 5 | 0 |
| 20 | 61 | 15 | 0.000 | 151 | 52 | 30.000 | 790950.0 | 560368.1 | 5 | 0 |
| 21 | 61 | 15 | 0.000 | 151 | 30 | 0.000 | 791354.2 | 580488.6 | 5 | 0 |
| 22 | 61 | 15 | 0.000 | 151 | 7 | 30.000 | 791873.8 | 600607.3 | 5 | 0 |
| 23 | 61 | 15 | 0.000 | 150 | 45 | 0.000 | 792509.0 | 620723.7 | 5 | 0 |
| 24 | 61 | 0 | 0.000 | 152 | 15 | 0.000 | 762815.3 | 540565.4 | 5 | 0 |
| 25 | 61 | 0 | 0.000 | 151 | 52 | 30.000 | 763105.6 | 560846.9 | 5 | 0 |
| 26 | 61 | 0 | 0.000 | 151 | 30 | 0.000 | 763512.0 | 581127.0 | 5 | 0 |
| 27 | 61 | 0 | 0.000 | 151 | 7 | 30.000 | 764034.5 | 601405.4 | 5 | 0 |
| 28 | 61 | 0 | 0.000 | 150 | 45 | 0.000 | 764673,2 | 621681.4 | 5 | 0 |
| 29 | 61 | 15 | 0.000 | 150 | 22 | 30.000 | 793259.6 | 640837.2 | 5 | 0 |
| 30 | 61 | 0 | 0.000 | 150 | 22 | 30.000 | 765428.0 | 641954.6 | 5 | 0 |

CENTRAL BELUGA SUBBASIN - BASEMAPS/MOD#S/TICS




CENTRAL BELUGA TICS - 6,000,000 Subtracted from Northing

| TIC ID | LATITUDE D | M | S | LONGITUDE D | M | S | NORTHING METERS | EASTING METERS | ZONE NO | SPHEROID CODE |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 61 | 45 | 0.000 | 151 | 52 | 30.000 | 846641.8 | 559407.0 | 5 | 0 |
| 2 | 61 | 45 | 0.000 | 151 | 30 | 0.000 | 847841.4 | 579207.1 | 5 | 0 |
| 3 | 61 | 45 | 0.000 | 151 | 7 | 30.000 | 847555.2 | 599005.4 | 5 | 0 |
| 4 | 61 | 30 | 0.000 | 151 | 52 | 30.000 | 818795.4 | 559888.1 | 5 | 0 |
| 5 | 61 | 30 | 0.000 | 151 | 30 | 0.000 | 819197.3 | 579848.6 | 5 | 0 |
| 6 | 61 | 30 | 0.000 | 151 | 7 | 30.000 | 819714.1 | 599807.3 | 5 | 0 |
| 7 | 61 | 30 | 0.000 | 150 | 45 | 0.000 | 820345.7 | 619763.6 | 5 | 0 |
| 8 | 61 | 15 | 0.000 | 151 | 52 | 30.000 | 790950.0 | 560368.1 | 5 | 0 |
| 9 | 61 | 15 | 0.000 | 151 | 30 | 0.000 | 791354.2 | 580488.6 | 5 | 0 |
| 10 | 61 | 15 | 0.000 | 151 | 7 | 30.000 | 791873.8 | 600607.3 | 5 | 0 |
| 11 | 61 | 15 | 0.000 | 150 | 45 | 0.000 | 792509.0 | 620723.7 | 5 | 0 |

C. Data Structure and Classification

As indicated, the definition of data classes for each of the variables in this study was guided by considerations similar to those which guided the selection of the variables themselves. That is, the data classification had to consider information critical to the required level of environmental evaluation, and it had to be broad enough to produce legible maps with sufficient detail to be useful. The data selected and classified for inclusion in the geographic information for the Talkeetna and Beluga Subbasins was structured for mapping on four manuscripts. In general, related data variables were identified for mapping on the same manuscript. For example, geology, landform, slope, soils and vegetation were identified for mapping on the same mylar sheet. The four manuscripts were designed as a means of efficiently compositing the broad range of data selected for inclusion in the automated system. It should be noted the data manuscripts were designed for application atop the module spatial structure of the GIS, that is, four manuscript maps were identified for overlay atop each of their corresponding map modules covering the study area. The four manuscript maps are identified as follows:

| Map Manuscript No. | Map Manuscript Name |
|---|---|
| No. 1 | Integrated Terrain Units |
| No. 2 | Surface Hydrology |
| No. 3 | Points and Linear Features |
| No. 4 | Land Status |

The following outline illustrates the essential nature of the data

structure and classifications employed in the creation of the GIS for the Talkeetna and Beluga Subbasins. A complete enumeration of the classification and codes is provided in Appendices A1 (Talkeetna Subbasin) and A2 (Beluga Subbasin) of this report.

TALKEETNA SUBBASIN
SUSITNA RIVER/BASIN
ALASKA
DATA STRUCTURE AND CLASSIFICATION

MANUSCRIPT #1 - INTEGRATED TERRAIN UNIT MAP

- SLOPE (7 Classes)
- LANDFORM
  - Physiographic Division (8 Classes)
  - Landform Type (74 Classes)
- GENERAL GEOLOGY
  - Surficial Geology (4 Classes)
  - Bedrock Geology (19 Classes)
- ECONOMIC GEOLOGY (20 Classes)
- GEOLOGIC HAZARDS
  - Geologic Hazards I (13 Classes)
  - Geologic Hazards II (4 Classes)
- SOIL (275 Classes)
- HABITAT - Lower Talkeetna Subbasin Only
  - Habitat I (24 Classes)
  - Habitat II (5 Classes)
  - Habitat III (9 Classes)
  - Habitat IV (14 Classes)
  - Habitat V (2 Classes)
- LAND USE (67 Classes)
- VEGETATION (41 Classes)

MANUSCRIPT #2 - SURFACE HYDROLOGY MAP

- STREAM
  - Order (8 Classes)
  - Periodicity (2 Classes)
  - Origin (2 Classes)
  - Discharge Profile (2 Classes)
  - Situation (2 Classes)
  - Condition (2 Classes)
  - Anadromous Streams (6 Classes)
- WATERSHED
  - Topologic Number (123 Classes)

MANUSCRIPT #3 - POINTS AND LINEAR FEATURES MAP

- NATURAL LINES
  - Escarpment (2 Classes)
  - Fault Lines (4 Classes)
- CULTURAL LINES
  - Roads/Trails/Infrastructure Network (12 Classes)

CULTURAL POINTS
Extractive Sites (7 Classes)

MANUSCRIPT #4 - LAND STATUS MAP

CONGRESSIONAL TOWNSHIPS FOR THE U.S. SYSTEM OF RECTANGULAR SURVEYS
OWNERSHIP (11 Classes) No Data for Upper Talkeetna
AGENCY INTEREST (57 Classes) No Data for Upper Talkeetna

BELUGA SUBBASIN
SUSITNA RIVER/BASIN
ALASKA
DATA STRUCTURE AND CLASSIFICATION

MANUSCRIPT #1 - INTEGRATED TERRAIN UNIT MAP

SLOPE (7 Classes)
LANDFORM
    Physiographic Division (8 Classes)
    Landform Type (74 Classes)
GENERAL GEOLOGY
    Surficial Geology (4 Classes)
    Bedrock Geology (21 Classes)
GEOLOGIC HAZARDS (13 Classes)
SOIL (348 Classes)
LAND USE (68 Classes)
VEGETATION (41 Classes)

MANUSCRIPT #2 - SURFACE HYDROLOGY MAP

STREAM
    Order (8 Classes)
    Periodicity (2 Classes)
    Origin (2 Classes)
    Discharge Profile (2 Classes)
    Situation (2 Classes)
    Condition (2 Classes)
    Anadromous Streams (6 Classes)
WATERSHED
    Topologic Number (76 Classes)

MANUSCRIPT #3 - POINTS AND LINEAR FEATURES MAP

NATURAL LINES
    Escarpment (2 Classes)
    Fault LInes (4 Classes)
CULTURAL POINTS AND LINES
    Roads/Trails/Infrastructure Network (12 Classes)
    Extractive Sites (7 Classes)

MANUSCRIPT #4 - LAND STATUS MAP

CONGRESSIONAL TOWNSHIPS FOR THE U.S. SYSTEM OF
    RECTANGULAR SURVEYS

# Chapter II

# Data Mapping

Introduction
Methodology
Manuscript Mapping
  Map No. 1 Integrated Terrain Units
  Map No. 2 Surface Hydrology
  Map No. 3 Points and Linear Features
  Map No. 4 Land Status

## II. DATA MAPPING

### A. Introduction

As indicated, the mapping phase of this project involved the aggregation of the data provided by a number of State and Federal agencies, as well as that derived through the process of photo-interpretation, on four separate manuscript maps. Each of these manuscripts represented a class or format of data that could conveniently and meaningfully be displayed on one map. Some of the information was areal, such as landform or geology, and was shown as spatial units called polygons. Other information was in the form of points or lines, such as resource sites and streams, respectively. All three formats of data, categorized according to the types of information conveyed, were mapped for the study. The manuscripts prepared and the format of the data shown are as follows:

| Manuscript No. | Name | Data Format |
|---|---|---|
| No. 1 | Integrated Terrain Unit | Polygons |
| No. 2 | Surface Hydrology | Polygons & Lines |
| No. 3 | Points & Linear Features | Points & Lines |
| | Natural Lines | |
| | Cultural Points & Lines | |
| No. 4 | Land Status | Polygons |

The integrated terrain unit map utilized a mapping concept which resolved related environmental data to a single manuscript map. Its creation involved the manual overlay and integration of individually interpreted and mapped single-variable overlays onto a single map. A

scale of 1:63,360 was chosen for this manuscript as a means of accurately capturing the detailed soil and vegetation information represented on the collateral overlays. Each overlay contributed lines which were drafted onto the manuscript. However, given that boundaries between natural phenomena were often coincident, the process often involved the delineation of a single line on the manuscript in place of several different but generaly consistent lines which existed on individual overlay maps. Very small mapping units on the overlays, those smaller in size than two acres in the Talkeetna Subbasin and five acres in the Beluga Subbasin, were typically merged into larger surrounding or adjacent units. Thus, the data on this manuscript are considered to have a minimum polygon resolution of 2 or 5 acres, depending upon the subbasin in which they are located. The result of the process was the development of integrated terrain unit maps comprised of several thousand polygons, each representing areas of homogeneous natural characteristics. The other manuscripts were created by a process of rectification and compositing, with only limited integration occuring on the land status manuscripts to ensure accuracy and consistency between shared township lines and land status boundaries. They were also delinated at a scale of 1:63,360.

B. Methodology

The basic concept underlying the preparation of polygon maps such as Manuscript No. 1 was the Integrated Terrain Unit Mapping (ITUM) approach, used to integrate several kinds of variables into a single polygon map. There are four general principles dealing with the distribution of natural geographic attributes that relate to the ITUM approach.

1. The Principle of Graded Likenesses and Infinite Differences in Natural Areas

No two geographic locations or areas are ever exactly alike, although similaries can be perceived between areas which permit classification of areas into like kinds. The degree of perceived dissimilarity increases directly as the closeness of scrutiny increases. Conversely, similarities become more obvious as observation is less detailed.

2. The Principle of Areal Transitions

Changes in natural geographic characteristics from one area to another are usualy gradational. The rate of change along such gradations may vary. Thus, the placement of a line drawn to show the separation of any two features is in part a subjective decision. This means that for two or more data variables, different lines can be resolved into a single line, representing the best fit for both features, which can be drafted onto the final ITUM manuscript.

3. The Principles of Continuous Alteration of Areal Characteristics With Time

All the characteristics of any geographic area are changing continuously, although each feature changes at a rate which differs from the rate of change for other features. Since some features change more rapidly than others, the map has some data dealing with rapidly changing features and other data dealing with features which change quite slowly under most circumstances.

4. The Principle of the Functional Interrelatedness of Environmental Elements

As the pattern of any environmental attribute changes, it will have recognizable effect on the patterns of other environmental attributes in the same area. This interrelatedness often means that the various features of an area will respond somewhat as a unit, what might be called an "ecological response unit". The rate of environmental changes are determined by those factors described in Principle 3.

The ITUM mapping process resolves some major obstacles to the computerized handling of spatialy defined environmental information: the cost of automating multiple parametric data planes; the cost of doing polygon overlays in the computer; the problem of polygon "splinters" created through the overlay process; and perhaps most importantly, the problem of mismatched data sets which are supposed to be related and consistent. In many respects, the latter point represents the ultimate argument for the integration process. When complex land capability/suitability modeling is done in a data base, such as was done with those for the Talkeetna and Beluga Subbasins, the mismatches among

the data planes can cause major errors to surface across the mapped output. Differentiating between the valid and invalid values which are thus registered is difficult and often impossible. Using computer logic to resolve the discrepancies once the data are automated represents a coarser and less sensitive means than careful decision-making on a case by case basis by an experienced resource specialist with photos, basemaps, and related maps at hand.

Cost considerations relate to the considerable amount of staff-time and machine-time required to effectively automate and then overlay a number of maps in the computer. The cost of data base automation is a function of the number of maps to be automated and the complexity of the lines on those maps. If a number of lines are common to every map to be automted, a great saving can be realized by automating these common lines only once rather than for each map. The solution to this problem offered by the ITUM approach is that any line which is common to any two or more data maps is represented on the manuscript map for automation only once. In addition, the ITUM manuscripting process represents a pre-automation polygon overlay, wherein the polygons represented on the final manuscript represent the units created through the overlay of each of the separate data planes. The computer overlay process is both time-consuming and expensive. It also results in the creation of "splinter" polygons. Numerous small "splinter" polygons are typically created when computer software is used to overlay individually automated data variable maps. The "splinters" are often due to the failure of what should be identically placed lines, lying on the individual maps, to precisely

coincide with one another. For example, the boundary of a marsh may be shown in different locations on the vegetation map, the soils map, and landform map; or, even if shown in the same place, the boundary may be digitized somewhat differently each time. Even slight variations in the x,y coordinates of the points which define such lines, occurring from one map to the next, will cause splintering to occur. The splinters will be visible in plotted overlay maps and will also evidence themselves in automated analyses of polygon characteristics. The splinters are confusing both to the cartographic display of the data and to their analysis and interpretation as well.

Much of the data employed in the development of the GIS for the Talkeetna and Beluga Subbasins was in a format which required rescaling, adjustment to imagery, or both before it was in a form amenable to integration into a manuscript map. In the rescaling process a combination optical/manual procedure was followed. This method involved the use of an optical pantograph. A Kargl reflecting projector, with a rated distortion factor of less than 0.01% was used. Collateral maps were placed on a platform and their images were optically projected upward onto a glass surface. Enlargement or reduction of the original collateral maps occurred as the map-to-lens ratio was changed. Fastening the mylar copy of the topographic basemap onto the projection glass allowed the collateral to be reformatted to the basemap scale of 1:63,360. In certain cases, the enlarging or reducing process was repeated twice in order to achieve the required scale. After the information was adjusted to the basemap scale, it was manually

transferred onto the drafting film. Care was taken to ensure that all information was transferred accurately, and that no transposition of information codes occurred. An edit check of the hand drawn map compared it to the original data.

The physical characteristics and interpretive values of the phenomena mapped for this project were derived largely from the collateral maps and documents which were provided to the ESRI staff. Aerial imagery and basemaps were used to verify, rectify, and clarify the distribution and areal extent of the phenomena mapped from the collateral. Patterns were adjusted to match the imagery and the basemaps. The imagery and basemaps thus act as geographic "controls" for reformatting and for cartographic inconsistencies between the various data variables. Next, the polygons or line segments delineated on the data maps were assigned code numbers. These code numbers referred to the different values or characteristics which each such delineation represented. The code numbers were then either applied directly to the manuscript map itself or were referenced, in turn, to sequential numbers aplied to the map. In either case, the numbers used were related to the polygons or line segments shown on the map by being placed within the polygons or immediately adjacent to the lines. Each module was then edgematched to its adjoining module. Edgematching is a process of comparing the shared borders of adjoining map modules. Edgematching was done to correct any problems occurring along the borders due to the adjoining maps having been created independently of one another. Where lines of any kind crossed from one module into the other, these were checked to be sure that they were

properly located and that they matched. A check was also made to be sure that the code assignments along each side of the shared border were correct and were consistent with those across the border in other modules.

As noted above, mapped phenomena can be represented by polygons, points, or lines. In creating polygon maps, the study area was divided into smaller, discrete areas, each bounded by a closed line, called a polygon. Each polygon is homogeneous with respect to the variable or variables to which the particular polygon delineation refers. For purposes of identification and description, the individual polygons on a manuscript map were given sequential identification numbers. Each polygon's sequential identifier was then used to associate the polygon with an identically numbered set of attribute codes. Polygon numbering typicaly commenced with the number 1 in the upper left corner of the manuscript map and progressed sequentialy toward the lower right corner.

On the point and line manuscript maps, points were shown as two short line segments crossed at the location of the point feature and linear features were drawn as line segments. Coded values for lines and points were either applied directly to the manuscript map or they were referenced to the map by the use of sequential identification numbers, as with polygons. Locaters for the labels associated with points or lines were similar to the centroids associated with polygons in that they designated the lower left corner location of the first symbol of the label for a point or line.

C. Manuscript Maps

The maps created for the Talkeetna and Beluga Subbasins are outlined in this section. Appendix C contains a detailed discussion of them, encompassing the following: the reasons for incorporating each variable in the data base; the collateral information used to prepare each manuscript map; the implications of the source map's scale and resolution; the process used to transfer information from the source map to the stable base manuscript map; the interpretive decisions involved; and the reliability and quality of the information provided on each manuscript map.

Manuscript No. 1 - Integrated Terrain Units

Manuscript No. 1 is a polygon map delineated at a scale of 1:63,360 comprising sixteen data variables for Talkeetna Subbasin, and nine data variables for Beluga Subbasin. In virtually all instances, the classification used for a given data variable was consistent with that provided in the collateral information. For example, soil and vegetation were both mapped using the data classification provided in the original soil and vegetation surveys provided by the Soil Conservation Service and Forest Service. In some instances, a classification was modified to account to a higher level of data resolution in the present study than in the original one. In the creation of the manuscript maps for each of the corresponding map modules, each data variable was manually cross-compared and then checked against the basemaps and imagery before being delineated on the manuscript. The data planes with the highest accuracy and reliability were drafted first. Those with the least were drafted last. The addition of each new data plane typically resulted in the drafting of

additional lines on the manuscript; however, due to the integration process, proportionately more were added for the highly resolved data planes than for those with low resolution and realiability. As indicated earlier, some of the source data was derived from interpretations made at a scale of 1:250,000 or other general scales. In these cases, boundaries were adjusted to correspond with existing lines where appropriate. For example, landform boundaries were often changed to correspond with previousl delineated soil, vegetation, and slope lines. The data variables encompassed on the manuscript and their general order of integration are as follows: Soil, Vegetaton, Land Use, Slope, Landform, General Geology, Geologic Hazards, Economic Geology, and Habitat for Talkeetna Subbasin; and Soil, Vegetation, Land Use, Slope, Landform, General Geology and Geologic Hazards for Beluga Subbasin.

Manuscript No. 2 - Surface Hydrology

Manuscript No. 2 is a polygon and line map delineated at a scale of 1:63,360 comprising eight data variables in two categories for both subbasins. Polygons were used to represent watershed boundaries, lines to represent stream courses. Each stream course was delineated as a series of short, straight line segments. Data were composited on the manuscript, not integrated. All data were nonetheless checked against the basemaps and imagery to ensure accuracy and currency.

Manuscript No. 3 - Points and Linear Features

Manuscript No. 3 is a line, and point map delineated at a scale of 1:63,360 comprising four data variables for both subbasins. All data composited on the map was checked against the imagery and basemaps.

Linear features were represented by short straight line segments. The data planes and their formats are as follows:

Lines

Escarpments

Fault Lines

Roads/Trails/Infrastructure Network

Points

Extractive Sites

Manuscript No. 4 - Land Status

Manuscript No. 4 is a polygon map delineated at a scale of 1:63,360 comprising three different data variables. Data variables were cross compared before mapping in order to ensure line match where appropriate. For example, land status lines were drawn to match existing township boundaries where there was a clear relationship but not full correspondence. All data were checked against the basemaps. The order of delineation was as follows: Township, Ownership, and Agency Interest. The maps for Upper Talkeetna and Beluga Subbasins did not contain the ownership data or the Agency Interest data.

# Chapter III

# Data Automation

Introduction
Methodology
Interpreted and Derived Data
  Interpretive Matrices
  Distance Searches

# III. AUTOMATION

## A. Introduction

The central feature of this study was the automation of all of the geographic data collected for the data bank and regional analyses. The information prepared for automation was in two basic formats: the manuscript maps and the codes for those maps. The maps were automated by a process called digitizing. Lines defining each of the polygons or line segments were stored in the computer as series of x,y coordinates connected by straight line segments. Points were represented by single x,y coordinates. Given that the polygon coordinates were closely spaced and the connecting straight lines very short, the automated polygons closely approximate the curved lines drawn on the original manuscripts. The codes, which describe the attributes of the environmental variables represented on the manuscripts, were keypunched directly into the computer. A series of programs were then run on both the map and code data to eliminate errors and inconsistencies and to prepare the information for analysis, modeling, and computer mapping. This procedure was followed for each of the four manuscripts for each of the map modules comprising the two study areas. After all errors and inconsistencies on all the maps for a given study area were corrected, the polygon, line, and point information was converted into a parallel grid format. This in effect involved overlaying a uniform rectilinear grid over the automated maps and assigning an appropriate value for each variable to each cell based on the predominant characteristics in that cell.

The result of this and other processes was the creation of two grid

multivariable files (MVF). Each MVF incorporated all the data of the four manuscripts comprising the given subbasin study area into one code string for each grid cell.

In addition to the maps and basic code information, matrices of interpreted data were automated for the soil data variable. These interpretations provide supplementary information for mapped soil phases and series. In effect, they added layers of descriptive and interpretive codes to the basic soil units which were originally mapped. An expanded code of this type represents an efficient form of recording, storing, and modifying information which is, by nature, subject to change. Derived data items were also added to the data bases. These items are those which obtain from basic and/or interpreted data. They include distance searches, in which cells are identified in terms of their distance from such mapped phenomena as streams and roads. These derived data were included in the data base with the basic and interpreted data.

The final automated data bases contained data developed by three distinct processes. The spatial configuration and essential attributes of the mapped units were automted by a process of coordinate digitizing and code keypunching. These data were subsequently subjected to procedures which created a parallel grid file. The actual information in the system, however, was expanded by the addition of select matrix descriptions and interpretations. These were keypunched into the system and structured as associative tables in the polygon files. The data stored in the grid files were further expanded by the process of evaluating each grid cell relative to its distance from select geographic

phenomena and the number of occurrences of select phenomena within a specified radius.

B. Methodology

The technical process involved in transferring geographic data from the manuscript maps and associated codes to the automated data files can be divided into four major tasks. These can be described as follows:

1. Manuscript Map Preparation for Digitizing

Before any manuscript map was automated, it was carefully checked for errors and prepared for actual digitizing. The checking included examination for missing polygons or codes, extraneous lines, or problems which might cause confusion during digitizing. Next, a unique number was assigned to each of the four manuscript maps for each of the corresponding modules to distinguish it from all of the other files. Certain of the manuscripts were further subdivided into variable files during processing, reflecting the different types of data included on these maps. The manuscript and variable file numbers used and their corresponding variables are as follows:

| Manuscript # | Manuscript Map Name | Variables | Processed Variable File # | Type of Data |
|---|---|---|---|---|
| 1 | Terrain Units | Terrain Units | 01 | Polygons |
| 2 | Surface Hydrology | Watersheds | 22 | Polygons |
| | | Course Lines | 12 | Lines |
| 3 | Points, Linear, | Escarpments/Faults | 53 | Lines |

| | | | | |
|---|---|---|---|---|
| | and Natural | Cultural Lines | 43 | Lines |
| | Features | Extractive Sites | 03 | Points |
| 4 | Land Status | Land Status | 04 | Polygons |

Next, each manuscript map was prepared for digitizing by geographic reference tic points on each map in sequence from north to south. Then, the origin point and centroid of each polygon were marked.

2. Digitizing

Using a process termed "digitizing", all data recorded on the manuscript map was converted to machine readable form. A digitizer, a backlighted drafting table to which is attached a movable cursor, was used to make this conversion. As the cursor was moved horizontally and vertically over each manuscript map mounted on the digitizer table, electronic devices translated these movements into digital measurements in units of one thousandths of an inch. The numbered tic marks were digitized first. The cursor was moved to each tic mark and, by pressing a key, a record was sent to a mini-computer for storage. After all tic marks were digitized, each polygon, point, and line on the map was similarly recorded and stored. The digitized record indicated the precise location in x,y coordinates of all mapped information with respect to the tic marks. The tic marks represented known points of latitude and longitude to which all of the mapped information was referenced. Data digitizing and all subsequent data automation processes utilize PIOS (Polygon Information Overlay System) and GRID software. These software sets

have been developed by ESRI during the past ten years.

The digitizing process involved systemtically recording data according to a standard set of procedures. For polygon data, this involved selecting and recording a string of x,y coordinates, termed "vertices", where a change in direction occurred along the border of each polygon. Curves were approximated by short straight line segments. All polygons were automated as closed units. They were digitized in a specific order and sequenced accordingly. When donut polygons occurred, the innermost polygons were digitized first. Digitizing then proceeded to the polygon which contained the donut polygon or polygons. PIOS software resolved the hierarchy. Lines were digitized like polygons except that the strings of x,y coordinates were not required to close. Point features were represented by single x,y coordinates.

3. Editing of Digitized Files

After the manuscript map was digitized, the stored record was transferred from the digitizer's mini-computer to a large computer for further processing. The first step in the edit process was to shift and scale the coordinates of each file relative to tic marks which provided geographic reference. From this step, lists were generated which allowed tic identification numbers, tic coordinates, sequence numbers, donut level identifiers, and code numbers to be checked. Because of machine errors during digitizing, it was sometimes necessary to redigitize a polygon or a series of polygons. After these editing steps were completed, changes were made and the

revised files were stored. At this stage, all information stored in the file was numericaly accurate. After these machine edits, a plot of each manuscript map of each module was generated. These computer maps were used to visually check the accuracy of the digitized and machine edited x,y coordinates against the original manuscript maps.

Following the visual edit of points, lines, and polygons, the numeric attribute codes which had been keypunched into the computer were associated with their appropriate spatial unit. Each of the data variables in the system was plotted out at the manuscript scale and compared against manually prepared overlays of the collateral data. These plots, termed "dropline plots", were used to ensure that each data variable was accurately delineated and coded in the computer data file. Most data errors discovered in this edit process were corrected using PIOS edit software. For cases where entire polygons were missing, the original manuscript map was remounted on the digitizer and entire polygons in error were digitized. This redigitized information was merged into with the previous information set.

4. Final File Generation

This process involved the creation of final point, line, and polygon files for each of the two study areas as well as the creation of two parallel grid cell files. Two preliminary steps were required for completion of the x,y coordinate files. The first step involved the conversion of the digitized tic coordinates, which were referenced in inches, to a geographic coordinate referencing system

such as UTM. The next step involved the merging of the individual files created for each map module into a single file for the entire study area. At the completion of this step, the data files were in their final x,y coordinate format.

Following completion of the final polygon files, a grid cell format data file was created. Using a series of ESRI computer programs including GRIPS (Gridded information from Polygons), the polygon data files were converted to grid cell format data file. In effect, a uniform grid with a cell size of 10 acres was super-imposed over the point, line, and polygon data in each of the x,y coordinate files and each cell was assigned a code corresponding to the unit or the value of the unit in which it was located. This process resulted in the creation of a number of single variable grid files. These were subsequently merged together to create a multi-variable file of all of the grid data for each study area. The complete multi-variable files created for the Talkeetna and Beluga Subbasins contained all of the data variables contained in the four manuscript maps and some of the interpretative data from the expansion matrices. Certain simple data items were packed into one position in the multi-variable file to save space. The codes for two of the data variables, Cultural Lines and Stream Order, were renumbered to facilitate the gridding process. These new GRID code numbers are listed in parenthesis along with the original PIOS codes in Appendices A1 (Talkeetna) and A2 (Beluga) of this report. The format and contents of the multi-variable file are outlined in Appendices D1

(Talkeetna) and D2 (Beluga) of this report.

C. Interpretive and Derived Data

The basic data files created for the Talkeetna and Beluga studies were expanded to include interpretive and derived data. The interpretive data were added by keypunching numeric codes outlined on expansion matrices associated with specific data variables and classes. The derived data were generated through the manipulation of data which were already automated. This involved the execution of a number of simple and complex distance search procedures. The interpretive and derived data encompassed in the Talkeetna GIS and the Beluga GIS are described in the following subsections:

Expansion Matrices

The soils which were mapped as part of this study were delineated and identified by series and phase names. Several code matrices which provided additional description and interpretation of the mapped units were developed by the Soil Conservation Service. These were automated by ESRI and associated with their respective soil types. The characteristics which were associated with the approximately three hundred soil units are outlined below. It is important to note that once the matrixed interpretive values were associated with their respective soil types in the data bank, maps illustrating the distribution of the interpreted condition could be produced. The interpretive values were similarly positioned by direct use in the computer modeling efforts.

## Soil Expansion Matrix Factors

Description

- Slope Phase
- K Factor

Capability Rating

- Agricultural Capability Class
- Agricultural Productivity Rating
  - Grains
  - Hay, Silage and Pasture
  - Potatoes
  - Average
- Oats and Barley Potential
- Grazing Potential

Limitations

- Septic Tank Absorption Fields
- Shallow Excavation
- Dwellings without Basements
- Dwellings with Basements
- Small Commercial Buildings
- Local Roads and Streets
- Roadfill Source
- Drainage
- Camp Areas
- Picnic Areas
- Playgrounds
- Paths and Trails

The complete soil expansion matrix is included in Appendix E.

Distance Searches

Once all of the data for the study were in a grid format, additional manipulations of the data were performed. These involved the application of both simple and complex distance search programs to the automated data. Simple search programs were used to determine the distance of each cell from streams, water bodies, roads, and a number of other features. These features were originally encoded as basic data items in the form of polygons, points, and lines. For each feature, the computer determined the grid cells within a specified distance of that feature. Cells within that distance were coded consecutively from "0" for the feature itself, increasing outward as successive integers for each cell. Cells outside that distance were coded as 9999. Complex search programs were used to identify and record the number of different types or classes of phenomena lying within a specified radius of each cell. The number of different vegetation types lying within one half kilometer of each cell was determined by such a procedure. This served as a measure of ecological edge conditions. A measure of relative relief was similarly determined. The following distance searches were conducted as part of the Talkeetna and Beluga studies:

Low Density Remote Residential

Talkeetna Subbasin Only

a. Vegetation Cover - Codes from Primary Vegetation

   2 cells High (codes = 25, 28, 46)

2 cells Moderate (codes = 21, 24, 26, 27, 29, 32, 33, 34, 42, 45)

2 cells Low (codes = 22, 31, 35, 36, 43)

2 cells Very Low (codes = 41, 50, 51, 52, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69)

b. Water Availability

16 cells Lake (code = 8 from Physiographic Division)

16 cells Large River (code = 97 from Primary Vegetation

4 cells Non-Glacial Stream (code = 2 from Stream Origin)

Remote Subdivisions

a. Vegetation Cover - Codes from Primary Vegetation

2 cells High (codes = 21, 22, 24, 25, 26, 42, 45)

2 cells Moderate (codes = 27, 28, 29, 31, 32, 33, 34, 46)

2 cells Low (codes = 35, 36, 41, 43, 50, 51, 52, 60, 61, 62, 63, 64, 65, 66, 67, 68. 69)

b. Water Availability

Lake (code = 8 from Physographic Division)

Large River (code = 97 from Primary Vegetation)

8 Cells Non-Glacial Streams = 2nd Order (codes = 2-6 from Stream Order and code = 2 from Stream Origin)

Moderate/High Density Residential

Water Availability

Non-Glacial Streams $\geq$ 2nd Order (codes = 2-6 from Stream Order and code = 2 from Stream Origin)

# Chapter IV

# Computer Modeling

Introduction
Methodology
Model Outlines

# IV. COMPUTER MODELING

## A. Introduction

The automated data base developed for the Talkeetna and Beluga Subbasins was used for purposes of regional land assessment and evaluation. Working under the direction of and in conjunction with State and Federal resource specialists and planners, ESRI processed a number of conceptual models to assess both the natural opportunities and constraints in the region and the capability and suitability of the land for potential uses. At the outset of each study, ESRI staff met with representatives of State and Federal Agencies and developed the general criteria for modeling. Following the automation of the data base, ESRI staff began programming conceptual models provided by the appropriate agencies. As conducted during this study, modeling was both a developmental and iterative process. The mapped results of the first model iterations were reviewed in the field and revisions were made to the models and programs. Most of the models went through three iterations before being finalized. It is important to note that GIS applications represent a dynamic process which is systematic, flexible, and ongoing. Thus, the models and maps presented in this report represent a time slice across a line of evolutionary understandings and perspectives about the natural and cultural resources of the Talkeetna and Beluga Subbasins.

As employed in this study, modeing represented a process by which the data mapped and automated for the study were manipulated in the computer to produce maps with evaluations of various environmental factors. Such

evaluations were based on a set of assumptions regarding the positive or negative significance of particular features of the landscape to the relevant factor. For example, the relative importance of geologic units to an evaluation of groundwter availability and of slope to the evaluation of land capability for certain types of development was assessed. Some of the models were based upon the assignment of numeric values to different data variables, others were based upon the assignment of ratings. In the settlement capability models, each variable within each factor was assigned a rating from high to low plus incapable. For example, in the evaluation of capability for large lot subdivisions, the landform type glacial moraine was ranked as high capability, active floodplain as incapable. Each of the settlement models contained a summation element which, in effect, determined the overall capability rating of each area. As used in this study, land capability was conceptualized as the inherent capacity of the land to sustain development, taking into account natural promoting and constraining factors. More specifically, it referred to the inherent capacity of the total complex of land-based environmental patterns and processes to sustain a specific type of use without bringing about unusual environmental degradation or exposing people or investment to hazards or unusual costs.

B. Methodology

Eighteen models were applied to the Talkeetna data base, and fifteen models were applied to the Beluga data base. Thirteen of these models were the same for both subbasins, and Two of the models derived similar outputs by somewhat different processes. Consequently, at this time, three models were applied to the Talkeetna data base and were not applied to the Beluga data base. There were two general types of models used. The first type, sch as the Soil Drainage model, draw directly from a matrix of interpretive values coded to one of the basic data types included in the data bank. these models might be termed simple models. The second, such as the residential capability/suitbility models, reference and assign new value to a number of basic, derived on previously interpreted factors. These complex models might be considered true analytical models. They were applied to the automated data bases in order to analyze and evaluate natural constraints and opportunities in the study area and to assess land capability for specific uses. These models were designed and evaluated by representatives of State and Federal Agencies including: Alaska Department of Natural Resources; Alaska Department of Fish and Game; U.S. Soil Conservation Service; U.S. Forest Service; and U.S. Fish and Wildlife Service. One of the models, Erosion Potential, was developed by a contractor working for the Department of Natural Resources. The models were structured to provide a useful output to the resource analysis and planning process. They were directed by and are consistent with established and accepted principles of resource evaluation, and they are sensitive to the particular

environmental conditions and interrelations existing in the study area. The assumptions guiding model development are implicit in the factors selected and the weights assigned. Several interpretive models require special mention. The route selection model (COLOS) called for the application of a dynamic overlay program in the determination of optimal paths between select points in the study area. Using soils and landform ratings as a numerical base, the program generated a numerical surface between each pair of points. The shortest distance at the least cost represented the optimal path. The program was run for specific pairs of points and the results aggregated for final display. The wetlands model did not require the application of a special program. It was, however, designed as a test of the potential for deriving wetland delineations from soil and vegetation surveys. The following models were developed as part of this study:

MAPS AND MODELS

| | MAP # | TITLE | SUBBASIN |
|---|---|---|---|
| Simple | 1 | Soil Drainage | Both |
| Simple | 2 | Soil Limitations for Dwellings | Both |
| Simple | 3 | Range Resources | Both |
| Simple | 4 | Slope | Both |
| Simple | 5 | Forest Resources | Both |
| Analytical | 6 | Groundwater Availability | Both |
| Analytical | 7 | Economic Agriculture/Forestry | Both |
| Simple | 8 | Important Farmland | Both |

| | | | |
|---|---|---|---|
| Simple | 9 | Important Grazing Lands | Talkeetna |
| Analytical | 10 | Capability for Accessed Large Lot Residential Development | Talkeetna |
| Analytical | 11 | Capability for Moderate/High Density Residential Development | Both |
| Analytical | 12 | Capability for Low Density Remote Residential Development | Both |
| Analytical | 13 | Erosion Potential | Both |
| Analytical | 14 | Habitat I - Moose | Both |
| Analytical | 15 | Habitat II - General Habitats | Both |
| Analytical | 16 | Wetlands | Diff |
| Analytical | 17 | Road Suitability | Diff |
| Analytical | 18 | Colos | Talkeetna |

Once programmed, each model was run in the automated geographic data files for the study area. All models were run in the 10-acre grid multi-variable file developed from the original point, line, and polygon data. This file included the following: basic data encoded in the initial process of automation; interpretive data encoded in the expansion matrices; and derived data developed through the process of distance searching. Many of the models required the development of sub-modeling routines to evaluate such complex considerations as water and fuel availability, ecological edge, and terrain diversity. The results of each of the sub-models were checked before they were channeled into the principal models. As indicated earlier, most of the models went

through three iterations. The map outputs were first checked by ESRI progressional staff to ensure that the model had been programmed accurately. The maps were then forwarded through the Soil Conservation Service for review and for model revision by the appropriate agencies. The finalized models were then programmed for the production of line printer maps identified in the following chapter.

C. Model Outline

Each of the models developed and programmed for evaluating the land resources of the Willow Subbasin is outlined on the following pages. The outlines were designed to legibly convey the essence and salient characteristics of each model to both readers and programmers. Four columns were used to indicate model logic, data base factors, and value assignment. The first column indicates the general concept under consideration. General considerations such as water availability and septic tank limitations tie in directly with the water supply and waste disposal requirements of certain kinds of developed land uses. The second column identifies the specific class of data in the grid cell data base which was being used to satisfy the analytical requirements of the general consideration. For example, subsurface water availability as expressed through well yield and surface water availability as expressed through the incidence of non-glacial streams were often employed in the determination of general water availability. The third and fourth columns identify the values assigned to each of the specific factors and variables. The third column identifies value assigned when the specific feature or condition was incident in a cell, the fourth when it was proximate to a cell. Thus, an area might have received high vegetative resource value if it had a specific kind of forest cover or was close to an area which did. As evident, numeric values were assigned in some of the models, rank classification in others. In some models binary ratings were used, ON indicating that the analysis was passed to other steps in the model, OFF that the analysis was terminated. In several models,

factors or variables were not rated (NR) when no particular association or value could be determined. Care was taken in all of the models to ensure against double weighting and the possibility of an area with a clearly unsuitable condition receiving a high overall value and rating because of some other very positive conditions existing there. All modeled data were ultimately grouped into classes on the final maps produced in the study.

MODEL OUTLINE
SOIL DRAINAGE

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Soil Characteristic | Excessively Drained (E) | 1 | |
| | Well Drained (W) | 2 | |
| | Moderately Well Drained (M) | 3 | |
| | Poorly Drained (P) | 4 | |
| | Very Poorly Drained (VP) | 5 | |
| | Glacial | 6 | |
| | Water | 7 | |

MODEL OUTLINE
SOIL LIMITATIONS FOR DWELLINGS

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Soil Characteristic | Limitations | | |
| | Dwellings Without Basements | | |
| | Slight (St) | 1 | |
| | Moderate (M) | 2 | |
| | Severe (Sr) | 3 | |
| | Water | 4 | |
| | Dwellings With Basements | | |
| | Slight (St) | 1 | |
| | Moderate (M) | 2 | |
| | Severe (Sr) | 3 | |
| | Water | 4 | |

MODEL OUTLINE
RANGE RESOURCES

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Primary Vegetation | Closed Forest | | |
| | Coniferous Forest, White Spruce, Short Stands | 2 | |
| | Deciduous Forest, Mixed Forest, Young Stands | 2 | |
| | Deciduous Forest, Mixed Forest, Medium-Aged Stands | 2 | |
| | Coniferous Forest, White Spruce, Tall Stands | 2 | |
| | Deciduous Forest, Mixed Forest, Old Stands | 2 | |
| | Cottonwood, Young Stands | 2 | |
| | Cottonwood, Medium-Aged Stands | 2 | |
| | Cottonwood, Old Stands | 2 | |
| | Open Forest-Woodland | | |
| | Coniferous Forest, White Spruce, Short Stands | 3 | |
| | Deciduous Forest, Mixed Forest, Medium-Aged Stands | 3 | |
| | Coniferous Forest, White Spruce, Tall Stands | 3 | |
| | Deciduous Forest, Mixed Forest, Old Stands | 3 | |
| | Cottonwood, Medium-Aged Stands | 3 | |
| | Cottonwood, Old Stands | 3 | |
| | Closed Forest (Black Spruce Mountain Hemlock) | | |
| | Black Spruce, Short Strands | 2 | |
| | Black Spruce, Tall Stands | 2 | |
| | Mountain Hemlock, Short Stands | 2 | |
| | Mountain Hemlock, Tall Stands | 2 | |
| | Open Forest-Woodland (Black Spruce) | | |
| | Black Spruce, Short Stands | 3 | |

| | |
|---|---|
| Salt Water Wetlands | |
| Salt Grassland | 5 |
| Low Shrub | 5 |
| Tidal Marsh | 5 |
| Tall Shrubs | |
| Alder | 6 |
| Alder-Willow | 6 |
| Low Shrub | |
| Willow Resin Birch | 6 |
| Grassland | |
| Upland Grass | 8 |
| Tundra | |
| Sedge-Grass | 7 |
| Herbaceous | 7 |
| Shrub | 6 |
| Mat and Cushion | 7 |
| Fresh Water Wetlands | |
| Sphagnum-Bog | 4 |
| Sagnum-Srub Bog | 4 |
| Cultural Features | |
| Cultural Influences | 1 |
| Barren | |
| Mud Flats | 1 |
| Rock | 1 |
| Permanent Snow and Ice | |
| Snowfield | 1 |
| Glacier | 1 |
| Water | |
| Lakes > 40 acres | 1 |
| Lakes $\geq$ 10 10 acres < 40 acres | 1 |
| Streams $\geq$ 165 Ft Wide < 600 Feet | 1 |
| Rivers > 1/8 Mile Wide | 1 |

MODEL SUMMATION RULES

| Rank | Category |
|---|---|
| 1 | Non Vegetated |
| 2 | Closed Forest |
| 3 | Open Forest |
| 4 | Fresh Water Wetland |
| 5 | Salt Water Wetland |
| 6 | Shrub |
| 7 | Tundra |
| 8 | Grassland |

MODEL OUTLINE
SPECIFIC SLOPE FROM SOILS

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Soil Characteristic | Slope Gradient | | |
| Slope Gradient | Water | 1 | |
| | Glacial | 2 | |
| | 0-3% Slope | 3 | |
| | 3-7% Slope | 4 | |
| | 7-12% Slope | 5 | |
| | 12-20% Slope | 6 | |
| | 20-30% Slope | 7 | |
| | 30-45% Slope | 8 | |
| | > Slope | 9 | |

MODEL OUTLINE
FOREST RESOURCES

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Primary Vegetation | Closed Forest | | |
| | Coniferous Forest, White Spruce, Short Stands | 9 | |
| | Deciduous Forest, Mixed Forest, Young Stands | 5 | |
| | Deciduous Forest, Mixed Forest, Medium-Aged Stands | 5 | |
| | Coniferous Forest, White Forest, Old Stands | 9 | |
| | Deciduous Forest, Mixed Forest, Old Stands | 5 | |
| | Cottonwood, Young Stands | 3 | |
| | Cottonwood, Medium-Aged Stands | 3 | |
| | Cottonwood, Old Stands | 3 | |
| | Open Forest-Woodland | | |
| | Coniferous Forest, White Spruce, Short Stands | 8 | |
| | Deciduous Forest, Mixed Forest, Mediume-Aged Stands | 4 | |
| | Coniferous Forest, White Spruce, Tall Stands | 8 | |
| | Deciduous Forest, Mixed Forest, Old Stands | 4 | |
| | Cottonwood, Medium-Aged Stands | 2 | |
| | Cottonwood, Old Stands | 2 | |
| | Closed Forest (Black Spruce Mountain Hemlock) | | |
| | Black Spruce, Short Stands | 7 | |
| | Black Spruce, Tall Stands | 7 | |
| | Mountain Hemlock, Short Stands | 9 | |
| | Mountain Hemlock, Tall Stands | 9 | |
| | Open Forest-Woodland (Black Spruce) | | |
| | Black Spruce, Short Stands | 6 | |

| | |
|---|---|
| Salt Water Wetlands | |
| Salt Grassland | 1 |
| Low Shrub | 1 |
| Tidal Marsh | 1 |
| Tall Shrubs | |
| Alder | 1 |
| Alder-Willow | 1 |
| Low Shrub | |
| Willow Resin Birch | 1 |
| Grassland | |
| Upland Grass | 1 |
| Tundra | |
| Sedge-Grass | 1 |
| Herbaceous | 1 |
| Shrub | 1 |
| Mat and Cushion | 1 |
| Fresh Water Wetlands | |
| Sphagnum-Bog | 1 |
| Sagnum-Shrub Bog | 1 |
| Cultural Features | |
| Cultural Influences | 1 |
| Barren | |
| Mud Flats | 1 |
| Rock | 1 |
| Permanent Snow and Ice | |
| Snowfield | 1 |
| Glacier | 1 |
| Water | 1 |
| Lakes > 40 Acres | 1 |
| Lakes $\geq$ 10 Acres < 40 Acres | 1 |
| Streams $\geq$ 165 Feet Wide < 600 Feet Wide | 1 |
| Rivers > 1/8 Mile Wide | 1 |

MODEL SUMMATION RULES

| Rank | Category |
|---|---|
| 1 | Non-Forests |
| 2 | Open Cottonwood |
| 3 | Closed Cottonwood |
| 4 | Open Mixed Forest |
| 5 | Closed Mixed Forest |
| 6 | Open Black Spruce |
| 7 | Closed Black Spruce |
| 8 | Open White Spruce |
| 9 | Closed White Spruce, Hemlock |

