38. VEGETATION

38.1 Introduction

The vegetation study describes the predominant vegetation types found in the Cook Inlet drainages study area. This information also helps to support wetland and habitat studies. The specific objectives of the vegetation study are as follows:

- Customize an existing vegetation classification system to include Project Vegetation Types amenable to photo-interpretation.
- Provide descriptions of Project Vegetation Types.
- Map Project Vegetation Types in the Cook Inlet drainages mapping area within the larger Cook Inlet drainages study area.
- Compile and document information on plant species observed

The objectives and methodology used for the Cook Inlet drainages study area were similar to those for the Bristol Bay drainages study areas (Chapter 13). HDR Alaska, Inc. conducted field work for this study primarily in summer and early autumn of 2004 and 2005.

Vegetation field data were collected as part of the wetland mapping program. Because the vegetation study was conducted as part of the wetland studies (Chapter 39), study sites were selected primarily to assist in the identification and mapping of wetlands and non-wetlands. Study sites also were selected to ensure data collection from each Project Vegetation Type across landscapes and soil types, as noted both on aerial photographs and while conducting field work.

Vegetation data collected at detailed-data collection plots included estimates of the percent cover of each plant species, site photographs, and initial classification of the Project Vegetation Type. The classification system incorporated information on canopy cover, needleleaf versus broadleaf tree species, shrub height and density, and dominant species.

Researchers analyzed vegetation data and aerial photo signatures to develop a system for describing and identifying Project Vegetation Types for the Pebble Project. This classification system (3PPI, 2008) is based on an existing standard vegetation classification system (Viereck et al, 1992; Wibbenmeyer et al, 1982) modified to accommodate interpretation of available aerial imagery. Thirty-seven Project Vegetation Types have been defined in the Cook Inlet drainages study area.

Vegetation mapping was completed for a portion of the Cook Inlet drainages study area. This mapping area—a 2,000-foot-wide corridor—extends from the Bristol Bay/Cook Inlet drainages boundary east to the head of Iliamna Bay, south along the east side of Iliamna Bay to its mouth, then northeast to the mouth of Iniskin Bay (Figure 38-1).

For clearer display on maps, the Project Vegetation Types in each study area were aggregated into nine Grouped Vegetation Types based on the dominant structure and growth form (forested, shrub, or herbaceous), vegetation density (open or closed canopy), and average height (dwarf, low, or tall).

A list of vascular plant species observed in the study area was developed, including incidental observations of non-vascular plant species and species considered rare by the Alaska Natural Heritage Program. For rare species observations, supporting data were collected, and a plant sample (voucher specimen) was taken if the population was large enough to support loss of a specimen.

All data from the vegetation study have been entered into a relational database for the Pebble Project.

38.2 Results and Discussion

The vegetation does not vary greatly throughout the Cook Inlet drainages study area; it is all strongly affected by the steep mountainous terrain and the maritime climate of lower Cook Inlet. The mountain slopes support dense alder thickets (Open and Closed Tall Shrub Types, and Open Low Shrub Types) interspersed, in some areas, with herb meadows (Dry to Moist Herbaceous Types). Along the coast, mudflats (Open Water) are extensive, and bedrock outcrops (Unvegetated Cover Types) form cliffs in some areas. Salt-tolerant vegetation (Wet Herbaceous Types) occupies relatively protected areas in the upper intertidal zone along the coast. The mountain slopes are dissected by streams that flow directly down the mountainsides to the ocean. Forested areas are limited.

Researchers collected data at 174 sites in the Cook Inlet study area. These sites included limited-data collection sites and detailed-data collection sites. Vegetation data from the field and site photographs were compared to aerial photo signatures to produce a vegetation map for the approximately 3,870-acre Cook Inlet drainages mapping area (Figure 38-1). The maps identify 33 Project Vegetation Types (including vegetation types and unvegetated land cover types) in the mapping area. Detailed descriptions of the Project Vegetation Types, including plant species composition and percent coverage, were developed based on information from 139 detailed-data collection plots.

Shrub vegetation types represented 57 percent of the mapping area, with closed tall shrub types being most common. Open water (primarily subtidal waters and intertidal mudflats) represented 29 percent of the area. Unvegetated/partially cover types comprised approximately 12 percent. Herbaceous vegetation represented about 1 percent, and forest represented less than 1 percent of the mapping area. Table 38-1 lists the Grouped Vegetation Types, with the acreage of each and the percentage of the Cook Inlet drainages mapping area that each type comprises.

Investigators observed one plant species tracked by the Alaska Natural Heritage Program, Kamchatka spikerush (*Eleocharis kamtschatica*), in the Cook Inlet drainages study area, but outside the current mapping area.

38.3 References

Three Parameters Plus, Inc. (3PPI). 2008. Pebble Project Vegetation Type Photo Signature Guide, Draft Report. Version XVII. Palmer, AK. May.

Viereck, L.A., C.T. Dyrness, A.R. Batten, and K.J. Wenzlick. 1992. The Alaska Vegetation Classification. General Technical Report PNW-GTR-286. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, Oregon.

Wibbenmeyer, M., J. Grunblatt, and L. Shea. 1982. User's Guide for Bristol Bay Land Cover Maps. Bristol Bay Cooperative Management Plan. Alaska Department of Natural Resources and Alaska Department of Fish and Game, Anchorage, AK.

38.4 Glossary

Aerial photo signature—a unique texture, pattern, or color that vegetation has when captured in photographs taken from an airplane.

Herbaceous plants—plants that have leaves and stems that die to the soil level at the end of the growing season.

Non-wetlands—uplands and lowland areas that are neither aquatic habitats, wetlands, nor other special aquatic sites. Non-wetlands are seldom or never inundated, or if frequently inundated, they have saturated soils for only brief periods during the growing season, and if vegetated, they normally support a prevalence of vegetation typically adapted for life only in aerobic soil conditions.

Project Vegetation Types—dominant vegetation types that include typical plant-species composition and vegetation structure.

Voucher specimen—any specimen that serves as a basis of study and is retained as a reference; it should be in a publicly accessible scientific reference collection. For purposes of this study, voucher specimens of Alaska Natural Heritage Program tracked species were collected and sent to the University of Alaska, Fairbanks, herbarium for species verification.

Wetlands—areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support—and that under normal circumstances do support—a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs, and similar areas.

TABLE 38-1
Grouped Vegetation Types and their Acreages within the Cook Inlet Drainages Mapping Area

Grouped Vegetation Type	Acres [a]	Percent of Mapping Area [a]