MODEL OUTLINE
GROUNDWATER AVAILABILITY

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| General Geology | No Surficial Deposits | 2 | |
| | Surficial Deposits | 3 | |
| | Waterbody | 3 | |
| | Glacier | 1 | |
| Physiographic Division | Mountain | 2 | |
| | Hill | 2 | |
| | Slope | 3 | |
| | Plateau | 2 | |
| | Valley | 3 | |
| | Coastal Lowland | 3 | |
| | Glacier | 1 | |
| | Waterbody | 3 | |
| Landform | Glacial | 2 | |
| | Fluvioglacial | 2 | |
| | Aerolean | 2 | |
| | Littoral | 3 | |
| | Fluvial | | |
| | Channel | 3 | |
| | River | 3 | |
| | Floodplain | | |
| | Active | 3 | |
| | Abandoned | 3 | |
| | Alluvial Plain | 2 | |
| | Alluvial Fan/Cone | 2 | |
| | Lacustrine Deposits | 2 | |
| | Mass Wasting | | |
| | Colluvium | 2 | |
| | Talus | 1 | |
| | Landslide Deposits | 2 | |
| | Rock Glacier | 1 | |
| | Mine Tailings | 2 | |
| | Tectonic Uplift | | |
| | Upland Valley | 2 | |
| | Mountain Sideslope | 1 | |
| | Mountain Ridgetop | 1 | |
| | Waterbody | 3 | |
| | Ice and Snow | 1 | |

MODEL SUMMATION RULES

H = All 3, no 2 or 1
M = One or More 2's, no 1
L = One or More 1

MODEL OUTLINE
ECONOMIC AGRICULTURE/FORESTRY

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Soil Characteristic | Agricultural Capability | | |
| | Class II | 1 | |
| | Class III | 2 | |
| Primary Vegetation | Closed Forest | | |
| | Coniferous Forest, White Spruce, Short Stands | 5 | |
| | Deciduous Forest, Mixed Forest, Young Stands | 5 | |
| | Deciduous Forest, Mixed Forest, Medium-Aged Stands | 5 | |
| | Coniferous Forest, White Spruce, Tall Stands | 5 | |
| | Deciduous Forest, Mixed Forest, Old Stands | 5 | |
| | Cottonwood, Young Stands | 0 | |
| | Cottonwood, Medium-Aged Stands | 5 | |
| | Cottonwood, Old Stands | 5 | |
| | Open Forest-Woodland | | |
| | Coniferous Forest, White Spruce, Short Stands | 0 | |
| | Deciduous Forest, Mixed Forest, Medium-Aged Stands | 0 | |
| | Coniferous Forest, White Spruce, Tall Stands | 0 | |
| | Deciduous Forest, Mixed Forest, Old Stands | 5 | |
| | Cottonwood, Medium-Aged Stands | 0 | |
| | Cottonwood, Old Stands | 5 | |
| | Closed Forest (Black Spruce Mountain Hemlock) | | |
| | Black Spruce, Short Stands | 5 | |
| | Black Spruce, Tall Stands | 5 | |
| | Mountain Hemlock, Short Stands | 0 | |
| | Mountain Hemlock, Tall Stands | 5 | |

| | |
|---|---|
| Open Forest-Woodland | |
| (Black Spruce) | |
| Black Spruce, Shorts Stands | 0 |
| Salt Water Wetlands | |
| Salt Grass Land | 0 |
| Low Shrub | 0 |
| Tidal Marsh | 0 |
| Tall Shrubs | |
| Alder | 0 |
| Alder-Willow | 0 |
| Low Shrub | |
| Willow Resin Birch | 0 |
| Grassland | |
| Upland Grass | 0 |
| Tundra | |
| Sedge-Grass | 0 |
| Herbaceous | 0 |
| Shrub | 0 |
| Mat and Cushion | 0 |
| Fresh Water Wetlands | |
| Sphagnum-Bog | 0 |
| Sphagnum-Shrub Bog | 0 |
| Cultural Features | |
| Cultural Influences | 0 |
| Barren | |
| Mud Flats | 0 |
| Rock | 0 |
| Permanent Snow and Ice | |
| Snowfield | 0 |
| Glacier | 0 |
| Water | Off |

MODEL SUMMATION RULES

| Value | Ranking | Category |
|---|---|---|
| Off | 1 | Water |
| 0 | 2 | Other Lands |
| 7 | 3 | Class III and Select Forest |

| | | |
|---|---|---|
| 6 | 4 | Class II and Select Forest |
| 5 | 5 | Select Forest Type |
| 2 | 6 | Class III Soils |
| 1 | 7 | Class II Soils |

MODEL OUTLINE
IMPORTANT FARMLAND

| Consideration | Specific Data Class | Value (Incidence) | Value (Incidence) |
|---|---|---|---|
| Landform | Active Channel | W | |
| | Water | W | |
| Soil Characteristics | Soil Priority Point Value | | |
| | GE5.3 | A | |
| | 4.3 - 5.2 | B | |
| | 3.3 - 4.2 | C | |
| | 2.3 - 3.2 | D | |
| | 1.3 - 2.2 | E | |
| | 0.0 - 1.2 | F | |

MODEL SUMMATION RULES

| | |
|---|---|
| Capability Class A | A |
| Capability Class B | B |
| Capability Class C | C |
| Capability Class D | D |
| Capability Class E | E |
| Capability Class F | F |
| Water | W |

MODEL OUTLINE
IMPORTANT GRAZING LANDS (POTENTIAL)
TALKEETNA SUBBASIN

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Soil Characteristics | Important Grazing Lands (Potential) | | |
| | 1 | 1 | |
| | 2 | 2 | |
| | 3 | 3 | |
| | 4 | 4 | |
| | 5 | 5 | |

MODEL SUMMATION RULES

| | |
|---|---|
| Excellent | 1 |
| Good | 2 |
| Fair | 3 |
| Poor | 4 |
| Water | 5 |

MODEL OUTLINE
LAND CAPABILITY FOR ACCESSED LARGE LOT RESIDENTIAL DEVELOPMENT
TALKEETNA SUBBASIN

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Landform Type | Glacial | | |
| | Moraine | H | |
| | Till | H | |
| | Drumlin | | |
| | Drumlin/Drumloid | H | |
| | Rock Drumlin | NR | |
| | Fluvioglacial | | |
| | Outwash | H | |
| | Abandoned Outwash Channel | H | |
| | Remnant Subglacial | | |
| | Stream Valley | H | |
| | Kame Complex | H | |
| | Esker | H | |
| | Crevasse Filling | H | |
| | Side Glacial Drainage | | |
| | Channel | H | |
| | Flute | H | |
| | Aeolian | | |
| | Dune | L | |
| | Littoral | | |
| | Longshore Bar | L | |
| | Beach | L | |
| | Barrier Spit | L | |
| | Delta | L | |
| | Tidal Flat | U | |
| | Coastal Plain | NR | |
| | Fluvial | | |
| | Active Channel | U | |
| | River Bar | U | |
| | Floodplain | | |
| | Active | U | |
| | Abandoned | NR | |
| | Alluvial Plain | H | |
| | Alluvial Fan/Cone | H | |
| | Lacustrine Deposit | H | |
| | Mass Wasting | | |
| | Colluvium | U | |
| | Talus | U | |
| | Landslide Deposit | U | |
| | Rock Glacier | U | |
| | Mine Tailings | U | |

| | | |
|---|---|---|
| | Tectonic Uplift | |
| | Upland Valley | H |
| | Mountain Sideslope | NR |
| | Mountain Ridgetop | NR |
| | Waterbody | U |
| | Ice and Snow | U |
| Slope Gradient | Average Slope Gradient | |
| | 0-3% | H |
| | 3-7% | H |
| | 7-12% | H |
| | 12-20% | M |
| | 20-30% | L |
| | 30-45% | L |
| | > 45% | U |
| | Specific Slope Phase | |
| | 0-3% | H |
| | 3-7% | H |
| | 7-12% | H |
| | 12-20% | M |
| | 20-30% | M |
| | 30-45% | L |
| | > 45% | U |
| Geologic Hazard | Primary Potential | |
| | Flood Zone | U |
| | Secondary Potential | |
| | Flood Zone | NR |
| | Outburst Flood Zone | U |
| | Catastrophic Wave Zone | U |
| | Landslide Zone | U |
| | Varying Particle Size | NR |
| | Unstable Ground | NR |
| | Avalanche Track | U |
| Soil Characteristics | Septic Tank Limitations | |
| | Slight | H |
| | Moderate | M |
| | Severe | L |
| | Limitations for Dwellings | |
| | With Basements | |
| | Slight | H |
| | Moderate | M |
| | Severe | M |
| | Limitations for Dwellings | |
| | Without Basements | |
| | Slight | H |
| | Moderate | M |
| | Severe | L |

| | | |
|---|---|---|
| | Limitations for Local Roads and Streets | |
| | Slight | H |
| | Moderate | H |
| | Severe | M |
| | Drainage | |
| | Excessively Drained | M |
| | Somewhat Excessively Drained | H |
| | Well Drained | H |
| | Moderately Well Drained | M |
| | Somewhat Poorly Drained | L |
| | Poorly Drained | U |
| | Very Poorly Drained | U |
| Water Availability | Potential Well Yield Area | |
| | Area 1 | L |
| | Area 2 or 3 | H |

MODEL SUMMATION RULES

Ratings are scanned within each general category encompassing more than one factor and the most severely constraining rating is used to provide the overall rating for the category. In effect, each general consideration - landform, soils, water availability, etc., - has a single rating when summation begins. The following summation procedures are used:

| | |
|---|---|
| High Capability | GE1H and Not EQ M L or U |
| Moderate Capability | EQ1 or 2M and Not EQ L or U |
| Low Capability | GT2M or EQ1 or 2L and Not EQ U |
| Incapable | GT2L or GE1U |

MODEL OUTLINE
LAND CAPABILITY FOR MODERATE/HIGH DENSITY RESIDENTIAL DEVELOPMENT

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Landform Type | Glacial | | |
| | Moraine | H | |
| | Till | H | |
| | Drumlin | | |
| | Drumlin/Drumloid | H | |
| | Rock Drumlin | NR | |
| | Fluvioglacial | | |
| | Outwash | H | |
| | Abandoned Outwash Channel | H | |
| | Remnant Subglacial Stream Valley | H | |
| | Kame Complex | H | |
| | Esker | H | |
| | Crevasse Filling | H | |
| | Side Glacial Drainage Channel | H | |
| | Flute | H | |
| | Aeolian | | |
| | Dune | L | |
| | Littoral | | |
| | Longshore Bar | U | |
| | Beach | U | |
| | Barrier Spit | U | |
| | Delta | L | |
| | Tidal Flat | U | |
| | Coastal Plain | NR | |
| | Fluvial | | |
| | Active Channel | U | |
| | River Bar | U | |
| | Floodplain | | |
| | Active | U | |
| | Abandoned | NR | |
| | Alluvial Plain | H | |
| | Alluvial Fan/Cone | H | |
| | Lacustrine Deposit | H | |
| | Mass Wasting | | |
| | Colluvium | U | |
| | Talus | U | |
| | Landslide Deposit | U | |
| | Rock Glacier | U | |
| | Mine Tailings | U | |

| | | |
|---|---|---|
| | Tectonic Uplift | |
| | Upland Valley | H |
| | Mountain Sideslope | NR |
| | Mountain Ridgetop | NR |
| | Waterbody | U |
| | Ice and Snow | U |
| Slope Gradient | Average Slope Gradient | |
| | 0-3% | H |
| | 3-7% | H |
| | 7-12% | H |
| | 12-20% | M |
| | 20-30% | L |
| | 30-45% | U |
| | > 45% | U |
| | Specific Slope Phase | |
| | 0-3% | H |
| | 3-7% | H |
| | 7-12% | H |
| | 12-20% | M |
| | 20-30% | L |
| | 30-45% | L |
| | > 45% | U |
| Geologic Hazard | Primary Potential | |
| | Flood Zone | U |
| | Secondary Potential | |
| | Flood Zone | NR |
| | Outburst Flood Zone | U |
| | Catastrophic Wave Zone | U |
| | Landslide Zone | U |
| | Varying Particle Size | NR |
| | Unstable Ground | NR |
| | Avalanche Track | U |
| Soil Characteristics | Limitations for Dwellings | |
| | With Basements | |
| | Slight | H |
| | Moderate | M |
| | Severe | L |
| | Limitations for Dwellings | |
| | Without Basements | |
| | Slight | H |
| | Moderate | M |
| | Severe | L |
| | Limitations for Local | |
| | Roads and Streets | |
| | Slight | H |
| | Moderate | H |

| | | |
|---|---|---|
| | Severe | M |
| | Drainage | |
| | Excessively Drained | M |
| | Somewhat Excessively Drained | H |
| | Well Drained | H |
| | Moderately Well Drained | M |
| | Somewhat Poorly Drained | L |
| | Poorly Drained | U |
| | Very Poorly Drained | U |
| | Ice | U |
| Water Availability | Non-Glacial Stream (GE2nd Order) | |
| | LE1 Mile Distance | NR |
| | GT1 Mile Distance | |
| | If Potential Well Yield Area 1 | L |
| | If Potential Well Yield Area 2 or 3 | NR |

MODEL SUMMATION RULES

Ratings are scanned within each general category encompassing more than one factor and the most severely constraining rating is used to provide the overall rating for the category. In effect, each general consideration - landform, soils, water availability, etc., - has a single rating when summation begins. The following summation procedures are used:

| | |
|---|---|
| High Capability | GE1H and Not EQ M L or U |
| Moderate Capability | EQ1 or 2M and Not EQ L or U |
| Low Capability | GT2M or EQ1 or 2L and Not EQ U |
| Incapable | GT2L or GE1U |

MODEL OUTLINE
LAND CAPABILITY FOR LOW DENSITY REMOTE
RESIDENTIAL DEVELOPMENT

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Landform Type | Glacial | | |
| | Moraine | H | |
| | Till | H | |
| | Drumlin | | |
| | Drumlin/Drumloid | H | |
| | Rock Drumlin | NR | |
| | Fluvioglacial | | |
| | Outwash | H | |
| | Abandoned Outwash Channel | H | |
| | Remnant Subglacial Stream Valley | H | |
| | Kame Complex | H | |
| | Esker | H | |
| | Crevasse Filling | H | |
| | Side Glacial Drainage Channel | H | |
| | Flute | H | |
| | Aeolian | | |
| | Dune | L | |
| | Littoral | | |
| | Longshore Bar | L | |
| | Beach | L | |
| | Barrier Spit | L | |
| | Delta | L | |
| | Tidal Flat | U | |
| | Coastal Plain | NR | |
| | Fluvial | | |
| | Active Channel | U | |
| | River Bar | U | |
| | Floodplain | | |
| | Active | U | |
| | Abandoned | NR | |
| | Alluvial Plain | H | |
| | Alluvial Fan/Cone | H | |
| | Lacustrine Deposit | H | |
| | Mass Wasting | | |
| | Colluvium | U | |
| | Talus | U | |
| | Landslide Deposit | U | |
| | Rock Glacier | U | |
| | Mine Tailings | U | |

| | | |
|---|---|---|
| | Tectonic Uplift | |
| | Upland Valley | H |
| | Mountain Sideslope | NR |
| | Mountain Ridgetop | NR |
| | Waterbody | U |
| | Ice and Snow | U |
| Slope Gradient | Average Slope Gradient | |
| | 0-3% | H |
| | 3-7% | H |
| | 7-12% | H |
| | 12-20% | H |
| | 20-30% | M |
| | 30-45% | L |
| | > 45% | L |
| | Specific Slope Phase | |
| | 0-3% | H |
| | 3-7% | H |
| | 7-12% | H |
| | 12-20% | H |
| | 20-30% | M |
| | 30-45% | M |
| | > 45% | U |
| Geologic Hazard | Primary Potential | |
| | Flood Zone | U |
| | Secondary Potential | |
| | Flood Zone | NR |
| | Outburst Flood Zone | U |
| | Catastrophic Wave Zone | U |
| | Landslide Zone | U |
| | Varying Particle Size | NR |
| | Unstable Ground | NR |
| | Avalanche Track | U |
| Soil Characteristics | Limitations for Dwellings | |
| | With Basements | |
| | Slight | H |
| | Moderate | H |
| | Severe | M |
| | Limitations for Dwellings | |
| | Without Basements | |
| | Slight | H |
| | Moderate | H |
| | Severe | M |
| | Drainage | |
| | Excessively Drained | M |
| | Somewhat Excessively | |
| | Drained | H |

| | | | |
|---|---|---|---|
| | Well Drained | H | |
| | Moderately Well Drained | M | |
| | Somewhat Poorly Drained | H | |
| | Poorly Drained | L | |
| | Very Poorly Drained | U | |
| | Ice | U | |
| Vegetation Cover | Closed Forest | | |
| | Coniferous-White Spruce-Short | M | M |
| | Coniferous-White Spruce-Tall | H | H |
| | Coniferous-Black Spruce-Short | U | U |
| | Coniferous-Black Spruce-Tall | M | M |
| | Coniferous-Hemlock-Sort | M | M |
| | Coniferous-Hemlock-Tall | H | H |
| | Deciduous/Mixed-Young | M | M |
| | Deciduous/Mixed-Medium Age | M | M |
| | Deciduous/Mixed-Old | M | M |
| | Cottonwood-Young | M | M |
| | Cottonwood-Medium Age | H | H |
| | Cottonwood-Old | M | M |
| | Open Forest | | |
| | Coniferous-White Spruce-Short | L | L |
| | Coniferous-White Spruce-Tall | M | M |
| | Coniferous-Black Spruce-Short | L | L |
| | Deciduous/Mixed-Medium Age | M | M |
| | Deciduous/Mixed-Old | M | M |
| | Cottonwood-Medium Age | L | L |
| | Cottonwood-Old | L | L |
| | Non-Forest | | |
| | Salt Water Wetland | U | U |
| | Tall Shrubs | U | U |
| | Low Shrubs | U | U |
| | Grassland | U | U |
| | Tundra | U | U |
| | Fresh Water Wetland | U | U |
| | Culturally Disturbed Land | | |
| | If Agriculture, Vacant-Disturbed, or Extensive Recreation | L | |
| | If Other Developed Land Use | L | |
| | Barren | U | |
| | Permanent Snow and Ice | U | |

| | | |
|---|---|---|
| | Water | U |
| Water Availability | Lake, Large River or Non-Glacial Stream | |
| | LE 1/4 Mile Distance | H |
| | GT 1/4 - EQ 1/2 Mile Distance | M |
| | GT 1/2 Mile Distance | L |

MODEL SUMMATION RULES

Ratings are scanned within each general category encompassing more than one factor and the most severely constraining rating is used to provide the overall rating for the category. In effect, each general consideration - landform, soils, water availability, etc., - has a single rating when summation begins. The following summation procedures are used:

| | |
|---|---|
| High Capability | GE1H and Not EQ M L or U |
| Moderate Capability | EQ1 or 2M and Not EQ L or U |
| Low Capability | GT2M or EQ1 or 2L and Not EQ U |
| Incapable | GT2L or GE1U |

MODEL OUTLINE
EROSION POTENTIAL

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Soil Characteristics | K Factor | N | |
| Slope Gradient | Specific Slope Gradient | | |
| | 0-3% | .245 | |
| | 3-7% | .746 | |
| | 7-12% | 1.78 | |
| | 12-20% | 3.60 | |
| | 20-30% | 6.34 | |
| | 30-45% | 10.71 | |
| | > 45% | 17.58 | |

MODEL SUMMATION RULES

K Factor values are multiplied to value for average slope gradient to determine computed soil loss in tons per acre-year.

| Value | Ranking | Category |
|---|---|---|
| - | 1 | Water |
| 0-3 | 2 | 0-3 Tons/Acre-Year |
| 4-7 | 3 | 4-7 Tons/Acre-Year |
| 8-15 | 4 | 8-15 Tons/Acre-Year |
| 16-25 | 5 | 16-25 Tons/Acre-Year |
| 26-40 | 6 | 26-40 Tons/Acre-Year |
| 41-129 | 7 | GT 40 Tons/Acre-Year |

MODEL OUTLINE
MOOSE HABITAT

| Consideration | Specific data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Primary Vegetation | Closed Forest | | |
| | Coniferous Forest, White Spruce, Short Stands | 3 | |
| | Deciduous Forest, Mixed Forest, Young Stands | 2 | |
| | Deciduous Forest, Mixed Forest, Medium-Aged Stands | 1 | |
| | Coniferous Forest, White Spruce, Tall Stands | 1 | |
| | Deciduous Forest, Mixed Forest, Old Stands | 2 | |
| | Cottonwood, Young Stands | 1 | |
| | Cottonwood, Medium-Aged Stands | 3 | |
| | Cottonwood, Old Stands | 3 | |
| | Open Forest-Woodland | | |
| | Coniferous Forest, White Spruce, Short Stands | 2 | |
| | Deciduous Forest, Mixed Forest, Medium-Aged Stands | 2 | |
| | Coniferous Forest, White Spruce, Tall Stands | 2 | |
| | Deciduous Forest, Mixed Forest, Old Stands | 3 | |
| | Cottonwood, Medium-Aged Stands | 5 | |
| | Cottonwood, Old Stands | 3 | |
| | Closed Forest (Black Spruce Mountain Hemlock) | | |
| | Black Spruce, Short Strands | 4 | |
| | Black Spruce, Tall Stands | 4 | |
| | Mountain Hemlock, Tall Stands | 1 | |
| | Open Forest-Woodland (Black Spruce) | | |
| | Black Spruce, Short Stands | 5 | |

| | | |
|---|---|---|
| Salt Water Wetlands | | |
| Salt Grassland | 9 | |
| Low Shrub | 9 | |
| Tidal Marsh | 9 | |
| Tall Shrubs | | |
| Alder | 3 | |
| Alder-Willow | 1 | |
| Low Shrub | | |
| Willow Resin Birch | | 6 |
| Grassland | | |
| Upland Grass | | 6 |
| Tundra | | |
| Sedge-Grass | | 8 |
| Herbaceous | | 6 |
| Shrub | | 7 |
| Mat and Cushion | | 8 |
| Fresh Water Wetlands | | |
| Sphagnum-Bog | 9 | |
| Sagnum-Srub Bog | | 7 |
| Cultural Features | | |
| Cultural Influences | 10 | |
| Barren | | |
| Mud Flats | 10 | |
| Rock | 10 | |
| Permanent Snow and Ice | | |
| Snowfield | 10 | |
| Glacier | 10 | |
| Water | 11 | |

MODEL SUMMATION RULES

VALUES 1-4 = LEVEL 1 MOD/HIGH WR, (S/S/F) RANGE
VALUES 6-7 = LEVEL 2 MOD/HIGH (S/S/F) RANGE, NO WR
VALUES 5, 8-10 = LEVEL 3 LOW TO NO HABITAT
VALUES 11 = LEVEL 4 WATER

MODEL OUTLINE
GENERAL HABITAT

| Consideration | Specific data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Primary Vegetation | Closed Forest | | |
| | Coniferous Forest, White Spruce, Short Stands | 8 | |
| | Deciduous Forest, Mixed Forest, Young Stands | 10 | |
| | Deciduous Forest, Mixed Forest, Medium-Aged Stands | 5 | |
| | Coniferous Forest, White Spruce, Tall Stands | 8 | |
| | Deciduous Forest, Mixed Forest, Old Stands | 5 | |
| | Cottonwood, Young Stands | 10 | |
| | Cottonwood, Medium-Aged Stands | 10 | |
| | Cottonwood, Old Stands | 10 | |
| | Open Forest-Woodland | | |
| | Coniferous Forest, White Spruce, Short Stands | 2 | |
| | Deciduous Forest, Mixed Forest, Medium-Aged Stands | 1 | |
| | Coniferous Forest, White Spruce, Tall Stands | 2 | |
| | Deciduous Forest, Mixed Forest, Old Stands | 1 | |
| | Cottonwood, Medium-Aged Stands | 4 | |
| | Cottonwood, Old Stands | 4 | |
| | Closed Forest (Black Spruce Mountain Hemlock) | | |
| | Black Spruce, Short Strands | 8 | |
| | Black Spruce, Tall Stands | 8 | |
| | Mountain Hemlock, Tall Stands | 8 | |
| | Open Forest-Woodland (Black Spruce) | | |
| | Black Spruce, Short Stands | 11 | |

| | |
|---|---|
| Salt Water Wetlands | |
| Salt Grassland | 7 |
| Low Shrub | 9 |
| Tidal Marsh | 7 |
| Tall Shrubs | |
| Alder | 13 |
| Alder-Willow | 3 |
| Low Shrub | |
| Willow Resin Birch | 6 |
| Grassland | |
| Upland Grass | 14 |
| Tundra | |
| Sedge-Grass | 15 |
| Herbaceous | 15 |
| Shrub | 15 |
| Mat and Cushion | 15 |
| Fresh Water Wetlands | |
| Sphagnum-Bog | 12 |
| Sphagnum-Shrub Bog | 12 |
| Cultural Features | |
| Cultural Influences | 16 |
| Barren | |
| Mud Flats | 16 |
| Rock | 16 |
| Permanent Snow and Ice | |
| Snowfield | 16 |
| Glacier | 16 |
| Water | 17 |

MODEL SUMMATION RULES

MAP 1

| Ranking | Category |
|---|---|
| 1 | = Mixed Forest - Open |
| 2 | = Conifer Forest - Open |
| 3 | = Tall Shrub Alder-Willow |
| 4 | = Deciduous Forest - Open |
| 5 | = Mixed Forest - Closed |
| 6 | = Low Shrubs - Willow Resin Birch |

7 = Salt Water Wetland, Grassland, and Tidal Flats
8 = Conifer Forest - Closed
9 = Low Shrub Salt Water Wetland
10 = Deciduous Forest - Closed
11 = Short Black Spruce - Open
12 = Sphagnum Bog
13 = Tall Shrub Alder
14 = Grassland
15 = Tundra - Special Consideration
16 = Low Diversity/Capability
17 = Lakes and Streams

MAP 2

| Aggregated Ranking | Original Ranking | Category |
|---|---|---|
| 1 | 17 | Lakes and Streams |
| 2 | 15 | Tundra Special Consideration |
| 3 | 16 | Low Diversity/Capability |
| 4 | 8-14 | Moderate Diversity/Capability |
| 5 | 1-7 | High Diversity/Capability |

MODEL OUTLINE
WETLANDS MATRIX
TALKEETNA SUBBASIN

| VEGETATION TYPE | SOIL TYPE | | | | | | | | | HYDROLOGY | LAND FORM | SOIL DRAINAGE CHARACTERISTICS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Kalifonski | Lucille | Spenard | Chulitna-Slikok | Delyndia-Salamatof | Mutnala-Chichantna | Mutnala-Slikok | Talkeetna-Slikok | All Other Soils | STREAM ORDER IS 1-3 AND STREAM DISCHARGE PROFILE IS LOWLAND | ACTIVE FLOODPLAIN, ACTIVE CHANNEL OR RIVER BASE | VP | P | SP | MW | W | SE | EX |
| Closed Forest (GE 50% Crown Cover) | | | | | | | | | | | | | | | | | | |
| Coniferous-White Spruce-Short | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 1 | 1 | 7 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-White Spruce-Tall | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-Black Spruce-Short | 0 | 0 | 0 | | | | | | | 13 | 1 | 1 | 7 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-Black Spruce-Tall | 0 | 0 | 0 | | | | | | | 13 | 1 | 1 | 7 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-Hemlock-Short | 0 | 0 | 0 | | | | | | | 13 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-Hemlock-Tall | 0 | 0 | 0 | | | | | | | 13 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deciduous/Mixed-Young | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Deciduous/Mixed-Medium Age | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Deciduous/Mixed-Old | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood-Young | 0 | 0 | 0 | | | | | | | 13 | 2 | 2 | 7 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood-Medium Age | 0 | 0 | 0 | | | | | | | 13 | 2 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood-Old | 0 | 0 | 0 | | | | | | | 13 | 2 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |

MODEL OUTLINE
WETLANDS MATRIX
TALKEETNA SUBBASIN (Cont.)

| VEGETATION TYPE | SOIL TYPE | | | | | | | | | HYDROLOGY | LAND FORM | SOIL DRAINAGE CHARACTERISTICS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Kalifonski | Lucille | Spenard | Chulitna-Slikok | Delyndia-Salamatof | Mutnala-Chichantna | Mutnala-Slikok | Talkeetna-Slikok | All Other Soils | STREAM ORDER IS 1-3 AND STREAM DISCHARGE PROFILE IS LOWLAND | ACTIVE FLOODPLAIN, ACTIVE CHANNEL OR RIVER BASE | VP | P | SP | MW | W | SE | EX |
| Open Forest (GE 10% to LT 50% Crown Cover) | | | | | | | | | | | | | | | | | | |
| Coniferous-White Spruce-Short | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 1 | 1 | 7 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-White Spruce-Tall | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-Black Spruce-Short | 0 | 0 | 0 | | | | | | | 13 | 4 | 4 | 7 | 0 | 0 | 0 | 0 | 0 |
| Deciduous/Mixed-Medium Age | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Deciduous/Mixed-Old | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood-Medium Age | 0 | 0 | 0 | | | | | | | 13 | 2 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood-Old | 0 | 0 | 0 | | | | | | | 13 | 2 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Non-Forest (LT 10% Crown Cover) | | | | | | | | | | | | | | | | | | |
| Saltwater Wetland | | | | | | | | | | | | | | | | | | |
| Grassland | 0 | 0 | 0 | | | | | | | 9 | 9 | 9 | 9 | 0 | 0 | 0 | 0 | 0 |
| Low Shrub | 0 | 0 | 0 | | | | | | | 8 | 8 | 8 | 8 | 0 | 0 | 0 | 0 | 0 |
| Tidal Marsh | 0 | 0 | 0 | | | | | | | 10 | 10 | 10 | 10 | 0 | 0 | 0 | 0 | 0 |
| Tall Shrub | | | | | | | | | | | | | | | | | | |
| Alder | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 5 | 5 | 7 | 0 | 0 | 0 | 0 | 0 |
| Alder-Willow | 0 | 0 | 0 | | | | | | | 13 | 5 | 5 | 7 | 0 | 0 | 0 | 0 | 0 |
| Low Shrub | | | | | | | | | | | | | | | | | | |
| Willow-Resin Birch | 0 | 0 | 0 | | | | | | | 13 | 5 | 5 | 7 | 0 | 0 | 0 | 0 | 0 |

MODEL OUTLINE
WETLANDS MATRIX
TALKEETNA SUBBASIN (Cont.)

| VEGETATION TYPE | SOIL TYPE: Kalifonski | Lucille | Spenard | Chulitna-Slikok | Delyndia-Salamatof | Mutnala-Chichantna | Mutnala-Slikok | Talkeetna-Slikok | All Other Soils | HYDROLOGY: STREAM ORDER IS 1-3 AND STREAM DISCHARGE PROFILE IS LOWLAND | LAND FORM: ACTIVE FLOODPLAIN, ACTIVE CHANNEL OR RIVER BASE | SOIL DRAINAGE CHARACTERISTICS: VP | P | SP | MW | W | SE | EX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Non-Forest (LT 10% Crown Cover) (Continued) | | | | | | | | | | | | | | | | | | |
| Grassland | | | | | | | | | | | | | | | | | | |
| Grassland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 13 | 6 | 6 | 7 | 0 | 0 | 0 | 0 | 0 |
| Tundra | | | | | | | | | | | | | | | | | | |
| Sedge-Grass | 0 | 0 | 0 | | | | | | | 13 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 |
| Herbaceous | 0 | 0 | 0 | | | | | | | 13 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 |
| Shrub | 0 | 0 | 0 | | | | | | | 13 | 6 | 5 | 5 | 0 | 0 | 0 | 0 | 0 |
| Mat-Cushion | 0 | 0 | 0 | | | | | | | 13 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 |
| Freshwater | | | | | | | | | | | | | | | | | | |
| Sphagnum Bog | 0 | 0 | 0 | | | | | | | 13 | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 |
| Sphagnum Shrub Bog | 0 | 0 | 0 | | | | | | | 13 | 5 | 5 | 5 | 0 | 0 | 0 | 0 | 0 |
| Cultural | | | | | | | | | | | | | | | | | | |
| Cultural Influence | 0 | 0 | 0 | | | | | | | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barren | | | | | | | | | | | | | | | | | | |
| Mud Flats | 0 | 0 | 0 | | | | | | | 11 | 11 | 11 | 11 | 0 | 0 | 0 | 0 | 0 |
| Rock | | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Snow | | | | | | | | | | | | | | | | | | |
| Snow Field | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Glacier | | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

MODEL OUTLINE
WETLANDS MATRIX
TALKEETNA SUBBASIN (Cont.)

| VEGETATION TYPE | SOIL TYPE: Kalifonski | Lucille | Spenard | Chulitna-Slikok | Delyndia-Salamatof | Mutnala-Chichantna | Mutnala-Slikok | Talkeetna-Slikok | All Other Soils | HYDROLOGY: STREAM ORDER IS 1-3 AND STREAM DISCHARGE PROFILE IS LOWLAND | LAND FORM: ACTIVE FLOODPLAIN, ACTIVE CHANNEL OR RIVER BASE | SOIL DRAINAGE CHARACTERISTICS: VP | P | SP | MW | W | SE | EX |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water | | | | | | | | | | | | | | | | | | |
| Lake GE 40 Acres | | | | | | | | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Lake GE 10 Acres and LT 40 Acres | | | | | | | | | | | 15 | 15 | 15 | 15 | 15 | 15 | 115 | 15 |
| Stream or River GE 165 Feet and LT 660 Feet Wide | | | | | | | | | | | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| River GE 660 Feet Wide | | | | | | | | | | | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| Stream or River LT 165 Feet Wide | | | | | | | | | | | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |

## WETLAND TYPE CODES

0 Non Wetland

1-7 Palustrine Wetland

1 Forested Needle Leaved Evergreen - Picea mariana (PF04)
2 Forested Broad Leaved Deciduous - Populus balsamifera (PF01)
3 Forested Needle Leaved Evergreen and Broad Leaved Deciduous (PF04 and PF01)
4 Scrub/Shrub Needle Leaved Evergreen - Picea mariana (PSS4)
5 Scrub/Shrub Broad Leaved Deciduous (PSS1)
6 Emergent Persistent - (Carex) (PEM5)
7 Potential Palustrian Wetland Inclusions

8-12 Estuarine Wetland

8 Intertidal Scrub/Shrub Broad Leaved Deciduous - Myrica (E2SS1)
9 Intertidal Emergent Persistent - Calamagrostis (EAA1)
10 Intertidal Emergent Persistent - Scirpus, Limbia, or Sargeniaum (E2EM1)
11 Intertidal unconsolidated Shore Mud Flat (E2FL3)
12 Potential Estuarine Wetland Inclusions

Riverine

13 Upper perennial Streambed Cobble/Gravel (R3SB1)
14 Lower Perennial Streambed/Unconsolidated Bottom (R2UB1)

Lacustrine

15 Limnetic Unconsolidated Bottom Cobble/Gravel (L1UB1)

WETLANDS II AGGREGATED TO TWELVE LEVELS
TALKEETNA SUBBASIN

| Aggregated Ranking | Original Ranking | Description |
|---|---|---|
| 1 | 0 | Non-Wetland |
| 2 | 1 | Palustrine - Forested Needle Leaved Evergreen - |
| 3 | 2-3 | Palustrine - Forested Needle Leaved Evergreen and Broad Leaved Deciduous |
| 4 | 4-5 | Palustrine - Scrub/Shrub Needle Leaved Evergreen and Broad Leaved Deciduous |
| 5 | 6 | Palustrine - Emergent Persistant |
| 6 | 7 | Palustrine - Potential Palustrine Wetland Inclusions |
| 7 | 8 | Estuarine - Intertidal Scrub or Shrub Broad Leaved Dedicuous |
| 8 | 9 | Estuarine - Intertidal Emergent Persistant - Elymus |
| 9 | 10 | Estuarine - Intertidal Emergent Persistant - Scirpus |
| 10 | 11 | Estuarine - Intertidal Mud Flat |
| 11 | 13 | Riverine - Upper Perennial Stream Bed |
| 12 | 14 | Lacustrine - Littoral and Limnetic (Unconsolidated Bottom Cobble/Gravel |

MODEL OUTLINE
WETLANDS MATRIX
BELUGA SUBBASIN

| VEGETATION TYPE | SOIL TYPE | | | | | | | | | LANDFORM | SOIL DRAINAGE CHARACTERISTICS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KALIFONSKI | LUCILLE | SPENARD | CHULITNA-SLIKOK | DELYNDIA-SALAMATOF | MUTNALA-CHICHANTNA | MUTNALA-SLIKOK | TALKEETNA-SLIKOK | ALL OTHER SOILS | ACTIVE FLOODPLAIN, ACTIVE CHANNEL OR RIVER BAR | VP | P | SP | MW | W | SE | EX |
| Closed Forest (GE 50% Crown Cover) | | | | | | | | | | | | | | | | | |
| Coniferous-White Spruce-Short | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 1 | 7 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-White Spruce-Tall | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-Black Spruce-Short | 0 | 0 | 0 | | | | | | | 1 | 1 | 7 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-Black Spruce-Tall | 0 | 0 | 0 | | | | | | | 1 | 1 | 7 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-Hemlock-Short | 0 | 0 | 0 | | | | | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-Hemlock-Tall | 0 | 0 | 0 | | | | | | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deciduous/Mixed-Young | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Deciduous/Mixed-Medium Age | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Deciduous/Mixed-Old | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood-Young | 0 | 0 | 0 | | | | | | | 2 | 2 | 7 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood-Medium Age | 0 | 0 | 0 | | | | | | | 2 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood-Old | 0 | 0 | 0 | | | | | | | 2 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Open Forest (GE 10% to LT 50% Crown Cover) | | | | | | | | | | | | | | | | | |
| Coniferous-White Spruce-Short | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 1 | 7 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-White Spruce-Tall | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Coniferous-Black Spruce-Short | 0 | 0 | 0 | | | | | | | 4 | 4 | 7 | 0 | 0 | 0 | 0 | 0 |

MODEL OUTLINE
WETLANDS MATRIX
BELUGA SUBBASIN (Continued)

| VEGETATION TYPE | SOIL TYPE | | | | | | | | | LANDFORM | SOIL DRAINAGE CHARACTERISTICS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KALIFONSKI | LUCILLE | SPENARD | CHULITNA-SLIKOK | DELYNDIA-SALAMATOF | MUTNALA-CHICHANTNA | MUTNALA-SLIKOK | TALKEETNA-SLIKOK | ALL-OTHER SOILS | ACTIVE FLOODPLAIN, ACTIVE CHANNEL OR RIVER BAR | VP | P | SP | MW | W | SE | EX |
| Open Forest (GE 10% to LT 50% Crown Cover) (Cont.) | | | | | | | | | | | | | | | | | |
| Deciduous/Mixed-Medium Age | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Deciduous/Mixed-Old | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood-Medium Age | 0 | 0 | 0 | | | | | | | 2 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Cottonwood-Old | 0 | 0 | 0 | | | | | | | 2 | 3 | 7 | 0 | 0 | 0 | 0 | 0 |
| Non-Forest (LT 10% Crown Cover) | | | | | | | | | | | | | | | | | |
| Saltwater Wetland | | | | | | | | | | | | | | | | | |
| Grassland | 0 | 0 | 0 | | | | | | | 9 | 9 | 9 | 0 | 0 | 0 | 0 | 0 |
| Low Shrub | 0 | 0 | 0 | | | | | | | 8 | 8 | 8 | 0 | 0 | 0 | 0 | 0 |
| Tidal | 0 | 0 | 0 | | | | | | | 10 | 10 | 10 | 0 | 0 | 0 | 0 | 0 |
| Tall Shrub | | | | | | | | | | | | | | | | | |
| Alder | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 7 | 0 | 0 | 0 | 0 | 0 |
| Alder-Willow | 0 | 0 | 0 | | | | | | | 5 | 5 | 7 | 0 | 0 | 0 | 0 | 0 |
| Low Shrub | | | | | | | | | | | | | | | | | |
| Willow-Resin Birch | 0 | 0 | 0 | | | | | | | 5 | 5 | 7 | 0 | 0 | 0 | 0 | 0 |
| Grassland | | | | | | | | | | | | | | | | | |
| Grassland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 | 7 | 0 | 0 | 0 | 0 | 0 |
| Tundra | | | | | | | | | | | | | | | | | |
| Sedge-Grass | 0 | 0 | 0 | | | | | | | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 |
| Herbaceous | 0 | 0 | 0 | | | | | | | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 |
| Shrub | 0 | 0 | 0 | | | | | | | 6 | 5 | 5 | 0 | 0 | 0 | 0 | 0 |
| Mat-Cushion | 0 | 0 | 0 | | | | | | | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 |
| Freshwater | | | | | | | | | | | | | | | | | |
| Sphagnum Bog | 0 | 0 | 0 | | | | | | | 6 | 6 | 6 | 0 | 0 | 0 | 0 | 0 |
| Sphagnum Shrub Bog | 0 | 0 | 0 | | | | | | | 5 | 5 | 5 | 0 | 0 | 0 | 0 | 0 |

MODEL OUTLINE
WETLANDS MATRIX
BELUGA SUBBASIN (Continued)

| VEGETATION TYPE | SOIL TYPE | | | | | | | | | LANDFORM | SOIL DRAINAGE CHARACTERISTICS | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | KALIFONSKI | LUCILLE | SPENARD | CHULITNA-SLIKOK | DELYNDIA-SALAMATOF | MUTNALA-CHICHANTNA | MUTNALA-SLIKOK | TALKEETNA-SLIKOK | ALL OTHER SOILS | ACTIVE FLOODPLAIN, ACTIVE CHANNEL OR RIVER BAR | VP | P | SP | MW | W | SE | EX |
| Cultural | | | | | | | | | | | | | | | | | |
| Cultural Influence | 0 | 0 | 0 | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Barren | | | | | | | | | | | | | | | | | |
| Mud Flats | 0 | 0 | 0 | | | | | | | 11 | 11 | 11 | 0 | 0 | 0 | 0 | 0 |
| Rock | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Snow | | | | | | | | | | | | | | | | | |
| Snow Field | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Glacier | | | | | | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Water | | | | | | | | | | | | | | | | | |
| Lake GE 40 Acres | | | | | | | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Lake GE 10 Acres and LT 40 Acres | | | | | | | | | | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Stream or River GE 165 Feet and LT 660 Feet Wide | | | | | | | | | | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| River GE 660 Feet Wide | | | | | | | | | | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| Stream or River LT 165 Feet Wide | | | | | | | | | | 13 | 13 | 13 | 13 | 13 | 13 | 13 | 13 |

## WETLAND TYPE CODES

0 Non Wetland

1-7 Palustrine

1 Forested Needle-leaved Evergreen - Picea mariana (PF04)
2 Forested Broad-leaved Deciduous - Populus balsamifera (PF01)
3 Forested Needle-leaved Evergreen and Broad-leaved Deciduous (PF04 and PF01)
4 Scrub/Shrub Needle-leaved Evergreen - Picea mariana (PSS4)
5 Scrub/Shrub Broad-leaved Deciduous (PSS1)
6 Emergent Persistant - Carex (PEM1)
7 Potential Palustrine Wetland Inclusions

8-12 Estuarine Wetland

8 Intertidal Scrub/Shrub Broad-leaved Deciduous - Myrica (E2SS1)
9 Intertidal Emergent Persistant - Calamagrostis (EM1)
10 Intertidal Emergent Persistant - Scirpus, Limbia, or Spargeniaum (E2E1)
11 Intertidal Unconsolidated Shore Mud Flat (E2FL3)
12 Potential Estuarine Wetland Inclusions

13-14 Riverine

13 Upper Perennial Unconsolidated Bottom Cobble/Gravel (R3SB1)
14 Lower Perennial Unconsolidated Bottom (R2UB1)

15 Lacustrine

15 Limnetic Unconsolidated Bottom Cobble/Gravel (L1UB1)

MODEL OUTLINE
ROAD SUITABILITY
TALKEETNA SUBBASIN

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Landform Type (Rating 1 to 10, 1 is best) | Glacial | | |
| | Moraine | 4 | |
| | Till | 4 | |
| | Drumlin | | |
| | Drumlin/Drumloid | 3 | |
| | Rock Drumlin | 7 | |
| | Fluvioglacial | | |
| | Outwash | 3 | |
| | Abandoned Outwash Channel | 3 | |
| | Remnant Subglacial Stream Valley | 4 | |
| | Kame Complex | 2 | |
| | Esker | 1 | |
| | Crevasse Filling | 1 | |
| | Side Glacial Drainage Channel | 3 | |
| | Flute | 3 | |
| | Aeolian | | |
| | Dune | 7 | |
| | Littoral | | |
| | Longshore Bar | 8 | |
| | Beach | 8 | |
| | Barrier Spit | 8 | |
| | Delta | 9 | |
| | Tidal Flat | 9 | |
| | Coastal Plain | 9 | |
| | Fluvial | | |
| | Active Channel | 8 | |
| | River Bar | 6 | |
| | Floodplain | | |
| | Active | 7 | |
| | Abandoned | 4 | |
| | Alluvial Plain | 3 | |
| | Alluvial Fan/Cone | 2 | |
| | Lacustrine Deposit | 9 | |
| | Mass Wasting | | |
| | Colluvium | 10 | |
| | Talus | 10 | |
| | Landslide Deposit | 10 | |
| | Rock Glacier | 10 | |

| | | |
|---|---|---|
| | Mine Tailings | 5 |
| | Tectonic Uplift | |
| | Upland Valley | 7 |
| | Mountain Sideslope | 10 |
| | Mountain Ridgetop | 10 |
| | Waterbody | 10 |
| | Ice and Snow | 10 |
| Slope Gradient (Rating is 1 to 40, 1 is best) | Slope Gradient | |
| | Level or Nearly Level | 1 |
| | Gently Sloping | 2 |
| | Undulating | 2 |
| | Sloping (Moderately) | 3 |
| | Rolling | 3 |
| | Strongly Sloping | 5 |
| | Hilly | 5 |
| | Moderately Steep | 15 |
| | Steep | 20 |
| | Very Steep | 30 |
| | Extremely Steep | 30 |
| | Water | 30 |
| | Ice | 30 |
| Geologic Hazard (Rating is 1 to 10, 1 is best) | Primary Potential | |
| | Flood Zone | 10 |
| | Primary Flood Zone/ | |
| | Wave Zone | 10 |
| | Secondary Potential | |
| | Flood Zone | 5 |
| | Secondary Flood Zone/ | |
| | Wave Zone | 5 |
| | Outburst Flood Zone | 10 |
| | Catastrophic Wave Zone | 10 |
| | Landslide Zone | 10 |
| | Varying Particle Size | 5 |
| | Unstable Ground | 10 |
| | Avalanche Track | 10 |
| Soil Characteristics (Rating is 1 to 10, 1 is best) | Limitations for Local Roads and Streets | |
| | Slight | 1 |
| | Moderate | 5 |
| | Severe | 10 |
| | Water | 10 |
| (Rating is 1 to 15, 1 is best) | Drainage | |
| | Excessively Drained | 1 |
| | Somewhat Excessively Drained | 1 |
| | Well Drained | 1 |

| | | |
|---|---|---|
| | Moderately Well Drained | 2 |
| | Somewhat Poorly Drained | 5 |
| | Poorly Drained | 10 |
| | Very Poorly Drained | 15 |
| | Ice | 15 |
| | Water | 15 |
| (Rating is 1 to 10, 1 is best) | Source Road Fill | |
| | Good | 1 |
| | Fair | 5 |
| | Poor | 10 |
| | Water | 10 |
| (Rating is 1 to 15, 1 is best) | From Good | |
| | If $\leq$ 1/2 Mile | 1 |
| | If $>$ 1/2 Mile $\leq$ 1 Mile | 2 |
| | If $>$ 1 Mile $\leq$ 2 Miles | 4 |
| | If $>$ 1 Miles $\leq$ 3 Miles | 6 |
| | If $>$ 3 Miles $\leq$ 4 Miles | 8 |
| | If $>$ 4 Miles $\leq$ 5 Miles | 10 |
| | If $>$ 5 Miles | 15 |
| Vegetation Cover (Rating is 1 to 40, 1 is best) | Closed Forest (GE 50% Crown Cover) | 10 |
| | Open Forest (GE 10% to LT 50% Crown Cover) | 6 |
| | Non Forest (LT 10% Crown Cover) | |
| | Salt Water Wetland | |
| | Grassland | 40 |
| | Low Shrub | 40 |
| | Tidal Marsh | 40 |
| | Tall Shrub | |
| | Alder | 4 |
| | Alder-Willow | 4 |
| | Low Shrub | |
| | Willow-Resin Birch | 2 |
| | Grassland | |
| | Grassland | 1 |
| | Tundra | |
| | Sedge-Grass | 20 |
| | Herbaceous | 15 |
| | Shrub | 20 |
| | Mat-Cushion | 20 |
| | Freshwater | |
| | Sphagnum Bog | 30 |
| | Shagnum Shrub Bog | 30 |
| | Cultural | |
| | Cultural Influence | 1 |

| | |
|---|---|
| Barren | |
| Mud Flats | 40 |
| Rock | 40 |
| Snow | |
| Snow Field | 40 |
| Glacier | 40 |
| Water | |
| Lake GE 40 Acres | 40 |
| Lake GE 10 Acres and LT 40 Acres | 40 |
| Stream or River GE 165 Feet Wide and LT 660 Feet Wide | 40 |
| River GE 600 Feet Wide | 40 |
| Stream or River LT 165 Feet Wide | 40 |

MODEL SUMMATION RULES

| | |
|---|---|
| High | Less than 10 |
| Moderate High | 11 - 15 |
| Moderate | 16 - 30 |
| Low | 31 - 60 |
| Very Low | 61 - 100 |
| Extremely Low | 101 - 150 |

MODEL OUTLINE
COLOS - TALKEETNA SUBBASIN

Using cell values from the Road Suitability Model, Colos determined the shortest distance at the least cost for these points:

| | | |
|---|---|---|
| 1) | Old Skwentna Road House | 6861770N/586840E |
| 2) | Skwentna | 6870530N/590530E |
| 3) | Alexander | 6812100N/620790E |
| 4) | Mouth of Kroto Creek | 6842900N/642000E |
| 5) | Moose River and Petersville Road | 6911580N/632950E |
| 6) | Parker Lake | 6880000N/630000E |

Five Colos Runs Between Points:

1-3
1-2
2-5
4-5
5-6

Output showed 9 levels of Optimality from highest to least for each corridor.

MODEL OUTLINE
ROAD SUITABILITY
BELUGA SUBBASIN

| Consideration | Specific Data Class | Value (Incidence) | Value (Proximity) |
|---|---|---|---|
| Landform Type (Rating 1 to 10, 1 is best) | Glacial | | |
| | Moraine | 1 | |
| | Till | 1 | |
| | Drumlin | | |
| | Drumlin/Drumloid | 1 | |
| | Rock Drumlin | 7 | |
| | Fluvioglacial | | |
| | Outwash | 3 | |
| | Abandoned Outwash Channel | 3 | |
| | Remnant Subglacial Stream Valley | 4 | |
| | Kame Complex | 2 | |
| | Esker | 1 | |
| | Crevasse Filling | 1 | |
| | Side Glacial Drainage Channel | 3 | |
| | Flute | 3 | |
| | Aeolian | | |
| | Dune | 7 | |
| | Littoral | | |
| | Longshore Bar | 8 | |
| | Beach | 8 | |
| | Barrier Spit | 8 | |
| | Delta | 9 | |
| | Tidal Flat | 9 | |
| | Coastal Plain | 9 | |
| | Fluvial | | |
| | Active Channel | 8 | |
| | River Bar | 10 | |
| | Floodplain | | |
| | Active | 7 | |
| | Abandoned | 4 | |
| | Alluvial Plain | 3 | |
| | Alluvial Fan/Cone | 2 | |
| | Lacustrine Deposit | 9 | |
| | Mass Wasting | | |
| | Colluvium | 10 | |
| | Talus | 10 | |
| | Landslide Deposit | 10 | |
| | Rock Glacier | 10 | |

| | | |
|---|---|---|
| | Mine Tailings | 5 |
| | Tectonic Uplift | |
| | Upland Valley | 7 |
| | Mountain Sideslope | 10 |
| | Mountain Ridgetop | 10 |
| | Waterbody | 10 |
| | Ice and Snow | 10 |
| Slope Gradient (Rating is 1 to 60, 1 is best) | Slope Gradient | |
| | Level or Nearly Level | 1 |
| | Gently Sloping | 5 |
| | Undulating | 5 |
| | Sloping (Moderately) | 15 |
| | Rolling | 15 |
| | Strongly Sloping | 25 |
| | Hilly | 25 |
| | Moderately Steep | 40 |
| | Steep | 50 |
| | Very Steep | 60 |
| | Extremely Steep | 60 |
| Geologic Hazard (Rating is 1 to 10, 1 is best) | Primary Potential | |
| | Flood Zone | 10 |
| | Primary Flood Zone/ Catastrophic Wave Zone | 10 |
| | Secondary Potential | |
| | Flood Zone | 5 |
| | Outburst Flood Zone | 10 |
| | Catastrophic Wave Zone | 10 |
| | Landslide Zone | 10 |
| | Varying Particle Size | 5 |
| | Unstable Ground | 10 |
| | Avalanche Track | 10 |
| Soil Characteristics (Rating is 1 to 10, 1 is best) | Limitations for Local Roads and Streets | |
| | Slight | 1 |
| | Moderate | 5 |
| | Severe | 10 |
| (Rating is 1 to 15, 1 is best) | Drainage | |
| | Excessively Drained | 1 |
| | Somewhat Excessively Drained | 1 |
| | Well Drained | 1 |
| | Moderately Well Drained | 2 |
| | Somewhat Poorly Drained | 5 |
| | Poorly Drained | 10 |
| | Very Poorly Drained | 15 |

| | | | |
|---|---|---|---|
| (Rating is 1 to 10, 1 is best) | Source Road Fill | | |
| | Good | 1 | |
| | Fair | 5 | |
| | Poor | 10 | |
| | Water | 10 | |
| (Rating is 1 to 15, 1 is best) | From Good | | |
| | If $\leq$ 1/2 Mile | | 1 |
| | If $>$ 1/2 Mile $\leq$ 1 Mile | | 2 |
| | If $>$ 1 Mile $\leq$ 2 Miles | | 4 |
| | If $>$ 2 Miles $\leq$ 3 Miles | | 6 |
| | If $>$ 3 Miles $\leq$ 4 Miles | | 8 |
| | If $>$ 4 Miles $\leq$ 5 Miles | | 10 |
| | If $>$ 5 Miles | | 15 |
| Vegetation Cover (Rating is 1 to 150 1 is best) | Closed Forest | | |
| | (GE 50% Crown Cover) | 5 | |
| | Open Forest (GE 10% to | | |
| | LT 50% Crown Cover) | 4 | |
| | Non Forest (LT 10% Crown Cover) | | |
| | Salt Water Wetland | | |
| | Grassland | 80 | |
| | Low Shrub | 80 | |
| | Tidal Marsh | 80 | |
| | Tall Shrub | | |
| | Alder | 3 | |
| | Alder-Willow | 3 | |
| | Low Shrub | | |
| | Willow-Resin Birch | 2 | |
| | Grassland | | |
| | Grassland | 1 | |
| | Tundra | | |
| | Sedge-Grass | 20 | |
| | Herbaceous | 15 | |
| | Shrub | 20 | |
| | Mat-Cushion | 20 | |
| | Freshwater | | |
| | Sphagnum Bog | 70 | |
| | Shagnum Shrub Bog | 70 | |
| | Cultural | | |
| | Cultural Influence | 1 | |
| | Barren | | |
| | Mud Flats | 80 | |
| | Rock | 80 | |
| | Snow | | |
| | Snow Field | 100 | |
| | Glacier | 100 | |
| | Water | | |
| | Lake GE 40 Acres | 150 | |

| | | |
|---|---|---|
| | Lake GE 10 Acres and LT 40 Acres | 150 |
| | Stream or River GE 165 Feet Wide and LT 660 Feet Wide | 150 |
| | River GE 600 Feet Wide | 150 |
| Hydrology | Stream Order 1-8 | |
| | Stream or River LT 165 Feet Wide | 100 |

MODEL SUMMATION RULES

| | |
|---|---|
| Class I | 0-10 |
| Class II | 11-20 |
| Class III | 21-30 |
| Class IV | 31-40 |
| Class V | 41-60 |
| Class VI | 61-80 |
| Class VII | 81-100 |
| Class VIII | 101-130 |
| Class IX | GT 130 |

# Chapter V

# Computer Mapping

Introduction
Methodology
Maps, Legends and Statistics
  Maps
  Legends and Statistics

# V. COMPUTER MAPPING

## A. Introduction

The automated data files for the two subbasins were used to produce a variety of computer maps at the same scale. The two types of computer maps produced for this study were maps of basic data and maps of modeled outputs. Basic data maps portray information directly from the data entered into the computer in the form of manuscript maps, codes, and expansion matrices. Both the original mapped phenomena, such as soil type, and its matrixed attributes, such as soil drainage characteristics, are shown on these maps. They illustrte select physical components of the landscape as well as land use, administrative, and infrastruction considerations. Modeled outputs utilize information contained in the data base, but these data have been manipulated, restructured, and weighted according to the models outlined in the previous section. As noted previously, some models also utilize classes of information generated by separate sub-models. The model maps illustrate environmental assessments and evaluations of the region expressed in terms of general opportunities and constraints and specific land capability and suitability. Some of the maps identified in this section were produced in a pen plotter format with lines showing boundaries and numeric codes showing types or classes of data. The rest of the computer maps were produced in shaded grey tone symbolism. These maps illustrate basic and modeled data which are in a grid format rather than the original line, point, and polygon format.

B. Methodology

Two types of maps were created to illustrate basic environmental conditions. These are pen plotter maps and line printer maps. The map set representing Vegetation was output in a pen plotter format on mylar. It illustrated the polygon configuration of the original mapped data at a scale of 1:63,360. This enables the vegetation maps to be overlayed on their corresponding 15 quadrangle maps. The rest of the map sets which display basic environmental conditions were produced in a shaded grey tone format on a line printer. Six map sets were common to both subbasins. A seventh map set for Talkeetna Subbasin was also made. These maps, which represented gridded data, were also produced at a scale of 1:63,360. They were printed on paper panels which fitted together to form individual maps illustrating the two entire study areas.

The computer maps which were produced to illustrate basic environmental conditions in the two study areas are listed on the following table:

COMPUTER MAPS

BASIC AND INTERPRETED ENVIRONMENTAL CONDITIONS

| Pen Plotter Maps | Talkeetna | Beluga |
|---|---|---|
| Vegetation | X | X |
| **Line Printer Maps** | | |
| Soil Drainage | X | X |
| Soil Limitations for Dwellings | X | X |
| Range Resources | X | X |
| Soil Slope | X | X |
| Forest Resources | X | X |
| Important Farmland | X | X |
| Important Grazing Lands | X | |

Computer maps illustrating the results of the application of theoretical models to the original data base were also produced. They illustrate data transformed and analyzed in a grid cell configuration. All are based on the conceptual models outlined in the previous chapter of this report. These models were programmed to manipulate the basic, matrixed, and derived grid data in the automated system. This process resulted in the creation of a data file for each model which stored accumulated values by cells. All of the modeled data was printed with a grey tone format at a scale of 1:63,360 on paper panels which fitted together to form individual maps illustrating the two entire study areas. The computer maps which were produced to illustrate interpreted and evaluated environmental conditions in the study area are as follows:

COMPUTER MAPS

MODELED ENVIRONMENTAL CONDITIONS

| Settlement | Talkeetna | Beluga | Same Model Format |
|---|---|---|---|
| Capability for Accessed Large Lot Residential Development | X | | |
| Capability for Moderate/High Density Residential Development | X | X | X |
| Capability for Low Density Remote Residential Development | X | X | X |
| **Other** | | | |
| Groundwater Availability | X | X | X |
| Economic Agriculture/Forestry | X | X | X |
| Erosion Potential | X | X | X |
| Moose Habitat | X | X | X |
| General Habitat I | X | X | X |
| General Habitat II | X | X | X |
| Wetlands I | X | X | |
| Wetlands II | X | | |
| Road Suitability | X | X | |
| Colos | X | | |

C. Legends and Statistics

Each of the maps produced for the two subbasins were accompanied by a legend and statistics sheets describing the map symbolism and the areal extent of the mapped phenomena. A typed sheet for each of the maps, except vegetation, is included at the end of this chapter. In the case of the vegetation maps produced for the study area, some thirty-five classes of vegetation were shown. Some of the maps portray qualitative data, others quantitative data. In general, the basic data maps are qualitative in nature, focusing on type rather than rating. However, where appropriate, the gray tone hierarchy was used to give a visual impression of importance or severity. The modeled maps are generally quantitative in nature, typically involving the ranking of areas within the region for their capability for specific types of land use. On most of the maps, the gray tone symbolism was selected to portray the ranking. In general, the sequence of light to dark was used to represent the sequence from high to low capability. The maps illustrating settlement capability, for example, display ranked data in four classes from high to incapable. They also display water as a separate data class. The vegetation maps were plotted on mylar and registered to the map modules comprising the study area. The remaining computer maps portray data for the individual entire subbasins. They display gridded information. As noted earlier, the grid multi-variable files were created for each study area as a whole. Thus, the line printer grid maps, whether of basic data or of modeled outputs, represent the entire study area for each subbasin on one map. Legends, which explain the information represented on the

line printer maps and statistical summaries which describe the areal extent of the mapped characteristics in acreage and percentage are listed on the following pages. The legends and statistics for Talkeetna Subbasin line printer maps are listed first, followed by the legends and statistics for the Beluga Subbasin line printer maps:

SOIL DRAINAGE

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % % |
|---|---|---|
| Excessively Drained | 19,750 | .85% |
| Well Drained | 1,220,630 | 52.63% |
| Moderately Well Drained | 5,740 | .25% |
| Poorly Drained | 399,310 | 17.22% |
| Very Poorly Drained | 571,880 | 24.66% |
| Glacier | 2,110 | .09% |
| Water | 99,830 | 4.30% |

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Non-Vegetated | 123,210 | 5.31% |
| Closed Forests | 795,400 | 34.30% |
| Open Forests | 131,330 | 5.66% |
| Fresh Water Wetland | 523,890 | 22.59% |
| Salt Water Wetland | 11,380 | .49% |
| Shrub | 640,450 | 27.61% |

| | | |
|---|---|---|
| Tundra | 64,460 | 2.78% |
| Grassland | 29,130 | 1.26% |

SOIL LIMITATIONS FOR DWELLINGS

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Sight | 453,070 | 19.54% |
| Moderate | 179,120 | 7.72% |
| Severe | 1,587,230 | 68.44% |
| Water | 99,830 | 4.30% |

RANGE RESOURCES

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Non-Vegetated | 123,210 | 5.31% |
| Closed Forests | 795,400 | 34.30% |
| Open Forests | 131,330 | 5.66% |
| Fresh Water Wetland | 523,890 | 22.59% |
| Salt Water Wetland | 11,380 | .49% |
| Shrub | 640,450 | 27.61% |
| Tundra | 64,460 | 2.78% |
| Grassland | 29,130 | 1.26% |

SLOPE

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| 0-3% Slope | 1,001,010 | 43.16% |
| 3-7% Slope | 482,410 | 20.81% |
| 7-12% Slope | 193,860 | 8.36% |
| 12-20% Slope | 179,120 | 7.72% |
| 20-30% Slope | 121,250 | 5.23% |
| 30-45% Slope | 142,170 | 6.13% |
| > 45% Slope | 97,490 | 4.20% |
| Water | 99,830 | 4.30% |
| Glacier | 2,110 | .09% |

FOREST RESOURCES

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Closed White Spruce/Hemlock | 15,460 | .67% |
| Open White Spruce | 66,540 | 2.87% |
| Closed Black Spruce | 138,450 | 5.97% |
| Open Black Spruce | 5,290 | .23% |
| Closed Mixed Forest | 635,610 | 27.41% |
| Open Mixed Forest | 57,760 | 2.49% |
| Closed Cottonwood | 5,880 | .25% |
| Open Cottonwood | 1,740 | .07% |
| Non-Forests | 1,392,520 | 60.04% |

IMPORTANT FARMLAND

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Class A | 102,510 | 4.42% |
| Class B | 168,010 | 7.24% |
| Class C | 47,420 | 2.04% |
| Class D | 51,900 | 2.24% |
| Class E | 435,680 | 18.79% |
| Class F | 1,413,900 | 60.97% |
| Waterbody | 99,830 | 4.30% |

IMPORTANT GRAZING LANDS (POTENTIAL) MAP

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Excellent | 693,080 | 29.89% |
| Good | 244,550 | 10.54% |
| Fair | 394,320 | 17.00% |
| Poor | 887,470 | 38.27% |
| Water | 99,830 | 4.30% |

GROUNDWATER AVAILABILITY MAP

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Yield Area 1 (Lowest) | 84,430 | 3.64% |
| Yield Area 2 | 563,460 | 67.41% |
| Yield Area 3 (Highest) | 671,360 | 28.95% |

ECONOMIC AGRICULTURE/FORESTRY

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Class III Soil and Select Forest Type | 79,350 | 3.42% |
| Class II Soil and Select Forest Type | 87,170 | 3.76% |
| Select Forest Type | 305,170 | 13.16% |
| Class III Soils | 217,310 | 9.37% |
| Class II Soils | 288,340 | 12.43% |
| Other Lands | 1,242,080 | 53.56% |
| Water | 99,830 | 4.30% |

CAPABILITY FOR ACCESSED LARGE LOT RESIDENTIAL DEVELOPMENT MAP

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| High | 199,790 | 8.61% |
| Moderate | 87,310 | 3.77% |
| Low | 710,360 | 30.63% |
| Incapable | 1,321,790 | 56.99% |

CAPABILITY FOR MODERATE/HIGH DENSITY RESIDENTIAL DEVELOPMENT MAP

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| High | 417,640 | 18.01% |
| Moderate | 182,120 | 7.85% |
| Low | 397,450 | 17.14% |
| Incapable | 1,322,040 | 57.00% |

CAPABILITY FOR LOW DENSITY REMOTE RESIDENTIAL DEVELOPMENT MAP

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| High | 5,670 | .24% |
| Moderate | 447,030 | 19.28% |
| Low | 435,590 | 18.78% |
| Incapable | 1,430,960 | 61.70% |

EROSION MAP

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Water | 99,830 | 4.30% |
| 0-3 Tons/Acre/Year | 1,103,530 | 47.58% |
| 4-7 Tons/Acre/Year | 421,130 | 18.16% |
| 8-15 Tons/Acre/Year | 183,230 | 7.90% |
| 16-25 Tons/Acre/Year | 162,990 | 7.03% |
| 26-40 Tons/Acre/Year | 108,310 | 4.67% |
| > 40 Tons/Acre/Year | 240,230 | 10.36% |

MOOSE HABITAT

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | | TOTAL AREA (ACRES) | % |
|---|---|---|---|
| Level 1 | Mod/High WR, (S/S/F) Range | 1,543,730 | 66.56% |
| Level 2 | Mod/High (S/S/F) Range No WR | 514,580 | 22.19% |
| Level 3 | Low to No Habitat | 161,110 | 6.95% |
| Level 4 | Water | 99,830 | 4.30% |

Abbreviations: WR = Winter Range

(S/S/F) = Spring/Summer/Fall

GENERAL HABITAT I

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| **High Diversity/Capability** | | |
| Mixed Forest - Open | 57,760 | 2.49% |
| Conifer Forest - Open | 67,070 | 2.89% |
| Tall Shrub Alder - Willow | 136,280 | 5.88% |
| Deciduous Forest - Open | 1,740 | .08% |
| Mixed Forest - Closed | 628,770 | 27.11% |
| Low Shrub - Willow Resin Birch | 13,250 | .57% |
| Salt Water Wetland, Grassland, and Tidal Flats | 8,870 | .38% |
| **Moderate Diversity/Capability** | | |
| Conifer Forest - Closed | 153,850 | 6.63% |
| Low Shrub Salt Water Wetland | 2,510 | .11% |
| Deciduous Forest - Closed | 12,880 | .56% |
| Short Black Spruce - Open | 5,290 | .23% |
| Sphagnum Bog | 522,780 | 22.54% |
| Tall Shrub Alder | 487,700 | 21.03% |

| | | |
|---|---|---|
| Grassland | 29,130 | 1.26% |
| **Tundra Special Consideration** | | |
| Tundra | 68,160 | 2.94% |
| **Low Diversity/Capability** | | |
| Low Diversity/Capability | 23,380 | 1.01% |
| **Water** | | |
| Lakes and Streams | 99,830 | 4.30% |

GENERAL HABITAT II

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| High Diversity/Capability | 913,740 | 39.40% |
| Moderate Diversity/Capability | 1,214,140 | 52.35% |
| Low Diversity/Capability | 23,380 | 1.01% |
| Tundra Special Consideration | 68,160 | 2.94% |
| Lakes and Streams | 99,830 | 4.30% |

WETLANDS I

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Non-Wetland | 1,256,050 | 54.16% |
| Palustrine Wetland | | |
| Forested Needle Leaved Evergreen | 40,920 | 1.76% |
| Forested Broad Leaved Deciduous | 520 | .02% |
| Forested Needle Leaved Evergreen and Forested Broad Leaved Deciduous | 14,270 | .62% |
| Scrub/Shrub Needle Leaved Evergeen | 3,310 | .14% |
| Scrub/Shrub Broad Leaved Deciduous | 450,390 | 19.42% |
| Emergent Persistent | 70,890 | 3.06% |
| Potential Palustrine Wetland Inclusions | 140,400 | 6.05% |
| Estuarine Wetland | | |
| Intertidal Scrub/Shrub Broad Leaved Deciduous | 2,510 | .11% |
| Intertidal Emergent Persistent (calamagrostis) | 4,110 | .18% |

WETLANDS I (Continued)

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Intertidal Emergent Persistent | | |
| (scirpus, limbia, spargeniam) | 4,760 | .21% |
| Intertidal Unconsolidated Shore | | |
| Mud Flat | 8,110 | .35% |
| Potential Estuarine Wetland Inclusions | | .00% |
| Riverine | | |
| Upper Perennial Streambed | | |
| Cobble/Gravel | 232,000 | 10.00% |
| Lower Perennial Streambed/ | | |
| Unconsolidated Bottom | 70,350 | 3.03% |
| Lacustrine | | |
| Limnetic Unconsolidated Bottom | | |
| Cobble/Gravel | 20,660 | .89% |

WETLANDS II

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Non-Wetland | 1,256,050 | 54.16% |
| Palustrine Wetland | | |
| Forested Needle Leaved Evergreen - *Picea mariana* (PF04) | 40,920 | 1.76% |
| Forested Needle Leaved Evergreen and Broad Leaved Deciduous - *Picea mariana* and *Populus valsamifera* (PF04 and PF01) | 14,790 | .68% |
| Scrub/Shrub Needle Leaved Evergreen - *Picea mariana* (PSS4) and Scrub/Shrub Broad Leaved Deciduous (PSS1) | 453,700 | 19.56% |
| Emergent Persistent - *Carex* (PEM1) | 70,890 | 3.06% |
| Potential Palustrine Wetland Inclusions | 140,400 | 6.05% |

WETLANDS II (Continued)

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Estuarine Wetland | | |
| Intertidal Scrub/Shrub Broad Leaved Deciduous Myrica (E2551) | 2,510 | .11% |
| Intertidal Emergent Persistent - *Elymus* (E2EM1) | 4,110 | .18% |
| Intertidal Emergent Persistent - *Scirpus*, *Limbia*, or *Sparganium* (E2EM1) | 4,760 | .21% |
| Intertidal Mud Flat (E2FL3) | 8,110 | .35% |
| Riverine | | |
| Upper Perennial Streambed Cobble/Gravel (R35B1) | 232,000 | 10.00% |
| Lacustrine | | |
| Littoraland Limnetic Unconsolidated Bottom Cobble/Gravel (L1, L1UB1, and L2UB1) | 91,010 | 3.92% |

ROAD SUITABILITY

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Class I Highest | 209,110 | 9.02% |
| Class II | 458,210 | 19.76% |
| Class III | 327,510 | 14.12% |
| Class IV | 319,550 | 13.78% |
| Class V | 129,440 | 5.58% |
| Class VI | 581,610 | 25.08% |
| Class VII | 152,000 | 6.55% |
| Class VIII | 34,270 | 1.48% |
| Class IX | 87,150 | 3.76% |
| Class X Lowest | 20,400 | .87% |

COLOS

SUSITNA RIVER BASIN

TALKEETNA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Class I Most Optimal | 25,240 | 1.09% |
| Class II | 29,280 | 1.26% |
| Class III | 36,570 | 1.58% |
| Class IV | 86,550 | 3.73% |
| Class V | 152,350 | 6.57% |
| Class VI | 248,450 | 10.71% |
| Class VII | 404,420 | 17.44% |
| Class VIII | 377,450 | 16.27% |
| Class IX Least Optimal | 958,940 | 41.35% |

SOIL DRAINAGE

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % % |
|---|---|---|
| Excessively Drained | ---- | 0.00% |
| Well Drained | 8,912.10 | 61.44% |
| Moderately Well Drained | ---- | 0.00% |
| Poorly Drained | 195,720 | 13.49% |
| Very Poorly Drained | 312,300 | 21.53% |
| Glacier | 17,200 | 1.19% |
| Water | 33,990 | 2.34% |

SOIL LIMITATIONS FOR DWELLINGS

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Slight | 169,240 | 11.67% |
| Moderate | 139,460 | 9.62% |
| Severe | 1,107,730 | 76.37% |
| Water | 33,990 | 2.34% |

RANGE RESOURCES

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Non-Vegetated | 91,340 | 6.30% |
| Closed Forests | 258,600 | 17.83% |
| Open Forests | 169,650 | 11.70% |
| Fresh Water Wetland | 215,290 | 14.84% |
| Salt Water Wetland | 18,940 | 1.31% |
| Shrub | 524,470 | 36.16% |
| Tundra | 146,480 | 10.10% |
| Grassland | 25,650 | 1.77% |

SLOPE

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| 0-3% Slope | 450,610 | 31.07% |
| 3-7% Slope | 229,950 | 15.85% |
| 7-12% Slope | 145,520 | 10.03% |
| 12-20% Slope | 193,600 | 13.35% |
| 20-30% Slope | 124,250 | 8.60% |
| 30-45% Slope | 148,070 | 10.21% |
| > 45% Slope | 108,760 | 7.50% |
| Water | 33,990 | 2.34% |
| Glacier | 15,190 | 1.05% |

FOREST RESOURCES

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Closed White Spruce/Hemlock | 14,400 | .99% |
| Open White Spruce | 5,210 | .36% |
| Closed Black Spruce | 35,010 | 2.41% |
| Open Black Spruce | 2,860 | .20% |
| Closed Mixed Forest | 203,060 | 14.00% |
| Open Mixed Forest | 155,810 | 10.74% |
| Closed Cottonwood | 6,130 | .42% |
| Open Cottonwood | 5,770 | .40% |
| Non-Forests | 1,022,170 | 70.47% |

IMPORTANT FARMLAND

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Class A | 42,380 | 2.92% |
| Class B | 70,940 | 4.89% |
| Class C | 17,020 | 1.17% |
| Class D | 27,440 | 1.89% |
| Class E | 146,970 | 10.13% |
| Class F | 1,109,130 | 76.47% |
| Waterbody | 36,540 | 2.52% |

GROUNDWATER AVAILABILITY MAP

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Yield Area 1 (Lowest) | 141,650 | 9.77% |
| Yield Area 2 | 1,130,330 | 77.93% |
| Yield Area 3 (Highest) | 178,440 | 12.30% |

ECONOMIC AGRICULTURE/FORESTRY

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Class III Soil and Select Forest Type | 107,020 | 7.38% |
| Class II Soil and Select Forest Type | 102,430 | 7.06% |
| Select Forest Type | 189,250 | 13.05% |
| Class III Soils | 57,430 | 3.96% |
| Class II Soils | 18,980 | 1.31% |
| Other Lands | 941,320 | 64.90% |
| Water | 33,990 | 2.34% |

CAPABILITY FOR MODERATE/HIGH DENSITY RESIDENTIAL DEVELOPMENT MAP

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| High | 146,170 | 10.08% |
| Moderate | 153,760 | 10.60% |
| Low | 386,390 | 26.64% |
| Incapable | 764,100 | 52.68% |

CAPABILITY FOR LOW DENSITY REMOTE RESIDENTIAL DEVELOPMENT MAP

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| High | 1,990 | .14% |
| Moderate | 80,580 | 5.56% |
| Low | 336,270 | 23.18% |
| Incapable | 1,031,580 | 71.12% |

EROSION MAP

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Water | 33,990 | 2.34% |
| 0-3 Tons/Acre/Year | 557,750 | 38.45% |
| 4-7 Tons/Acre/Year | 193,400 | 13.33% |
| 8-15 Tons/Acre/Year | 135,790 | 9.36% |
| 16-25 Tons/Acre/Year | 192,360 | 13.26% |
| 26-40 Tons/Acre/Year | 102,780 | 7.09% |
| > 40 Tons/Acre/Year | 234,350 | 16.16% |

MOOSE HABITAT

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | | TOTAL AREA (ACRES) | % |
|---|---|---|---|
| Level 1 | Mod/High WR, (S/S/F) Range | 914,730 | 63.07% |
| Level 2 | Mod/High (S/S/F) Range No WR | 18,035 | 12.43% |
| Level 3 | Low to No Habitat | 321,350 | 22.16% |
| Level 4 | Water | 33,990 | 2.34% |

Abbreviations: WR = Winter Range

(S/S/F) = Spring/Summer/Fall

GENERAL HABITAT I

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| High Diversity/Capability | | |
| Mixed Forest - Open | 155,810 | 10.74% |
| Conifer Forest - Open | 5,210 | .36% |
| Tall Shrub Alder - Willow | 59,420 | 4.10% |
| Deciduous Forest - Open | 5,770 | .40% |
| Mixed Forest - Closed | 203,040 | 14.00% |
| Low Shrub - Willow Resin Birch | 16,280 | 1.12% |
| Salt Water Wetland, Grassland, and Tidal Flats | 17,150 | 1.18% |
| Moderate Diversity/Capability | | |
| Conifer Forest - Closed | 4,941 | 3.41% |
| Low Shrub Salt Water Wetland | 1,790 | .12% |
| Deciduous Forest - Closed | 6,150 | .42% |
| Short Black Spruce - Open | 2,860 | .20% |
| Sphagnum Bog | 215,290 | 14.84% |
| Tall Shrub Alder | 435,000 | 29.99% |

| | | |
|---|---|---|
| Grassland | 25,650 | 1.77% |
| **Tundra Special Consideration** | | |
| Tundra | 160,250 | 11.05% |
| **Low Diversity/Capability** | | |
| Low Diversity/Capability | 57,350 | 3.95% |
| **Water** | | |
| Lakes and Streams | 33,990 | 2.34% |

GENERAL HABITAT II

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| High Diversity/Capability | 462,680 | 31.90% |
| Moderate Diversity/Capability | 736,150 | 50.75% |
| Low Diversity/Capability | 57,350 | 3.95% |
| Tundra Special Consideration | 160,250 | 11.05% |
| Lakes and Streams | 33,990 | 2.34% |

WETLANDS I

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Non-Wetland | 993,830 | 68.52% |
| Palustrine Wetland | | |
| Forested Needle Leaved Evergreen | 20,480 | 1.41% |
| Forested Broad Leaved Deciduous | 2,820 | .19% |
| Forested Needle Leaved Evergreen and Forested Broad Leaved Deciduous | 6,710 | .46% |
| Scrub/Shrub Needle Leaved Evergeen | 1,950 | .13% |
| Scrub/Shrub Broad Leaved Deciduous | 187,820 | 12.95% |
| Emergent Persistent | 107,670 | 7.42% |
| Potential Palustrine Wetland Inclusions | 65,670 | 4.53% |
| Estuarine Wetland | | |
| Intertidal Scrub/Shrub Broad Leaved Deciduous | 10790 | .12% |
| Intertidal Emergent Persistent (calamagrostis) | 9,250 | .64% |

WETLANDS I (Continued)

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Intertidal Emergent Persistent | | |
| (scirpus, limbia, spargeniam) | 7,900 | .54% |
| Intertidal Unconsolidated Shore | | |
| Mud Flat | 10,540 | .73% |
| Potential Estuarine Wetland Inclusions | | .00% |
| Riverine | | |
| Upper Perennial Streambed | | |
| Cobble/Gravel | | .00% |
| Lower Perennial Streambed/ | | |
| Unconsolidated Bottom | 10,630 | .73% |
| Lacustrine | | |
| Limnetic Unconsolidated Bottom | | |
| Cobble/Gravel | 23,360 | 1.61% |

ROAD SUITABILITY

SUSITNA RIVER BASIN

BELUGA SUBBASIN

| CLASS | TOTAL AREA (ACRES) | % |
|---|---|---|
| Class I Highest | 10 | 0.00% |
| Class II | 125,620 | 8.66% |
| Class III | 141,930 | 9.79% |
| Class IV | 146,810 | 10.12% |
| Class V | 258,990 | 17.86% |
| Class VI | 176,010 | 12.14% |
| Class VII | 172,620 | 11.90% |
| Class VIII | 219,280 | 15.12% |
| Class IX Lowest | 209,150 | 14.42% |

# Appendix A1

## Data Classification and Coding
## Talkeetna Subbasin

Integrated Terrain Unit Map
Surface Hydrology Map
Points and Linear Features Map
Land Status Map

MANUSCRIPT #1
INTEGRATED TERRAIN UNIT MAP
DATA CLASSIFICATION AND CODING

## SLOPE

Slope Gradient (Column 1)

1 = 0-3%
2 = 3-7%
3 = 7-12%
4 = 12-20%
5 = 20-30%
6 = 30-45%
7 = Greater than 45%

## LANDFORM

Physiographic Division (Column 2)

1 = Mountain
2 = Hill
3 = Slope
4 = Plateau
5 = Valley
6 = Coastal Lowlands
7 = Glacier
8 = Waterbody

Landform Type (Column 3, 4 and 5)

GLACIAL

110 = Moraine
111 = End Moraine
112 = Lateral Moraine
113 = Medial Moraine
114 = Morainal Ridge
115 = Rogen Moraine
116 = Ground Moraine

120 = Till
121 = Till, Undifferentiated

130 = Drumlin
131 = Drumlin, Drumloid
132 = Rock Drumlin, Drumlinoid

FLUVIOGLACIAL

210 = Outwash
220 = Abandoned Outwash Channel
230 = Remnant Subglacial Stream Valley
240 = Kame Complex
250 = Esker
260 = Crevasse Filling
270 = Side Glacial Drainage Channels
280 = Flute

AEOLIAN

310 = Dune
311 = Dune and Outwash Complex

LITTORAL

410 = Longshore Bar
411 = Longshore Bar Within Abandoned Coastline (Not Surveyed Flood Zone)
412 = Longshore Bar Within Abandoned Coastline (Surveyed Flood Zone)

420 = Beach

430 = Barrier Spit

440 = Delta
441 = Delta-Flood Plain Within Abandoned Coastline (Not Surveyed Flood Zone)
442 = Delta-Flood Plain Within Abandoned Coastline (Surveyed Flood Zone)
443 = Delta-Flood Plain (Not Surveyed Flood Zone)
444 = Delta-Flood Plain (Surveyed Flood Zone)
445 = Delta and Outwash Complex

450 = Tidal Flat
451 = Tidal Flat Within Abandoned Coastline (Not Surveyed Flood Zone)
452 = Tidal Flat Within Abandoned Coastline (Surveyed Flood Zone)

460 = Coastal Plain

FLUVIAL

510 = Active Channel
511 = Active Channel (Not Surveyed Flood Zone)
512 = Active Channel (Surveyed Flood Zone)

520 = River Bar
521 = River Bar (Not Surveyed Flood Zone)
522 = River Bar (Surveyed Flood Zone)

530 = Flood Plain
531 = Active (Not Surveyed Flood Zone)
532 = Active (Surveyed Flood Zone)
533 = Abandoned (Not Surveyed Flood Zone)
534 = Abandoned (Surveyed Flood Zone)

550 = Alluvial Plain

560 = Alluvial Fan/Cone

570 = Lacustrine Deposits

MASS WASTING

610 = Colluvium

620 = Talus

630 = Landslide Deposits

640 = Rock Glacier

650 = Mine Tailings

TECTONIC UPLIFT

710 = Upland Valley

720 = Mountain Sideslope

730 = Mountain Ridgetop

WATER BODY

810 = Sea

820 = Lagoon
821 = Lagoon Within Abandoned Coastline (Not Surveyed Flood Zone)
822 = Lagoon Within Abandoned Coastline (Surveyed Flood Zone)

830 = Lake
831 = Lake
832 = Lake Within Abandoned Coastline (Not Surveyed Flood Zone)
833 = Lake Within Abandoned Coastline (Surveyed Flood Zone)
834 = Lake in Active Flood Plain (Not Surveyed Flood Zone)
835 = Lake in Active Flood Plain (Surveyed Flood Zone)

840 = River
841 = River (Not Surveyed Flood Zone)
842 = River (Surveyed Flood Zone)

ICE AND SNOW

910 = Glacier

920 = Permanent Snowfield

GENERAL GEOLOGY

Surficial Geology (Column 6)

1 = No Surficial Deposits
2 = Surficial Deposits
3 = Water Body
4 = Glacier

Bedrock Geology (Columns 7 and 8)

01 = Tertiary, Undifferentiated (Tu)
02 = Tertiary Intrusive (Ti)
03 = Tsadaka Formation (Tt)
04 = Arkose Ridge Formation (Tar)
05 = Chickaloon Formation (Tc)
06 = Tertiary/Cretaceous Plutonic (TKgd)
07 = Paleozoic/Jurassic/Cretaceous, Undifferentiated Sediments and Metasediments (PKJu)
08 = Mesozoic/Paleozoic Metamorphosed Schist (MPs)
09 = Waterbody
10 = Tyonek Formation, Sedimentary Rock, Primary Sandstone (Tts)
11 = Mesozoic Marine Sedimentary Rocks, Undivided (including Graywacks, shale, siltstone, argillite, and chert) (Kju)
12 = Metamorphosed Volcanic Rocks (Pzv)
13 = Undifferentiated Volcanic Rocks (Tv)
14 = Intrusive Igneous Rock, Granite or Granodiorite (Ruth Pluton) (Tmr)
15 = Sterling Formation, Sedimentary Rock (Tps)
16 = Intrusive Igneous Rock, Granite or Granodiorite (Kahiltna Pluton) (Tmk)
17 = Undifferentiated Sedimentary Rocks (Tsu)
18 = Glacier
99 = Water

Economic Geology (Columns 9 and 10)

00 = No Mineral Deposits
01 = Surficial Deposits of Gravel, Gravel and Sand, or Sand
02 = Potential Deposits of Gold, Silver, Copper, Tungsten or Molybdenum
03 = Potential Deposits of Copper, Gold, Silver or Molybdenum
04 = Potential Deposits of Coal Field
05 = Potential Deposit of Uranium
06 = Surficial Deposits of Gravel, Gravel and Sand, or Sand
Potential Deposits of Coal Field and Uranium

07 = Potential Deposits of Coal Field and Uranium
08 = Surficial Deposits of Gravel, Gravel and Sand, or Sand
Potential Deposit of Uranium
09 = Potential Deposits of Uranium, Copper and Gold
10 = Potential Deposits of Copper and Gold
11 = Surficial Deposits of Gravel, Gravel and Sand, or Sand
Potential Deposits of Copper and Gold
12 = Potential Deposits of Uranium, Copper, Gold, Silver and Molybdenum
13 = Surficial Deposits of Gravel, Gravel and Sand, or Sand
Potential Deposit of Coal Field
14 = Potential Deposits of Coal Field, Gold, Silver, Copper and Molybdenum
Recognized Mineral Areas
15 = Surficial Deposits of Gravel, Gravel and Sand, or Sand
Potential Deposits of Gold, Silver, Copper and Molybdenum
Recognized Mineral Areas
16 = Potential Deposits of Gold, Silver, Copper and Molybdenum
Recognized Mineral Areas
17 = Potential Deposit of Gold
18 = Surficial Deposits of Gravel, Gravel and Sand, or Sand
Potential Deposits of Coal Field, Gold, Silver, Copper and Molybdenum
Recognized Mineral Areas
99 = Water

GEOLOGIC HAZARDS

Geologic Hazards I (Columns 11 and 12)

00 = No Geologic Hazards
01 = Primary Potential Flood Zone
02 = Secondary Potential Flood Zone
03 = Outburst Flooding Zone
04 = Catastrophic Wave Zone
05 = Landslide Zone
06 = Undulating Terrain With Varying Particle Size
07 = Unstable Ground
08 = Avalanche Tracks
09 = Glacier

14 = Primary Potential Flood Zone and Catastrophic Wave Zone

24 = Secondary Potential Flood Zone and Catastrophic Wave Zone

99 = Water

Geologic Hazards II (Column 13)

1 = Liquification, Slumps, Fissures or Compaction
2 = Known or High Potential for Landslides
3 = Liquifaction, Slumps, Fissures or Compaction/Known or High Potential for Landslides

9 = No Geologic Hazards (includes water)

SOILS

Soils (Columns 14, 15 and 16)

SUSITNA VALLEY SOIL SURVEY

115 = Bernice sandy loam, steep (BeF)
116 = Caswell silt loam (Ca)
117 = Chena fine sandy loam (Ch)
118 = Chulitna silt loam, nearly level (ClA)
119 = Chulitna silt loam, undulating (ClB)
120 = Chulitna silt loam, rolling (ClC)
121 = Clunie peat (Cn)
122 = Coal Creek silt loam (Co)
123 = Delyndia silt loam, nearly level (DeA)
124 = Delyndia silt loam, undulating (DeB)
125 = Delyndia silt loam, rolling (DeC)
126 = Delyndia silt loam, hilly (DeD)
127 = Delyndia-Salamatof complex (Dm)
128 = Dinglishna sandy loam (Dn)
129 = Dinglishna-Moose River complex (Dr)
130 = Flat Horn silt loam, nearly level (FhA)
131 = Flat Horn silt loam, undulating (FhB)
132 = Gravelly alluvial land (Ga)
133 = Gravel pits (Gv)
134 = Homestead silt loam, nearly level (HoA)
135 = Homestead silt loam, undulating (HoB)
136 = Homestead silt loam, rolling (HoC)
137 = Homestead silt loam, hilly (HoD)
138 = Homestead silt loam, moderately steep (HoE)
139 = Jacobsen very stony silt loam (Ja)
140 = Kalifonsky silt loam (Ka)
141 = Kashwitna silt loam, nearly level (KsA)
142 = Kashwitna silt loam, undulating (KsB)
143 = Kashwitna silt loam, rolling (KsC)
144 = Kashwitna silt loam, hilly (KsD)
145 = Kashwitna silt loam, moderately steep (KsE)
146 = Kashwitna silt loam, steep (KsF)
147 = Killey-Moose River complex (Kr)
148 = Lucile silt loam (Lu)
149 = Mixed alluvial land (Me)
150 = Moose River silt loam (Mr)
151 = Nancy silt loam, nearly level (NaA)
152 = Nancy silt loam, undulating (NaB)
153 = Nancy silt loam, rolling (NaC)
154 = Nancy silt loam, hilly (NaD)
155 = OMIT
156 = Nancy silt loam, moderately steep (NaE)

157 = Nancy silt loam, steep (NaF)
158 = Nancy silt loam, sandy substratum, nearly level (NcA)
159 = Nancy silt loam, sandy substratum, undulating (NcB)
160 = Nancy silt loam, sandy substratum, rolling (McC)
161 = Nancy silt loam, sandy substratum, hilly (NcD)
162 = Nancy silt loam, sandy substratum, moderately steep (NcE)
163 = Niklason fine sandy loam (Nk)
164 = Rabideux silt loam, nearly level (RaA)
165 = Rabideux silt loam, undulating (RaB)
166 = Rabideux silt loam, rolling (RaC)
167 = Rabideux silt loam, hilly (RaD)
168 = Rabideux silt loam, moderately steep (RaE)
169 = Rabideux silt loam, steep (RaF)
170 = Rabideux silt loam, shallow, nearly level (RbA)
171 = Rabideux silt loam, shallow, undulating (RbB)
172 = Rabideux silt loam, shallow, rolling (RbC)
173 = Rabideux silt loam, shallow, hilly (RbD)
174 = Rabideux silt loam, shallow, moderately steep (RbE)
175 = Rabideux silt loam, sandy substratum, nearly level (RdA)
176 = Rabideux silt loam, sandy substratum, undulating (RdB)
177 = Rabideux silt loam, sandy substratum, rolling (RdC)
178 = Rabideux silt loam, sandy substratum, hilly (RdD)
179 = Rabideux silt loam, sandy substratum, moderately steep (RdE)
180 = Salamatof peat (Sa)
181 = Schrock silt loam, nearly level (ShA)
182 = Slikok mucky silt loam (Sm)
183 = Sisitna fine sandy loam (Ss)
184 = Susitna and Niklason fine sandy loams, overflow (Sw)
185 = Terrace escarpments (Te)
186 = Tidal flats (Tf)
187 = Tidal marsh (Tm)
188 = Wasilla silt loam (Wa)
189 = Whitsol silt loam, nearly level (WhA)
190 = Whitsol silt loam, undulating (WhB)
191 = Whitsol silt loam, rolling (WhC)
192 = Whitsol silt loam, hilly (WhD)
193 = Whitsol silt loam, moderately steep (WhE)
194 = Homestead silt loam, steep (HoF)

401 = Coal Creek Silt Loam, 0-2& slope (010)
402 = Capps Sand, 0-2% slope (014)
403 = Drill Creek Peak, 0-3% slope (017A)
404 = Drill Creek Pea, 3-7% slope (017B)
405 = Chichantna Peat, 0-3% slope (018A)
406 = Chichantna Peat, 3-7% slope ((018B)
407 = Salamatof Peat, 0-2% slope (019)
408 = Triumvirate Silt Loam, 0-2% sope (023)
409 = Moose River Silt Loam, 0-2% slope (024)
410 = Mutnala Silt Loam, 0-2% slope (30A)
411 = Mutnala Silt Loam, 2-7% slope (30B)

412 = Mutnala Silt Loam, 7-12% slope (30C)
413 = Mutnala Silt Loam, 12-20% slope (30D)
414 = Mutnala Silt Loam, 7-20% slope (30C-D)
415 = Mutnala Silt Loam, 20-30% slope (30E)
416 = Mutnala Silt Loam, 30-45% slope (30F)
417 = Mutnala Silt Loam, 2045% slope (30EF)
418 = Mutnala-Chichantna Complex, 2-7% slope (30-18CD)
419 = Mutnala-Slikok Complex, 2-7% slope (30-31B)
420 = Mutnala-Slikok Complex, 7-12% slope (30-31C)
421 = Mutnala-Spenard Commplex, 2-7% slope (30-90B)
422 = Slikok Mucky Silt Loam, 0-2% slope (31A)
423 = Slikok Mucky Silt Loam, 2-7% slope (31B)
424 = Starichkof Peat, 0-2% slope (33A)
425 = Starichkof Peat, 2-7% slope (33B)
426 = Doroshin Peat, 0-2% slope (56A)
427 = Doroshin Peat, 2-7% slope (56B)
428 = Killey Silt Loam, 0-2% slope (63)
429 = Killey-Moose River Complex, 0-2% slope (63-24)
430 = Clunie Peat (64)
431 = Tidal Flats (65)
432 = Susitna Fine Sandy Loam, 0-2% slope (077)
433 = Wasilla Silt Loam, 0-2% slope (079)
434 = Chedatna Silt Loam, 0-2% slope (080)
435 = Lucile Silt Loam, 0-2% slope (085)
436 = Lucile Sandy Substratum, 0-2% slope (086A)
437 = Spenard Silt Loam, 0-2% slope (90A)
438 = Spenard Silt Loam, 2-7% slope (90B)
439 = Talkeetna Silt Loam, 7-12% slope (93C)
440 = Talkeetna Silt Loam, 12-20% slope (93D)
441 = Talkeetna Silt Loam, 20-30% slope ((93E)
442 = Talkeetna Silt Loam, 30-45% slope (93F)
443 = Chuit Silt Loam, Hummocky Phase, 3-12% slope (95BC)
444 = Chuit Silt Loam, Hummocky Phase, 12-30% slope (95DE)
445 = Chuit Silt Loam, Hummocky Phase, 30%+ slope (95FG)
446 = Chuit Silt Loam, Hummocky Phase, 20-45% slope (95EF)
447 = Rock Outcrop-Chuit Complex, 7-12% slope (96CD)
448 = Rock Outcrop-Chuit Complex, 20-45% slope (96EF)
449 = Rock Outcrop, 45%+ slope (96G)
450 = Fluvent (107)
451 = Rabideux Silt Loam, 0-2% slope (126A)
452 = Rabideux Silt Loam, 2-7% slope (126B)
453 = Rabideux Silt Loam, 7-12% slope (126C)
454 = Rabideux Silt Loam, 12-20% slope (126D)
455 = Rabideux Silt Loam, 20-30% slope (126E
456 = Rabideux Silt Loam, 30-45% slope (126F)
457 = Judd Silt Loam, 0-2% slope (0130)
458 = Tidal Marsh (188)
459 = Rabideux Sand Substratum, 0-2% slope (0526A)
460 = Rabideux Sandy Substratum, 2-7% slope (0526B)
461 = Rabideux Sandy Substratum, 7-12% slope (0526C)

462 = Niklason Fine Sandy Loam, 0-2% slope (577)
463 = Nancy Sandy Substratum (Kashihitna) (687)
464 = Susitna Niklason Complex, 0-2% slope (777)
465 = Lithic Cryorthod 7-20% complex slopes (1001CE)
466 = Flat Horn Silt Loam, 2-7% slope (83B)
467 = Hewitt Peat, 0-2% slope (270)
468 = Mutnala-Slikok Complex, 0-2% slope (30-31A)
469 = Schrock Silt Loam, 0-2% slope (125)
470 = Lithic Cryorthod, 7-12% slope (1001C)
471 = Nancy Silt Loam, 0-2% slope (87A)
472 = Nancy Silt Loam, 2-7% slope (87B)
473 = Nancy Silt Loam, 7-12% slope (87C)
474 = Talkeetna Silt Loam, 2-7% slope (93B)
475 = Lucile Silt Loam, 2-7% slope (85B)
476 = Lucile Silt Loam, 7-12% slope (85C)
477 = Starichkof Peat, 7-12% slope (33C)
478 = Mutnala-Spenard Complex, 7-12% slope (30-90C)
479 = Bernice Sandy Loam, 30-45% slope (13F)
480 = Flat Horn Silt Loam, 0-2% slope (83A)
481 = Chuit Silt Loam, Hummocky Phase, greater than 45% slope (95G)
482 = Seely (60B)
483 = Chuit Silt Loam, Hummocky Phase, 7-20% slope (95CD)
484 = Seely (60C)
485 = Seely (60D)
486 = Mutnala-Slikok Complex, 12-20% slope (30-31D)
487 = Nancy Silt Loam, Sandy Substratum, 2-7% slope (687B)
488 = Nancy Silt Loam, Sandy Substratum, 7-12% slope (687C)
489 = Susitna-Niklason Overflow, 0-2% slope (677)
490 = Jacobsen Very Stony Silt Loam, 0-2% slope (123)
491 = Mutnala Silt Loam, 0-7% slope (30AB)
492 = Hewitt Peat, 0-2% slope (270)
493 = Rabideux Silt Loam, Shallow, 0-2% slope (626)
494 = Mutnala Silt Loam, nearly level (135A)
495 = Mutnala Silt Loam, (135)
496 = Whitsol Silt Loam, 2-7% slope (587B)
497 = Whitsol Silt Loam, 7-12% slope (587C)
498 = Mutnala-Slikok Complex, 7-12% complex slopes (30CD-31)
499 = Chuit Silt Loam, Hummocky Phase, 30-45% slope (95F)
500 = Mutnala Silt Loam, greater than 45% slope (30G)
501 = Spenard Silt Loam, 7-12% slope (90C)
502 = Mutnala-Slikok Complex, 30-45% slope (30-31F)
503 = Killey-Moose River Complex, 0-2% slope (24-63)
504 = Homestead Silt Loam, undulating (HOB)
505 = Rough broken land (terrace escarpments) (113)
506 = Talkeetna rock outcrop, greater than 45% slope (93G)
507 = Whitsol Silt Loam, 30-45% slope (587F)
508 = Whitsol Silt Loam, 20-30% slope (587E)
509 = Rough Mountainous Land (9)
510 = Talkeetna Silt Loam, 0-2% slope (93A)
511 = Bernice Sandy Loam, 45%+ slope (13G)

512 = Daneka Silt Loam, 2-7% slope (312B)
513 = Daneka Silt Loam, 7-12% slope (312C)
514 = Daneka Silt Loam, 12-20% slope (312D)
515 = Daneka Silt Loam, 20-30% slope (312E)
516 = Daneka Silt Loam, 30-45% slope (312F)
517 = Daneka Silt Loam, greater than 45% slope (312G)
518 = Daneka Silt Loam, 0-2% slope (312A)
519 = Jacobsen very stony silt loam, 7-12% slope (123C)
520 = Daneka Silt Loam, 7-20% slope (312CD)
521 = Schrock Silt loam, 2-7% slope (125B)
522 = Grubstake Silt Loam, 20-30% slope (313E)
523 = Jacobsen Very Stony Silt Loam, 2-7% slope (123B)
524 = Grubstake Silt Loam, 7-12% slope (313C)
525 = Homestead Silt Loam, very shallow, 20-30% slope (572E)
526 = Homestead Silt Loam, very shallow, 0-2% slope (572A)
527 = Kliskon, 7-12% slope (38C)
528 = Kliskon, 2-7% slope (38B)
529 = Rock Outcrop-Chuit Complex, greater than 45% slope (96G)
530 = Talkeetna Silt Loam, 2-12% slope (93BC)
531 = Kliskon, 0-2% slope (38A)
532 = Rabideux Silt Loam, cool phase, 0-2% slope (121A)
533 = Rabideux Silt Loam, cool phase, 2-7% slope (121B)
534 = Rabideux Silt Loam, cool phase, 7-12% slope (121C)
535 = Slikok Mucky Silt Loam, 7-12% slope (31C)
536 = Chuit Silt Loam, Hummocky Phase, 12-20% slope (95D)
537 = Talkeetna Silt Loam, 7-20% slope (93CD)
538 = Talkeetna-Slikok Complex, 7-12% slope (93-31E)
539 = Chulitna-Slikok Complex, 7-12% slope (526-31C)
540 = Chulitna-Slikok Complex, 12-20% slope (526-31D)
541 = Watana Silt Loam, 20-30% slope (311E)
542 = Mutnala-Chichantna Complex, 2-7% slope (30-18B)
543 = (Glacial) Glacial

NO SOIL SURVEY
(ESRI Extrapolation)

600 = Alluvial Land
601 = Susitna-Niklason Complex, 0-2% slope
602 = Salamatof peat, 0-2% slope
603 = Niklason Fine Sandy Loam, 0-2% slope
604 = Mutnala Silt Loam, 207% slope
605 = Mutnala-Spenard Complex, 2-7% slope
606 = Starichkof Peat, 0-2% slope
607 = Mutnala Silt Loam, 12-2-% slope
608 = Slikok Mucky Silt Loam, 0-2% slope
609 = Chultna Silt Loam, 2-7% slope
610 = Rabideux Silt Loam, 2-7% slope
611 = Rabideux Silt Loam, 2-7% slope
612 = Rabideux Silt Loam, 7-12% slope
613 = Rabideux Silt Loam, 12-20% slope

614 = Rabideux Silt Loam, 20-30% slope
615 = Rabideux Silt Loam, 30-45% slope
616 = Moose River Silt Loam, 0-2% slope
617 = Doroshin Peat, 0-2% slope
618 = Spenard Silt Loam, 0-2% slope
619 = Spenard Silt Loam, 2-7% slope
620 = Mutnala Silt Loam, 7-12% slope
621 = Mutnala Silt Loam, 20-30% slope
622 = Lucile Silt Loam, 0-2% slope
623 = Nancy Silt Loam, 0-2% slope
624 = Nancy Silt Loam, 30-45% slope
625 = Nancy Silt Loam, 20-30% slope
626 = Nancy Silt Loam, 2-7% slope
627 = Talkeetna Silt Loam, 2-7% slope
628 = Talkeetna Silt Loam, 7-12% slope
629 = Talkeetna Silt Loam, 12-20% slope
630 = Talkeetna Silt Loam, 20-30% slope
631 = Talkeetna Silt loam, 30-45% slope
632 = Deneka Silt Loam, 7-12% slope
633 = Deneka Silt Loam, 12-20% slope
634 = Deneka Silt Loam, 20-30% slope
635 = Deneka Silt Loam, greater than 45% slope
636 = Schrock Silt Loam, 0-2% slope
637 = Kashwitna Silt Loam, 2-7% slope
638 = Jacobsen Very Stony Silt Loam, 0-2% slope
639 = Kashwitna Silt Loam, 0-2% slope
640 = Niklason Fine Sandy Loam, 0-2% slope
641 = Bernice Sandy Loam, 30-45 % slope
642 = Jacobsen Very Stony Silt Loam, 2-7% slope
643 = Mixed Alluvial Land
644 = Killey-Moose River Complex, 0-2% slope
645 = Moose River Silt Loam, 0-2% slope
646 = Mutnala Silt Loam, 12-20% slope
647 = Mutnala Silt Loam, 30-45% slope
648 = Kashwitna Silt Loam, 7-12% slope
649 = Nancy Silt Loam, 12-20% slope
650 = Killey-Moose River Complex, 0-2% slope

999 = Water

HABITATS

No Habitat Data for Upper Talkeetna Subbasin

Habitat I (Columns 17 and 18)
Source: Paul Arneson, Dan Timm

00 = No Habitat or No Data
01 = A6, B6, C(1,3,4)

02 = A, C
03 = A(1,6), B(1,6), C(1,2,3,4,6)
04 = A(1,6), B(1,6), C(1,2,3,4,6)
05 = A
06 = A + Old Fire Good Moose Winter Habitat
07 = Old Fire Good Moose Winter Habitat
08 = A(1,6), B(1,6), C(1,2,3,4,6) Old Fire Good Moose Winter Habitat
09 = A(1,6), B(1,6), C3
10 = A1, C(1,2,3,6,7)
11 = C Moose Concentration
12 = C Moose Concentration A1, C(1,2,3,7)
13 = A1, C(1,2,3,7)
14 = C3
15 = A(1,6), C(1,4,6)
16 = H(6,8), C4
17 = A(1,6), C(3,4,6) N(6,8)
18 = A6, C3
19 = C1,3
20 = A(1,6), C(3,4)
21 = A6, B6, C3
22 = A1, C1
23 = A6, C(2,6,7)

Habitat II (Column 19)
Source: Jack Didrickson, Dave Harkness

0 = No Habitat or No Data
1 = H8
2 = H(6,7,8,9)
3 = H(6,7,8,9)
4 = H(6,7,8,9)

Habitat III (Column 20)
Source: Alaska Wildlife and Habitat, Vol. 2

0 = No Habitat or No Data
1 = Ki, Ti, Ni
2 = Oi, Ni
3 = O, Siii, Ni
4 = Siii, O
5 = Ti, Ni
6 = Ki
7 = Oii
8 = Ki, O, Siii

Habitat IV (Columns 21 and 22)
Source: Alaska Wildlife and Habitat, Vol. 1, 2

00 = No Habitat or No Data
01 = A1

02 = D
03 = D, Gi
04 = Gii, Gi, D
05 = Gii, D
06 = Gi, D
07 = Gii, D
08 = B5
09 = B6
10 = A6, B6
11 = A6
12 = A1, B6
13 = A1, D

Habitat V (Column 23)
Source: Seabird Catalog Information, USFWS

0 = No Habitat or No Data
1 = V(i) (6,8)

HABITAT CODE DESCRIPTION

| Wildlife Resources | Habitat Usage |
|---|---|
| A = Black Bear | 1 = Spring/Summer Range |
| B = Grizzly Bear | 2 = Fall |
| C = Moose | 3 = Winter |
| D = Caribou | 4 = Calving |
| Gi = Dall Sheep | 6 = Feeding |
| Gii = Mountain Goat | 7 = Migration |
| H = Water Fowl | 8 = Nesting/Molting |
| Ki = Marten | 9 = Staging |
| Ni = Beaver | |
| Oi = Hoary Marmot | |
| Siii = White Tailed Ptarmigan | |
| Vi = Gull spp (Laurus spp) | |

LAND USE

Land Use (Columns 24, 25, 26 and 27)

AGRICULTURE

0110 = Pasture
0120 = Grain, Grass
0130 = Vegetables
0140 = Dairy
0150 = Other

RESIDENTIAL

0210 = Dispersed Residential
0220 = Low Density
0230 = Medium Density
0240 = High Density
0250 = Commercial (Hotel, Motel or Lodge)

COMMERCIAL

0310 = Eating and Drinking Establishment
0320 = Food
0330 = General Merchandise
0340 = Apparel and Accessories
0350 = Furniture or Home Furnishings and Equipment
0360 = Building Materials, Hardware or Farm Equipment
0370 = Auto Dealers or Gasoline Service Stations
0380 = Other

MANUFACTURING

0410 = Food
0420 = Lumber or Wood Products
0430 = Gravel or Cement Products
0440 = Other

SERVICES

0510 = Miscellaneous Business Services
0520 = Personal
0530 = Professional
0540 = Finance, Construction or Real Estate
0550 = Repair
0560 = Other

PUBLIC/QUASI-PUBLIC SERVICES

0610 = Military
0620 = Governmental Institution
0630 = Educational Institution
0640 = Health Institution
0650 = Church or Community Center
0660 = Cemetary
0670 = Solid Waste Disposal Site
0680 = Other

COMMUNICATION FACILITY

0700 = Communication Facility, Undifferentiated

TRANSPORTATION FACILITY

0810 = Airport
  0811 = Public Access
  0812 = Private Access
0820 = Marine, Port or Dock Facility

UTILITY

0900 = Utilities, Undifferentiated

RESOURCE EXTRACTION

1020 = Sand/Gravel Quarry and Borrow Pit
1030 = Surface Mine
1040 = Gas Field Well
  1041 = Inactive
  1042 = Active
1050 = Oil Well Field
  1051 = Inactive
  1052 = Active
1060 = Timber

MIXED URBAN BUILT UP

1100 = Mixed Urban Built Up

UNDER CONSTRUCTION

1200 = Under Construction

VACANT DISTURBED

1300 = Vacant Disturbed

OUTDOOR RECREATION (Source: DNR Land Use Maps, Imagery)

1410 = Marine Boat Launching Sites
1420 = Public Park, Campground, Refuge
1430 = Private Resort, Park, Group Camp

RECREATION (Source: DNR Recreation Map)

1510 = Bird Watching
1520 = Bird Watching/Mountaineering
1530 = Mountaineering

1540 = Lake Boating/Lake Canoeing
1550 = Lake Boating/Lake Canoeing/Lake Fishing
1551 = Lake Boating/Lake Canoeing and Intensive Fishing
1552 = Lake Boating/Lake Canoeing and Moderate Fishing
1553 = Lake Boating/Lake Canoeing and Light Fishing
1554 = Lake Boating/Lake Canoeing and Very Light Fishing
1560 = Lake Fishing
1561 = Intensive Fishing
1562 = Moderate Fishing
1563 = Light Fishing
1564 = Very Light Fishing

NATURAL LANDS

1600 = Natural Lands, Undifferentiated (Including Water Bodies)

VEGETATION

Primary Vegetation (Columns 28 and 29)
Secondary Vegetation (Columns 30 and 31)
Tertiary Vegetation (Columns 32 and 33)
Quaternary Vegetation (Columns 34 and 35)

FOREST AND WOODLAND

Closed Forest

21 = Coniferous Forest, White Spruce, Short Stands
22 = Deciduous Forest, Mixed Forest, Young Stands
24 = Deciduous Forest, Mixed Forest, Medium-Aged Stands
25 = Coniferous Forest, White Spruce, Tall Stands
26 = Deciduous Forest, Mixed Forest, Old Stands
27 = Cottonwood, Young Stands
28 = Cottonwood, Medium-Aged Stands
29 = Cottonwood, Old Stands

Open Forest-Woodland

31 = Coniferous Forest, White Spruce, Short Stands
32 = Deciduous Forest, Mixed Forest, Medium-Aged Stands
33 = Coniferous Forest, White Spruce, Tall Stands
34 = Deciduous Forest, Mixed Forest, Old Stands
35 = Cottonwood, Medium-Aged Stands
36 = Cottonwood, Old Stands

Closed Forest (Black Spruce Mountain Hemlock)

41 = Black Spruce, Short Stands
42 = Black Spruce, Tall Stands

45 = Mountain Hemlock, Short Stands
46 = Mountain Hemlock, Tall Stands

Open Forest-Woodland (Black Spruce)

43 = Black Spruce, Short Stands

NON FORESTED

Salt Water Wetlands

50 = Salt Grassland
51 = Low Shrub
52 = Tidal marsh

Tall Shrubs

60 = Alder
61 = Alder-Willow (streamside veg.)

Low Shrub

62 = Willow Resin Birch

Grassland

63 = Upland Grass

Tundra

64 = Sedge-Grass
65 = Herbaceous
66 = Shrub
67 = Mat and Cushion

Freshwater Wetlands

68 = Sphagnum Bog
69 = Sphagnum-Shrub Bog

Cultural Features

70 = Cultural Influences

Barren

80 = Mud Flats
81 = Rock

Permanent Snow and Ice

82 = Snowfield
83 = Glacier

Water

91 = Lakes greater than 50 ac. (census water)
92 = Lakes at least 10 ac., but less than 40 ac.
96 = Streams and Rivers at least 165 feet wide, but less than 500 feet wide
97 = Rivers greater than 1/8 mile (census water)

MANUSCRIPT #2
SURFACE HYDROLOGY MAP
DATA CLASSIFICATION AND CODING

STREAM NETWORK

Order Column 1

1 - 8

Periodicity (Column 2)

1 = Intermittent
2 = Perennial

Origin (Column 3)

1 = Non Glacial
2 = Glacial

Discharge Profile (Column 4)

1 = Lowland
2 = Mountain

Situation (Column 5)

1 = Not Within Waterbody
2 = Within Waterbody

Condition (Column 6)

1 = Non Braided
2 = Braided

Salmon Type (Columns 7-11)
No Data for Lower Talkeetna Subbasin
King Salmon (Column 7)
Sockeye Salmon (Column 8)
Coho Salmon (Column 9)
Pink Salmon (Column 10)
Chum Salmon (Column 11)

0 or Blank = No Data
1 = Salmon Not Present
2 = Salmon Present, But Not Spawning
3 = Salmon Present, Discontinuous Spawning
4 = Salmon Present, Known Spawning Area

Non-Salmon Freshwater Fish Type (Column 13-16)
No Data for Lower Talkeetna Subbasin
Dolly Varden (Column 13)
Arctic Char (Column 14)
Rainbow Trout (Column 15)
Whitefish (Column 16)

0 or Blank = No Data
1 = Not Present
2 = Present

WATERSHED

Topologic Number (Columns 1-7)*

8th Order or Higher (Column 1)
7th Order (Column 2)
6th Order (Column 3)
5th Order (Column 4)
4th Order (Column 5)
3rd Order (Column 6 and 7)

I. 8th order of higher watershed basins

A. 1000000 = All basins draining into the 8th order Susitna River receive a 1 in column 1 (1)

B. 2000000 = All basins draining into the Cook Inlet (121)

C. 3000000 = Special watershed draining both directions; into the Susitna and the Cook Inlet.

II. 7th order basins comprising Susitna River 8th

A. 1100000 = Susitna River 7th (13)
B. 1200000 = Yentna River 7th (38)

III. 6th order basins

A. 6th order basins comprising Susitna River 7th

1. 1110000 = Kroto Creek 6th (108)
2. 1120000 = Susitna River 6th (111)

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*GRID codes in parenthesis.

B. 6th order basins comprising Yentna River 7th

1. 1210000 = Yentna 6th
2. 1220000 = Skwentna 6th

IV. 5th order basins

A. 5th order basins comprising Kroto Creek 6th

1. 1111000 = Kroto Creek 5th (21)
2. 1112000 = Moose Creek 5th (30)

B. 5th order basins comprising Susitna River 6th

1. 1121000 = Chulitna Creek 5th (54)
2. 1122000 = Susitna River 5th (60)
3. 1123000 = Talkeetna River 5th (62)

C. 5th order basins draining directly into Yentna 7th

1. 1201000 = Kahiltna River 5th (78)
2. 1202000 = Lake Creek 5th (97)

D. 5th order basin draining directly into Susitna 8th

1. 1001000 = Alexander Creek 5th (3)

E. 5th Order Basins Within Skwentna River 6th

1. 1221000 = Talachulitna River 5th (116)

V. 4th order basins

A. 4th order basins comprising Kroto Creek 5th

1. 1111100 = Kroto Creek 4th (23)
2. 1111200 = Unnamed 4th (27)

B. 4th order basins comprising Moose Creek 5th

1. 1112100 = Moose Creek 4th (31)
2. 1112200 = Nine Mile Creek 4th (35)

C. 4th order basins within Susitna River 5th

1. 1121100 = Tokositna River 4th (56)

D. 4th order basins within Talkeetna 5th

1. 1123100 = Chunilna Creek 4th (65)

2. 1123200 = Talkeetna River 4th (68)
3. 1123300 = Sheep River 4th (70)

E. 4th order basins comprising Kahiltna 5th

1. 1201100 = Unnamed 4th (81)
2. 1201200 = Kahiltna 4th (84)
3. 1201300 = Peters Creek 4th (93)

F. 4th order basins draining directly into Susitna 6th

1. 1120100 = Kashwitna River 4th (44)
2. 1120200 = Montana Creek 4th (46)
3. 1120300 = Unnamed 4th (51)

G. 4th order basins draining directly into Yentna 7th

1. 1200100 = Fish Lake Creek (75)

H. 4th order basins within Lake Creek 5th

1. 1202100 = Camp Creek 4th (102)
2. 1202200 = Lake Creek 4th (105)

I. 4th order streams draining directly into Skwentna 6th

1. 1220100 = Eight Mile Creek (113)

J. 4th order streams comprising Alexander Creek 5th

1. 1001100 = Wolverine/Lower Sucker Creeks (5)
2. 1001200 = Alexander Creek (8)

VI. Third order basins

A. 3rd order basins comprising Kroto Creek 4th

1. 1111101 = Unnamed 3rd order (24)
2. 1111102 = Kroto Creek 3rd (25)
3. 1111103 = Seventeen Mile Creek 3rd (26)

B. 3rd order draining directly into Kroto Creek 5th

1. 1111001 = Unnamed 3rd (22)

C. 3rd order draining direc'ly into Kroto Creek 5th

1. 1111201 - Unnamed 3rd (28)
2. 1111202 = Unnamed 3rd (29)

D. 3rd order basins comprising Moose Creek 4th

1. 1112101 = Unnamed 3rd (32)

2. 1112102 = West Fork Moose Creek 3rd (33)
3. 1112103 = Moose Creek 3rd (34)

E. 3rd order basins comprising Nine Mile Creek 4th

1. 1112201 = Unnamed 3rd (36)
2. 1112202 = Nine Mile Creek 3rd (37)

F. 3rd order basins comprising unnamed 4th

1. 1201101 = Unnamed 3rd (82)
2. 1201102 = Unnamed 3rd (83)

G. 3rd order basins comprising Kahiltna 4th

1. 1201201 = Unnamed 3rd (85)
2. 1201202 = Bear Creek (86)
3. 1201203 = Unnamed 3rd (87)
4. 1201204 = Hungry Man Creek (88)
5. 1201205 = Cache Creek 3rd (89)
6. 1201206 = Treasure Creek 3rd (90)
7. 1201207 = Dutch Creek 3rd (91)
8. 1201208 = Granite Creek 3rd (92)

H. 3rd order basin in Peters Creek 4th

1. 1201301 = Martin Creek 3rd (94)
2. 1201302 = Kenny Creek 3rd (95)
3. 1201203 = Peters Creek 3rd (96)

I. 3rd order basins within Camp Creek 4th

1. 1202101 = Mills Creek 3rd (103)
2. 1202102 = Camp Creek 3rd (104)

J. 3rd order basins within Lake Creek 4th

1. 1202201 = Sunflower Creek 3rd (106)
2. 1202202 = Lake Creek 3rd (107)

K. 3rd order basins craining directly into Kahiltna 5th

1. 1201001 = Indian Creek 3rd (79)
2. 1201002 = Unnamed 3rd (80)

L. 3rd order basins comprising unnamed 4th

1. 1120301 = Rabideux Creek (52)
2. 1120302 = Queer Creek (53)

M. 3rd order basins draining directly into Susitna River 6th

1. 1120001 = Caswell Creek (39)
2. 1120002 = Sheep Creek (40)
3. 1120003 = Sunshine Question Creek (41)
4. 1120004 = Birch Creek (42)
5. 1120005 = Trapper Creek (43)

N. 3rd order draining into Talkeetna 5th

1. 1123001 = Wiggle Creek (63)
2. 1123002 = Unnamed 3rd (64)

O. 3rd order basins comprising Eight Mile Creek 4th

1. 1220101 = Unnamed 3rd (114)
2. 1220102 = Unnamed 3rd (115)

P. 3rd orders draining directly into Ynetna River 7th

1. 1200001 = Unnamed 3rd (72)
2. 1200002 = Moose Creek 3rd (73)
3. 1200003 = Indian Creek 3rd (74)

Q. 3rd order basins comprising Alexander Creek 4th

1. 1001201 = Bear Creek (9)
2. 1001202 = Clear Creek (10)
3. 1001203 = Deep Creek (11)
4. 1001204 = Unnamed (12)

R. 3rd order basins within Wolverine/Lower Sucker

1. 1001101 = Unnamed 3rd (6)
2. 1001102 = Wolverine Creek 3rd (7)

S. 3rd order basins draining directly into Alexander Creek 5th

1. 1001001 = Trail Creek (4)

T. 3rd order basins draining directly into Susitna 7th

1. 1100001 = Fish Creek (14)
2. 1100002 = Unnamed 3rd (15)

U. 3rd order basins draining directly into Susitna 8th

1. 1000001 = Unnamed 3rd (2)

V. 3rd order basins draining directly into Cook Inlet

1. 2000001 = Theodore River (122)
2. 2000002 = Lewis River (123)

W. 3rd order basin that drains into Talachulitina 4th (out of study area), the Skwentna 6th

1. 1221201 = Talachulitna 3rd (120)

X. 3rd order basins draining directly into Kroto Creek 6th

1. 1110001 = Unnamed 3rd (17)
2. 1110002 = Unnamed 3rd (18)
3. 1110003 = Unnamed 3rd (19)
4. 1110004 = Unnamed 3rd (20)

Y. 3rd order basins draining directly into Lake Creek 5th

1. 1202001 = Yenlo Creek 3rd (98)
2. 1202002 = Unnamed 3rd (99)
3. 1202003 = Unnamed 3rd (100)
4. 1202004 = Home Creek 3rd (101)

Z. 3rd order basins draining directly into Yentna 6th

1. 1210001 = Hewitt Creek 3rd (109)
2. 1210002 = Donkey Creek 3rd (110)

AA. 3rd order basins comprising Fish Lake 4th

1. 1200101 = Unnamed 3rd (76)
2. 1200102 = Unnamed 3rd (77)

BB. 3rd order basins comprising Montana Creek 4th

1. 1120202 = Unnamed 3rd (47)
2. 1120203 = North Fork 3rd (48)
3. 1120204 = Middle Fork 3rd (49)
4. 1120205 = South Fork 3rd (50)

CC. 3rd order basins within Kashwitna River 4th

1. 1120101 = North Fork Kashwitna River 3rd (45)

DD. 3rd order basins within Tokositna River 4th

1. 1121101 = Tokositna River 3rd (57)
2. 1121102 = Bunco Creek 3rd (58)
3. 1121103 = Unnamed 3rd (59)

EE. 3rd order basins draining directly into Chulitna 5th

1. 1121001 = Unnamed 3rd (55)

FF. 3rd order basins draining directly into Susitna River 5th

1. 1122001 = Whiskers Creek 3rd (61)

GG. 3rd order basins within Talkeetna River 4th

1. 1123201 = Disappointment Creek 3rd (69)

HH. 3rd order basins within Chunilna River 4th

1. 1123101 = Unnamed 3rd (66)
2. 1123102 = Unnamed 3rd (67)

II. 3rd order basins draining directly into Talachulitna 5th

1. 1221002 = Unnamed 3rd (117)
2. 1221003 = Thursday Creek 3rd (118)
3. 1221004 = Unnamed 3rd (119)

JJ. 3rd order basins draining directly into Skwentna River 6th

1. 1220001 = Shell Creek 3rd (112)

KK. 3rd order special watershed draining both directions into the Susitna River and the Cook Inlet.

1. 3000001 = Ivan River 3rd (124)

MANUSCRIPT #3
POINTS AND LINEAR FEATURES MAP
DATA CLASSFICATION AND CODING

NATURAL LINES

No data (Columns 1 and 2)

00 = No data

Escarpments, Column 3 (Lines)

1 = Not an Escarpment
2 = Escarpment

Fault Lines, Column 4 (Lines)

1 = Not a Fault Line
2 = Possible Fault (requires field verification)
3 = Suspected or Inferred Fault
4 = Known Fault

CULTURAL LINEAR FEATURES*

No Data (Columns 1 and 2)

00 = No data

Roads/Trails/Infrastructure Network (Column 3 and 4)

Roads

11 = Non Paved Road
12 = Paved Road
13 = Non Paved Road and Existing Utility Corridor
14 = Paved Road and Existing Utility Corridor
15 = Non Paved Road and Proposed Utility Corridor
16 = Paved Road and Proposed Utility Corridor
17 = Proposed Road-Point McKenzie Highway

Trails

21 = Existing Trail (1)

Seismic Survey Lines

31 = Existing Seismic Survey Line (1)

*GRID codes in parenthesis

Railroads

41 = Existing Railroad (1)

Utility Corridors

51 = Existing Utility Corridor (2)
52 = Proposed Utility Corridor (1)

No Data (Columns 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14)

000000000000 = No Data

CULTURAL POINTS

Extractive Sites (Columns 1-4)

1020 = Sand/Gravel Quarry and Borrow Pit
1030 = Subsurface Mine Entrance
1040 = Gas Well
  1041 = Inactive
  1042 = Active
1050 = Oil Well
  1051 = Inactive
  1052 = Active
1060 = Abandoned Gas or Oil Well

MANUSCRIPT #4
LAND STATUS MAP
DATA CLASSIFICATION AND CODING

TOWNSHIP

Township, Columns 1, 2, 3, 4, 5, 6 and 7

Township

Number of Township, Column 1 and 2
(i.e., 07 = Township 7)

North/South Designation, Column 3

1 = North
2 = South

Name of Baseline, Column 4

0 = No Data
1 = Unnamed Baseline

Range

Number of Range, Column 5 and 6
(i.e., 12 - Range 12)

East/West Designation, Column 7

1 = East
2 = West

Name of Meridian, Column 8

0 = No Data
1 = Seward Meridian

OWNERSHIP

No ownership data for Upper Talkeetna Subbasin

Ownership, Column 9 and 10

00 = No Data

Federal

10 = Federal

State

20 = State
21 = State Patented Land
22 = State Tentatively Approved
23 = State University
24 = Other State Land Campground and Foreclosure
25 = State Selected Land

Borough Land

31 = Borough Patented Land
32 = Borough Tentatively Approved

Municipal

40 = Municipal

Private

50 = Private

AGENCY INTEREST

No agency interest data for Upper Talkeetna Subbasin

Agency Interest, Column 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28 and 29

Fish and Game, Column 11

0 = No Data
1 = Not Fish and Game
2 = Fish and Game

Joint Fish and Game and Parks, Column 12

0 = No Data
1 = Not Joint Fish and Game and Parks
2 = Joint Fish and Game and Parks

Parks, Columm 13

0 = No Data
1 = Not Parks
2 = Parks

Timber, Column 14

0 = No Data

1 = No Timber
2 = Timber

Highway Corridor, Column 15

0 = No Data
1 = No Highway Corridor
2 = Highway Corridor

Agriculture, Column 16

0 = No Data
1 = No Agriculture
2 = Agriculture

Materials Site, Column 17

0 = No Data
1 = Not Materials Site
2 = Materials Site

Misc. Watershed, Column 18

0 = No Data
1 = No Misc. Watershed
2 = Misc. Watershed

Mineral Zone, Column 19

0 = No Data
1 = No Mineral Zone
2 = Mineral Zone

FSLUPC Ecological Reserve, Column 20

0 = No Data
1 = No FSLUPC Ecological Reserve
2 = FSLUPC Ecological Reserve

New Capital Site, Column 21

0 = No Data
1 = Not New Capital Site
2 = New Capital Site

New Capital Site Buffer, Column 22

0 = No Data
1 = Not New Capital Site Buffer
2 = New Capital Site Buffer

Miscellaneous, Column 23

0 = No Data
1 = Not Miscellaneous
2 = Miscellaneous

Intensive Recreation Areas, Column 24

0 = No Data
1 = Not Intensive Recreation Areas
2 = Recreation Areas

Boro Natural Buffer, Column 25

0 = No Data
1 = Not Boro Natural Buffer
2 = Boro Natural Buffer

Boro Wayside, Column 26

0 = No Data
1 = Not Boro Wayside
2 = Boro Wayside

Excl., Column 27

0 = No Data
1 = Not Excl.
2 = Excl.

# Appendix A2

## Data Classification and Coding
## Beluga Subbasin

Integrated Terrain Unit Map
Surface Hydrology Map
Points and Linear Features Map
Land Status Map

MANUSCRIPT #1
INTEGRATED TERRAIN UNIT MAP
DATA CLASSIFICATION AND CODING

## SLOPE

Slope Gradient (Column 1)

1 = 0-3%
2 = 3-7%
3 = 7-12%
4 = 12-20%
5 = 20-30%
6 = 30-45%
7 = Greater than 45%

## LANDFORM

Physiographic Division (Column 2)

1 = Mountain
2 = Hill
3 = Slope
4 = Plateau
5 = Valley
6 = Coastal Lowlands
7 = Glacier
8 = Waterbody

Landform Type (Column 3, 4 and 5)

GLACIAL

110 = Moraine
111 = End Moraine
112 = Lateral Moraine
113 = Medial Moraine
114 = Morainal Ridge
115 = Rogen Moraine
116 = Ground Moraine

120 = Till
121 = Till, Undifferentiated

130 = Drumlin
131 = Drumlin, Drumloid
132 = Rock Drumlin, Drumlinoid

FLUVIOGLACIAL

210 = Outwash
220 = Abandoned Outwash Channel
230 = Remnant Subglacial Stream Valley
240 = Kame Complex
250 = Esker
260 = Crevasse Filling
270 = Side Glacial Drainage Channels
280 = Flute

AEOLIAN

310 = Dune
311 = Dune and Outwash Complex

LITTORAL

410 = Longshore Bar
411 = Longshore Bar Within Abandoned Coastline (Not Surveyed Flood Zone)
412 = Longshore Bar Within Abandoned Coastline (Surveyed Flood Zone)

420 = Beach

430 = Barrier Spit

440 = Delta
441 = Delta-Flood Plain Within Abandoned Coastline (Not Surveyed Flood Zone)
442 = Delta-Flood Plain Within Abandoned Coastline (Surveyed Flood Zone)
443 = Delta-Flood Plain (Not Surveyed Flood Zone)
444 = Delta-Flood Plain (Surveyed Flood Zone)
445 = Delta and Outwash Complex

450 = Tidal Flat
451 = Tidal Flat Within Abandoned Coastline (Not Surveyed Flood Zone)
452 = Tidal Flat Within Abandoned Coastline (Surveyed Flood Zone)

460 = Coastal Plain

FLUVIAL

510 = Active Channel
511 = Active Channel (Not Surveyed Flood Zone)
512 = Active Channel (Surveyed Flood Zone)

520 = River Bar
521 = River Bar (Not Surveyed Flood Zone)
522 = River Bar (Surveyed Flood Zone)

530 = Flood Plain

531 = Active (Not Surveyed Flood Zone)
532 = Active (Surveyed Flood Zone)
533 = Abandoned (Not Surveyed Flood Zone)
534 = Abandoned (Surveyed Flood Zone)

550 = Alluvial Plain

560 = Alluvial Fan/Cone

570 = Lacustrine Deposits

MASS WASTING

610 = Colluvium

620 = Talus

630 = Landslide Deposits

640 = Rock Glacier

650 = Mine Tailings

TECTONIC UPLIFT

710 = Upland Valley

720 = Mountain Sideslope

730 = Mountain Ridgetop

WATER BODY

810 = Sea

820 = Lagoon
821 = Lagoon Within Abandoned Coastline (Not Surveyed Flood Zone)
822 = Lagoon Within Abandoned Coastline (Surveyed Flood Zone)

830 = Lake
831 = Lake
832 = Lake Within Abandoned Coastline (Not Surveyed Flood Zone)
833 = Lake Within Abandoned Coastline (Surveyed Flood Zone)
834 = Lake in Active Flood Plain (Not Surveyed Flood Zone)
835 = Lake in Active Flood Plain (Surveyed Flood Zone)

840 = River
841 = River (Not Surveyed Flood Zone)
842 = River (Surveyed Flood Zone)

ICE AND SNOW

910 = Glacier

920 = Permanent Snowfield

GENERAL GEOLOGY

Surficial Geology (Column 6)

1 = No Surficial Deposits
2 = Surficial Deposits
3 = Water Body
4 = Glacier

Bedrock Geology (Columns 7 and 8)

01 = Tertiary, Undifferentiated (Tu, Qag)
02 = Tertiary Intrusive (Ti)
03 = Tsadaka Formation (Tt)
04 = Arkose Ridge Formation (Tar)
05 = Chickaloon Formation (Tc)
06 = Tertiary/Cretaceous Plutonic (TKgd)
07 = Paleozoic/Jurassic/Cretaceous, Undifferentiated Sediments and Metasediments (PKJu)
08 = Mesozoic/Paleozoic Metamorphosed Schist (MPs)
09 = Waterbody
10 = Tyonek Formation, Sedimentary Rock, Primary Sandstone (Tts)
11 = Mesozoic Marine Sedimentary Rocks, Undivided (including Graywacks, shale, siltstone, argillite, and chert) (Kju)
12 = Metamorphosed Volcanic Rocks (Pzv)
13 = Undifferentiated Volcanic Rocks (Tv)
14 = Intrusive Igneous Rock, Granite or Granodiorite (Ruth Pluton) (Tmr)
15 = Sterling Formation, Sedimentary Rock (Tps)
16 = Intrusive Igneous Rock, Granite or Granodiorite (Kahiltna Pluton) (Tmk)
17 = Undifferentiated Sedimentary Rocks (Tsu)
18 = Glacier
19 = Kenai Formation, Sandstone, Conglomerate, Siltstone, Claystone (tku, Tkm, Tkl)
20 = Landslide Deposits (Qls)
99 = Water

Economic Geology (Columns 9 and 10)

00 = No Mineral Deposits or No Data

GEOLOGIC HAZARDS

Geologic Hazards I (Columns 11 and 12)

00 = No Geologic Hazards
01 = Primary Potential Flood Zone
02 = Secondary Potential Flood Zone
03 = Outburst Flooding Zone
04 = Catastrophic Wave Zone
05 = Landslide Zone
06 = Undulating Terrain With Varying Particle Size
07 = Unstable Ground
08 = Avalanche Tracks
09 = Glacier

14 = Primary Potential Flood Zone and Catastrophic Wave Zone

24 = Secondary Potential Flood Zone and Catastrophic Wave Zone

99 = Water

Geologic Hazards II (Column 13)

0 = No Data

SOILS

Soils (Columns 14, 15 and 16)

SUSITNA VALLEY SOIL SURVEY

115 = Bernice sandy loam, steep (BeF)
116 = Caswell silt loam (Ca)
117 = Chena fine sandy loam (Ch)
118 = Chulitna silt loam, nearly level (ClA)
119 = Chulitna silt loam, undulating (ClB)
120 = Chulitna silt loam, rolling (ClC)
121 = Clunie peat (Cn)
122 = Coal Creek silt loam (Co)
123 = Delyndia silt loam, nearly level (DeA)
124 = Delyndia silt loam, undulating (DeB)
125 = Delyndia silt loam, rolling (DeC)
126 = Delyndia silt loam, hilly (DeD)
127 = Delyndia-Salamatof complex (Dm)
128 = Dinglishna sandy loam (Dn)
129 = Dinglishna-Moose River complex (Dr)
130 = Flat Horn silt loam, nearly level (FhA)
131 = Flat Horn silt loam, undulating (FhB)
132 = Gravelly alluvial land (Ga)
133 = Gravel pits (Gv)
134 = Homestead silt loams, nearly level (HoA)
135 = Homestead silt loams, undulating (HoB)
136 = Homestead silt loam, rolling (HoC)
137 = Homestead silt loam, hilly (HoD)

138 = Homestead silt loam, moderately steep (HoE)
139 = Jacobsen very stony silt loam (Ja)
140 = Kalifonsky silt loam (Ka)
141 = Kashwitna silt loam, nearly level (KsA)
142 = Kashwitna silt loam, undulating (KsB)
143 = Kashwitna silt loam, rolling (KsC)
144 = Kashwitna silt loam, hilly (KsD)
145 = Kashwitna silt loam, moderately steep (KsE)
146 = Kashwitna silt loam, steep (KsF)
147 = Killey-Moose River complex (Kr)
148 = Lucile silt loam (Lu)
149 = Mixed alluvial land (Me)
150 = Moose River silt loam (Mr)
151 = Nancy silt loam, nearly level (NaA)
152 = Nancy silt loam, undulating (NaB)
153 = Nancy silt loam, rolling (NaC)
154 = Nancy silt loam, hilly (NaD)
155 = OMIT
156 = Nancy silt loam, moderately steep (NaE)
157 = Nancy silt loam, steep (NaF)
158 = Nancy silt loam, sandy substratum, nearly level (NcA)
159 = Nancy silt loam, sandy substratum, undulating (NcB)
160 = Nancy silt loam, sandy substratum, rolling (NcC)
161 = Nancy silt loam, sandy substratum, hilly (NcD)
162 = Nancy silt loam, sandy substratum, moderately steep (NcE)
163 = Niklason fine sandy loam (Nk)
164 = Rabideux silt loam, nearly level (RaA)
165 = Rabideux silt loam, undulating (RaB)
166 = Rabideux silt loam, rolling (RaC)
167 = Rabideux silt loam, hilly (RaD)
168 = Rabideux silt loam, moderately steep (RaE)
169 = Rabideux silt loam, steep (RaF)
170 = Rabideux silt loam, shallow, nearly level (RbA)
171 = Rabideux silt loam, shallow, undulating (RbB)
172 = Rabideux silt loam, shallow, rolling (RbC)
173 = Rabideux silt loam, shallow, hilly (RbD)
174 = Rabideux silt loam, shallow, moderately steep (RbE)
175 = Rabideux silt loam, sandy substratum, nearly level (RdA)
176 = Rabideux silt loam, sandy substratum, undulating (RdB)
177 = Rabideux silt loam, sandy substratum, rolling (RdC)
178 = Rabideux silt loam, sandy substratum, hilly (RdD)
179 = Rabideux silt loam, sandy substratum, moderately steep (RdE)
180 = Salamatof peat (Sa)
181 = Schrock silt loam, nearly level (ShA)
182 = Slikok mucky silt loam (Sm)
183 = Sisitna fine sandy loam (Ss)
184 = Susitna and Niklason fine sandy loams, overflow (Sw)
185 = Terrace escarpments (Te)
186 = Tidal flats (Tf)
187 = Tidal marsh (Tm)

188 = Wasilla silt loam (Wa)
189 = Whitsol silt loam, nearly level (WhA)
190 = Whitsol silt loam, undulating (WhB)
191 = Whitsol silt loam, rolling (WhC)
192 = Whitsol silt loam, hilly (WhD)
193 = Whitsol silt loam, moderately steep (WhE)
194 = Homestead silt loam, steep (HoF)

ADVANCE COPY BELUGA-YENTNA SURVEY

401 = Coal Creek Silt Loam, 0-2% slope (010)
402 = Capps Sand, 0-2% slope (014)
403 = Drill Creek Peak, 0-3% slope (017A)
404 = Drill Creek Pea, 3-7% slope (017B)
405 = Chichantna Peat, 0-3% slope (018A)
406 = Chichantna Peat, 3-7% slope ((018B)
407 = Salamatof Peat, 0-2% slope (019)
408 = Triumvirate Silt Loam, 0-2% sope (023)
409 = Moose River Silt Loam, 0-2% slope (024)
410 = Mutnala Silt Loam, 0-2% slope (30A)
411 = Mutnala Silt Loam, 2-7% slope (30B)
412 = Mutnala Silt Loam, 7-12% slope (30C)
413 = Mutnala Silt Loam, 12-20% slope (30D)
414 = Mutnala Silt Loam, 7-20% slope (30C-D)
415 = Mutnala Silt Loam, 20-30% slope (30E)
416 = Mutnala Silt Loam, 30-45% slope (30F)
417 = Mutnala Silt Loam, 20-45% slope (30EF)
418 = Mutnala-Chichantna Complex, 2-7% slope (30-18CD)
419 = Mutnala-Slikok Complex, 2-7% slope (30-31B)
420 = Mutnala-Slikok Complex, 7-12% slope (30-31C)
421 = Mutnala-Spenard Commplex, 2-7% slope (30-90B)
422 = Slikok Mucky Silt Loam, 0-2% slope (31A)
423 = Slikok Mucky Silt Loam, 2-7% slope (31B)
424 = Starichkof Peat, 0-2% slope (33A)
425 = Starichkof Peat, 2-7% slope (33B)
426 = Doroshin Peat, 0-2% slope (56A)
427 = Doroshin Peat, 2-7% slope (56B)
428 = Killey Silt Loam, 0-2% slope (63)
429 = Killey-Moose River Complex, 0-2% slope (63-24)
430 = Clunie Peat (64)
431 = Tidal Flats (65)
432 = Susitna Fine Sandy Loam, 0-2% slope (077)
433 = Wasilla Silt Loam, 0-2% slope (079)
434 = Chedatna Silt Loam, 0-2% slope (080)
435 = Lucile Silt Loam, 0-2% slope (085)
436 = Lucile Sandy Substratum, 0-2% slope (086A)
437 = Spenard Silt Loam, 0-2% slope (90A)
438 = Spenard Silt Loam, 2-7% slope (90B)
439 = Talkeetna Silt Loam, 7-12% slope (93C)
440 = Talkeetna Silt Loam, 12-20% slope (93D)

441 = Talkeetna Silt Loam, 20-30% slope ((93E)
442 = Talkeetna Silt Loam, 30-45% slope (93F)
443 = Chuit Silt Loam, Hummocky Phase, 3-12% slope (95BC)
444 = Chuit Silt Loam, Hummocky Phase, 12-30% slope (95DE)
445 = Chuit Silt Loam, Hummocky Phase, 30%+ slope (95FG)
446 = Chuit Silt Loam, Hummocky Phase, 20-45% slope (95EF)
447 = Rock Outcrop-Chuit Complex, 7-12% slope (96CD)
448 = Rock Outcrop-Chuit Complex, 20-45% slope (96EF)
449 = Rock Outcrop, 45%+ slope (96G)
450 = Fluvent (107)
451 = Rabideux Silt Loam, 0-2% slope (126A)
452 = Rabideux Silt Loam, 2-7% slope (126B)
453 = Rabideux Silt Loam, 7-12% slope (126C)
454 = Rabideux Silt Loam, 12-20% slope (126D)
455 = Rabideux Silt Loam, 20-30% slope (126E
456 = Rabideux Silt Loam, 30-45% slope (126F)
457 = Judd Silt Loam, 0-2% slope (0130)
458 = Tidal Marsh (188)
459 = Rabideux Sand Substratum, 0-2% slope (0526A)
460 = Rabideux Sandy Substratum, 2-7% slope (0526B)
461 = Rabideux Sandy Substratum, 7-12% slope (0526C)
462 = Niklason Fine Sandy Loam, 0-2% slope (577)
463 = Nancy Sandy Substratum (Kashihitna) (687)
464 = Susitna Niklason Complex, 0-2% slope (777)
465 = Lithic Cryorthod 7-20% complex slopes (1001CE)
466 = Flat Horn Silt Loam, 2-7% slope (83B)
467 = Hewitt Peat, 0-2% slope (270)
468 = Mutnala-Slikok Complex, 0-2% slope (30-31A)
469 = Schrock Silt Loam, 0-2% slope (125)
470 = Lithic Cryorthod, 7-12% slope (1001C)
471 = Nancy Silt Loam, 0-2% slope (87A)
472 = Nancy Silt Loam, 2-7% slope (87B)
473 = Nancy Silt Loam, 7-12% slope (87C)
474 = Talkeetna Silt Loam, 2-7% slope (93B)
475 = Lucile Silt Loam, 2-7% slope (85B)
476 = Lucile Silt Loam, 7-12% slope (85C)
477 = Starichkof Peat, 7-12% slope (33C)
478 = Mutnala-Spenard Complex, 7-12% slope (30-90C)
479 = Bernice Sandy Loam, 30-45% slope (13F)
480 = Flat Horn Silt Loam, 0-2% slope (83A)
481 = Chuit Silt Loam, Hummocky Phase, greater than 45% slope (95G)
482 = Seely (60B)
483 = Chuit Silt Loam, Hummocky Phase, 7-20% slope (95CD)
484 = Seely (60C)
485 = Seely (60D)
486 = Mutnala-Slikok Complex, 12-20% slope (30-31D)
487 = Nancy Silt Loam, Sandy Substratum, 2-7% slope (687B)
488 = Nancy Silt Loam, Sandy Substratum, 7-12% slope (687C)
489 = Susitna-Niklason Overflow, 0-2% slope (677)
490 = Jacobsen Very Stony Silt Loam, 0-2% slope (123)

491 = Mutnala Silt Loam, 0-7% slope (30AB)
492 = Hewitt Peat, 0-2% slope (270)
493 = Rabideux Silt Loam, Shallow, 0-2% slope (626)
494 = Mutnala Silt Loam, nearly level (135A)
495 = Mutnala Silt Loam, (135)
496 = Whitsol Silt Loam, 2-7% slope (587B)
497 = Whitsol Silt Loam, 7-12% slope (587C)
498 = Mutnala-Slikok Complex, 7-12% complex slopes (30CD-31)
499 = Chuit Silt Loam, Hummocky Phase, 30-45% slope (95F)
500 = Mutnala Silt Loam, greater than 45% slope (30G)
501 = Spenard Silt Loam, 7-12% slope (90C)
502 = Mutnala-Slikok Complex, 30-45% slope (30-31F)
503 = Killey-Moose River Complex, 0-2% slope (24-63)
504 = Homestead Silt Loam, undulating (HOB)
505 = Rough broken land (terrace escarpments) (113)
506 = Talkeetna rock outcrop, greater than 45% slope (93G)
507 = Whitsol Silt Loam, 30-45% slope (587F)
508 = Whitsol Silt Loam, 20-30% slope (587E)
509 = Rough Mountainous Land (9)
510 = Talkeetna Silt Loam, 0-2% slope (93A)
511 = Bernice Sandy Loam, 45%+ slope (13G)
512 = Daneka Silt Loam, 2-7% slope (312B)
513 = Daneka Silt Loam, 7-12% slope (312C)
514 = Daneka Silt Loam, 12-20% slope (312D)
515 = Daneka Silt Loam, 20-30% slope (312E)
516 = Daneka Silt Loam, 30-45% slope (312F)
517 = Daneka Silt Loam, greater than 45% slope (312G)
518 = Daneka Silt Loam, 0-2% slope (312A)
519 = Jacobsen very stony silt loam, 7-12% slope (123C)
520 = Daneka Silt Loam, 7-20% slope (312CD)
521 = Schrock Silt loam, 2-7% slope (125B)
522 = Grubstake Silt Loam, 20-30% slope (313E)
523 = Jacobsen Very Stony Silt Loam, 2-7% slope (123B)
524 = Grubstake Silt Loam, 7-12% slope (313C)
525 = Homestead Silt Loam, very shallow, 20-30% slope (572E)
526 = Homestead Silt Loam, very shallow, 0-2% slope (572A)
527 = Kliskon, 7-12% slope (38C)
528 = Kliskon, 2-7% slope (38B)
529 = Rock Outcrop-Chuit Complex, greater than 45% slope (96G)
530 = Talkeetna Silt Loam, 2-12% slope (93BC)
531 = Kliskon, 0-2% slope (38A)
532 = Rabideux Silt Loam, cool phase, 0-2% slope (121A)
533 = Rabideux Silt Loam, cool phase, 2-7% slope (121B)
534 = Rabideux Silt Loam, cool phase, 7-12% slope (121C)
535 = Slikok Mucky Silt Loam, 7-12% slope (31C)
536 = Chuit Silt Loam, Hummocky Phase, 12-20% slope (95D)
537 = Talkeetna Silt Loam, 7-20% slope (93CD)
538 = Talkeetna-Slikok Complex, 7-12% slope (93-31E)
539 = Chulitna-Slikok Complex, 7-12% slope (526-31C)
540 = Chulitna-Slikok Complex, 12-20% slope (526-31D)

541 = Watana Silt Loam, 20-30% slope (311E)
542 = Mutnala-Chichantna Complex, 2-7% slope (30-18B)
543 = (Glacial) Glacial
544 = Mutnola Silt Loam, 12-30% slope (30DE)
545 = Mutnola-Drill Creek Complex, 12-20% slope (30-17CS)
548 = Yenlo Silt Loam, 2-12% slope (97BC)
549 = Yenlo Silt Loam, 20-30% slope (97E)
550 = Yenlo Silt Loam, 30%+ slope (97FG)
551 = Talkeetna Silt Loam, 12-30% slope (93DE)
552 = Yenlo-Chichantna Complex, 7-20% slope (97-18CD)
553 = Talkeetna-Chichantna Complex, 12-20% slope (93-18D)
554 = Talkeetna-Chichantna Complex, 20-30% slope (93-18E)
555 = Yenlo Silt Loam, 12-20% slope (97D)
556 = Rabideux Silt Loam (128A)
557 = Mutnala Silt Loam, 2-12% slope (30BC)
558 = Chuit Silt Loam, Hummocky Phase, 7-12% slope (95C)
570 = Glacial Rubble Land
578 = Chuit Silt Loam, Hummocky Phase, 2-7% slope (95B)
579 = Spenard Silt Loam, 12-30% slope (90DE)
581 = Whitsol Silt Loam, 12-20% slope (587D)
582 = Youngstown Silt Loam, 0-2% slope (15A)
583 = Youngstown Silt Loam, 2-7% slope (15B)
584 = Nancy Silt Loam, Sandy Substratum, 0-2% slope (687A)
585 = Seeley Silt Loam, 2-7% slope (60B)
586 = Tyonek Peat, 0-2% slope (20)
587 = Yenlo Silt Loam, 0-2% slope (97A)
588 = Clunie Peat (=430) (260)
589 = Yenlo-Drill Creek Complex, 2-7% slope (97-17B)
590 = Cobbly Coal Creek (10R)
591 = Inceptisol-Starichkof-Mutnala Complex, 0-7% slope (10T)
592 = Judd Silt Loam, 7-12% slope (130C)
593 = Whitsol Silt Loam, 0-2% slope (587A)
594 = Judd Silt Loam, 2-7% slope (130B)
595 = Whitsol Silt Loam, 45%+ slope (587G)
596 = Yenlo Silt Loam, 2-7% slope (97B)
597 = Yenlo Silt Loam, 7-12% slope (97C)
598 = Yenlo Silt Loam, 12-30% slope (97DE)
599 = Yenlo Silt Loam, 30-45% slope (97F)

No Soil Survey
(ESRI Extrapolation)

600 = Alluvial Land
601 = Susitna-Niklason Complex, 0-2% slope
602 = Salamatof peat, 0-2% slope
603 = Niklason Fine Sandy Loam, 0-2% slope
604 = Mutnala Silt Loam, 207% slope
605 = Mutnala-Spenard Complex, 2-7% slope
606 = Starichkof Peat, 0-2% slope
607 = Mutnala Silt Loam, 12-2-% slope

608 = Slikok Mucky Silt Loam, 0-2% slope
609 = Chultna Silt Loam, 2-7% slope
610 = Rabideux Silt Loam, 2-7% slope
611 = Rabideux Silt Loam, 2-7% slope
612 = Rabideux Silt Loam, 7-12% slope
613 = Rabideux Silt Loam, 12-20% slope
614 = Rabideux Silt Loam, 20-30% slope
615 = Rabideux Silt Loam, 30-45% slope
616 = Moose River Silt Loam, 0-2% slope
617 = Doroshin Peat, 0-2% slope
618 = Spenard Silt Loam, 0-2% slope
619 = Spenard Silt Loam, 2-7% slope
620 = Mutnala Silt Loam, 7-12% slope
621 = Mutnala Silt Loam, 20-30% slope
622 = Lucile Silt Loam, 0-2% slope
623 = Nancy Silt Loam, 0-2% slope
624 = Nancy Silt Loam, 30-45% slope
625 = Nancy Silt Loam, 20-30% slope
626 = Nancy Silt Loam, 2-7% slope
627 = Talkeetna Silt Loam, 2-7% slope
628 = Talkeetna Silt Loam, 7-12% slope
629 = Talkeetna Silt Loam, 12-20% slope
630 = Talkeetna Silt Loam, 20-30% slope
631 = Talkeetna Silt loam, 30-45% slope
632 = Deneka Silt Loam, 7-12% slope
633 = Deneka Silt Loam, 12-20% slope
634 = Deneka Silt Loam, 20-30% slope
635 = Deneka Silt Loam, greater than 45% slope
636 = Schrock Silt Loam, 0-2% slope
637 = Kashwitna Silt Loam, 2-7% slope
638 = Jacobsen Very Stony Silt Loam, 0-2% slope
639 = Kashwitna Silt Loam, 0-2% slope
640 = Niklason Fine Sandy Loam, 0-2% slope
641 = Bernice Sandy Loam, 30-45 % slope
642 = Jacobsen Very Stony Silt Loam, 2-7% slope
643 = Mixed Alluvial Land
644 = Killey-Moose River Complex, 0-2% slope
645 = Moose River Silt Loam, 0-2% slope
646 = Mutnala Silt Loam, 12-20% slope
647 = Mutnala Silt Loam, 30-45% slope
648 = Kashwitna Silt Loam, 7-12% slope
649 = Nancy Silt Loam, 12-20% slope
650 = Killey-Moose River Complex, 0-2% slope
651 = Chuit Silt Loam - Hummocky Phase, greater than 45% slope
652 = Chuit Silt Loam - Hummocky Phase, 3-12% slope
653 = Chuit Silt Loam - Hummocky Phase, 12-30% slope
654 = Chuit Silt Loam - Hummocky Phase 30-45% slope
655 = Rock Outcrop, greater than 45% slope
656 = Judd Silt Loam, 0-2% slope
657 = Hewitt Peat, 0-2% slope

658 = Fluvent
659 = Susitna Fine Sandy Loam, 0-2% slope
660 = Starichkof Peat, 2-7% slope
661 = Doroshin Peat, 2-7% slope
662 = Yenlo Silt Loam, 12-30% slope
663 = Yenlo Silt Loam, 30-45% slope
664 = Yenlo Silt Loam, 30%+ slope
665 = Youngstown Silt Loam, 0-2% slope
666 = Youngstown Silt Loam, 2-7% slope
667 = Rock Outcrop-Chuit Complex, 7-12% slope
668 = Chuit Silt Loam, Hummocky Phase, 20-45% slope
669 = Talkeetna Silt Loam, 7-20% slope
670 = Whitsol Silt Loam, 2-7% slope
671 = Whitsol Silt Loam, 7-12% slope
672 = Whitsol Silt Loam, 12-20% slope
673 = Whitsol Silt Loam, 20-30% slope
674 = Whitsol Silt Loam, 30-45% slope
675 = Rabideux Silt Loam, cool, 0-2% slope
676 = Rabideux Silt Loam, cool, 2-7% slope
677 = Cobbly Coal Creek
678 = Chuit Silt Loam, Hummocky Phase, 20-45% slope
679 = Mutnala Silt Loam, 2-12% slope
680 = Killey Silt Loam, 0-2% slope
681 = Spenard Silt Loam, 7-12% slope
682 = Spenard Silt Loam, 12-20% slope
683 = Wasilla Silt Loam, 0-2% slope
684 = Fluvent
685 = Mutnala-Slikok Complex, 2-7% slope
686 = Yenlo Silt Loam, 2-12% slope
687 = Chichantna Peat, 3-7% slope
698 = Glacial Rubble Land
699 = Glacial

999 = Water

Columns (17, 18, 19, 20, 21, 22 and 23)

00000000 = No Data

LAND USE

Land Use (Columns 24, 25, 26 and 27)

AGRICULTURE

0110 = Pasture
0120 = Grain, Grass
0130 = Vegetables
0140 = Dairy

0150 = Other

RESIDENTIAL

0210 = Dispersed Residential
0220 = Low Density
0230 = Medium Density
0240 = High Density
0250 = Commercial (Hotel, Motel or Lodge)

COMMERCIAL

0310 = Eating and Drinking Establishment
0320 = Food
0330 = General Merchandise
0340 = Apparel and Accessories
0350 = Furniture or Home Furnishings and Equipment
0360 = Building Materials, Hardware or Farm Equipment
0370 = Auto Dealers or Gasoline Service Stations
0380 = Other

MANUFACTURING

0410 = Food
0420 = Lumber or Wood Products
0430 = Gravel or Cement Products
0440 = Other

SERVICES

0510 = Miscellaneous Business Services
0520 = Personal
0530 = Professional
0540 = Finance, Construction or Real Estate
0550 = Repair
0560 = Other

PUBLIC/QUASI-PUBLIC SERVICES

0610 = Military
0620 = Governmental Institution
0630 = Educational Institution
0640 = Health Institution
0650 = Church or Community Center
0660 = Cemetary
0670 = Solid Waste Disposal Site
0680 = Other

COMMUNICATION FACILITY

0700 = Communication Facility, Undifferentiated

TRANSPORTATION FACILITY

0810 = Airport
  0811 = Public Access
  0812 = Private Access
0820 = Marine, Port or Dock Facility

UTILITY

0900 = Utilities, Undifferentiated

RESOURCE EXTRACTION

1020 = Sand/Gravel Quarry and Borrow Pit
1030 = Surface Mine
1040 = Gas Well Field
  1041 = Inactive
  1042 = Active
1050 = Oil Well Field
  1051 = Inactive
  1052 = Active
1060 = Timber

1070 = Mineral Extraction Site

MIXED URBAN BUILT UP

1100 = Mixed Urban Built Up

UNDER CONSTRUCTION

1200 = Under Construction

VACANT DISTURBED

1300 = Vacant Disturbed

OUTDOOR RECREATION (Source: DNR Land Use Maps, Imagery)

1410 = Marine Boat Launching Sites
1420 = Public Park, Campground, Refuge
1430 = Private Resort, Park, Group Camp

RECREATION (Source: DNR Recreation Map)

1510 = Bird Watching
1520 = Bird Watching/Mountaineering
1530 = Mountaineering

1540 = Lake Boating/Lake Canoeing
1550 = Lake Boating/Lake Canoeing/Lake Fishing
1551 = Lake Boating/Lake Canoeing and Intensive Fishing
1552 = Lake Boating/Lake Canoeing and Moderate Fishing
1553 = Lake Boating/Lake Canoeing and Light Fishing
1554 = Lake Boating/Lake Canoeing and Very Light Fishing
1560 = Lake Fishing
1561 = Intensive Fishing
1562 = Moderate Fishing
1563 = Light Fishing
1564 = Very Light Fishing

NATURAL LANDS

1600 = Natural Lands, Undifferentiated (Including Water Bodies)

VEGETATION

Primary Vegetation (Columns 28 and 29)
Secondary Vegetation (Columns 30 and 31)
Tertiary Vegetation (Columns 32 and 33)
Quaternary Vegetation (Columns 34 and 35)

FOREST AND WOODLAND

Closed Forest

21 = Coniferous Forest, White Spruce, Short Stands
22 = Deciduous Forest, Mixed Forest, Young Stands
24 = Deciduous Forest, Mixed Forest, Medium-Aged Stands
25 = Coniferous Forest, White Spruce, Tall Stands
26 = Deciduous Forest, Mixed Forest, Old Stands
27 = Cottonwood, Young Stands
28 = Cottonwood, Medium-Aged Stands
29 = Cottonwood, Old Stands

Open Forest-Woodland

31 = Coniferous Forest, White Spruce, Short Stands
32 = Deciduous Forest, Mixed Forest, Medium-Aged Stands
33 = Coniferous Forest, White Spruce, Tall Stands
34 = Deciduous Forest, Mixed Forest, Old Stands
35 = Cottonwood, Medium-Aged Stands
36 = Cottonwood, Old Stands

Closed Forest (Black Spruce Mountain Hemlock)

41 = Black Spruce, Short Stands
42 = Black Spruce, Tall Stands

45 = Mountain Hemlock, Short Stands
46 = Mountain Hemlock, Tall Stands

Open Forest-Woodland (Black Spruce)

43 = Black Spruce, Short Stands

NON FORESTED

Salt Water Wetlands

50 = Salt Grassland
51 = Low Shrub
52 = Tidal marsh

Tall Shrubs

60 = Alder
61 = Alder-Willow (streamside veg.)

Low Shrub

62 = Willow Resin Birch

Grassland

63 = Upland Grass

Tundra

64 = Sedge-Grass
65 = Herbaceous
66 = Shrub
67 = Mat and Cushion

Freshwater Wetlands

68 = Sphagnum Bog
69 = Sphagnum-Shrub Bog

Cultural Features

70 = Cultural Influences

Barren

80 = Mud Flats
81 = Rock

Permanent Snow and Ice

82 = Snowfield
83 = Glacier

Water

91 = Lakes greater than 40 ac. (census water)
92 = Lakes at least 10 ac., but less than 40 ac.
96 = Streams and Rivers at least 165 feet wide, but less than 500 feet wide
97 = Rivers greater than 1/8 mile (census water)

MANUSCRIPT #2
SURFACE HYDROLOGY MAP
DATA CLASSIFICATION AND CODING

STREAM NETWORK

Order Column 1

1 - 8

Periodicity (Column 2)

1 = Intermittent
2 = Perennial

Origin (Column 3)

1 = Non Glacial
2 = Glacial

Discharge Profile (Column 4)

1 = Lowland
2 = Mountain

Situation (Column 5)

1 = Not Within Waterbody
2 = Within Waterbody

Condition (Column 6)

1 = Non Braided
2 = Braided

Salmon Type (Columns 7-11)

King Salmon (Column 7)
Sockeye Salmon (Column 8)
Coho Salmon (Column 9)
Pink Salmon (Column 10)
Chum Salmon (Column 11)

0 = No Data
1 = Salmon Not Present
2 = Salmon Present, But Not Spawning
3 = Salmon Present, Discontinuous Spawning
4 = Salmon Present, Known Spawning Area

Non-Salmon Freshwater Fish Type (Column 12-15)

Dolly Varden (Column 12)
Arctic Char (Column 13)
Rainbow Trout (Column 14)
Whitefish (Column 15)

0 = No Data
1 = Not Present
2 = Present

WATERSHED

Topologic Number (Columns 1-7)*

8th Order of Higher (Column 1)
7th Order (Column 2)
6th Order (Column 3)
5th Order (Column 4)
4th Order (Column 5)
3rd Order (Column 6 and 7)

I. 8th order of higher watershed basins

A. 1000000 = All basins draining into the 8th order Susitna River.

B. 2000000 = All basins draining into the Cook Inlet

C. 3000000 = Special watershed draining both directions; into the Susitna and the Cook Inlet.

D. 4000000 = Special watershed draining both directions into McArthur River and the Cook Inlet.

II. 7th order basins comprising Susitna River 8th

A. 7th order basins within Susitna River 8th
1. 1200000 = Yentna River 7th

III. 6th order basins

A. 6th order basins comprising Susitna River 7th

1. 1210000 = Yentna River 6th (13)
2. 1220000 = Skwentna River 6th (33)

---

*GRID code in parenthesis.

B. 6th order basins draining directly into the Cook Inlet

1. 2010000 = Beluga River 6th (66)

IV. 5th order basins

A. 5th order basins within Yentna River 6th

1. 1211000 = East Fork Yentna River 5th (20)
2. 1212000 = West Fork Yentna River 5th (24)
3. 1213000 = Kichatna River 5th (26)

B. 5th order basins within Skwentna River 6th

1. 1221000 = Talachulitna River 5th (38)

C. 5th order basins draining both directions into McArthur River and Cook Inlet.

1. 4001000 = Chakachatna River 5th (94)

D. 5th order basin draining directly into Yentna River 8th

1. 1202000 = Lake Creek 5th (out of study)

E. 5th Order Basins Within Beluga River 6th

1. 2011000 = Beluga River 5th (78)
2. 2011200 = Coal Creek 5th (87)

F. 5th order basins draining directly into the Susitna River 8th

1. 1001000 = Alexander Creek 5th (out of study area)

V. 4th order basins

A. 4th order basins draining directly into Yentna River 6th

1. 1210100 = Johnson Creek 4th (18)

B. 4th order basins within Kichatna River 5th

1. 1213100 = Kichatna River 4th (27)
2. 1213200 = Unnamed 4th (30)

C. 4th order basins draining directly into Skwentna River 6th

1. 1220200 = Hayes River 4th (36)

D. 4th order basins draining directly into Cook Inlet

1. 2000300 = Chuitna River 4th (60)

E. 4th order basins draining directly into Beluga River 6th

1. 2010100 = Unnamed 4th (71)
2. 2010200 = Unnamed 4th (74)

F. 4th order basins within Beluga River 5th

1. 2011100 = Beluga River 4th (79)
2. 2011200 = Chichantna River 4th (83)

G. 4th order basins within Chakachatna River 5th

1. 4001100 = Straight Creek 4th (96)

H. 4th order basins within Lake Creek 5th

1. 1202100 = Camp Creek 4th (out of study)

I. 4th order basins within Lake Creek 5th

1. 1202200 = Lake Creek 4th (out of study)

J. 4th order basins within Coal Creek 5th

1. 2012100 = Coal Creek 4th (88)
2. 2012200 = West Fork Coal Creek 4th (90)

K. 4th order basins within Alexander Creek 5th

1. 1001100 = Wolverine/Lower Sucker Creek 4th
2. 1001200 = Alexander Creek 4th

L. 4th order basins within Talachulitna River 5th

1. 1221100 = Talachulitna Creek 4th (42)
2. 1221200 = Talachulitna River 4th (45)
3. 1221300 = Friday Creek 4th (49)

VI. 3rd order basins

A. 3rd order basins draining directly into Lake Creek 5th

1. 1202004 = Home Creek 3rd (8)

B. 3rd order basins within Camp Creek 4th

1. 1202101 = Mills Creek 3rd (9)
2. 1202102 = Camp Creek 3rd (10)

C. 3rd order basins within Lake Creek 4th

1. 1202201 = Sunflower Creek 3rd (11)
2. 1202202 = Lake Creek 3rd (12)

D. 3rd order basins drainiing directly into Yentna River 6th

1. 1210001 = Hewitt Creek 3rd (14)
2. 1210002 = Donkey Creek 3rd (15)
3. 1210003 = Unnamed 3rd (16)
4. 1210004 = Clearwater Creek 3rd (17)

E. 3rd order basins within Johnson Creek 4th

1. 1210101 = Red Creek 3rd (19)

F. 3rd order basins draining directly into East Fork Yentna River 5th

1. 1211001 = Rich Creek 3rd (21)
2. 1211002 = Unnamed 3rd (22)
3. 1211003 = Unnamed 3rd (23)

G. 3rd order basins draining directly into West Fork Yentna River 5th

1. 1212001 = Unnamed 3rd (25)

H. 3rd order basins within Kichatna River 4th

1. 1213101 = Unnamed 3rd (28)
2. 1213102 = Nakochna River 3rd (29)

I. 3rd order basins within Unnamed 4th (1213200)

1. 1213201 = Unnamed 3rd (31)
2. 1213202 = Unnamed 3rd (32)

J. 3rd order basins draining directly into Skwentna River 6th

1. 1220001 = Shell Creek 3rd (34)
2. 1220002 = Canyon Creek 3rd (35)

K. 3rd order basins within Hayes River 4th

1. 1220201 = Unnamed 3rd (37)

L. 3rd order basins draining directly into Talachulitna River 5th

1. 1221003 = Thursday Creek 3rd (39)
2. 1221004 = Unnamed 3rd (40)
3. 1221005 = Deep Creek 3rd (41)

M. 3rd order basins within Talachulitna Creek 4th

1. 1221101 = Unnamed 3rd (43)
2. 1221102 = Talachulitna Creek 3rd (44)

N. 3rd order basins within Talachulitna River 4th

1. 1221201 = Talachulitna River 3rd (46)
2. 1221202 = Unnamed 3rd (47)
3. 1221203 = Unnamed 3rd (48)

O. 3rd order basins within Friday Creek 4th

1. 1221301 = Friday Creek 3rd (50)
2. 1221302 = Saturday Creek 3rd (51)
3. 1221303 = Unnamed 3rd (52)

P. 3rd order basins draining directly into Cook Inlet

1. 2000001 = Theodore River 3rd (54)
2. 2000002 = Lewis River 3rd (55)
3. 2000003 = Three Mile Creek 3rd (56)
4. 2000004 = Old Tyonek Creek 3rd (57)
5. 2000005 = Nikolai Creek 3rd (58)
6. 2000006 = Chuitkinachna Creek 3rd (59)

Q. 3rd order basins within Chuitna River 4th

1. 2000301 = Lone Creek 3rd (61)
2. 2000302 = Unnamed 3rd (62)
3. 2000303 = Chuit Creek 3rd (63)
4. 2000304 = Chuitna River 3rd (64)
5. 2000305 = Unnamed 3rd (65)

R. 3rd orders basins draining directly into Beluga River 6th

1. 2010001 = Unnamed 3rd (67)
2. 2010002 = Unnamed 3rd (68)
3. 2010003 = Unnamed 3rd (69)
4. 2010004 = Pretty Creek 3rd (70)

S. 3rd order basins within unnamed 4th (2010200)

1. 2010201 = Unnamed 3rd (75)
2. 2010202 = Unnamed 3rd (76)
3. 2010203 = Unnamed 3rd (77)

T. 3rd order basins within Beluga River 4th

1. 2011101 = Unnamed 3rd (80)

2. 2011102 = Unnamed 3rd (81)
3. 2011103 = Unnamed 3rd (82)

U. 3rd order basins within Chichantna River 4th

1. 2011201 = Unnamed 3rd (84)
2. 2011202 = Chichantna River 3rd (85)
3. 2011203 = Unnamed 3rd (86)

V. 3rd order basins within Coal Creek 4th

1. 2012101 = Unnamed 3rd (89)

W. 3rd order basins within West Fork Coal Creek 4th

1. 2011101 = West Fork Coal Creek 3rd (91)
2. 2012202 = Unnamed 3rd (92)

X. 3rd order basins within unnamed 4th (2010100)

1. 2010101 = Unnamed 3rd (72)
2. 2010102 = Unnamed 3rd (73)

Y. 3rd order basins within Wolverine/Lower Sucker Creek 4th

1. 1001102 = Wolverine Creek 3rd (4)

Z. 3rd order basins within Alexander Creek 4th

1. 1001201 = Bear Creek 3rd (5)
2. 1001202 = Clear Creek 3rd (6)
3. 1001203 = Deep Creek 3rd (7)

AA. 3rd order basins draining directly into Alexander Creek 5th

1. 1001001 = Trail Creek 3rd (3)

BB. 3rd order basins draining directly into Susitna River 8th

1. 1000001 = Unnamed 3rd (2)

CC. 3rd order basins both directions into Susitna River and Cook Inlet

1. 3000001 = Ivan River 3rd (93)

DD. 3rd order basins draining directly into Chakachatna River 5th

1. 4001001 = Unnamed 3rd (95)

EE. 3rd order basins within Straight Creek 4th

1. 4001101 = Straight Creek 3rd (97)
2. 4001102 = Unnamed 3rd (98)

MANUSCRIPT #3
POINTS AND LINEAR FEATURES MAP
DATA CLASSFICATION AND CODING

NATURAL LINES

No data (Columns 1 and 2)

00 = No data

Escarpments, Column 3 (Lines)

1 = Not an Escarpment
2 = Escarpment

Fault Lines, Column 4 (Lines)

1 = Not a Fault Line
2 = Possible Fault (requires field verification)
3 = Suspected or Inferred Fault
4 = Known Fault

CULTURAL LINEAR FEATURES*

Roads/Trails/Infrastructure Network, Column 1 and 2

Roads

11 = Non Paved Road
12 = Paved Road
13 = Non Paved Road and Existing Utility Corridor
14 = Paved Road and Existing Utility Corridor

Trails

21 = Existing Trail (1)

Seismic Survey Lines

31 = Existing Seismic Survey Line (1)

Utility Corridors

51 = Existing Utility Corridor (2)

NOT USED (Columns 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14)

000000000000 = No Data

* Grid codes in parenthesis

CULTURAL POINTS

Extractive Sites, Column 15, 16, 17 and 18

1020 = Sand/Gravel Quarry and Borrow Pit
1030 = Subsurface Mine Entrance
1040 = Gas Well
  1041 = Inactive
  1042 = Active
1050 = Oil Well
  1051 = Inactive
  1052 = Active
1060 = Abandoned Gas or Oil Well

MANUSCRIPT #4
LAND STATUS MAP
DATA CLASSIFICATION AND CODING

TOWNSHIP

Township, Columns 1, 2, 3, 4, 5, 6 and 7

Township

Number of Township, Column 1 and 2
(i.e., 07 = Township 7)

North/South Designation, Column 3

1 = North
2 = South

Name of Baseline, Column 4

1 = Unnamed Baseline

Range

Number of Range, Column 5 and 6
(i.e., 12 - Range 12)

East/West Designation, Column 7

1 = East
2 = West

# Appendix B

## Data Code Descriptions

Integrated Terrain Unit Map
Surface Hydrology Map
Points and Linear Features Map
Land Status Map

MANUSCRIPT #1
INTEGRATED TERRAIN UNIT MAP
DATA CODE DESCRIPTIONS

SLOPE

Slope is defined as the angle which any part of the earth's surface makes with a horizontal datum. For the Talkeetna and Beluga Subbasin resource inventories, slope was mapped by percent slope class. The assigned value represents the average percent slope within the terrain unit polygon. Some variation will occur within each polygon because of minor surface fluctuations. The same slope classes were chosen to be mapped on the terrain units that were mapped as phase breaks in SCS soil surveys.

0 - 3% = Nearly level

3 - 7% = Undulating, gently sloping

7- 12% = Rolling

12-20% = Hilly

20-30% = Moderately Steep

30-45% = Steep

45% and greater = Extremely Steep

| Percent Slope | Angle of Inclination | Slope Ratio | Gradient (feet per mile) |
|---|---|---|---|
| 3 | 1 43' | 33.3:1 | 158.4 |
| 7 | 4 7' | 14.3:1 | 369.6 |
| 12 | 6 53' | 8.3:1 | 633.6 |
| 20 | 11 28' | 5:1 | 1056 |
| 30 | 17 11' | 3.3:1 | 1584 |
| 45 | 25 47' | 2.2:1 | 2376 |

LANDFORMS

Landforms are the distinctive configurations of the land surface and are environmentally significant because they influence the place to place variation in ecological factors such as water availability and exposure to radiant solor energy.

PHYSIOGRAPHIC DIVISION

Physiographic division is a type of landform classification which divides the land surface into broad major categories.

1 = Mountain: A sloping mass of land considerably higher than its surroundings. Its summit area is smaller than its base and has an elevation over 1500 feet.

2 = Hill: An elevated portion of the earth's surface which has an undulating to moderately steep sloping surface. Hills are generally found along the foot of mountainous areas and have elevations less than 1500 ft.

3 = Slope: A moderately steep to steep portion of the earth's surface generally located between valley and mountain or hill and mountain physiographic divisions.

4 = Plateau: An elevated tract of comparatively flat or level land.

5 = Valley: A relatively flat depression in the earth's surface formed either by erosion or by structural processes.

6 = Coastal Lowland: Regional features of low relief bounded seaward by the shore and landward by highlands.

7 = Glacier: A extensive slowly flowing body of ice formed on land by snow transformed into ice by pressure recrystallization of the snow.

8 = Waterbody: Any accumulation of water which occurs on the earth's

surface. For the Willow Sub-basin Resource Inventory, only waterbodies over 5 acres and rivers over 1/8 of a mile wide were mapped.

LANDFORM TYPE

A landform type is any element of the landscape characterized by a distinctive surface expression, internal structure, or both, and sufficiently conspicuous to be included in a physiographic description. Physiographic divisions are subdivided by the more detailed landform type classification.

Glacial

Glacial landforms are created or deposited by a glacier.

110 = Moraine: An accumulation of glacial till (glacial sediments ranging in size rom huge boulders to fine dust) deposited chiefly by direct glacial action. The resulting landforms are undulating, poorly drained, and exhibit a topography which is independent of control by the surface on which the moraine lies.

111 = End Moraine: A moraine marking the terminal position of a valley glacier.

112 = Lateral Moraine: A low long ridge-like moraine deposited on or near the side margin of a mountain glacier.

113 = Medial Moraine: An enlongated moraine carried in or upon the middle of a valley glacier and parallel to its side, formed by the merging of adjacent lateral moraines below the junction of two coalescing valley glaciers.

114 = Morainal Ridge: A pronounced mound or ridge of till within a moraine.

115 = Rogen Moraine: A ridge-like moraine transverse to the direction of glacial movement formed beneath the glacier in zones of shearing ice sheets.

116 = Ground Moraine: A fairly even thin layer of till deposited directly from a glacier and having an undulating surface.

120 = Till: Unsorted, unstratified sediments carried and deposited by a glacier. It is composed of rock fragments of all sizes and types.

121 = Till, Undifferentiated: A thick layer of till deposited directly from a glacier onto the earth's surface. Till often completely burys pre-existing topography giving rise to nearly flat level surfaces. The composition of the till, both rock type and fragment size, is unspecified.

130 = Drumlin: Till molded by glacial ice into low, enlongated hills with the longer axis parallel to the direction of the glacial movement.

131 = Drumlin-Drumloid: This landform class is a combination of drumlin and drumloid. A drumlin is till molded by glacial ice into low, enlongated hills with the longer axis parallel to the direction of the glacial movement. A drumloid is similar to a drumlin except that its shape is irregular.

132 = Rock Drumlin-Drumlinoid: This landform class is a combination of rock drumlin and drumlinoid. Rock drumlin is a smooth, steamlined hill that resembles a drumlin, but has a bedrock core usually veneered with a thin layer of till formed by glacial erosion. A drumlinoid is an irregularly shaped rock drumlin.

Fluvioglacial

Fluvioglacial landforms are formed or deposited by glacial meltwater.

210 = Outwash: Stratified glacial debris, mainly sand and gravel, deposited by glacial meltwater beyond the end moraine or the margin of an active glacier.

220 = Abandoned Outwash Channel: Outwash deposited by a remnant stream channel which once emerged from a glacier, braided in form, now often covered by wetland and associated organic deposits.

230 = Remnant Subglacial Stream Valey: A stream valley formed by a stream which flowed beneath the once overlying glacier.

240 = Kame Complex: Mounds, hills, or hummocky areas composed of poorly sorted sands and gravels deposited by glacial meltwater in depressions in the ice or fan deposits formed against the edge of an ice sheet. As the glacier melts their form is modified by slumping and settling.

250 = Esker: Low, narrow, sinuous ridges of poorly sorted sands and gravel deposited by streams that ran on, within, or beneath a glacier.

260 = Crevasse Filling: Type of kame that is ridge-like. They are composed of poorly sorted sand and gravels, and are similar in appearance to eskers except that they are smaller and shorter and may extend in any direction to the flow of the glacier (where eskers usually parallel the glacial flow).

270 = Side Glacial Drainage Channels: Drainage channels cut into the hillside along the margins of a glacier by stream.

280 = Flute: Small, longitudinal, shallow channels between small parallel ridges, found on moraines.

Aeolian

Aeolian landforms are shaped or formed by the wind.

310 = Dune: A ridge of sand formed by and constantly changed by wind.

311 = Dune and Outwash Complex: A dune which formed on outwash.

Littoral

Littoral landforms are situated on or near a coast.

410 = Longshore Bar: A low, elongated sand ridge, built chiefly by wave action, occurring at some distance from and extending generally parallel with the shoreline.

Abandoned Coastline: Marks the locations of past ocean levels. They are formed either by a reduction in the ocean level or an emergence of the coast.

Survey Flood Zone: Areas which have been surveyed by the Army Corps of Engineers, and established to be flood prone.

Not Surveyed Flood Zone: Areas established by Aerial Information System (AIS) to be flood prone by using the imagery, topographic maps, soil maps, and soil descriptions.

411 = Longshore Bar Within Abandoned Coastline, Not surveyed Flood Zone: This longshore bar is located on the seaward side of the abandoned coastline and has been established to be flood prone by AIS.

412 = Longshore Bar Within Abandoned Coastline, Surveyed Flood Zone: A longsore bar located on the seaward side of the abandoned coastline which has been established to be flood prone by the Army Corps of Engineers.

420 = Beach: The coastal zone extending from the low tide limit to a place where there is a definite change in material or physiographic form. It must at least partly consist of unconsolidated material like sand, cobble, or boulders.

430 = Barrier Spit: A type of longshore bar connected at one end to the mainland.

440 = Delta: A low, nealy flat accumulation of sediments deposited where rivers empty into lakes or ocean.

441 = Delta-Flood Plain Within Abandoned Coastline, Not Surveyed Flood Zone: A type of delta within the active flood plain of a river and located on the seaward side of the abandoned coastline. It has also been established to be flood prone by AIS.

442 = Delta-Flood Plain Within Abandoned coastline, Surveyed Flood Zone: A type of delta within the active flood plain of a river and located on the seaward side of the abandoned coastline. It has been established to be flood prone by the Army Corps of Engineers.

443 = Delta-Flood Plain, Not Surveyed Flood Zone: A type of delta within the active flood plain of a river. It has been established to be flood prone by AIS.

444 = Delta-Flood Plain, Surveyed Flood Zone: A type of delta within the active flood plain of a river. It has been established to be flood prone by the Army Corps of Engineers.

445 = Delta and Outwash Complex: This landform type is a mixture of delta and outwash landform types. It usually occurs on the interface between the two landform types.

450 = Tidal Flat: A nearly horizontal, marshy or barren tract of land that is alternately covered and uncovered by the rise and fall of the tide, and consists of unconsolidated sediments, mostly mud and sand.

451 = Tidal Flat Within Abandoned Coastline, Not Surveyed Flood Zone: A type of tidal flat located on the seaward side of the abandoned coastline which has been established to be flood prone by AIS.

452 = Tidal Flat Within Abandoned Coastline, Surveyed Flood Zone: A type of tidal flat located on the seaward side of the abandoned coastline which has been established to be flood prone by the Army Corps of Engineers.

460 = Coastal Plain: A sediment-covered area of continental shelf recently emerged above sea level.

Fluvial

Fluvial landforms are formed or shaped by flowing water.

510 = Active Channel: A river plus all of its ephemeral sand bar deposits.

511 = Active Channel, Not Surveyed Flood Zone: Active channels which have been established to be flood prone by Aerial Information Systems.

512 = Active Channel, Surveyed Flood Zone: Active channel which have been established to be flood prone be the Army Corps of Engineers.

520 = River Bar: Ephemeral, alluvial deposits composed largely of silt, sand or gravel. They are mostly unvegetated, but some might have grass and shrub cover.

521 = River Bar, Not Surveyed Flood Zone: River bar which has been established to be a flood prone area by Aerial Information Systems.

522 = River Bar, Surveyed Flood Zone: River bar which has been established to be flood prone by the Army Corps of Engineers.

530 = Flood Plain: A flat strip of land bordering a river. It was constructed or is in the process of being constructed by the present river in its existing regime and is covered with water when the river overflows its bank at time of high water.

Active Flood Plain: A flood plain which is subject to periodic, often yearly, flooding.

Abandoned Flood Plain: A remnant flood plain, portions of which may be infrequently flooded.

531 = Active Flood Plain, Not Surveyed Flood Zone: Active flood plain which has been established to be flood prone by Aerial Informtion Systems.

532 = Active Flood Plain, Surveyed Flood Zone: Active flood plain which has been established to be flood prone by the Army Corps of Engineers.

533 = Abandoned Flood Plain, Not Surveyed Flood Zone: Abandoned flood plain which has been established to be flood prone by Aerial Information Systems.

534 = Abandoned Flood Plain, Surveyed Flood Zone: Abandoned flood plain which has been established to be flood prone by the Army Corps of Engineers.

550 = Alluvial Plain: An extensive, flat area resulting from the deposition of thick deposits of alluvium. Portions of the alluvial plain may be subject to infrequent flooding.

560 = Alluvial Fan/Cone: A body of stream deposits whose surface approximates a segment of a cone that radiates downslope from the point where the stream leaves a mountainous area. Alluvial fans and cones have greatly diverse sizes, slopes, types of deposits and source area characteristics.

570 = Lacustrine Deposits: Material deposited from lake water. Many nearly level fine grained soils have developed from such deposits from lakes that have long since disappeared.

Mass Wasting

Mass wasting is a variety of processes by which large masses of earth material are moved by gravity either slowly or quickly from one place to another.

610 = Colluvium: Unconsolidated debris, rock fragments and soil, carried by sheet wash from hillsides to the base of the slope.

620 = Talus: A collection of loose rock fragments that have accumulated in a sloping pile at the foot of a steep slope.

630 = Landslide Deposits: Materials associated with downslope transport by means of gravity of soil and rock debris.

640 = Rock Glacier: A mass of poorly sorted angular boulders or fine material cemented by interstitial ice, occurring in high mountains in a permafrost area, derived from a cirque wall or other steep cliff by frost action.

650 = Mine Tailings: Those portions of washed ore (usually rock fragments) that are regarded as too poor to be treated further. They are artificially deposited usually near a mining operation.

Tectonic Uplift

Tectonic uplift is a process by which land surfaces are elevated due to deformation of the earth's crust.

710 = Upland Valley: Any hollow or low lying area bounded by hills or mountain slopes. It is usually traversed by a stream or river which receives the drainage of the surrounding heights. An upland valley is one which is found within the mountain physiographic province class.

720 = Mountain Sideslope: The sloping portion of land found within the mountain physiographic province class.

730 = Mountain Ridgetop: The gently sloping area found on the summit of a mountain. It is surrounded on at least two sides by steep mountain sideslopes.

Waterbody

A waterbody is any accumulation of water which occurs on the earths surface. For the Talkeena and Beluga Subbasin Resource Inventories only waterbodies over 5 acres and rivers over 1/8 of a mile wide have been mapped.

810 = Sea: An ocean or a large body of salt water.

820 = Lagoon: An elongated body of water separated from the open sea by longshore bars, which has little connection with the sea.

821 = Lagoon Within Abandoned Coastline, Not Surveyed Flood Zone: A lagoon which lies on the seaward side of the abandoned coastline and which was determined to be flood prone by AIS.

822 = Lagoon Within Abandoned Coastline, Surveyed Flood Zone: A lagoon which lie on the seaward side of the abandoned coastline and which was determined to be flood prone by the Army Corps of Engineers.

830 = Lake: A body of fresh water enclosed by land. Only lakes five acres and larger were mapped for the Talkeetna and Beluga Subbasin Resource Inventories.

831 = Lake

832 = Lake Within Abandoned Coastline, Not Surveyed: A lake which lies on the seaward side of the abandoned coastline and which was determined to be flood prone by AIS.

833 = Lake Within Abandoned Coastline, Surveyed Flood Zone: A lake which lies on the seaward side of the abandoned coastline and which was determined to be flood prone by the Army Corps of Engineers.

834 = Lake in Active Flood Plain, Not surveyed Flood Zone: A lake which is located in an active flood plain and which was determined to be flood prone by AIS.

835 = Lake in Active Flood Plain, Surveyed Flood Zone: A lake which is located in an active flood plain and which was determined to be flood prone by the Army Corps of Engineers.

840 = River: A natural stream of water, fed by converging tributaries, glaciers, or ground water.

841 = River, Not Surveyed Flood Zone: A river which has been established as a flood prone area by Aerial Information systems.

842 = River, Surveyed Flood Zone: A river which has been established as a flood prone area by the Army Corps of Engineers.

Ice and Snow

Non-vegetated areas covered with ice, (glaciers) or snow (permanent snowfield) year round.

910 = Glacier: An extensive slowly flowing body of ice formed on land by snow transformed into ice by pressure recrystallization of the snow.

920 = Permanent Snowfield: Areas covered throughout the year by snow. Permanent snowfields are found in the higher elevations.

GENERAL GEOLOGY

General Geology is divided into the following subsections: Surficial Geology and Bedrock Geology. To assist in interpreting their descriptions, a brief glossary of some important terms is provided at the end of this set of code descriptions.

SURFICIAL GEOLOGY

Surficial Geology describes the material occurring on the earth's surface, consisting of unconsolidated residual, alluvial deposits, glacial deposits, or bedrock surfaces.

1 = No Surficial Deposits: Large areas within the upland and mountain areas of the study area were coded as having no significant surficial deposits. However, much of the lower slopes within this area do have a thin veneer of glacial till and colluvium and within valley bottom, alluvium.

2 = Surficial Deposits: Includes glacial till and outwash, channel fill, alluvium, colluvium and loess deposits. The lowland valley areas are covered by thick deposits of glacial drift and alluvial sediment that consists mainly of gravelly and sandy material, and deposits of silty windlaid sediments and volcanic ash.

3 = Waterbody: Only waterbodies larger than 5 acres were mapped.

4 = Glacier: Areas of glacial ice and/or permanent snowfields on the surface.

BEDROCK GEOLOGY

Bedrock Geology describes the rock formation, ages and types underlying those in surficial geology.

01 = Tertiary Undifferentiated: All the tertiary age formations not identified as a particular formation.

02 = Tertiary Intensive: Made up of dikes, sills, and stock; Felsic to mafic of tertiary age.

03 = Tsadaka Formation: A formation of conglomerates, sandstone, and siltstone of tertiary age.

04 = Arkose Ridge Formation: This unit consists of arkosic sandstone, conglomerate, and shale of paleocene age.

05 = Chickaloon Formation: This unit is composed of claystone, siltstone, sandstone, coal-bearing beds, and conglomerate of Paleocene age.

06 = Tertiary/Cretaceous Plutonic: A general grouping of a pluton mass, or body of igneous rock formed beneath the earth's surface, that has an origin sometime between the Tertiary and Cretaceous periods.

07 = Paleozoic/Jurassic/Cretaceous: A general grouping of partially changed unidentified rock formations found with these periods.

08 = Mesoic/Paleozoic Metamorphozed Schist (MPs): Formation of a medium or coarse grained rock changed over time.

09 = Waterbody

10 = Tyonek Formation (Tts): Ths formation is comprised of predominantly sandstone, but also includes siltstone, coal-bearing beds, and conglomerate of Ogliocene age. The conglomerate may be locally the dominant rock type. The Tyonek formation is part of the Kenai Group.

11 = Mesozoic Marine Sedimentary Rocks, Undivided (Kju): This designation is utilized to refer to an unnamed body of rocks consisting primarily of grawacke, shale, siltstone, argillite, and chert of Jurassic to Cretaceous age.

12 = Metamorphosed Volcanic Rocks (Pvz): This designation is utilized to refer to a body of metavolcanic rocks of Paleozoic age.

13 = Undifferentiated Volcanic Rocks (Tv): This unit is utilized to refer to all unnamed volcanic rocks of Tertiary age. These volcanics may occur as extensive flows, hypabyssal intrusive rocks, pyroclastic tuffs and/or volcanic breccias.

14 = Intrusive Igneous Rock, Granite or Granodiorite (Ruth Pluton) (Tmr): This designation refers to the Ruth Pluton, which consists of a number of shallow, forcibly emplaced, epizonal plutonic bodies of granodiorite composition formed during the Paleocene to possibly Eocene Age.

15 = Sterling Formation (Tps): This unit is comprised of sandstone and siltstone beds with some coal-bearing strata of Miocene to Pliocene Age. The Sterling Formation is considered part of the Kenai Group.

16 = Intrusive Igneous Rock, Granite or Grandodiorite (Kahiltna Pluton) (Tmk): The designation refers to the Kahiltna Pluton, which is composed of numerous forcibly placed, epizonal plutonic bodies of granite and/or granodiorite formed during Tertiary times.

17 = Undifferentiated Sedimentary Rocks (Tsu): This unit refers to all the Paleocene to Pliocene (Tertiary) sedimentary formations occuring within the study area. This designation is used primarily when the body of rock cannot be correlated to any specific formation. These formations

include the Kenai Group, Tsadaka Formation, West Foreland Formation, Wishbone Formation, Arkose Ridge Formation, Chickaloon Formation and others.

18 = Glacial: This unit refers to glacial ice and permament snowfields which are of sufficient thickness to obscure the identification of the underlying country rock.

19 = Kenai Group (Tku, Tkm, Tki): This group is composed of sandstone, siltstone, coal-bearing beds, and conglomerate of Oligocene to Pliocene age. The unit consists of the Sterling Formation, the Beluga Formation, the Hemlock Conglomerate, and the Tyonek Formation.

20 = Landslide Deposits (Qls): This unit is comprised of mass-wasting products of Quaternary age. The unit is considered part of the surficial cover deposits.

99 = Water

TERMS

Clastic - Consisting of fragments of rocks or of organic structures that have been moved individually from their places of origin.

Claystone - An altered feldspathic igneous rock in which the groundmass or even the entire rock has been reduced to clay minerals.

Dikes - Tabular bodies of igneous rock that cut across the structure of adjacent rocks or cut massive rocks. Most dikes result from the intrusion of magma.

Felsic - A rock containing one or all of the following minerals: Feldspar, feldspathoids, and silica.

Igneous - Formed by solidification from molten or partially molten state. Rocks formed in this manner below the surface are called plutonic rocks.

Loess - A homogenous nonstratified sediment of silt, fine sand and clay deposited primarily by the wind.

Mafic - Synonomous with "dark minerals", composed predominantly of the magnesium rock-forming silicates.

Metamorphic - Rocks created by high temperatures and pressures which deform the existing rocks without melting them.

Monogenetic - Originating in one way or from one source.

Polygenetic - Originating in various ways or from various sources; formed at different places or times or from different parts.

Sandstone - A cemented detrital sediment composed mostly of quartz grains.

Sills - An intrusive body of igneous rock which has been emplaced parallel to the bedding of the intruded rock.

Siltstone - A very fine grained consolidated clastic rock composed mostly of particles of silt grade.

Stock - A body of plutonic rock that covers less than 40 square miles, has steep contacts (places where different rock types come together), and may or may not cut across the bedding of adjacent rocks.

ECONOMIC GEOLOGY

No Data for Beluga Subbasin

Economic Geology outlines those areas with geologic resources of possible practical utility. These utilities include the extraction and use of metal bearing minerals, construction materials and coal.

Potential Deposits: This designation refers to those areas which have a high probability of possessing deposits of the rock or mineral or the combination of rocks and minerals in question.

Surficial Deposits: This designation refers to those areas with known surface deposits of the rocks in question.

Recognized Mineral Areas: This designation refers to those areas which have a previous history of possessing the minerals in question.

00 = No Mineral Deposits or No Data
01 = Surficial Deposits of Gravel, Gravel and Sand, or Sand
02 = Potential Deposits of Gold, Silver, Copper, Tungsten or Molybdenum
03 = Potential Deposits of Copper, Gold, Silver or Molybdenum
04 = Potential Deposits of Coal Field
05 = Potential Deposit of Uranium
06 = Surficial Deposits of Gravel, Gravel and Sand, or Sand Potential Deposits of Coal Field and Uranium
07 = Potential Deposits of Coal Field and Uranium
08 = Surficial Deposits of Gravel, Gravel and Sand, or Sand Potential Deposit of Uranium
09 = Potential Deposits of Uranium, Copper and Gold
10 = Potential Deposits of Copper and Gold
11 = Surficial Deposits of Gravel, Gravel and Sand, or Sand Potential Deposits of Copper and Gold
12 = Potential Deposits of Uranium, Copper, Gold, Silver and Molybdenum
13 = Surficial Deposits of Gravel, Gravel and Sand, or Sand Potential Deposit of Coal Field
14 = Potential Deposits of Coal Field, Gold, Silver, Copper and Molybdenum Recognized Mineral Areas
15 = Surficial Deposits of Gravel, Gravel and Sand, or Sand Potential Deposits of Gold, Silver, Copper and Molybdenum Recognized Mineral Areas
16 = Potential Deposits of Gold, Silver, Copper and Molybdenum Recognized Mineral Areas
17 = Potential Deposit of Gold
18 = Surficial Deposits of Gravel, Gravel and Sand, or Sand Potential Deposits of Coal Field, Gold, Silver, Copper and Molybdenum Recognized Mineral Areas
99 = Water

## RELATIVE GEOLOGIC TIME

| ERA | | PERIOD | | EPOCH | ATOMIC TIME |
|---|---|---|---|---|---|
| | | | | | |
| Cenozoic | Late | Quaternary | Late | Holocene | 11,000 |
| | | | | | 500,000 |
| | | | Early | Pleistocene | 2 million |
| | Early | Tertiary | | Pliocene | 12 million |
| | | | | Miocene | 26 million |
| | | | | Oligocene | 38 million |
| | | | | Eocene | 54 million |
| | | | | Paleocene | 65 million |
| Mesozoic | | Cretaceous | | Late<br>Early | 136 million |
| | | Jurassic | | Late<br>Middle<br>Early | 193 million |
| | | Triassic | | Late<br>Middle<br>Early | 225 million |
| Paleozoic | | Permian | | Late<br>Early | 280 million |
| | | Carboniferous | Pennsylvanian | Late<br>Middle<br>Early | |
| | | | Mississippian | Late<br>Early | 345 million |
| | | Devonian | | Late<br>Middle<br>Early | 395 million |
| | | Silurian | | Late<br>Middle<br>Early | 435 million |
| | | Ordovician | | Late<br>Middle<br>Early | 500 million |
| | | Cambrian | | Late<br>Middle<br>Early | 570 million |
| Pre-Cambrian | | | | | 3,600+ million |

Modified after Putnam (1971).

GEOLOGIC HAZARDS

Geologic Hazards refer to the potential of natural phenomena affecting the present state of any or all earth structures.

GEOLOGIC HAZARDS I:

This class identifies geologic hazards determined using collateral maps, drawn at a scale of 1:63,360, supplied by Kenneson G. Dean and J. Page Spencer of the Geophysical Institute, University of Alaska.

00 = No Geologic Hazard: An area that has no potential of any geologic hazard listed in this Geologic Hazards I section.

01 = Primary Potential Flood Zone: The active flood plain portion of a valley which is subject to periodic (often annual) flooding, standing surface water, and development of aufeis (sheets of ice formed by winter flooding caused by blockage of channel by freezing).

02 = Secondary Potential Flood Zone: An abandoned flood plain which is subject to occassional flooding and standing surface water.

03 = Outburst Flood Zone: An area subject to sudden (often annual) release of meltwater from a glacier, glacier dammed lakes, or ice and/or debris dammed streams, sometimes resulting in catastrophic floods.

04 = Catastrophic Wave Zone: An area subject to large gravitational sea waves produced by a large scale, short duration disturbance by shallow, submarine earthquakes, submarine earth movement, subsidence, volcanic eruption, or any large scale displacement of water by mass movement of rock and soil material.

05 = Landslide Zone: An area directly affected by the rapid downslope transport by means of gravitational stresses of soil and rock material in mass.

06 = Undulating Terrain With Varying Particle Size: An area of very undulating terrain with particle size ranging from clay to boulders. This area is usually associated with glacial moraine deposits, which are characterized by poor slope stability and intermittent poor drainage.

07 = Unstable Ground: Areas of general intense sheetwash, falling rocks, debris flows and associated deposits. These areas are mainly confined to the mountainous areas and show areas of poor slope stability.

08 = Avalanche Track: The central channel-like corridor along which avalanche debris travels.

09 = Glacier

14 = Primary Potential Flood Zone and Catastrophic Wave Zone: The active floodplain portion of a valley which is subject not only to periodic (often annual) flooding, standing surface water, and development of aufeis (sheets of ice formed by winter flooding caused by blockage of channel by freezing), but also subject to large gravitational sea waves produced by a large gravitational sea waves produced by a large scale, short duration disturbance by shallow, submarine earthquakes, submarine earth movement, subsidence, volcanic eruption, or any large scale displacement of water by mass movement of rock and soil materials.

24 = Secondary Potential Flood Zone and Catastrophic Wave Zone: An abandoned floodplain which is subject not only to occassional flooding and standing surface water, but also subject to large gravitational sea

waves produced by a large scale, short duration disturbance by shallow, submarine earthquakes, submarine earth movement, subsidence, volcanic eruption, or any large scale displacement of water by mass movement of rock and soil material.

99 = Water

GEOLOGIC HAZARDS II

No Data for Beluga Subbasin

This class identifies geologic hazards using collateral maps drawn at a scale of 1:250,000. There is a brief glossary of terms at the end of this section to aid in the understanding of some of the code descriptions.

0 = No Data

1 = Liquefaction, Slumps, Fissures, or Compaction: Area that is mostly underlaying by layers of silty wind laid deposits, or loess, that contain large quanitities of volcanic ash. Certain valley areas are subject to these hazards. The lower valley areas and coastal areas also have high water tables. When there is an earthquake in the area, there is a danger that the saturated silt and volcanic ash layer will liquify, increasing the probability of landslides, earth flows and slumps. Fissures and compactions can result in the wet valley areas when the glacial sediment begins to dry and its volume decreases. This can result in ground fissure and compaction.

2 = Known or High Potential for Landslides: An area where landslides have or most likely will occur determined by landslide history and/or coinciding area information.

3 = Liquefaction, Slumps, Fissures or Compaction/Know or High Potential for Landslides. An area that has the structure of code 1 & 2.

9 = No Geologic Hazards: An area that has no potential of any geologic hazards listed in this Geologic Hazards II section.

TERMS

Liquefaction - The transformation of a granular material from a solid into a liquified form, under conditions of increased water flow through silt or volcanic ash, as a result of the earth's movement.

Slump - Material that has slid down from high rock slopes.

Fissures - An extensive crack, break, or fracture in soil or bedrock associated with compaction.

Compaction - Decrease in volume of sediments due to compressive stress, usually resulting from continued deposition above but also from drying and other causes.

Landslides - The perceptible downward sliding or falling of a relatively dry mass of earth, rock, or mixture of the two.

SOILS

Refer to Appendix A for code listings. Soils are mapped by series and phase.

HABITATS

No Data for Upper Talkeetna and Beluga Subbasins

Habitat is the region or environment where a plant or animal is normally found. The following is a list of coded animals divided into resourse types (See Appendix A for code structure).

WILDLIFE RESOURCE TYPES

Mammals

Carnivores

A Black Bear (Ursus americanus)

B Grizzly Bear (Ursus arctos)

Ki Marten (Martes americana)

Hoofed Mammals

C Moose (Alces alces)

D Caribou (Rangifer tarandus granti)

Gi Dall Sheep (Ovis dali)

Gii Mountain Goat (Oreamnos americanus)

Rodents

Ni Beaver (Castor canadensis)

Oi Hoary Marmot (Marmota caligata)

Birds

Upland Gamebirds

Siii White-tailed Grouse (Pediocetes phasianellus)

Water Fowl

Seabirds

Vi Gull spp. (Laurus spp.)

WILDLIFE HABITAT USAGE: This section defines what habitat activities animals experience and where and when they experience them.

A. Season

This defines areas where certain animals are found in a specific season.

1. Spring & Summer
2. Fall
3. Winter

B. Use Activity

This section defines what animal activities occur and where.

4. Calving - Where the births of the specific coded animals occur.
5. Feeding - Where the animals feed.
6. Migration - Where each animal migrates.
7. Nesting/Molting - Where species of fowl make their nests and molt.
8. Stagging - Where specific animals are known to breed.

LAND USE

Land use refers to the human activities occurring on the land.

Agriculture

Consists of any nonurban area which exhibits a ground cover that has been altered in a regular or orderly pattern suggestive of forming. This includes both field and structure patterns typical of farm operations.

0110 = Pasture: All areas which exhibit signs of grazing (sparse or improved vegetation cover) with fence lines, evidence of cultivation and animal paths. It does not include open range or dairy and horse farming

facilities with evidence of intensive use such as ramadas, waste water ponds, race tracks or milking barns.

0120 = Grain, Grass: All areas used for the production of field crops excluding vegetables. Fallow fields are included here although no knowledge of length of fallow time is available.

0130 = Vegetables: Land used for the production of vegetables.

0140 = Dairy: All areas used for the intensive raising of dairy cattle. Characteristic features include ramadas, waste water ponds, haystacks, milk barns, and holding lots.

0150 - Other Agriculture: Equipment storage facilities, water retention facilities where farm oriented, and other special use facilities.

Residential

Consists of transient and nontransient home and family living space. This classification includes structures, lawn area, driveways, swimming pools, and street patterns typical of residential development.

0210 = Dispersed Residential: One dwelling per 5 acres and larger. This class includes permanent and recreational residences on tracts of land over 5 acres. The classification is mainly used for identifying isolated cabins.

0220 = Low Density: One dwelling per 2 1/2 to 5 acre lots. This class includes rural residential development on lots of 2 1/2 to 5 acres. It also includes residential housing "clusters" where houses front roads at intervals of at least one house per 2 1/2 to 5 acres.

0230 = Medium Density: One dwelling per 1/2 to 2 1/2 acres. This class includes rural and suburban residential development on lots of 1/2 to 2 1/2 acres.

0240 = High Density: One dwelling on less than 1/2 acre. This includes typical urban housing patterns and multi-family facilities. Multi-family is taken to mean there is more than one unit of a residential nature within the design of the structure.

0250 = Commercial (Hotel, Motel or Lodge): All commercial residential structures, including parking lots, driveways, swimming pools, and lawn areas.

Commercial

This includes activities which provide goods of all types to the consumer or which function to redistribute goods, but which do not alter them in handling except to repackage or complete their assemblage.

0310 = Eating and Drinking Establishment: Commercial establishments such as restaurants and bars, which provide prepared food and beverages for immediate consumption.

0320 = Food: Grocery stores and their associated parking facilities.

0330 = General Merchandise: Commercial establishments which sell general merchandise, such as department stores, and their parking facilities.

0340 = Apparel and Accessories: Commercial establishments which sell apparel and accessories and their parking facilities.

0350 = Furniture or Home Furnishings and Equipment: Commercial establishment which sell furniture, home furnishings, and equipment and their parking facilities.

0360 = Building Materials, Hardware, or Farm Equipment: Commercial establishments which sell building materials, hardware, or farm equipment and their parking facilities.

0370 = Auto Dealers or Gasoline Service Stations: Auto dealers, gasoline service stations, and auto repair businesses and their parking facilities.

0380 = Other: All other types of commercial establishments not covered in the previous commercial descriptions.

Manufacturing

Consists of all industrial and processing facilities. An activity must perform some change in the nature or form of materials to be included in this class. Manufacturing parks include associated warehouses, storage yards, research laboratories, and parking facilities.

0410 = Food: Manufacturing facilities which process food products.

0420 = Lumber or Wood Products: Facilities which manufacture lumber or wood products.

0430 = Gravel or Cement Products: Manufacturing facilities which produce gravel or cement products.

0440 = Other: All other types of light and heavy industry and processing facilities.

Services

Consists of commercial areas (building and parking facilities) used predominantly for the sale of services.

0510 = Miscellaneous Business Services: Establishments engaged in the purchase or sale of commodities or in related financial transactions.

0520 = Personal: Businesses which provide some personal service, such as beauty shops, dance studios.

0530 = Professional: Businesses which provide professional services, such as lawyers, accountants, etc.

0540 = Finance, Construction or Real Estate: Finance, construction, and real estate businesses.

0550 = Repair: Businesses that offer repair services, such as appliance repair, clock repair, etc.

0560 = Other: All other types of services not covered in the previous service descriptions.

Public/Quasi - Public Services

Consist of government buildings, hospitals, schools, churches, fairgrounds and other public group facilities.

0610 = Military: All developed lands controlled by a branch of the United States Armed Forces.

0620 = Governmental Institution: All civil offices, jails, post offices, city halls, county administrative facilities, courts and libraries.

0630 = Educational Institutions: All public and private schools and school administration buildings.

0640 = Health Institution: Public and private hospitals, clinics, psychiatric faclities and sanitariums that give both custodial and short term care.

0650 = Church or Community Center: Churchs, mosques, temples, tabernacles and other places of worship or religious pursuit. Religious retreats, monasteries, convents, etc. are included. Not included are

educational facilities which offer other than religious training, i.e., church owned colleges and universitys. Also within this class are community centers.

0660 = Cemetary: Public and private cemeteries, memorial parks, and mausoleums. This class also includes all facilities associated with the cemetery, such as chapel or gardens.

0670 = Solid Waste Disposal Site: Abandoned, currently active, and proposed dumps and sanitary landfill operations.

0680 = Other: Amphitheaters and other public facilities not included above.

Communication Facility

0700 = Communication Facility, Undifferentiated: Radio, television, and telephone communication facilities, including broadcast towers and associated buildings.

Transportation Facilities

Consists of airports and marine facilities.

0810 = Airport: An airport is a tract of land or water that is maintained for the landing and takeoff of airplanes and for the receiving and discharging of passengers and cargo. It also includes facilities for the shelter, supply, and repair of aircraft.

0811 = Public Access: Airport open for public use.

0812 = Private Access: Airport restricted to private access.

0820 = Marine, Port or Dock Facility: All port, dock, and storage facilities for the commercial and pleasure boats. Also included are ship repair facilities and dredger operations.

Utility

Consists of telephone, electric and domestic water facilities.

0900 = Utilities, Undifferentiated: Areas which are owned or operated by a major utility, such as utility equipment repair yards and storage areas.

Resource Extraction

Consists of extraction area for mining of sand and gravel, minerals, gas, and oil. It also includes logging areas.

1020 = Sand/Gravel Quarry and Borrow Pit: Excavated areas where sand and gravel has been extracted for use as fill and as a building material.

1030 = Surface Mining: Strip mining operations and quarries.

1040 = Gas Well Fields: Areas used for the extraction of gas. This class includes gas storage tanks and any associated structures.

1041 = Inactive: Gas fields not currently in production.

1042 = Active: Gas fields currently in production.

1050 = Oil Well Fields: Areas used for the extraction of oil. This class also includes oil storage tanks and any associated structures.

1051 = Inactive: Oil fields not currently in production.

1052 = Active: Oil fields currently in production.

1060 = Timber: Areas used for intensive logging.

1070 = Mineral Extraction Site: Areas used for mineral extraction.

Mixed Urban Build-up

1100 = Mixed Urban Build Up: Consists of those areas where individual urban uses cannot be separated at the mapping scale. The category typically includes developments along transportation routes and in cities and

towns where residential, commercial services, and manufacturing cannot be mapped individually because their areas are less than the minimum mapping resolution.

Under Construction

1200 = Under Construction: Areas in which the basic infrastructure exists but no structures are present.

Vacant Disturbed

1300 = Vacant Disturbed: Rural areas which have had their natural vegetation cover removed but are not currently being used.

Outdoor Recreation

1410 = Marine Board Launching Sites

1420 = Public Park, Campground, Refuge

1430 = Private Resort, Park, Group Camp

Recreation

1510 = Bird Watching

1520 = Bird Watching/Mountaineering

1530 = Mountaineering

1540 = Lake Boating/Lake Canoeing

1550 = Lake Boating/Lake Canoeing/Lake Fishing

1551 = Lake Boating/Lake Canoeing and Intensive Fishing

1552 = Lake Boating/Lake Canoeing and Moderate Fishing

1553 = Lake Boating/Lake Canoeing and Light Fishing

1554 = Lake Boating/Lake Canoeing and Very Light Fishing

1560 = Lake Fishing

1561 = Intensive Fishing

1562 = Moderate Fishing

1563 = Light Fishing

1564 = Very Light Fishing

Natural Lands, Undifferentiated

1600 = Natural Lands, Undifferentiated: Consists of all natural areas which have no land use. Natural lands also include all waterbodies.

VEGETATION

Primary Vegetation

Secondary Vegetation

Tertiary Vegetation

Quaternary Vegetation

Wherever possible, pure strands of any vegetation type were delineated as polygons and given the appropriate primary vegetation code. However, many vegetation types can occur in stands of less than five acres, the minimum mapping resolution, and are therefore too small to be mapped as discrete polygons. If only the primary vegetation type was mapped, polygons less than 5 aces would be ignored. This vegetation classification deals with these small vegetation stands by identifying not just a polygon's primary vegetation, but also the secondary, tertiary, and quaternary vegetation. The dominant vegetation type is coded as the primary vegetation, and any additional vegetation types which occur within the polygon are coded secondary, tertiary or quarternary vegetation.

Forest - Woodland

Forest: Forest land is land with more than 50% of the area having tree crown cover or formerly having 50% cover.

21 = Coniferous Forest, White Spruce, Short Stands, Closed Forest: Main canopy usually less than 30 ft. in height, usually found at higher elevations as isolated pockets in area dominated by alder, grassland, or open mixed stands.

22 = Deciduous Forest, Mixed Forest, Young Stands, Closed Forest: Canopy is usually very finely textured as seen from above, openings in stand are very rare. Composed mostly of birch and/or aspen. This type very rarely mixed with other types except when found as a remnant condition in burned areas. Spruce is not usually evident as a component of the overstory in these young stands. 0-40 years old.

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

25 = Coniferous Forest, White Spruce, Tall Stands, Closed Forest: Main canopy usually greater than 30 ft. in height, usually found at lower elevations on better sites, almost always found mixed with old and decadent deciduous trees (very rarely found as a pure type in Susitna Valley).

26 = Deciduous Forest, Mixed Forest, Old Stands, Closed Forest: Canopy is usually somewhat coarse textured as seen from above, openings are

usually common and may cover close to half of the stand area. Canopy may also appear smooth, but openings appear as definite holes in the crown. Deciduous trees in these old stands are usually decadent. Spruce is usually becoming the dominant species. The understory component of the stand is usually visible from above and includes Calamagrostics and Alnus as its most common species. These stands are always greater than 100 years old.

27 = Cottonwood, Young Stands, Closed Forest: Most commonly found on new islands, downstream ends of old islands, and point bars of rivers. Cottonwood or poplar is usually found mixed with large alder and/or willow - (understory is sparse to nonexistent). 0-40 years old.

28 = Cottonwood, Medium-Aged Stands, Closed Forest: Most commonly found in a riverine situation or within at least one mile of a river (alluvial soils). Stands are usually pure cottonwood or poplar, spacing is even and crown closure approaches 100%. Understory in the Susitna Valley is dominated by alder and devil's club. 40-100 years old.

29 = Cottonwood, Old Stands, Closed Forest: Most commonly found in riverine influence (alluvial soils). Stands may be mixed with young white spruce. Cottonwood are extremely large (30-40 inches in diameter) and decadent (larger trees may be only shells). Stand appears somewhat clumpy due to openings appearing in stand. Understory includes large quantities of alder, devil's club and willow. Greater than 100 years old.

Open Forest - Woodland

A forest or woodland area with 10% - 50% crown cover.

31 = Coniferous Forest, White Spruce, Short Stands, Woodland: Usually found at higher elevations as a transition type between closed forest and high elevation nonforest areas. Usually found mixed with elements of the higher elevation type, i.e., if the higher elevation type is a mixture of alder and grass then the open white spruce transition type will normally be forming a complex type with alder and grass. 30 feet tall.

32 = Deciduous Forest, Mixed Forest, Medium-Aged Stands, Woodland: Although birch/aspen stands are not usually found as a transition type between forest and high elevation nonforest areas, they are often found just below areas of type 31. 40 years old.

33 = Coniferous Forest, White Spruce, Tall Stands, Woodland: Same as type 31 except normally found at lower elevations or on better sites. Commonly found in creek bottoms mixed with alder/willow and grass. 30 ft. tall.

34 = Deciduous Forest, Mixed Forest, Old Stands, Woodland: Found in same general location as type 33. Found in association with grass and alder. Birch, in this type, is usually found growing in very small, tight clumps. Spruce are usually found to have an open grown form and are normally much younger than the hardwood component of the type.

35 = Cottonwood, Medium-Aged Stands, Woodland: Usually found at treeline just above elevational limit of open white spruce. Found in pockets among low shrubs.

36 = Cottonwood, Old Stands, Woodland: Two elevational phases of this type seem to occur. The high elevation phase, consisting of balsam poplar, may be found mixed with streamside alder/willow along flowing water on high elevation flats. The low elevation phase, consisting of

cottonwood, may be found on major river flood plains growing with a confusing mixture of other types including open spruce, open birch, alder, grass, etc.

Closed Forest (Black Spruce Mountain Hemlock)

A forest area having a greater than or equal to 50% crown cover composed of black spruce or mountain hemlock.

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

42 = Black Spruce, Tall Stands, Closed Forest: Main canopy usually greater than 30 ft. in ht. Can usually be identified as a fire formed stand, on relatively good sites, stands are remarkably pure and the stocking density is usually quite high. May be found mixed with very scattered birch.

45 = Mountain Hemlock, Short Stands, Closed Forest: Main canopy less than 30 ft. Geographically limited in Susitna Valley to higher ground west of Tyonek, found as stringers mixed with other local types.

46 = Mountain Hemlock, Tall Stands, Closed Forest: Main canopy greater than 30 ft. Geographically limited in Susitna Valley to low ground west of Tyonek, found as stringer stands mixed with other local types.

Open Forest - Woodland (Black Spruce)

Includes black spruce stands with 10% to 50% crown cover.

43 = Black Spruce, Short Stands, Open Forest-Woodland: Found in association with bog types. Black spruce are usually of very poor form. Site is either wet or cold or both - trees usually less than 15 ft. in height.

Non Forested

Non forested land is land with less than 10% of the area having tree crown cover.

Salt Water Wetlands

Salt water wetlands are areas with moist soil and high saline levels.

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

51 = Low shrub: Myrica dominated shrubland located on tidal flats. Water level is usually fluctuating seasonally. In areas that are more continuously wet, sedge replaces Myrica.

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

Tall Shrubs

Taller stands of a several stemmed woody plant composed of the following vegetation types:

60 = Alder: This type is dominated by tall (10-15 ft.) alder growing in dense thickets with grasses, ferns, and a great variety of forbs growing in the understory. Devil's club can be found as a dominant understory

to the alder on wetter and steeper sites. Devil's club will normally exclude other understory vegetation. The type is found at or above treeline. At treeline it is often found mixed with open white spruce and cottonwood types.

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

Low Shrub

A low, several stemmed woody plant composed of the following vegetation types:

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

Grassland

Land in which grasses are the predominant vegetation.

63 = Upland Grass: This type is dominated by Calamagrostics 1 to 2 meters tall. Fireweed and various ferns are sometimes common. This type is most often found as an understory in the more open forest types and

woodland areas where it is commonly associated with alder patches. This type can also be found unassociated with other types along small streams.

Tundra

An area where the mean monthly temperature is below freezing. In the summer, only mosses, lichens and some flowering plants appear, while the cold of winter make normal tree growth impossible, allowing only stunted willows, birches, etc.

64 = Sedge-Grass: This type is found above treeline on relatively flat, wet areas. Vegetation consists almost entirely of various wet sedges.

65 = Herbaceous: This type is found above treeline and is almost always found mixed with and above shrub tundra. The variety of species found in this type is immense, consisting mainly of various grasses and forbs. Soil varies in depth and may be intermixed with rock outcroppings. Vegetation may not be continuous.

66 = Shrub: This type is dominated by dwarf arctic birch and other shrubs along with various short grasses and a large number of forbs. This type is almost always found mixed with and below herbacious tundra. Density of the shrubs found in this type varies considerably and may often appear quite patchy.

67 = Mat and Cushion: This type is dominated by such plants as dryas, crowberry, bearberry, sedge, grass, lichen and other rooted forbs.

Climatic conditions are extreme at the elevation where this type is found. Vegetation cover may be complete (closed mat cushion) or relatively sparse (scattered mat cushion) with a large percentage of the vegetation being lichen. This type is often mixed with rock.

Freshwater Wetlands

An area of moist soil saturated with freshwater and containing the following vegetation:

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

69 = Sphagnum-Shrub Bog: Vegetation of this type is dominated by a thick moss mat (sphagnum) and/or sedge tussocks. Grass, ericaceous shrubs, salix, blueberry and cranberry may also be present. Ground water level usually varies seasonally but this type is generally not as wet as sphagnum bog. This type is usually mixed with open stands of short black spruce. Many other types may also be found in close association with sphagnum shrub bog. The associated types are typically found on glacial moraines and eskers within the bog area.

Cultural Features

Man related features associated with the following:

70 = Cultural Influences: May be broadly defined as land that has been obviously affected by human activity. Includes agricultural land, urban areas, and land developed to support or provide services to agricultural and urban land. This "type" may indeed be vegetated but vegetation that is present may not be natural in either composition or spacing.

Barren

Largely unvegetated tracts of land.

80 = Mud Flats: Confined to tidal areas (Cook Inlet) and the mouths of major rivers (Susitna, Knik). This "type" may appear vegetated on C.I.R. and color photography or from the air; however, the "vegetation" is usually algal blooms and/or other sea plants. Mud flats are usually well patterned with ripple marks or water drainage patterns. They are normally submersed during high tide. They may be used as resting and feeding areas by waterfowl.

81 = Rock: Exposed bedrock and scree commonly found along with mat cushion tundra at high elevations. This "type" is also used to describe large landslide areas, some morainal features, and other natural barren areas.

Permanent Snow and Ice

An area where snow and ice is present throughout the year.

82 = Snowfield: High elevation snow accumulation areas. Appears to be a permanent or nearly year round part of the landscape. May be found as small pockets on slopes protected from the sun, on lee slopes or in gulleys. Usually found over bare ground. May also be found as large snow accumulation areas at very high elevations. Often mixed with mat-cushion tundra and rock.

83 = Glacier: Includes both icefields and glaciers. Usually found covering several square miles. Considered a permanent part of landscape. To differentiate 83 from 82 note 83 covers much larger areas; crevasses, moraines and other glacial features are usually present.

Water

Areas consisting of the following water bodies:

91 = Lakes greater than 40 ac. (census water)

92 = Lakes at least 10 ac., but less than 40 ac.

96 = Streams and rivers at least 165 feet wide, but less than 600 feet wide

97 = Rivers greater than 1/8 mile (census water)

MANUSCRIPT #2
SURFACE HYDROLOGY
DATA CODE DESCRIPTIONS

STREAM

A general term for water flowing in one direction such as a rill, rivulet, brook, creek, and river.

Order

Stream order is the delineation of streams according to their hierarchical position within a drainage network. The smallest streams which have no tributaries are called first order streams. A second order stream is formed by the joining of two first order streams. When two second order streams flow together a third order stream is created and so on. A lower order tributary flowing into a higher ordered stream does not change the order of the larger stream.

Periodicity

All streams within the study areas were perennial, meaning they flow throughout the year.

1 = Intermittent: Stream which flow discontinuously throughout the year. These stream usually exhibit seasonal flows or flow after it rains.

2 = Perennial: Streams which flow continuously year round.

Origin

The origin of a stream identifies whether or not that stream originates directly from glacial meltwater.

1 = Non-glacial: Non-glacial streams are formed as a result of surface run off and subsurface seepage.

2 = Glacial: Streams which originate directly from glacial meltwater are glacial streams.

Discharge Profile

Discharge profile distinguishes streams which form in the mountains from streams which form in the valleys or lowland areas.

1 = Lowland Streams: The headwater of a lowland stream originates below 1500 feet, the approximate timberline.

2 = Mountain Streams: A mountain stream's headwaters originate above 1500 feet, the approximate timberline.

Situation

Situation indicates which line segments are drawn through polygons coded as waterbody on the ITUM, and which are not. (Enables water polygons and water line information to be plotted on the same map properly.)

1 = Not within Waterbody: Indicates stream segments which are not contained in ITUM waterbody polygons.

2 = Within Waterbody: Indicates stream segments which are contained in ITUM waterbody polygons.

Condition

Streams which are fed by glacial meltwater must transport excessive amounts of glacial sediment. The resulting braid channel is the most efficient form for transporting large amounts of sediment. Braided streams are made up of shifting, intertwining, shallow channels which are separated by sand and gravel deposits.

1 = Non Braided: A stream which does not exhibit a braided channel.

2 = Braided: A stream which has a braided channel configuration.

SALMON TYPE (Columns 7-11) Talkeetna Subbasin

No Data for Lower Talkeetna Subbasin

King Salmon (Column 7)
Sockeye Salmon (Column 8)
Coho Salmon (Column 9)
Pink Salmon (Column 10)
Chum Salmon (Column 11)

0 or Blank: No Data
1 = Salmon Not Present
2 = Salmon Present, But Not Spawning
3 = Salmon Present, Discontinuous Spawning
4 = Salmon Present, Known Spawning Area

NON-SALMON FRESHWATER FISH TYPE (Column 13-16)
No Data for Lower Talkeetna Subbasin

Dolly Varden (Column 13)
Arctic Char (Column 14)
Rainbow Trout (Column 15)
Whitefish (Column 16)

0 or Blank = No Data
1 = Not Present
2 = Present

SALMON TYPE (Columns 7-11) Beluga Subbasin

King Salmon (Column 7)
Sockeye Salmon (Column 8)
Coho Salmon (Column 9)
Pink Salmon (Column 10)
Chum Salmon (Column 11)

0 = No Data
1 = Salmon Not Present
2 = Salmon Present, But Not Spawning
3 = Salmon Present, Discontinuous Spawning
4 = Salmon Present, Known Spawning Area

NON-SALMON FRESHWATER FISH TYPE (Columns 12-15)

Dolly Varden (Column 12)
Arctic Char (Column 13)
Rainbow Trout (Column 14)
Whitefish (Column 15)

0 = No Data
1 = Not Present
2 = Present

WATERSHED - Talkeetna Subbasin

Topologic Number (Columns 1-7)

8th Order or Higher (Column 1)
7th Order (Column 2)
6th Order (Column 3)
5th Order (Column 4)
4th Order (Column 5)
3rd Order (Columns 6 and 7)

I. 8th order or higher watershed basins

A. 1000000 = All basins draining into the 8th order Susitna River receive a 1 in column 1

B. 2000000 = All basins draining into the Cook Inlet

C. 3000000 = Special watershed draining both directions; into the Susitna and the Cook Inlet.

II. 7th order basins comprising Susitna River 8th

A. 1100000 = Susitna River 7th
B. 1200000 = Yentna River 7th

III. 6th order basins

A. 6th order basins comprising Susitna River 7th

1. 1110000 = Kroto Creek 6th
2. 1120000 = Susitna River 6th

B. 6th order basins comprising Yentna River 7th

1. 1210000 = Yentna 6th
2. 1220000 = Skwentna 6th

IV. 5th order basins

A. 5th order basins comprising Kroto Creek 6th

1. 1111000 = Kroto Creek 5th
2. 1112000 = Moose Creek 5th

B. 5th order basins comprising Susitna River 6th

1. 1121000 = Chulitna Creek 5th
2. 1122000 = Susitna River 5th
3. 1123000 = Talkeetna River 5th

C. 5th order basins draining directly into Yentna 7th

1. 1201000 = Kahiltna River 5th
2. 1202000 = Lake Creek 5th

D. 5th order basin draining directly into Susitna 8th

1. 1001000 = Alexander Creek 5th

E. 5th order basins within Skwentna River 6th

1. 1221000 = Talachulitna River 5th

V. 4th order basins

A. 4th order basins comprising Kroto Creek 5th

1. 1111100 = Kroto Creek 4th
2. 1111200 = Unnamed 4th

B. 4th order basins comprising Moose Creek 5th

1. 1112100 = Moose Creek 4th
2. 1112200 = Nine Mile Creek 4th

C. 4th order basins within Susitna River 5th

1. 1121100 = Tokositna River 4th

D. 4th order basins within Talkeetna 5th

1. 1123100 = Chunilna Creek 4th
2. 1123200 = Talkeetna River 4th
3. 1123300 = Sheep River 4th

E. 4th order basins comprising Kahiltna 5th

1. 1201100 = Unnamed 4th
2. 1201200 = Kahiltna 4th
3. 1202300 = Peters Creek 4th

F. 4th order basins draining directly into Susitna 6th

1. 1120100 = Kashwitna River 4th

2. 1120200 = Montana Creek 4th
3. 1120300 = Unnamed 4th

G. 4th order basins draining directly into Yentna 7th

1. 1200100 = Fish Lake Creek

H. 4th order basins within Lake Creek 5th

1. 1202100 = Camp Creek 4th
2. 1202200 = Lake Creek 4th

I. 4th order streams draining directly into Skwentna 6th

1. 1220100 = Eight Mile Creek

J. 4th order streams comprising Alexander Creek 5th

1. 1001100 = Wolverine/Lower Sucker Creeks
2. 1001200 = Alexander Creek

VI. Third order basins

A. 3rd order basins comprising Kroto Creek 4th

1. 1111101 = Unnamed 3rd order
2. 1111102 = Kroto Creek 3rd
3. 1111103 = Seventeen Mile Creek 3rd

B. 3rd order draining directly into Kroto Creek 5th

1. 1111001 = Unnamed 3rd

C. 3rd order draining directly into Kroto Creek 5th

1. 1111201 = Unnamed 3rd
2. 1111202 = Unnamed 3rd

D. 3rd order basins comprising Moose Creek 4th

1. 1112101 = Unnamed 3rd
2. 1112102 = West Fork Moose Creek 3rd
3. 1112103 = Moose Creek 3rd

E. 3rd order basins comprising Nine Mile Creek 4th

1. 1112201 = Unnamed 3rd
2. 1112202 = Nine Mile Creek 3rd

F. 3rd order basins comprising unnamed 4th

1. 1201101 = Unnamed 3rd
2. 1201102 = Unnamed 3rd

G. 3rd order basins comprising Kahiltna 4th

1. 1201201 = Unnamed 3rd
2. 1201202 = Bear Creek
3. 1201203 = Unnamed 3rd
4. 1201204 = Hungry Man Creek
5. 1201205 = Cache Creek 3rd
6. 1201206 = Treasure Creek 3rd
7. 1201207 = Dutch Creek 3rd
8. 1201208 = Granite Creek 3rd

H. 3rd order basin in Peters Creek 4th

1. 1201301 = Martin Creek 3rd
2. 1201302 = Kenny Creek 3rd
3. 1201303 = Peters Creek 3rd

I. 3rd order basins within Camp Creek 4th

1. 1202101 = Mills Creek 3rd
2. 1202102 = Camp Creek 3rd

J. 3rd order basins within Lake Creek 4th

1. 1202201 = Sunflower Creek 3rd
2. 1202202 = Lake Creek 3rd

K. 3rd order basins craining directly into Kahiltna 5th

1. 1201001 = Indian Creek 3rd
2. 1201002 = Unnamed 3rd

L. 3rd order basins comprising unnamed 4th

1. 1120301 = Rabideux Creek
2. 1120302 = Queer Creek

M. 3rd order basins draining directly into Susitna River 6th

1. 1120001 = Caswell Creek
2. 1120002 = Sheep Creek
3. 1120003 = Sunshine Question Creek
4. 1120004 = Birch Creek
5. 1120005 = Trapper Creek

N. 3rd order draining into Talkeetna 5th

1. 1123001 = Wiggle Creek
2. 1123002 = Unnamed 3rd

O. 3rd order basins comprising Eight Mile Creek 4th

1. 1220101 = Unnamed 3rd
2. 1220102 = Unnamed 3rd

P. 3rd orders draining directly into Ynetna River 7th

1. 1200001 = Unnamed 3rd
2. 1200002 = Moose Creek 3rd
3. 1200003 = Indian Creek 3rd

Q. 3rd order basins comprising Alexander Creek 4th

1. 1001201 = Bear Creek
2. 1001202 = Clear Creek
3. 1001203 = Deep Creek
4. 1001204 = Unnamed

R. 3rd order basins within Wolverine/Lower Sucker

1. 1001101 = Unnamed 3rd
2. 1001102 = Wolverine Creek 3rd

S. 3rd order basins draining directly into Alexander Creek 5th

1. 1001001 = Trail Creek

T. 3rd order basins draining directly into Susitna 7th

1. 1100001 = Fish Creek
2. 1100002 = Unnamed 3rd

U. 3rd order basins draining directly into Susitna 8th

1. 1000001 = Unnamed 3rd

V. 3rd order basins draining directly into Cook Inlet

1. 2000001 = Theodore River
2. 2000002 = Lewis River

W. 3rd order basin that drains into Talachulitna 4th (out of study area), then Skwentna 6th

1. 1221201 = Talachulitna 3rd

X. 3rd order basins draining directly into Kroto Creek 6th

1. 1110001 = Unnamed 3rd
2. 1110002 = Unnamed 3rd
3. 1110003 = Unnamed 3rd

Y. 3rd order basins draining directly into Lake Creek 5th

1. 1202001 = Yenlo Creek 3rd
2. 1202002 = Unnamed 3rd
3. 1202003 = Unnamed 3rd
4. 1202004 = Home Creek 3rd

Z. 3rd order basins draining directly into Yentna 6th

1. 1210001 = Hewitt Creek 3rd
2. 1210002 = Donkey Creek 3rd

AA. 3rd order basins comprising Fish Lake 4th

1. 1200101 = Unnamed

BB. 3rd order basins comprising Montana Creek 4th

1. 1120202 = Unnamed 3rd
2. 1120203 = North Fork 3rd
3. 1120204 = Middle Fork 3rd
4. 1120205 = South Fork 3rd

CC. 3rd order basins within Kashwitna River 4th

1. 1120101 = North Fork Kashwitna River 3rd

DD. 3rd order basins within Tokositna River 4th

1. 1121101 = Tokositna River 3rd
2. 1121102 = Bunco Creek 3rd
3. 1121103 = Unnamed 3rd

EE. 3rd order basins draining directly into Chulitna 5th

1. 1121001 = Unnamed 3rd

FF. 3rd order basins draining directly into Susitna River 5th

1. 1122001 = Whiskers Creek 3rd

GG. 3rd order basins within Talkeetna River 4th

1. 1123201 = Disappointment Creek 3rd

HH. 3rd order basins within Chunilna River 4th

1. 1123101 = Unnamed 3rd
2. 1123102 = Unnamed 3rd

II. 3rd order basins draining directly into Talachulitna 5th

1. 1221002 = Unnamed 3rd
2. 1221003 = Thursday Creek 3rd
3. 1221004 = Unnamed 3rd

JJ. 3rd order basins draining directly into Skwentna River 6th

1. 1220001 = Shell Creek 3rd

KK. 3rd order special watershed draining both directions into the Susitna River and the Cook Inlet.

1. 3000001 = Ivan River 3rd

WATERSHED - BELUGA SUBBASIN

Topologic Number (Columns 1-7)

8th Order of Higher (Column 1)
7th Order (Column 2)
6th Order (Column 3)
5th Order (Column 4)
4th Order (Column 5)
3rd Order (Column 6 and 7)

I. 8th order of higher watershed basins

A. 1000000 = All basins draining into the 8th order Susitna River.

B. 2000000 = All basins draining into the Cook Inlet

C. 3000000 = Special watershed draining both directions; into the Susitna and the Cook Inlet.

D. 4000000 = Special watershed draining both directions into McArthur River and the Cook Inlet.

II. 7th order basins comprising Susitna River 8th

A. 7th order basins within Susitna River 8th
1. 1200000 = Yentna River 7th

III. 6th order basins

A. 6th order basins comprising Susitna River 7th

1. 1210000 = Yentna River 6th (13)
2. 1220000 = Skwentna River 6th (33)

B. 6th order basins draining directly into the Cook Inlet

1. 2010000 = Beluga River 6th (66)

IV. 5th order basins

A. 5th order basins within Yentna River 6th

1. 1211000 = East Fork Yentna River 5th (20)
2. 1212000 = West Fork Yentna River 5th (24)
3. 1213000 = Kichatna River 5th (26)

B. 5th order basins within Skwentna River 6th

1. 1221000 = Talachulitna River 5th (38)

C. 5th order basins draining both directions into McArthur River and Cook Inlet.

1. 4001000 = Chakachatna River 5th (94)

D. 5th order basin draining directly into Yentna River 8th

1. 1202000 = Lake Creek 5th (out of study)

E. 5th Order Basins Within Beluga River 6th

1. 2011000 = Beluga River 5th (78)
2. 2011200 = Coal Creek 5th (87)

F. 5th order basins draining directly into the Susitna River 8th

1. 1001000 = Alexander Creek 5th (out of study area)

V. 4th order basins

A. 4th order basins draining directly into Yentna River 6th

1. 1210100 = Johnson Creek 4th (18)

B. 4th order basins within Kichatna River 5th

1. 1213100 = Kichatna River 4th (27)
2. 1213200 = Unnamed 4th (30)

C. 4th order basins draining directly into Skwentna River 6th

1. 1220200 = Hayes River 4th (36)

D. 4th order basins draining directly into Cook Inlet

1. 2000300 = Chuitna River 4th (60)

E. 4th order basins draining directly into Beluga River 6th

1. 2010100 = Unnamed 4th (71)
2. 2010200 = Unnamed 4th (74)

F. 4th order basins within Beluga River 5th

1. 2011100 = Beluga River 4th (79)
2. 2011200 = Chichantna River 4th (83)

G. 4th order basins within Chakachatna River 5th

1. 4001100 = Straight Creek 4th (96)

H. 4th order basins within Lake Creek 5th

1. 1202100 = Camp Creek 4th (out of study)

I. 4th order basins within Lake Creek 5th

1. 1202200 = Lake Creek 4th (out of study)

J. 4th order basins within Coal Creek 5th

1. 2012100 = Coal Creek 4th (88)
2. 2012200 = West Fork Coal Creek 4th (90)

K. 4th order basins within Alexander Creek 5th

1. 1001100 = Wolverine/Lower Sucker Creek 4th
2. 1001200 = Alexander Creek 4th

L. 4th order basins within Talachulitna River 5th

1. 1221100 = Talachulitna Creek 4th (42)
2. 1221200 = Talachulitna River 4th (45)
3. 1221300 = Friday Creek 4th (49)

VI. 3rd order basins

A. 3rd order basins draining directly into Lake Creek 5th

1. 1202004 = Home Creek 3rd (8)

B. 3rd order basins within Camp Creek 4th

1. 1202101 = Mills Creek 3rd (9)
2. 1202102 = Camp Creek 3rd (10)

C. 3rd order basins within Lake Creek 4th

1. 1202201 = Sunflower Creek 3rd (11)
2. 1202202 = Lake Creek 3rd (12)

D. 3rd order basins drainiing directly into Yentna River 6th

1. 1210001 = Hewitt Creek 3rd (14)
2. 1210002 = Donkey Creek 3rd (15)
3. 1210003 = Unnamed 3rd (16)
4. 1210004 = Clearwater Creek 3rd (17)

E. 3rd order basins within Johnson Creek 4th

1. 1210101 = Red Creek 3rd (19)

F. 3rd order basins draining directly into East Fork Yentna River 5th

1. 1211001 = Rich Creek 3rd (21)
2. 1211002 = Unnamed 3rd (22)
3. 1211003 = Unnamed 3rd (23)

G. 3rd order basins draining directly into West Fork Yentna River 5th

1. 1212001 = Unnamed 3rd (25)

H. 3rd order basins within Kichatna River 4th

1. 1213101 = Unnamed 3rd (28)
2. 1213102 = Nakochna River 3rd (29)

I. 3rd order basins within Unnamed 4th (1213200)

1. 1213201 = Unnamed 3rd (31)
2. 1213202 = Unnamed 3rd (32)

J. 3rd order basins draining directly into Skwentna River 6th

1. 1220001 = Shell Creek 3rd (34)
2. 1220002 = Canyon Creek 3rd (35)

K. 3rd order basins within Hayes River 4th

1. 1220201 = Unnamed 3rd (37)

L. 3rd order basins draining directly into Talachulitna River 5th

1. 1221003 = Thursday Creek 3rd (39)
2. 1221004 = Unnamed 3rd (40)
3. 1221005 = Deep Creek 3rd (41)

M. 3rd order basins within Talachulitna Creek 4th

1. 1221101 = Unnamed 3rd (43)
2. 1221102 = Talachulitna Creek 3rd (44)

N. 3rd order basins within Talachulitna River 4th

1. 1221201 = Talachulitna River 3rd (46)
2. 1221202 = Unnamed 3rd (47)
3. 1221203 = Unnamed 3rd (48)

O. 3rd order basins within Friday Creek 4th

1. 1221301 = Friday Creek 3rd (50)
2. 1221302 = Saturday Creek 3rd (51)
3. 1221303 = Unnamed 3rd (52)

P. 3rd order basins draining directly into Cook Inlet

1. 2000001 = Theodore River 3rd (54)
2. 2000002 = Lewis River 3rd (55)
3. 2000003 = Three Mile Creek 3rd (56)
4. 2000004 = Old Tyonek Creek 3rd (57)
5. 2000005 = Nikolai Creek 3rd (58)
6. 2000006 = Chuitkinachna Creek 3rd (59)

Q. 3rd order basins within Chuitna River 4th

1. 2000301 = Lone Creek 3rd (61)
2. 2000302 = Unnamed 3rd (62)
3. 2000303 = Chuit Creek 3rd (63)
4. 2000304 = Chuitna River 3rd (64)
5. 2000305 = Unnamed 3rd (65)

R. 3rd orders basins draining directly into Beluga River 6th

1. 2010001 = Unnamed 3rd (67)
2. 2010002 = Unnamed 3rd (68)
3. 2010003 = Unnamed 3rd (69)
4. 2010004 = Pretty Creek 3rd (70)

S. 3rd order basins within unnamed 4th (2010200)

1. 2010201 = Unnamed 3rd (75)
2. 2010202 = Unnamed 3rd (76)
3. 2010203 = Unnamed 3rd (77)

T. 3rd order basins within Beluga River 4th

1. 2011101 = Unnamed 3rd (80)
2. 2011102 = Unnamed 3rd (81)
3. 2011103 = Unnamed 3rd (82)

U. 3rd order basins within Chichantna River 4th

1. 2011201 = Unnamed 3rd (84)
2. 2011202 = Chichantna River 3rd (85)
3. 2011203 = Unnamed 3rd (86)

V. 3rd order basins within Coal Creek 4th

1. 2012101 = Unnamed 3rd (89)

W. 3rd order basins within West Fork Coal Creek 4th

1. 2011101 = West Fork Coal Creek 3rd (91)
2. 2012202 = Unnamed 3rd (92)

X. 3rd order basins within unnamed 4th (2010100)

1. 2010101 = Unnamed 3rd (72)
2. 2010102 = Unnamed 3rd (73)

Y. 3rd order basins within Wolverine/Lower Sucker Creek 4th

1. 1001102 = Wolverine Creek 3rd (4)

Z. 3rd order basins within Alexander Creek 4th

1. 1001201 = Bear Creek 3rd (5)
2. 1001202 = Clear Creek 3rd (6)
3. 1001203 = Deep Creek 3rd (7)

AA. 3rd order basins draining directly into Alexander Creek 5th

1. 1001001 = Trail Creek 3rd (3)

BB. 3rd order basins draining directly into Susitna River 8th

1. 1000001 = Unnamed 3rd (2)

CC. 3rd order basins both directions into Susitna River and Cook Inlet

1. 3000001 = Ivan River 3rd (93)

DD. 3rd order basins draining directly into Chakachatna River 5th

1. 4001001 = Unnamed 3rd (95)

EE. 3rd order basins within Straight Creek 4th

1. 4001101 = Straight Creek 3rd (97)
2. 4001102 = Unnamed 3rd (98)

MANUSCRIPT #3
POINTS AND LINEAR FEATURES MAP
DATA CODE DESCRIPTIONS

NATURAL LINES

A map of lines illustrating the following natural features:

Escarpment

A cliff or steep rock face of great length formed by erosion or possibly by faulting. The following describes the escarpment in the area.

1 = Not an Escarpment: Line segments on the natural line manuscript which are not escarpments.

2 = Escarpment: Line segments on the natural line manuscript which are escarpments.

Fault Lines

A fault line is a fracture or fracture zone in soil or in rock mass where relative displacement has occurred.

1 = No Fault: No faults have been identified in the area. Only major faults are identified by this very general survey. Where the public health and safety is concerned detailed studies are needed to verify the existence and extent of known faults and to detect any additional faults.

2 = Possible Fault: Conditions suggest the possible existence of a fault. Often there is little topographic expression. Many times faults will be covered by thick deposits of glacial sediments, making identification very difficult. Detailed field verification is required to establish the existence of a fault.

3 = Suspected or Inferred Fault: Possible fault which has limited topographic expression and can only be tentatively identified using

aerial photography. Field verification is necessary to establish the existence of this type of fault.

4 = Known Fault: Fault is one whose existence has been verified using aerial photography and field work.

CULTURAL LINES

A map of points and lines illustrating the following cultural features:

ROADS/TRAILS/INFRASTRUCTURE NETWORK

Roads

All major roads were mapped. Secondary and feeder roads were not mapped.

11 = Non Paved road: Dirt or gravel covered road.

12 = Paved Road: All weather, hard or unpaved surface road.

13 = Non Paved road and Existing Utility Corridor: Non paved road with a utility corridor along its route.

14 = Paved Road and Existing Utility Corridor: Paved road with a utility corridor along its route.

15 = Non Paved Road and Proposed Utility Corridor: Non paved road with a new utility corridor proposed along its route.

16 = Paved Road and Proposed Utility Corridor: Paved road with a new utility corridor proposed along its route.

17 = Proposed Road - Point McKenzie Highway: The proposed Point McKenzie Highway.

Trails

Trails are marked paths used for the following functions: Dog mushing; hunting; hiking; equestrian; off road vehicle; cross country skiing; snow

vehicles; and snow shoeing.

21 = Existing Trails: Existing trail system was obtained from maps supplied by DNR.

Seismic Survey Lines

Seismic survey lines are straight narrow cleared paths, often many miles long, used to study the underlaying geology and seismic conditions.

Railroads

All existing railroads currently being used were mapped.

41 = Existing Railroad

Utility Corridors

Utility corridors are the rights-of-way of transmission lines. Only major utility corridors were mapped.

51 = Existing Utility Corridor: Major existing utility corridors.

52 = Proposed Utility Corridor: Major proposed utility corridors.

CULTURAL POINTS

Consists of all of the extractive site - areas containing minerals that can be extracted for use.

1020 = Sand/Gravel Quarry and Borrow Pit: Surface minerals where rock is removed to produce building materials or fill.

1030 = Subsurface Mine Entrance: Surface entrances of underground mines

1040 = Gas Well

1041 = Inactive: Operational gas wells not currently being used.

1042 = Active: Gas wells currently being used.

1050 = Oil Well

1051 = Inactive: Operational oil wells not currently being used.

1052 = Active: Oil wells currently being used.

1060 = Abandoned Gas or Oil Well

MANUSCRIPT #4
LAND STATUS MAP
DATA CODE DESCRIPTIONS

CONGRESSIONAL TOWNSHIP (For the U. S. system of rectangular surveys)

Under this system the land is divided into townships 6 miles square with boundaries running due north-south, east-west. Principal meridians and baselines were established as a reference system for the township surveys. The location of each township in a survey region is given with respect to the point at which the principal meridian and the baseline intersect. The coordinates that specify a particular township are read off as the number of townships north or south of the baseline; the number of townships east or west of the principal meridian is called the range.

Number of Township

How many townships the particular township lies from the baseline.

n = Number of Township

North/South Designation

This indicates if the township falls north or south of the baseline.

1 = North

2 = South

Name of Baseline

The baseline used for the whole Susitna Basin study area is unnamed.

Number of Range

How many townships the particular township lies from the meridian.

n = Number of Range

East/West Designation

This indicates if the township falls east or west of the meridian.

1 = East

2 = West

Name of Meridian

1 = Seward Meridian: The principle meridian used for the whole Susitna Basin study area is the Seward Meridian.

OWNERSHIP

No Data for Upper Talkeetna or Beluga Subbasins

Describes who owns the land, and is divided into the following classification:

00 = No Data

Federal

10 = Federal

State

21 = State Patented Land

22 = State Tentatively Approved

23 = State University

24 = Other State Land Campground and Foreclosure

25 = State Selected Land

Borough Land

31 = Borough Patented Land

32 = Borough Tentatively Approved

Municipal

40 = Municipal

Private

50 = Private

AGENCY INTEREST

Describes which agency(s) has an interest in a particular location.

Fish and Game

1 = Not Fish and Game

2 = Fish and Game

Joint Fish and Game and Parks

1 = Not Joint Fish and Game and Parks

2 = Joint Fish and Game and Parks

Parks

1 = Not Parks

2 = Parks

Timber

1 = Not Timber

2 = Timber

Highway Corridor

1 = Not Highway Corridor

2 = Highway Corridor

Agriculture

1 = Not Agriculture

2 = Agriculture

Materials Site

1 = Not Materials Site

2 = Materials Site

Miscellaneous Watershed

1 = Not Miscellaneous Watershed

2 = Miscellaneous Watershed

Mineral Zone

1 = Not Mineral Zone

2 = Mineral Zone

FSLUPC Ecological Reserve

1 = Not FSLUPC Ecological Reserve

2 = FSLUPC Ecological Reserve

New Capital Site

1 = Not New Capital Site

2 = New Capital Site

New Capital Site Buffer

1 = Not New Capital Site Buffer

2 = New Capital Site Buffer

Miscellaneous

1 = Not Miscellaneous

2 = Miscellaneous

Intensive Recreation Areas

1 = Not Intensive Recreation Areas

2 = Recreation Areas

# Appendix C

## Data Sources and Mapping Methodology

Integrated Terrain Unit Map
Surface Hydrology Map
Points and Linear Features Map
Land Status Map

The following manuscripts compose the Talkeetna and Beluga Subbasin Resource Inventories:

Integrated Terrain Unit Map

Surface Hydrology Map

Points and Linear Features Map

Land Status Map

## A. INTEGRATED TERRAIN UNIT MAP (ITUM)

### 1. Slope Gradient

Slopes were interpreted from topographic sheets which give the general gradient of the region. High reliability of the collateral material was ensured by using U.S.G.S. topographic sheets which are regarded as the "standard" for regional mapping. Polygons with slopes greater or lesser than the coded slope value but below 5 acres in resolution were not mapped. Thus, slope code values give a more generalized representation of slope gradient for each polygon. Slope was interpreted from 1:37,000 scale topographic sheets have 50-foot and 100-foot contour intervals rather than from soil phase maps that exhibited detailed slopes. The soil phase maps often delineated embankment and humocky morainal deposits as having steep slopes while these same features are not shown as slope units on the topographic map. To distinguish general slope of the land as well as the slope of micro-relief features, the interpreted slope map can be compared to the soil phase map.

The slope classes used were 0-3%, 3-7%, 7-12%, 12-20%, 20-30%, 30-45%, and 45% of greater. To interpret the slope, a scale having different line

densities corresponding to contour line density at the specified slope classes was used to compare the contour lines on the topographic map. A mylar slope overlay was prepared by drawing polygons around areas of homogeneous line density. Numeric code values 1-7 were written in the resulting polygons and each map was edited for lines that did not connect or had missing code values. The maps were finally edgematched to adjoining sheets and discrepancies were corrected by comparing them with the topographic maps.

2. Landforms

The landform overlay was obtained from 1:63,360 scale blueprint landform maps (Kennerson, G. Dean/Spencer, J. Page, Geophysical Institute, University of Alaska, 1978). The blueprint lines and codes were transferred onto the stable base overlay registered to the attached topo sheet. Extra care was taken to ensure proper registration to the basemaps because the blueprint is susceptible to shrinking and stretching.

Landforms are the distintive configuration of the land surface and are environmentally significant because they influence the variation in ecological factors such as water availability and exposure to solar radiation. The two distinct maps developed for landforms were physiographic division and landform types. These factors are explained in subsections below. The landform mapped is of a detailed regional scope and provides descriptions of subregonal sites and an overview of morphodynamics.

a. Physiographic Division

Physiographic Division is a type of landform classification dividing the land surface into broad major categories. The categories are defined

in Appendices A1 and A2. The same collateral maps used for the landform map were used to create the physiographic division overlays. The detailed soil phase map was also a good source for checking a features steepness and exact areal configuraton.

The physiographic division overlay was then compared to the imagery. Quality review was made to ensure that polygons were coded and lines closed, as well as for shape and position being accurately depicted.

b. Landform Types

A Landform Type is any element of the landscape characterized by a distinctive surface expression, internal structure and sufficiently conspicuous to be classified. The flood prone areas were obtained from the Army Corps of Engineers Flood Survey Maps. Since these maps only reflected conditions of major rivers, mapping other flood prone areas relied on photo-interpretation and basemaps. The soil survey map was used to verify landform. Soil's parent material was used to resolve issues such as whether an area was outwash or till. The soil's parent material was reviewed to determine if the drift material was deposited by water or from a glacier. Soil phase was used to check moraines because the 1:63,360 scale topo sheet with its 50-foot and 100-foot contour interval was often too general to identify the moraines.

When the data were recorded, the overlay was compared to the imagery. All polygons were edited to ensure proper coding and closing of lines. Imagery and basemaps were carefully studied to preclude omission of landform polygons. Then the 1:63,360 scale landform type overlay was transferred to the ITUM.

3. General Geology

The geology map was constructed by using a hand drawn geology collateral map at a scale of 1:250,000. The collateral map was overlain on a topographic map of the same scale and optically/manually rescaled after registering the 1:63,360 scale basemap and geology overlay to the 1:250,000 scale topographic sheet. The rescaled geology overlay was compared to the imagery and basemaps to validate the lines, positions, and code values. Few changes were made to the bedrock geology because there was minimal topographic expression of the underlying geology type.

a. Surficial Geology

The surficial geology map identifying areas with or without surficial deposits was refined to match the visible pattern on the imagery and slope breaks of the topo map and soil phase. Once the 1:63,360 scale overlay containing the surficial and bedrock geology information was completed and edited to check line configuration and code values, the map was transferred to the ITUM.

The data compiled from the collateral map are suitable for semi-detailed analysis and display. The surficial deposit information map is very reliable since it was matched against identifiable patterns on the phase and basemap.

b. Bedrock Geology

High reliance was placed on the collateral map and few line adjustments were made while compiling the bedrock geology overlays. Some parts of the study areas have been recently glaciated, making photo identification of bedrock units in these areas almost impossible.

4. Economic Geology

The economic geology overlay was prepared using a hand drawn collateral map at a scale of 1:250,000. The collateral map was overlain on a topographic sheet of the same scale and optically/manually rescaled, registering the 1:63,360 scale basemap and economic geology overlay to the 1:250,000 scale topographic sheet.

Most economic geology units concided to a specific landform. For instance, sand dunes, moraines and flood plains were often shown as being sources of sand and gravel. The economic geology units had to be refined to the landform units they represented. The other economic geology units, potential mineral deposits, were transferred directly to the overlay. A final edit was performed to ensure map accuracy and then the overlay was transferred to the ITUM.

The reliability of sand and gravel source areas is very good since they were drawn using the landform polygons. However, the potential mineral deposits polygons are generalized and do not imply that deposits exist throughout the polygon. Detailed field investigations will be necessary to establish the presence of the mineral deposits.

5. Geologic Hazards

The geologic hazards mapped were on a polygon by polygon basis compared to the aerial photographs. The unit descriptions were taken from the collateral documents. Where the unit boundaries were noticeably inconsistent with collateral materials, slight adjustments were made by the interpreter. The interpretation was based on stereoscopicaly viewed air photos. The data compiled from the collateral material is suitable for semi-detailed analysis

and display. However, due to the inherent variability within geologic units, this data must not be substituted for detailed site mapping where public health or safety may be involved in the preparation of engineering plans.

a. Geologic Hazard I

The Geologic Hazard I overlays were compiled using 1:63,360 scale blueprint copies of geologic hazard collateral maps. The hazard lines and codes were transferred from the blueprint copies onto the mylar overlay attached to the topo. Extra care was taken to ensure proper registration to the basemap because the original was a blueprint.

The rescaled overlay was compared to the landform map and the hazard lines were refined to landform lines. For example, primary and secondary flood zones on the geologic hazard maps were identical to active and abandoned flood plains on the landform maps, and undulating terrain with varying particle size on the Geologic Hazard I map corresponded to moraines on landform maps.

Geologic hazards, in corresponding to a landform type, were refined using the visible patterns on the photo. Additional hazard areas not on the geologic hazard collateral were delineated using the photo and basemap. A final edit was made to ensure map accuracy and then the overlay was transferred to the ITUM. The reliability of the Geologic Hazard I map is very good for a regional perspective since all polygons were compared with the photo to ensure proper codes and line configuration. However, hazard areas smaller than the minimum resolution were not mapped.

b. Geologic Hazard II

The Geologic Hazard II overlay was prepared using a hand drawn collateral map at a scale of 1:250,000. The collateral map was overlain onto a topographic map of the same scale and optically/manually rescaled, registering the 1:63,360 scale basemaps and Geologic Hazard II overlay to the 1:250,000 topographic map. The overlay was then compared with the photo and topographic sheets. The lines were adjusted to match terrain features. Often areas that had high potential for land slides corresponded with moraines on the landform overlay. So, when possible, the Geologic Hazard II overlays were adjusted to the landform's polygon configuration. The Geologic Hazard II overlays were carefully checked for proper line configuration and code values, and were then transferred to the ITUM. The Geologic Hazard II map identifies large areas which could have a potential geologic hazard. Detailed site mapping is necessary to identify a particular site for a geologic hazard.

The general reliability of the data is good. The original collateral at a scale of 1:250,000 identified large, general areas as having hazards. These general lines were then fit to the terrain using the imagery.

6. Soil

This data item was derived from the U.S. Department of Agriculture, Soil Conservation Service Soil Surveys. The majority of the studies were covered by 1:63,360 scale mosaicked blacklines from the Susitna Valley and the Beluga-Yentna soil surveys. These soil maps were photographically rescaled to 1:37,000.

Dynamic features such as flood plain, soils and tidal flats were updated

to match current conditions found on the imagery. The finished soil overlays were carefully checked against the imagery and vegetation collateral to confirm that the soil pattern had been properly registered, reflected visible patterns on the imagery and was consistent with the vegetation map. The general interim survey soil lines were adjusted to match the more detailed vegetation lines.

All of the soil maps used photos as their base. The soils overlay was prepared by registering the 1:37,000 scale basemap and soil overlay to the photographically enlarged 1:37,000 scale soil surveys. This was accomplished by overlaying the topo and soil overlay on the soil collateral. Known linear and point features were aligned on the soil map with their corresponding features on the basemap before drafting the pattern.

Soil polygons under two acres were dropped or absorbed into an adjacent similar soil unit. The maps were edited against the original soil collateral for transposed codes and missing lines.

Boundary lines were drawn on the soils overlay between adjoining soil surveys, because the soil surveys were made at different times and with different degrees with generalization. No two soil surveys edgematched. Often along the interface between surveys, the lines matched fairly well, but the assigned code values were often different. The boundary between the two surveys was drawn to the nearest polygon on the ITUM.

Several areas on map sheets Talkeetna Mountains, A-6 and B-1, and Anchorage D-8 of the Talkeetna Subbasin study area and several areas on map sheets Talkeetna A-3 and A-4, and Tyonek A-6, B-5, B-6, C-4, C-5 and D-5 of the Beluga Subbasin study area were unsurveyed for soils. By reading the

soil descriptions and checking the surrounding soil patterns against the image the soil lines were interpolated into the unsurveyed area. Special attention was given to vegetation and slope differences.

Soil data was mapped at the soil phase level representing the most detailed level for taxanomic classification of soils. Value variations within soil units from the typical pedon are an operational part defining soils. The soils data will vary in reliability from one interpretation to the next depending upon the precision with which the pertinent values were assessed during the original collection of the soils data. Differences in soils data interpretation will cause variations of reliability. By using soil phases on the mapping unit, the descriptions can be improved as new information because available from the Soil Conservation Service. This data is used in detailed subregional analysis and display and the descriptive information of every soil phase meets the needs of the site selection process.

7. Habitat

The habitat overlay was compiled using the following map sources: Alaska's Wildlife and Habitat, Volume 1, 2, The Sea Bird Catalog, habitat maps prepared by Jack Dickerson, David Harkness, and by Paul Arreson and Dan Timm. The collateral maps were drawn on mylar overlays registered to 1:63,360 scale U.S.G.S. paper topographic maps.

The lines were transferred directly to the 1:63,360 scale habitat overlay, carefully registering the mylar topo map and habitat overlay to the paper topo and collateral overlays. The polygons were given code numbers which represented animal type and habitat usage. Polygons containing

identical animal types and habitat usage were assigned the same code value.

The habitat maps prepared by Jack Dickerson, Paul Harkness, Paul Arneson and Dan Timm had many polygon boundaries ending in straight lines along map borders. These maps are general field observation maps and are not intended to represent the exact spatial extent of the various habitats.

The habitat maps were compared against the imagery and basemap and some lines were adjusted to match obvious vegetation and terrain features. By and large, the lines reflect the configuration of the original collateral. Corrections and adjustments were made, but most lines were delineated on the habitat overlay as they appeared on the collateral. The completed overlay was then transferred to the ITUM.

The reliability of this item is good for use at the regional level.

The habitat maps, which are mainly compiled from field observation, delineate large areas as various habitat areas. Most of these habitat polygons contains a wide divergence of natural, and sometimes cultural features. Therefore, within any area there could be sections of heavy occurrence grading down to no occurrence at all. Detailed studies of the natural and cultural features with field studies are necessary to verify the existence of a habitat.

a. Habitat I

The Habitat I overlay was compiled using a 1:63,360 scale habitat collateral map prepared by Paul Arneson and Dan Timm.

b. Habitat II

The Habitat II overlay was compiled using 1:63,360 habitat collateral maps prepared by Jack Didrickson and Dave Harkness.

c. Habitat III

The Habitat III overlay was compiled using 1:63,360 habitat collateral maps obtained from Alaska Wildlife and Habitat, Vol. 2.

d. Habitat IV

The Habitat IV overlay was compiled using 1:63,360 habitat collateral maps obtained from Alaska's Wildlife and Habitat, Vol. 1 and 2.

e. Habitat V

The Habitat V overlay was compiled using 1:63,360 habitat collateral maps obtained from Seabird Catalog Information, U.S. Fish and Wildlife Service.

8. Land Use

The land use map was compiled using the vegetation overlay, the topo sheet, the imagery and the 1:63,360 scale land use map supplied by the Department of Natural Resources. The Department of Natural Resources land use map was compiled using older photos and field reconnaissance studies. Many of these maps did not take into account recent development. Some polygons were not in the proper locations. Also, the map didn't fit the topo sheet. Therefore, when it was used, continual adjustments had to be made to attain the proper registration with the mylar basemap. The land use overlay was prepared by transferring all the disturbed area "70" (cultural influence) from the vegetation overlay to the land use overlay. These areas were then given land use codes by placing the topo sheet, with the attached mylar land use overlay, on the image and interpreting the actual land use within the disturbed areas. When the interpreter was unsure about a polygons land use the information was checked using the DNR land use maps. A final check

against the image was performed to identify remote residential, which was seldom delineated on the vegetation map, and to check for any other land use polygons that were overlooked.

The recreational uses coded 1500, were obtained using the DNR recreation overlay. These lines were transferred directly onto the land use overlay. The collateral map did not fit the topo sheet, therefore, it necessitated continual adjustment to obtain the best possible registration.

The minimum land use polygon mapping resolution was 2.5 acres. However, the land use classification has a very detailed urban breakdown. Many of the land use classes, such as eating and drinking establishments, occur in units of 2.5 acres or smaller. Consequently, it was often necessary to aggregate these small urban units into the general classification "mixed urban build up".

The general reliability of the land use map is very good. The classification uses a hierarchical classification system and may be used for detailed analysis and display as well as for general regional aplications. This data must be supported by more detailed inventories for those regulatory procedures which require an accurate count of occupied dwellings or other specific site information.

9. Vegetation

This data item was prepared from 1:63,360 scale clear acetate vegetation maps supplied by the U.S. Forest Service. These vegetation maps were interpreted from the same imagery that the current study uses. Each photo has a corresponding vegetation map overlay.

With the collateral vegetation map attached to the proper photo, the

vegetation polygons were transferred onto the manuscript vegetation map, which was attached to the topo basemap. The topo and manuscript basemaps were adjusted to attain registration to features on the photo.

As the lines were being transferred from the vegetation collateral, the interpreter checked the position of the line work to ensure code and signature consistency. A final edit was performed to identify missing lines and uncoded polygons.

The vegetation collateral map was of excellent quality and only a few areas on the imagery disagreed with the vegetation collateral. Since it was interpreted from recent photos, dynamic phenomena such as stream course configuration and land use are accuratey portrayed. The overall reliability of this data is excellent, but any planning decision requiring specific site vegetation information would require further refinement of the vegetation polygons.

B. SURFACE HYDROLOGY MAP

These maps consist of sequentially numbered lines and polygons and corresponding sequentially numbered code lists. The maps consist of stream courses and watershed boundaries. The maps were drawn at a scale of 1:63,360 and each map comprising the surface hydrology map is described in subsections that follow:

1. Stream

The stream map, scaled at 1:63,360, was made by transferring the stream courses from the topo sheets to the hydrology manuscript as a series of straight line segments. This straight line technique makes the digitizing of manuscripts easier and this method does not significantly change the stream network configuration. The soil surveys which delineate stream courses along with the imagery were used to identify additional streams and record them on the overlay. The imagery was used to correct stream courses that had changed as a result of stream piracy or by natural immigration across a flood plain. These corrections aided in eliminating edgematching discrepancies.

The general reliability of stream course configuration was made excellent by basemap and soil survey updating to match the imagery. A copy of the hydrology manuscript was made for each hydrology data variable: Order, periodicity, origin, discharge profile, situation and condition, recreation uses and anadromous streams. The completed overlays were then integrated and coded.

a. Order

The streams from the original manuscript copy were transferred onto the stream order overlay. The stream network was assigned order values

in the following manner. All unbranched tributaries are first order streams; when two channel segments of order N join they form a channel of order N+1.

When streams of different orders join, the higher order stream code value is retained.

The hydrology manuscript was overlain on the order map and each line segment's value was recorded on a code sheet.

b. Periodicity

The completed hydrology manuscript maps were compared to the topographic map and imagery. It was determined that all of the streams in the study area were perennial.

c. Origin (Glacial/Nonglacial)

The streams from the original manuscript copy were transferred onto the overlay. All streams were then compared to the imagery and basemaps. Streams with headwater or tributaries originating from a glacier were coded glacial and all others nonglacial. The hydrology manuscript map was overlain on the origin overlay and each line segment code was recorded.

d. Discharge Profile (Mountain/Lowland)

All streams from the hydrology manuscript were transferred onto the discharge profile overlay. The overlay was then compared to the imagery and basemap. Streams with headwater or tributaries which flow above 1500 feet or above the timber line were coded mountainous. All others were coded lowland. The hydrology manuscript map was overlain on the discharge profile map and each line segment's value was recorded on a

code sheet.

e. Situation

All the streams reflected on the hydrology manuscript were transferred onto the situation overlay. By using the topographic map and imagery, stream course segments contained within water bodies were identified. This made it possible to produce a computer plot of stream courses and water bodies from the ITUM and drop the line segments within the waterbodies.

f. Condition

A review of the imagery and basemap established that there were no braided stream courses within the study area.

g. Anadromous Streams

The anadromous stream overlay was compiled using a small scaled anadromous stream collateral map supplied by the client. The maps were reformatted to 1:63,360 and all streams on the final manuscript were coded accordingly.

The general reliability of this mapped item is good for the major rivers. However, because the origina collateral was at a small scale, it didn't show many of the smaller streams. They were, therefore, coded as not an anadromous stream.

2. Watersheds

The completed stream course maps were mosaicked together and polygons were drawn around every 3rd order or higher basin. The general watershed boundaries were then adjusted to the topography using the basemap and imagery.

a. Topologic Number

The resulting watershed system was coded hierarchically, making it possible to identify which basins flow into which basin.

The general reliability of the watershed map is very good. However, field studies would be required to determine or verify the precise break in drainage between two watersheds.

C. POINTS AND LINEAR FEATURES MAP

1. Natural Lines

Natural lines were composed of two variables: escarpments and fault lines. An overlay was completed for each variable, and all lines were carefully checked against the imagery to assure proper location and code value. Finally, the manuscripts were compiled, edgematched, sequentially numbered, and coded.

a. Escarpment

Escarpments were obtained from the blueprint geologic hazards map at a scale of 1:63,360. The line representing the escarpment was transferred from the geologic hazards map onto the natural line overlay which was attached to the basemap. The overlay was compared to the photo and basemap to verify the position of the major escarpments.

The general reliability of this item is excellent. Smaller escarpments below the minimum mag resolution were not mapped.

b. Fault Lines

Faults were mapped from the blueprint copy of the geology hazards map ata scale of 1:63,360. The faults were transferred from the geologic hazard map onto the natural lines overlay. The overlay was compared to the image adjusting the lines to perceptible linements.

The general reliability of this item is good, but detailed field survey is needed where public health and safety are involved.

2. Cultural Points and Lines

The cultural points and lines were composed of two variables: Roads/Trails/Infrastructure and Extractive Sites.

The Roads/Trails/Infrastructure network was interpreted using the basemap and imagery. Cultural points were mapped using the basemaps, imagery and land use maps supplied by the client.

Each of the variables were carefully checked against the imagery to assure proper location and code value. Finally, the manuscripts were compiled, edgematched, numbered and coded.

a. Roads/Trails/Infrastructure

The methods used for mapping roads involved identifying the type of road and its configuration on the imagery and then using the basemap to assure proper registration onto the infrastructure overlay. Since the road configuration on the topo sheet was often found to be incorrect, roads were mapped primarily using the imagery. Only major roads and highways were mapped and feeder roads and residential street patterns were not.

Trails were mapped from recreation collateral supplied by the Alaska Department of Natural Resources. An attempt was made to photo check each trail, but we were unable to because of their narrowness and the dense forest cover. Railroads were obtained directly from the topo sheet and compared to the imagery to assure that the topo sheet patterns were correct.

Major seismic survey lines were identified on the image and transferred to the infrastructure overlay using the basemap to assure proper registration.

b. Extractive Sites

The topo sheet and imagery were used to identify sand and gravel

quarries and barrow pits. The topo sheet tended to depict the larger quarries and pits, while the imagery reflected more recent and smaller ones.

Mines and wells were mapped using a combination of the topo sheet, imagery and land use collateral.

D. LAND STATUS MAP

The land status map was compiled using the 1:63,360 scale basemaps and the 1:63,360 scale Agency Interest and Land Ownership maps obtained from the Alaska Department of Natural Resources. The manuscript map included overlays on township and range, ownership, and agency interest. The township and range was transferred directly from the basemap. The ownership and agency interests were compiled using the Department of Natural Resource land status map.

To compile the manuscript, the township and range lines were transferred from the basemap onto the land status manuscript map. Ownership and Agency Interest overlays were made by registering the blueprint land status collateral maps to the basemap and transferring the lines onto the overlays. The reformatted overlays were then transferred to the manuscript copy. There was little integration needed since each data overlay line work followed township and range lines.

The manuscript and polygons were sequentialy numbered and each polygon was assigned code values using the basemap and data overlays. The code values were recorded on code sheets.

1. Congressional Townships for the U.S. System of Rectangular Surveys

Township and range was interpreted directly from the topographic map. The township and range overlay was fastened to the topographic sheet and the lines drafted. The township and range lines were not surveyed in the study area, therefore, lines from adjoining sheets frequently did not edgematch.

The general reliability of this data item is good. When the lines are surveyed, the change in position of the surveyed line will probably be

insignificant considering the minimum 2.5 acre resolution.

2. Ownership

Ownership was obtained from blueprinted ownership and agency interest maps supplied by the Alaska Department of Natural Resources. The ownership lines and codes had been overlain on a copy of the 1:63,360 scale topographic map and blueprinted. Often the ownership overlay shifted on the topo sheet, resulting in an improper registration on the finished blueprint. Because the ownership was done on a blueprint, the map stretched considerably.

The ownership overlay was produced by registering the mylar topo sheet with the ownership overlay attached to the blueprinted ownership lines. The blueprinted topo lines were ignored. Since ownership in the area had been designed using the township and range system, special care was taken to register the township and range lines on the topo to the ownership lines on the blueprints by using a template. The template divided a typical section into 8 smaller sections, and adjusted the ownership lines to their proper positions. The general reliability of the ownership overlay is good, because the ownership lines were adjusted to fit the township and range survey. No additional polygons were created or code values changed.

3. Agency Interest

The agency interest overlay was produced using information obtained from the ownership and agency interest maps supplied by the Department of Natural Resources. The collateral map received was a 1:63,360 scale blueprint copy of a clear acetate land use map and a clear acetate agency interest map overlain on a paper topo sheet. During the blueprint process, the overlays shifted on the basemap and the collateral stretched causing improper

registration to the paper topo map.

The agency interest overlay was produced by registering it and the mylar topographic sheet to the agency interest lines on the blueprint copy, ignoring the blueprinted topograhic map. The collateral agency interest lines were carefully registered to the township and range lines on the mylar basemap. The lines were transferred to the agency interest overlays. A template, showing eight smaller sections, was used during this process to insure proper placement of lines.

Special care to ensure that the agency interest information was properly registered to the basemap enhanced the reliability of the finished overlay. No additional polygons were created or code values changed.

# Appendix D1

## Grid Multi-Variable File
## Talkeetna Subbasin

SUSITNA RIVER BASIN
Talkeetna Subbasin

GRID MULTIVARIABLE FILE
(* indicates the position has been packed for storage efficiency)

| Position | Description |
|---|---|
| 1 | Row |
| 2 | Column |
| 3 | Map Module Number |
| 4 | Unique Terrain Unit Number |
| 5 | Unique Land Status Number |
| 6 | Unique Stream Course Number |
| 7 | Terrain Unit Polygon Number |
| 8 | Average Slope |
| 9 | Physiographic Division/Landform* |
| 10 | Surficial Geology |
| 11 | Bedrock/Economic Geology* |
| 12 | Geologic Hazards* |
| 13 | Soils |
| 14 | Habitat I,II,III* |
| 15 | Habitat IV,V* |
| 16 | Land Use |
| 17 | Vegetation I,II* |
| 18 | Vegetation III,IV* |
| 19 | Land Status Polygon Number |
| 20 | Township |
| 21 | Range |
| 22 | Land Ownership |
| 23 | Agency Interest I* |
| 24 | Agency Interest II* |
| 25 | Agency Interest III* |
| 26 | Agency Interest IV* |
| 27 | Stream Segment Number |
| 28 | Stream I* |
| 29 | Stream II* |
| 30 | Cultural Line Sequence Number |
| 31 | Roads |
| 32 | Trails, Seismic Line, Railroads, and Utilities* |
| 33 | Extractive Sites |
| 34 | Watersheds |
| 35 | Natural Lines* |
| 36 | Soil Expansion I* |
| 37 | Soil Expansion II* |
| 38 | Soil Expansion III* |
| 39 | Soil Capability Class |
| 40 | Soil Priority Group* |
| 41 | Soil Average Point Value/Specific Slope* |
| 42 | Soil K Values/Potential Grazing* |

TALKEETNA SUBBASIN

## DESCRIPTION OF PACKED VARIABLES

(Note: Digits are packed from right to left. Rightmost position is # one.)

| POSITION | TOTAL # OF DIGITS | RANGE | DESCRIPTION |
|---|---|---|---|
| Terrain Units | | | |
| 9 | 4 | 4-4 | Physiographic Division |
| | | 1-3 | Landform |
| 11 | 4 | 3-4 | Bedrock Geology |
| | | 1-2 | Economic Geology |
| 12 | 3 | 2-3 | Geologic Hazards I |
| | | 1-1 | Geologic Hazards II |
| 14 | 4 | 3-4 | Habitat I |
| | | 2-2 | Habitat II |
| | | 1-1 | Habitat III |
| 15 | 3 | 2-3 | Habitat IV |
| | | 1-1 | Habitat V |
| 17 | 4 | 3-4 | Primary Vegetation |
| | | 1-2 | Secondary Vegetation |
| 18 | 4 | 3-4 | Tertiary Vegetation |
| | | 1-2 | Quarternary Vegetation |
| Land Status | | | |
| 23 | 5 | 5-5 | Fish and Game |
| | | 4-4 | Fish, Game and Parks |
| | | 3-3 | Parks |
| | | 2-2 | Timber |
| | | 1-1 | Highway Corridor |
| 24 | 5 | 5-5 | Agriculture |
| | | 4-4 | Materials Site |
| | | 3-3 | Misc. Watershed |
| | | 2-2 | Mineral Zone |
| | | 1-1 | FSLUPC Ecological Reserve |
| 25 | 4 | 4-4 | New Capitol Site |
| | | 3-3 | New Capitol Site Buffer |

| | | | | |
|---|---|---|---|---|
| | | 2-2 | Miscellaneous | |
| | | 1-1 | Intensive Recreation Areas | |
| 26 | 5 | 5-5 | Boro Natural Buffer | |
| | | 4-4 | Boro Wayside | |
| | | 3-3 | Excl. | |
| | | 2-2 | Other RET. | |
| | | 1-1 | F/W Habitat 200 ft. setback | |
| Streams | | | | |
| 28 | 2 | 2-2 | Stream Order | |
| | | 1-1 | Stream Periodicity | |
| 29 | 4 | 4-4 | Stream Origin | |
| | | 3-3 | Stream Profile | |
| | | 2-2 | Situation | |
| | | 1-1 | Condition | |
| Cultural Lines | | | | |
| 32 | | 4-4 | Trails | |
| | | 3-3 | Seismic Lines | |
| | | 2-2 | Railroads | |
| | | 1-1 | Utilities | |
| Natural Lines | | | | |
| 35 | 2 | 2-2 | Escarpments | |
| | | 1-1 | Fault Lines | |
| Soil Limitations | | | | Legend |
| 36 | 4 | 4-4 | Septic Tank Absorption Fields | 7 |
| | | 3-3 | Shallow Excavation | 7 |
| | | 2-2 | Dwellings without Basements | 7 |
| | | 1-1 | Dwellings with Basements | 7 |
| 37 | 4 | 4-4 | Small Commercial Buildings | 7 |
| | | 3-3 | Local Roads and Streets | 7 |
| | | 2-2 | Roadfill Source | 7 |
| | | 1-1 | Drainage | 8 |

| | | | | |
|---|---|---|---|---|
| 38 | 4 | 4-4 | Camping Areas | 7 |
| | | 3-3 | Picnic Areas | 7 |
| | | 2-2 | Playgrounds | 7 |
| | | 1-1 | Paths and Trails | 7 |

| Soil Expansions | | | | Legend |
|---|---|---|---|---|
| 40 | 3 | 3-3 | Grains | 4 |
| | | 2-2 | Hay, Silage and Pasture | 4 |
| | | 1-1 | Potatoes | 4 |
| 41 | 3 | 2-3 | Average Point Value | 5 |
| | | 1-1 | Specific Slope | 2 |
| 42 | 3 | 2-3 | Soil K Values | 1 |
| | | 1-1 | Potential Grazing | 6 |

Talkeetna GRID CALCULATIONS - UTM ZONE 5

- 6 million meters has been subtracted from the vertical coordinate

GRIPS

minimum x coordinate = 576044.056m
maximum x coordinate = 680315.715m
minimum y coordinate = 791529.160m
maximum y coordinate = 948103.292m
origin = 576044.056, 948103.292
The grid cell is 10 acres or 201.168m/$_{side}$ for GRIPS 201.68/$_{3}$ = 67.056m/$_{side}$

Vertical shift = 14140.0
Horizontal shift = -8590.0
Maximum rows = 2337
Maximum columns = 1557

GRIDPST

OUTPUT NUMBER OF ROWS 2337/$_{3}$ = 779

OUTPUT NUMBER OF COLUMNS = 1557/$_{3}$ = 519

This produces a grid file with 231925 cells that contain data.

Appendix D2

Grid Multi-Variable File
Beluga Subbasin

SUSITNA RIVER BASIN
Beluga Subbasin

GRID MULTIVARIABLE FILE
(* indicates the position has been packed for storage efficiency)

| Position | Description |
|---|---|
| 1 | Row |
| 2 | Column |
| 3 | Map Module Number |
| 4 | Unique Terrain Unit Number |
| 5 | Unique Land Status Number |
| 6 | - Empty Position - |
| 7 | Terrain Unit Polygon Number |
| 8 | Average Slope |
| 9 | Physiographic Division/Landform* |
| 10 | Surficial Geology |
| 11 | Bedrock/Economic Geology* (No Data) |
| 12 | Geologic Hazards* (No Data) |
| 13 | Soils |
| 14 | Habitat I,II,III* (No Data) |
| 15 | Habitat IV,V* (No Data) |
| 16 | Land Use |
| 17 | Vegetation I,II* |
| 18 | Vegetation III,IV* |
| 19 | Land Status Polygon Number |
| 20 | Township |
| 21 | Range |
| 22 | Section Corners (Points) |
| 23 | Stream I* |
| 24 | Stream II* |
| 25 | Watersheds |
| 26 | Roads |
| 27 | Trails, Seismic Line, Railroads, and Utilities* |
| 28 | Natural Lines* |
| 29 | Extractive Sites |
| 30 | Soil Expansion I* |
| 31 | Soil Expansion II* |
| 32 | Soil Expansion III* |
| 33 | Soil Capability Class |
| 34 | Soil Priority Group* |
| 35 | Soil Average Point Value/Specific Slope* |
| 36 | Soil K Values/Potential Grazing* |

BELUGA SUBBASIN

DESCRIPTION OF PACKED VARIABLES

(Note: Digits are packed from right to left. Rightmost position is # one.)

| POSITION | TOTAL # OF DIGITS | RANGE | DESCRIPTION |
|---|---|---|---|
| Terrain Units | | | |
| 9 | 4 | 4-4 | Physiographic Division |
| | | 1-3 | Landform |
| 11 | 4 | 3-4 | Bedrock Geology |
| | | 1-2 | Economic Geology |
| 12 | 3 | 2-3 | Geologic Hazards I |
| | | 1-1 | Geologic Hazards II |
| 14 | 4 | 3-4 | Habitat I |
| | | 2-2 | Habitat II |
| | | 1-1 | Habitat III |
| 15 | 3 | 2-3 | Habitat IV |
| | | 1-1 | Habitat V |
| 17 | 4 | 3-4 | Primary Vegetation |
| | | 1-2 | Secondary Vegetation |
| 18 | 4 | 3-4 | Tertiary Vegetation |
| | | 1-2 | Quarternary Vegetation |
| Streams | | | |
| 23 | 2 | 2-2 | Stream Order |
| | | 1-1 | Stream Periodicity |
| 24 | 4 | 4-4 | Stream Origin |
| | | 3-3 | Stream Profile |
| | | 2-2 | Situation |
| | | 1-1 | Condition |
| Natural Lines | | | |
| 28 | 2 | 2-2 | Escarpments |
| | | 1-1 | Fault Lines |

Soil Limitations

| | | | | LEGEND |
|---|---|---|---|---|
| 30 | 4 | 4-4 | Septic Tank Absorption Fields | 7 |
| | | 3-3 | Shallow Excavation | 7 |
| | | 2-2 | Dwellings without Basements | 7 |
| | | 1-1 | Dwellings with Basements | 7 |
| 31 | 4 | 4-4 | Small Commercial Buildings | 7 |
| | | 3-3 | Local Roads and Streets | 7 |
| | | 2-2 | Roadfill Source | 7 |
| | | 1-1 | Drainage | 8 |
| 32 | 4 | 4-4 | Camping Areas | 7 |
| | | 3-3 | Picnic Areas | 7 |
| | | 2-2 | Playgrounds | 7 |
| | | 1-1 | Paths and Trails | 7 |

Soil Expansions

| | | | | |
|---|---|---|---|---|
| 34 | 3 | 3-3 | Grains | 4 |
| | | 2-2 | Hay, Silage and Pasture | 4 |
| | | 1-1 | Potatoes | 4 |
| 35 | 3 | 2-3 | Average Point Value | 5 |
| | | 1-1 | Specific Slope | 2 |
| 36 | 3 | 2-3 | Soil K Values | 1 |
| | | 1-1 | Potential Grazing | 6 |

Beluga GRID CALCULATIONS - UTM ZONE 5

- 6 million meters has been subtracted from the vertical coordinates.

GRIPS

minimum x coordinate = 549892.116m
maximum x coordinate = 622618.340m
minimum y coordinate = 762334.285m
maximum y coordinate = 937441.388m
origin = 549892.216, 937441.388

The grid cell size is 10 acres on $201.168\text{m}/_{\text{side}}$
For grips $201.168/_{3} = 67.056\text{m}/_{\text{side}}$

Vertical shift = 13980.9778
Horizontal shift = 8199.4924
Maximum rows = 2613
Mximum columns = 1086

GRIDPST

output number of rows $2613/_{3}$ = 871 rows
output number of columns $1086/_{3}$ = 362 columns

This produces a grid file with 145042 cells that contain data.

Appendix E1

Interpretive Soil Matrix
Talkeetna Subbasin

TALKEETNA
SOIL EXPANSION LEGENDS

1. Soil K Value (Erosion)

.00 - .49 (implied decimal point in computer file)

2. Specific Slope

| | | |
|---|---|---|
| 1 - Nearly level | 0 - 3% | A |
| 2 - Undulating | 3 - 7% | B |
| 3 - Rolling | 7 - 12% | C |
| 4 - Hilly | 12 - 20% | D |
| 5 - Mod. Steep | 20 - 30% | E |
| 6 - Steep | 30 - 45% | F |
| 7 - Very Steep | >45% | G |
| 8 - Variable | | |
| 0 - Water | | |

3. Agricultural Capability Class

00 - Water
21 - IIe
22 - IIw
24 - IIc
30 - III
31 - IIIe
32 - IIIw
33 - IIIs
41 - IVe
42 - IVw
43 - IVs
61 - VIe
62 - VIw
63 - VIs
71 - VIIe
72 - VIIw
73 - VIIs
83 - VIIIs
90 - Gravel pits

4. Soil Priority Group: Grain, Hay, Silage, Pasture and Potatoes

6 - Suitable
5
4
3
2
1

0 - Unsuitable (includes water)

5. Soil Average Point Value

0.0 - 6.0
(implied decimal point between digits in computer file)

6. Important Grazing Lands Potential

1 - Excellent (Ex)
2 - Good (Gd)
3 - Fair (Fa)
4 - Poor (Pr)
5 - Water

7. Soil Limitations

1 - Slight (St)
2 - Moderate (M)
3 - Severe (Sr)
0 - Water

8. Soil Drainage Class

1 - Excessively Drained (E)
2 - Somewhat Excessively Drained (SE)
3 - Well Drained (W)
4 - Moderately Well Drained (M)
5 - Somewhat Poorly Drained (SP)
6 - Poorly Drained (P)
7 - Very Poorly Drained (VP)
8 - Variable Drainage (VAR)
0 - Water

SOIL EXPANSION MATRIX FOR GRID MVF
TALKEETNA SUBBASIN

| SOIL TYPE | GRID MVF POSITION 36 | 37 | 38 | 39 | 40 | 41 | 42 |
|---|---|---|---|---|---|---|---|
| 115 | 3333 | 3331 | 3333 | 71 | 000 | 006 | 284 |
| 116 | 3312 | 1214 | 1113 | 22 | 444 | 401 | 372 |
| 117 | 3333 | 3321 | 3121 | 63 | 000 | 001 | 283 |
| 118 | 3311 | 1313 | 1113 | 24 | 556 | 531 | 371 |
| 119 | 3311 | 2313 | 1123 | 21 | 455 | 472 | 371 |
| 120 | 3322 | 3313 | 2333 | 31 | 244 | 333 | 371 |
| 121 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 122 | 3333 | 3336 | 3333 | 42 | 030 | 101 | 373 |
| 123 | 3311 | 1313 | 1113 | 33 | 243 | 301 | 432 |
| 124 | 3311 | 2313 | 1123 | 31 | 243 | 302 | 432 |
| 125 | 3322 | 3313 | 2233 | 31 | 232 | 233 | 432 |
| 126 | 3333 | 3323 | 3333 | 41 | 020 | 074 | 433 |
| 127 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 434 |
| 128 | 3333 | 3336 | 3333 | 62 | 000 | 001 | 284 |
| 129 | 3333 | 3336 | 3333 | 62 | 000 | 001 | 434 |
| 130 | 1311 | 1213 | 1113 | 24 | 666 | 601 | 431 |
| 131 | 1311 | 2213 | 1123 | 21 | 465 | 502 | 431 |
| 132 | 3333 | 3326 | 3333 | 82 | 000 | 001 | 054 |
| 133 | 3311 | 1113 | 3333 | 83 | 000 | 005 | 054 |
| 134 | 1311 | 1213 | 1123 | 33 | 232 | 231 | 372 |
| 135 | 1311 | 2213 | 1123 | 31 | 232 | 232 | 372 |
| 136 | 2322 | 3213 | 2233 | 31 | 121 | 133 | 372 |
| 137 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 373 |
| 138 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 374 |
| 139 | 3333 | 3336 | 3333 | 72 | 000 | 001 | 244 |
| 140 | 3333 | 3336 | 3333 | 32 | 031 | 131 | 433 |
| 141 | 3311 | 1213 | 1113 | 33 | 232 | 231 | 432 |
| 142 | 3311 | 2213 | 1123 | 31 | 232 | 232 | 432 |
| 143 | 3322 | 3213 | 2233 | 31 | 231 | 203 | 432 |
| 144 | 3333 | 3323 | 3333 | 41 | 020 | 074 | 433 |
| 145 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 434 |
| 146 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 147 | 3333 | 3326 | 3333 | 42 | 010 | 031 | 433 |
| 148 | 3312 | 1116 | 1113 | 33 | 142 | 231 | 433 |
| 149 | 3333 | 3324 | 3332 | 72 | 000 | 001 | 054 |
| 150 | 3333 | 3336 | 3333 | 62 | 020 | 071 | 374 |
| 151 | 3311 | 1213 | 1113 | 24 | 565 | 531 | 431 |
| 152 | 3311 | 2213 | 1123 | 21 | 465 | 502 | 431 |
| 153 | 3322 | 2213 | 2223 | 31 | 354 | 403 | 431 |
| 154 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |
| 156 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 157 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 158 | 3311 | 1213 | 1113 | 24 | 556 | 531 | 431 |
| 159 | 3311 | 2213 | 1123 | 21 | 455 | 472 | 431 |
| 160 | 3322 | 3213 | 2233 | 31 | 244 | 333 | 431 |
| 161 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |
| 162 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 163 | 3333 | 3313 | 3121 | 33 | 243 | 301 | 152 |
| 164 | 3311 | 1213 | 1113 | 24 | 555 | 501 | 431 |
| 165 | 3311 | 2213 | 1123 | 21 | 455 | 472 | 431 |
| 166 | 3322 | 3213 | 2233 | 31 | 244 | 333 | 431 |
| 167 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 168 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 169 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 170 | 3311 | 1213 | 1113 | 33 | 122 | 171 | 432 |
| 171 | 3311 | 2213 | 1123 | 31 | 222 | 202 | 432 |
| 172 | 3322 | 3213 | 2233 | 31 | 221 | 173 | 432 |
| 173 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 433 |
| 174 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 434 |
| 175 | 3311 | 1213 | 1113 | 33 | 233 | 271 | 432 |
| 176 | 3311 | 2213 | 1123 | 31 | 233 | 272 | 432 |
| 177 | 3322 | 3213 | 2233 | 31 | 022 | 133 | 432 |
| 178 | 3333 | 3323 | 3333 | 41 | 210 | 104 | 433 |
| 179 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 434 |
| 180 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 181 | 2312 | 1313 | 1113 | 24 | 666 | 601 | 371 |
| 182 | 3333 | 3336 | 3333 | 42 | 030 | 101 | 323 |
| 183 | 3333 | 3313 | 3121 | 24 | 666 | 601 | 201 |
| 184 | 3333 | 3313 | 3332 | 42 | 030 | 101 | 152 |
| 185 | 3333 | 3331 | 3333 | 83 | 000 | 007 | 004 |
| 186 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 187 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 188 | 3333 | 3326 | 3223 | 72 | 032 | 171 | 373 |
| 189 | 3311 | 1313 | 1113 | 24 | 666 | 601 | 431 |
| 190 | 3311 | 2313 | 1123 | 21 | 566 | 572 | 431 |
| 191 | 3322 | 3313 | 2233 | 31 | 354 | 403 | 431 |
| 192 | 3333 | 3323 | 3333 | 41 | 240 | 204 | 432 |
| 193 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 194 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 374 |
| 401 | 3333 | 3336 | 3333 | 42 | 030 | 101 | 373 |
| 402 | 3333 | 3313 | 3333 | 31 | 244 | 331 | 101 |
| 403 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 004 |
| 404 | 3333 | 3337 | 3333 | 82 | 000 | 002 | 004 |
| 405 | 3333 | 3337 | 3333 | 81 | 000 | 001 | 004 |
| 406 | 3333 | 3337 | 3333 | 81 | 000 | 002 | 004 |
| 407 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 408 | 3333 | 3323 | 3113 | 42 | 000 | 001 | 492 |
| 409 | 3333 | 3336 | 3333 | 62 | 020 | 071 | 374 |
| 410 | 1111 | 1213 | 1113 | 33 | 132 | 201 | 431 |
| 411 | 1111 | 2213 | 1123 | 31 | 132 | 202 | 431 |
| 412 | 2222 | 3213 | 2233 | 31 | 121 | 133 | 431 |
| 413 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 432 |
| 414 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 432 |
| 415 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 416 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 417 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 418 | 3333 | 3337 | 3333 | 81 | 021 | 102 | 493 |
| 419 | 3333 | 3336 | 3333 | 52 | 010 | 032 | 003 |
| 420 | 3333 | 3336 | 3333 | 52 | 010 | 033 | 003 |
| 421 | 3333 | 3326 | 3333 | 42 | 010 | 032 | 493 |
| 422 | 3333 | 3336 | 3333 | 42 | 030 | 101 | 323 |
| 423 | 3333 | 3336 | 3333 | 42 | 030 | 102 | 323 |
| 424 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 425 | 3333 | 3337 | 3333 | 82 | 000 | 002 | 054 |

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|---|---|---|---|---|---|---|---|
| 426 | 3333 | 3337 | 3333 | 72 | 000 | 001 | 054 |
| 427 | 3333 | 3337 | 3333 | 72 | 000 | 002 | 054 |
| 428 | 3333 | 3326 | 3323 | 52 | 010 | 031 | 493 |
| 429 | 3333 | 3326 | 3333 | 42 | 010 | 031 | 433 |
| 430 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 431 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 432 | 3333 | 3313 | 3121 | 24 | 666 | 601 | 201 |
| 433 | 3333 | 3326 | 3223 | 72 | 032 | 171 | 373 |
| 434 | 3311 | 1313 | 1111 | 21 | 465 | 501 | 201 |
| 435 | 3312 | 1116 | 1113 | 33 | 142 | 231 | 433 |
| 436 | 3312 | 1116 | 1113 | 42 | 132 | 201 | 493 |
| 437 | 3333 | 3326 | 3233 | 42 | 030 | 101 | 433 |
| 438 | 3333 | 3326 | 3233 | 42 | 030 | 102 | 433 |
| 439 | 3322 | 3213 | 2233 | 61 | 030 | 103 | 371 |
| 440 | 3333 | 3323 | 3333 | 61 | 030 | 104 | 372 |
| 441 | 3333 | 3333 | 3333 | 71 | 000 | 005 | 373 |
| 442 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 374 |
| 443 | 3333 | 3233 | 3333 | 81 | 000 | 003 | 494 |
| 444 | 3333 | 3233 | 3333 | 81 | 000 | 005 | 494 |
| 445 | 3333 | 3233 | 3333 | 81 | 000 | 007 | 494 |
| 446 | 3333 | 3233 | 3333 | 81 | 000 | 006 | 494 |
| 447 | 3333 | 3233 | 3333 | 81 | 000 | 003 | 494 |
| 448 | 3333 | 3233 | 3333 | 81 | 000 | 006 | 494 |
| 449 | 3333 | 3336 | 3333 | 83 | 000 | 007 | 004 |
| 450 | 3333 | 3323 | 3121 | 42 | 000 | 001 | 104 |
| 451 | 3311 | 1213 | 1113 | 24 | 555 | 501 | 431 |
| 452 | 3311 | 2213 | 1123 | 21 | 455 | 472 | 431 |
| 453 | 3322 | 3213 | 2233 | 31 | 244 | 333 | 431 |
| 454 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |
| 455 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 456 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 457 | 3311 | 1213 | 1113 | 33 | 233 | 271 | 492 |
| 458 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 459 | 3311 | 1213 | 1113 | 33 | 233 | 271 | 432 |
| 460 | 3311 | 2213 | 1123 | 31 | 233 | 272 | 432 |
| 461 | 3322 | 3213 | 2233 | 31 | 022 | 133 | 432 |
| 462 | 3333 | 3313 | 3121 | 33 | 243 | 301 | 152 |
| 463 | 3311 | 1213 | 1113 | 24 | 556 | 531 | 431 |
| 464 | 3333 | 3313 | 3121 | 22 | 462 | 401 | 492 |
| 465 | 3333 | 3333 | 3333 | 83 | 000 | 004 | 494 |
| 466 | 1311 | 2213 | 1123 | 21 | 465 | 502 | 431 |
| 467 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 004 |
| 468 | 3333 | 3336 | 3333 | 52 | 010 | 031 | 003 |
| 469 | 2312 | 1313 | 1113 | 24 | 666 | 601 | 371 |
| 470 | 3333 | 3333 | 3333 | 83 | 000 | 003 | 494 |
| 471 | 3311 | 1213 | 1113 | 24 | 565 | 531 | 431 |
| 472 | 3311 | 2213 | 1123 | 21 | 465 | 502 | 431 |
| 473 | 3322 | 2213 | 2223 | 31 | 354 | 403 | 431 |
| 474 | 3311 | 2213 | 1123 | 61 | 040 | 132 | 371 |
| 475 | 3312 | 1116 | 1113 | 33 | 142 | 232 | 433 |
| 476 | 3312 | 1116 | 1113 | 33 | 142 | 233 | 433 |
| 477 | 3333 | 3337 | 3333 | 82 | 000 | 003 | 054 |

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|---|---|---|---|---|---|---|---|
| 478 | 3333 | 3326 | 3333 | 42 | 010 | 033 | 493 |
| 479 | 3333 | 3331 | 3333 | 71 | 000 | 006 | 284 |
| 480 | 1311 | 1213 | 1113 | 24 | 666 | 601 | 431 |
| 481 | 3333 | 3233 | 3333 | 81 | 000 | 007 | 494 |
| 482 | 3311 | 2333 | 1113 | 51 | 030 | 102 | 434 |
| 483 | 3333 | 3233 | 3333 | 81 | 000 | 004 | 494 |
| 484 | 3322 | 3333 | 2233 | 51 | 030 | 103 | 434 |
| 485 | 3333 | 3333 | 3333 | 51 | 030 | 104 | 434 |
| 486 | 3333 | 3336 | 3333 | 52 | 010 | 034 | 003 |
| 487 | 3311 | 2213 | 1123 | 21 | 455 | 472 | 431 |
| 488 | 3322 | 3213 | 2233 | 31 | 244 | 333 | 431 |
| 489 | 3333 | 3313 | 3332 | 42 | 030 | 101 | 152 |
| 490 | 3333 | 3336 | 3333 | 72 | 000 | 001 | 244 |
| 491 | 1111 | 2213 | 1123 | 31 | 132 | 202 | 431 |
| 492 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 004 |
| 493 | 3311 | 1213 | 1113 | 33 | 122 | 171 | 432 |
| 494 | 1111 | 1213 | 1113 | 33 | 132 | 201 | 431 |
| 495 | 1111 | 1213 | 1113 | 33 | 132 | 201 | 431 |
| 496 | 3311 | 2313 | 1123 | 21 | 566 | 572 | 431 |
| 497 | 3322 | 3313 | 2233 | 31 | 354 | 403 | 431 |
| 498 | 3333 | 3336 | 3333 | 52 | 010 | 033 | 003 |
| 499 | 3333 | 3233 | 3333 | 81 | 000 | 006 | 494 |
| 500 | 3333 | 3333 | 3333 | 71 | 000 | 007 | 434 |
| 501 | 3333 | 3326 | 3233 | 42 | 020 | 073 | 433 |
| 502 | 3333 | 3336 | 3333 | 52 | 010 | 036 | 003 |
| 503 | 3333 | 3326 | 3333 | 42 | 010 | 031 | 433 |
| 504 | 1311 | 2213 | 1123 | 31 | 232 | 232 | 372 |
| 505 | 3333 | 3336 | 3333 | 83 | 000 | 007 | 004 |
| 506 | 3333 | 3333 | 3333 | 73 | 000 | 007 | 494 |
| 507 | 3333 | 3323 | 3333 | 61 | 000 | 006 | 433 |
| 508 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 509 | 3333 | 3331 | 3333 | 83 | 000 | 007 | 004 |
| 510 | 3311 | 2213 | 1123 | 63 | 040 | 131 | 371 |
| 511 | 3333 | 3331 | 3333 | 71 | 000 | 007 | 284 |
| 512 | 3333 | 3333 | 3333 | 71 | 040 | 132 | 491 |
| 513 | 3333 | 3333 | 3333 | 71 | 040 | 133 | 491 |
| 514 | 3333 | 3333 | 3333 | 71 | 040 | 134 | 491 |
| 515 | 3333 | 3333 | 3333 | 71 | 040 | 135 | 491 |
| 516 | 3333 | 3333 | 3333 | 71 | 040 | 136 | 491 |
| 517 | 3333 | 3333 | 3333 | 71 | 040 | 137 | 491 |
| 518 | 3333 | 3333 | 3333 | 71 | 040 | 131 | 491 |
| 519 | 3333 | 3336 | 3333 | 72 | 000 | 003 | 244 |
| 520 | 3333 | 3333 | 3333 | 71 | 040 | 134 | 491 |
| 521 | 2312 | 2313 | 1123 | 21 | 465 | 502 | 371 |
| 522 | 3333 | 3313 | 3333 | 71 | 000 | 005 | 433 |
| 523 | 3333 | 3336 | 3333 | 72 | 000 | 002 | 244 |
| 524 | 3222 | 2313 | 2233 | 71 | 030 | 103 | 432 |
| 525 | 3333 | 3323 | 3333 | 63 | 000 | 005 | 374 |
| 526 | 1311 | 1213 | 1123 | 43 | 020 | 071 | 372 |
| 527 | 3333 | 3326 | 3233 | 62 | 030 | 103 | 493 |
| 528 | 3333 | 3326 | 3233 | 62 | 030 | 102 | 493 |
| 529 | 3333 | 3233 | 3333 | 81 | 000 | 007 | 494 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 530 | 3322 | 3213 | 2233 | 61 | 030 | 103 | 371 |
| 531 | 3333 | 3326 | 3233 | 62 | 030 | 101 | 493 |
| 532 | 3311 | 1213 | 1113 | 21 | 140 | 171 | 492 |
| 533 | 3311 | 1213 | 1113 | 21 | 140 | 172 | 492 |
| 534 | 3311 | 1213 | 1113 | 21 | 140 | 173 | 492 |
| 535 | 3333 | 3336 | 3333 | 42 | 030 | 103 | 323 |
| 536 | 3333 | 3233 | 3333 | 81 | 000 | 004 | 494 |
| 537 | 3333 | 3323 | 3333 | 61 | 030 | 104 | 372 |
| 538 | 3333 | 3336 | 3333 | 72 | 000 | 005 | 492 |
| 539 | 3333 | 3336 | 3333 | 42 | 020 | 073 | 493 |
| 540 | 3333 | 3336 | 3333 | 42 | 020 | 074 | 493 |
| 541 | 3333 | 3333 | 3333 | 71 | 666 | 605 | 491 |
| 542 | 3333 | 3337 | 3333 | 81 | 021 | 102 | 493 |
| 543 | 3333 | 3338 | 3333 | 82 | 000 | 008 | 004 |
| 600 | 3322 | 2223 | 2222 | 41 | 000 | 001 | 104 |
| 601 | 3333 | 3313 | 3121 | 22 | 462 | 401 | 492 |
| 602 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 603 | 3333 | 3313 | 3121 | 33 | 243 | 301 | 152 |
| 604 | 1111 | 2213 | 1123 | 31 | 132 | 202 | 431 |
| 605 | 3333 | 3326 | 3333 | 42 | 010 | 032 | 493 |
| 606 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 607 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 432 |
| 608 | 3333 | 3336 | 3333 | 42 | 030 | 101 | 323 |
| 609 | 3311 | 2313 | 1123 | 21 | 455 | 472 | 371 |
| 610 | 3311 | 1213 | 1113 | 24 | 555 | 501 | 431 |
| 611 | 3311 | 2213 | 1123 | 21 | 455 | 472 | 431 |
| 612 | 3322 | 3213 | 2233 | 31 | 244 | 333 | 431 |
| 613 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |
| 614 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 615 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 616 | 3333 | 3336 | 3333 | 62 | 020 | 071 | 374 |
| 617 | 3333 | 3337 | 3333 | 72 | 000 | 001 | 054 |
| 618 | 3333 | 3326 | 3233 | 42 | 030 | 101 | 433 |
| 619 | 3333 | 3326 | 3233 | 42 | 030 | 102 | 433 |
| 620 | 2222 | 3213 | 2233 | 31 | 121 | 133 | 431 |
| 621 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 622 | 3312 | 1116 | 1113 | 33 | 142 | 231 | 433 |
| 623 | 3311 | 1213 | 1113 | 24 | 565 | 531 | 431 |
| 624 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 625 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 626 | 3311 | 2213 | 1123 | 21 | 465 | 502 | 431 |
| 627 | 3311 | 2213 | 1123 | 61 | 040 | 132 | 371 |
| 628 | 3322 | 3213 | 2233 | 61 | 030 | 103 | 371 |
| 629 | 3333 | 3323 | 3333 | 61 | 030 | 104 | 372 |
| 630 | 3333 | 3333 | 3333 | 71 | 000 | 005 | 373 |
| 631 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 374 |
| 632 | 3333 | 3333 | 3333 | 71 | 040 | 133 | 491 |
| 633 | 3333 | 3333 | 3333 | 71 | 040 | 134 | 491 |
| 634 | 3333 | 3333 | 3333 | 71 | 040 | 135 | 491 |
| 635 | 3333 | 3333 | 3333 | 71 | 040 | 137 | 491 |
| 636 | 2312 | 1313 | 1113 | 24 | 666 | 601 | 371 |
| 637 | 3311 | 2213 | 1123 | 31 | 232 | 232 | 432 |

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|---|---|---|---|---|---|---|---|
| 638 | 3333 | 3336 | 3333 | 72 | 000 | 001 | 244 |
| 639 | 3311 | 1213 | 1113 | 33 | 232 | 231 | 432 |
| 640 | 3333 | 3313 | 3121 | 33 | 000 | 001 | 374 |
| 641 | 3333 | 3331 | 3333 | 71 | 000 | 006 | 284 |
| 642 | 3333 | 3336 | 3333 | 72 | 000 | 002 | 244 |
| 643 | 3333 | 3324 | 3332 | 72 | 000 | 001 | 054 |
| 644 | 3333 | 3326 | 3333 | 42 | 010 | 031 | 433 |
| 645 | 3333 | 3336 | 3333 | 62 | 020 | 071 | 374 |
| 646 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 432 |
| 647 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 648 | 3322 | 3213 | 2233 | 31 | 231 | 203 | 432 |
| 649 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |
| 650 | 3333 | 3326 | 3333 | 42 | 010 | 031 | 433 |
| 999 | 0000 | 0000 | 0000 | 00 | 000 | 000 | 995 |

Appendix E2

Interpretive Soil Matrix
Beluga Subbasin

BELUGA
SOIL EXPANSION LEGENDS

1. Soil K Value (Erosion)

.00 - .49 (implied decimal point in computer file)

2. Specific Slope

| | | |
|---|---|---|
| 1 - Nearly level | 0 - 3% | A |
| 2 - Undulating | 3 - 7% | B |
| 3 - Rolling | 7 - 12% | C |
| 4 - Hilly | 12 - 20% | D |
| 5 - Mod. Steep | 20 - 30% | E |
| 6 - Steep | 30 - 45% | F |
| 7 - Very Steep | >45% | G |
| 8 - Variable | | |
| 0 - Water | | |

3. Agricultural Capability Class

00 - Water
21 - IIe
22 - IIw
24 - IIc
30 - III
31 - IIIe
32 - IIIw
33 - IIIs
41 - IVe
42 - IVw
43 - IVs
61 - VIe
62 - VIw
63 - VIs
71 - VIIe
72 - VIIw
73 - VIIs
83 - VIIIs
90 - Gravel pits

4. Soil Priority Group: Grain, Hay, Silage, Pasture and Potatoes

6 - Suitable
5
4
3
2
1

0 - Unsuitable (includes water)

5. Soil Average Point Value

0.0 - 6.0
(implied decimal point between digits in computer file)

6. Important Grazing Lands Potential

1 - Excellent (Ex)
2 - Good (Gd)
3 - Fair (Fa)
4 - Poor (Pr)
5 - Water

7. Soil Limitations

1 - Slight (St)
2 - Moderate (M)
3 - Severe (Sr)
0 - Water

8. Soil Drainage Class

1 - Excessively Drained (E)
2 - Somewhat Excessively Drained (SE)
3 - Well Drained (W)
4 - Moderately Well Drained (M)
5 - Somewhat Poorly Drained (SP)
6 - Poorly Drained (P)
7 - Very Poorly Drained (VP)
8 - Variable Drainage (VAR)
0 - Water

SOIL EXPANSION MATRIX FOR GRID MVF
BELUGA SUBBASIN

| SOIL TYPE | GRID MVF POSITION | | | | | | |
|---|---|---|---|---|---|---|---|
| | 30 | 31 | 32 | 33 | 34 | 35 | 36 |
| 115 | 3333 | 3331 | 3333 | 71 | 000 | 006 | 284 |
| 116 | 3312 | 1214 | 1113 | 22 | 444 | 401 | 372 |
| 117 | 3333 | 3321 | 3121 | 63 | 000 | 001 | 283 |
| 118 | 3311 | 1313 | 1113 | 24 | 556 | 531 | 371 |
| 119 | 3311 | 2313 | 1123 | 21 | 455 | 472 | 371 |
| 120 | 3322 | 3313 | 2333 | 31 | 244 | 333 | 371 |
| 121 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 122 | 3333 | 3336 | 3333 | 42 | 030 | 101 | 373 |
| 123 | 3311 | 1313 | 1113 | 33 | 243 | 301 | 432 |
| 124 | 3311 | 2313 | 1123 | 31 | 243 | 302 | 432 |
| 125 | 3322 | 3313 | 2233 | 31 | 232 | 233 | 432 |
| 126 | 3333 | 3323 | 3333 | 41 | 020 | 074 | 433 |
| 127 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 434 |
| 128 | 3333 | 3336 | 3333 | 62 | 000 | 001 | 284 |
| 129 | 3333 | 3336 | 3333 | 62 | 000 | 001 | 434 |
| 130 | 1311 | 1213 | 1113 | 24 | 666 | 601 | 431 |
| 131 | 1311 | 2213 | 1123 | 21 | 465 | 502 | 431 |
| 132 | 3333 | 3326 | 3333 | 82 | 000 | 001 | 054 |
| 133 | 3311 | 1113 | 3333 | 83 | 000 | 005 | 054 |
| 134 | 1311 | 1213 | 1123 | 33 | 232 | 231 | 372 |
| 135 | 1311 | 2213 | 1123 | 31 | 232 | 232 | 372 |
| 136 | 2322 | 3213 | 2233 | 31 | 121 | 133 | 372 |
| 137 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 373 |
| 138 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 374 |
| 139 | 3333 | 3336 | 3333 | 72 | 000 | 001 | 244 |
| 140 | 3333 | 3336 | 3333 | 32 | 031 | 131 | 433 |
| 141 | 3311 | 1213 | 1113 | 33 | 232 | 231 | 432 |
| 142 | 3311 | 2213 | 1123 | 31 | 232 | 232 | 432 |
| 143 | 3322 | 3213 | 2233 | 31 | 231 | 203 | 432 |
| 144 | 3333 | 3323 | 3333 | 41 | 020 | 074 | 433 |
| 145 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 434 |
| 146 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 147 | 3333 | 3326 | 3333 | 42 | 010 | 031 | 433 |
| 148 | 3312 | 1116 | 1113 | 33 | 142 | 231 | 433 |
| 149 | 3333 | 3324 | 3332 | 72 | 000 | 001 | 054 |
| 150 | 3333 | 3336 | 3333 | 62 | 020 | 071 | 374 |
| 151 | 3311 | 1213 | 1113 | 24 | 565 | 531 | 431 |
| 152 | 3311 | 2213 | 1123 | 21 | 465 | 502 | 431 |
| 153 | 3322 | 2213 | 2223 | 31 | 354 | 403 | 431 |
| 154 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |
| 156 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 157 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 158 | 3311 | 1213 | 1113 | 24 | 556 | 531 | 431 |
| 159 | 3311 | 2213 | 1123 | 21 | 455 | 472 | 431 |
| 160 | 3322 | 3213 | 2233 | 31 | 244 | 333 | 431 |
| 161 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |
| 162 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 163 | 3333 | 3313 | 3121 | 33 | 243 | 301 | 152 |
| 164 | 3311 | 1213 | 1113 | 24 | 555 | 501 | 431 |
| 165 | 3311 | 2213 | 1123 | 21 | 455 | 472 | 431 |
| 166 | 3322 | 3213 | 2233 | 31 | 244 | 333 | 431 |
| 167 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |

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|---|---|---|---|---|---|---|---|
| 168 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 169 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 170 | 3311 | 1213 | 1113 | 33 | 122 | 171 | 432 |
| 171 | 3311 | 2213 | 1123 | 31 | 222 | 202 | 432 |
| 172 | 3322 | 3213 | 2233 | 31 | 221 | 173 | 432 |
| 173 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 433 |
| 174 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 434 |
| 175 | 3311 | 1213 | 1113 | 33 | 233 | 271 | 432 |
| 176 | 3311 | 2213 | 1123 | 31 | 233 | 272 | 432 |
| 177 | 3322 | 3213 | 2233 | 31 | 022 | 133 | 432 |
| 178 | 3333 | 3323 | 3333 | 41 | 210 | 104 | 433 |
| 179 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 434 |
| 180 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 181 | 2312 | 1313 | 1113 | 24 | 666 | 601 | 371 |
| 182 | 3333 | 3336 | 3333 | 42 | 030 | 101 | 323 |
| 183 | 3333 | 3313 | 3121 | 24 | 666 | 601 | 201 |
| 184 | 3333 | 3313 | 3332 | 42 | 030 | 101 | 152 |
| 185 | 3333 | 3331 | 3333 | 83 | 000 | 007 | 004 |
| 186 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 187 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 188 | 3333 | 3326 | 3223 | 72 | 032 | 171 | 373 |
| 189 | 3311 | 1313 | 1113 | 24 | 666 | 601 | 431 |
| 190 | 3311 | 2313 | 1123 | 21 | 566 | 572 | 431 |
| 191 | 3322 | 3313 | 2233 | 31 | 354 | 403 | 431 |
| 192 | 3333 | 3323 | 3333 | 41 | 240 | 204 | 432 |
| 193 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 194 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 374 |
| | | | | | | | |
| 401 | 3333 | 3336 | 3333 | 42 | 030 | 101 | 373 |
| 402 | 3333 | 3313 | 3333 | 31 | 244 | 331 | 101 |
| 403 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 004 |
| 404 | 3333 | 3337 | 3333 | 82 | 000 | 002 | 004 |
| 405 | 3333 | 3337 | 3333 | 81 | 000 | 001 | 004 |
| 406 | 3333 | 3337 | 3333 | 81 | 000 | 002 | 004 |
| 407 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 408 | 3333 | 3323 | 3113 | 42 | 000 | 001 | 492 |
| 409 | 3333 | 3336 | 3333 | 62 | 020 | 071 | 374 |
| 410 | 1111 | 1213 | 1113 | 33 | 132 | 201 | 431 |
| 411 | 1111 | 2213 | 1123 | 31 | 132 | 202 | 431 |
| 412 | 2222 | 3213 | 2233 | 31 | 121 | 133 | 431 |
| 413 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 432 |
| 414 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 432 |
| 415 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 416 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 417 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 418 | 3333 | 3337 | 3333 | 81 | 021 | 102 | 493 |
| 419 | 3333 | 3336 | 3333 | 52 | 010 | 032 | 003 |
| 420 | 3333 | 3336 | 3333 | 52 | 010 | 033 | 003 |
| 421 | 3333 | 3326 | 3333 | 42 | 010 | 032 | 493 |
| 422 | 3333 | 3336 | 3333 | 42 | 030 | 101 | 323 |
| 423 | 3333 | 3336 | 3333 | 42 | 030 | 102 | 323 |
| 424 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 425 | 3333 | 3337 | 3333 | 82 | 000 | 002 | 054 |

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| 427 | 3333 | 3337 | 3333 | 72 | 000 | 002 | 054 |
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| 430 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 431 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
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| 433 | 3333 | 3326 | 3223 | 72 | 032 | 171 | 373 |
| 434 | 3311 | 1313 | 1111 | 21 | 465 | 501 | 201 |
| 435 | 3312 | 1116 | 1113 | 33 | 142 | 231 | 433 |
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| 437 | 3333 | 3326 | 3233 | 42 | 030 | 101 | 433 |
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| 439 | 3322 | 3213 | 2233 | 61 | 030 | 103 | 371 |
| 440 | 3333 | 3323 | 3333 | 61 | 030 | 104 | 372 |
| 441 | 3333 | 3333 | 3333 | 71 | 000 | 005 | 373 |
| 442 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 374 |
| 443 | 3333 | 3233 | 3333 | 81 | 000 | 003 | 494 |
| 444 | 3333 | 3233 | 3333 | 81 | 000 | 005 | 494 |
| 445 | 3333 | 3233 | 3333 | 81 | 000 | 007 | 494 |
| 446 | 3333 | 3233 | 3333 | 81 | 000 | 006 | 494 |
| 447 | 3333 | 3233 | 3333 | 81 | 000 | 003 | 494 |
| 448 | 3333 | 3233 | 3333 | 81 | 000 | 006 | 494 |
| 449 | 3333 | 3336 | 3333 | 83 | 000 | 007 | 004 |
| 450 | 3333 | 3323 | 3121 | 42 | 000 | 001 | 104 |
| 451 | 3311 | 1213 | 1113 | 24 | 555 | 501 | 431 |
| 452 | 3311 | 2213 | 1123 | 21 | 455 | 472 | 431 |
| 453 | 3322 | 3213 | 2233 | 31 | 244 | 333 | 431 |
| 454 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |
| 455 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 456 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 457 | 3311 | 1213 | 1113 | 33 | 233 | 271 | 492 |
| 458 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 459 | 3311 | 1213 | 1113 | 33 | 233 | 271 | 432 |
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| 461 | 3322 | 3213 | 2233 | 31 | 022 | 133 | 432 |
| 462 | 3333 | 3313 | 3121 | 33 | 243 | 301 | 152 |
| 463 | 3311 | 1213 | 1113 | 24 | 556 | 531 | 431 |
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| 465 | 3333 | 3333 | 3333 | 83 | 000 | 004 | 494 |
| 466 | 1311 | 2213 | 1123 | 21 | 465 | 502 | 431 |
| 467 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 004 |
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| 473 | 3322 | 2213 | 2223 | 31 | 354 | 403 | 431 |
| 474 | 3311 | 2213 | 1123 | 61 | 040 | 132 | 371 |
| 475 | 3312 | 1116 | 1113 | 33 | 142 | 232 | 433 |
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| 479 | 3333 | 3331 | 3333 | 71 | 000 | 006 | 284 |
| 480 | 1311 | 1213 | 1113 | 24 | 666 | 601 | 431 |
| 481 | 3333 | 3233 | 3333 | 81 | 000 | 007 | 494 |
| 482 | 3311 | 2333 | 1113 | 51 | 030 | 102 | 434 |
| 483 | 3333 | 3233 | 3333 | 81 | 000 | 004 | 494 |
| 484 | 3322 | 3333 | 2233 | 51 | 030 | 103 | 434 |
| 485 | 3333 | 3333 | 3333 | 51 | 030 | 104 | 434 |
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| 487 | 3311 | 2213 | 1123 | 21 | 455 | 472 | 431 |
| 488 | 3322 | 3213 | 2233 | 31 | 244 | 333 | 431 |
| 489 | 3333 | 3313 | 3332 | 42 | 030 | 101 | 152 |
| 490 | 3333 | 3336 | 3333 | 72 | 000 | 001 | 244 |
| 491 | 1111 | 2213 | 1123 | 31 | 132 | 202 | 431 |
| 492 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 004 |
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| 494 | 1111 | 1213 | 1113 | 33 | 132 | 201 | 431 |
| 495 | 1111 | 1213 | 1113 | 33 | 132 | 201 | 431 |
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| 497 | 3322 | 3313 | 2233 | 31 | 354 | 403 | 431 |
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| 499 | 3333 | 3233 | 3333 | 81 | 000 | 006 | 494 |
| 500 | 3333 | 3333 | 3333 | 71 | 000 | 007 | 434 |
| 501 | 3333 | 3326 | 3233 | 42 | 020 | 073 | 433 |
| 502 | 3333 | 3336 | 3333 | 52 | 010 | 036 | 003 |
| 503 | 3333 | 3326 | 3333 | 42 | 010 | 031 | 433 |
| 504 | 1311 | 2213 | 1123 | 31 | 232 | 232 | 372 |
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| 509 | 3333 | 3331 | 3333 | 83 | 000 | 007 | 004 |
| 510 | 3311 | 2213 | 1123 | 63 | 040 | 131 | 371 |
| 511 | 3333 | 3331 | 3333 | 71 | 000 | 007 | 284 |
| 512 | 3333 | 3333 | 3333 | 71 | 040 | 132 | 491 |
| 513 | 3333 | 3333 | 3333 | 71 | 040 | 133 | 491 |
| 514 | 3333 | 3333 | 3333 | 71 | 040 | 134 | 491 |
| 515 | 3333 | 3333 | 3333 | 71 | 040 | 135 | 491 |
| 516 | 3333 | 3333 | 3333 | 71 | 040 | 136 | 491 |
| 517 | 3333 | 3333 | 3333 | 71 | 040 | 137 | 491 |
| 518 | 3333 | 3333 | 3333 | 71 | 040 | 131 | 491 |
| 519 | 3333 | 3336 | 3333 | 72 | 000 | 003 | 244 |
| 520 | 3333 | 3333 | 3333 | 71 | 040 | 134 | 491 |
| 521 | 2312 | 2313 | 1123 | 21 | 465 | 502 | 371 |
| 522 | 3333 | 3313 | 3333 | 71 | 000 | 005 | 433 |
| 523 | 3333 | 3336 | 3333 | 72 | 000 | 002 | 244 |
| 524 | 3222 | 2313 | 2233 | 71 | 030 | 103 | 432 |
| 525 | 3333 | 3323 | 3333 | 63 | 000 | 005 | 374 |
| 526 | 1311 | 1213 | 1123 | 43 | 020 | 071 | 372 |
| 527 | 3333 | 3326 | 3233 | 62 | 030 | 103 | 493 |
| 528 | 3333 | 3326 | 3233 | 62 | 030 | 102 | 493 |
| 529 | 3333 | 3233 | 3333 | 81 | 000 | 007 | 494 |

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| 531 | 3333 | 3326 | 3233 | 62 | 030 | 101 | 493 |
| 532 | 3311 | 1213 | 1113 | 21 | 140 | 171 | 492 |
| 533 | 3311 | 1213 | 1113 | 21 | 140 | 172 | 492 |
| 534 | 3311 | 1213 | 1113 | 21 | 140 | 173 | 492 |
| 535 | 3333 | 3336 | 3333 | 42 | 030 | 103 | 323 |
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| 537 | 3333 | 3323 | 3333 | 61 | 030 | 104 | 372 |
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| 539 | 3333 | 3336 | 3333 | 42 | 020 | 073 | 493 |
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| 541 | 3333 | 3333 | 3333 | 71 | 666 | 605 | 491 |
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| 543 | 3333 | 3338 | 3333 | 82 | 000 | 008 | 004 |
| 600 | 3322 | 2223 | 2222 | 41 | 000 | 001 | 104 |
| 601 | 3333 | 3313 | 3121 | 22 | 462 | 401 | 492 |
| 602 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 603 | 3333 | 3313 | 3121 | 33 | 243 | 301 | 152 |
| 604 | 1111 | 2213 | 1123 | 31 | 132 | 202 | 431 |
| 605 | 3333 | 3326 | 3333 | 42 | 010 | 032 | 493 |
| 606 | 3333 | 3337 | 3333 | 82 | 000 | 001 | 054 |
| 607 | 3333 | 3323 | 3333 | 41 | 010 | 034 | 432 |
| 608 | 3333 | 3336 | 3333 | 42 | 030 | 101 | 323 |
| 609 | 3311 | 2313 | 1123 | 21 | 455 | 472 | 371 |
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| 612 | 3322 | 3213 | 2233 | 31 | 244 | 333 | 431 |
| 613 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |
| 614 | 3333 | 3323 | 3333 | 61 | 000 | 005 | 433 |
| 615 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 434 |
| 616 | 3333 | 3336 | 3333 | 62 | 020 | 071 | 374 |
| 617 | 3333 | 3337 | 3333 | 72 | 000 | 001 | 054 |
| 618 | 3333 | 3326 | 3233 | 42 | 030 | 101 | 433 |
| 619 | 3333 | 3326 | 3233 | 42 | 030 | 102 | 433 |
| 620 | 2222 | 3213 | 2233 | 31 | 121 | 133 | 431 |
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| 622 | 3312 | 1116 | 1113 | 33 | 142 | 231 | 433 |
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| 631 | 3333 | 3333 | 3333 | 71 | 000 | 006 | 374 |
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| 637 | 3311 | 2213 | 1123 | 31 | 232 | 232 | 432 |

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|---|---|---|---|---|---|---|---|
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| 648 | 3322 | 3213 | 2233 | 31 | 231 | 203 | 432 |
| 649 | 3333 | 3323 | 3333 | 41 | 130 | 134 | 432 |
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| 999 | 0000 | 0000 | 0000 | 00 | 000 | 000 | 995 |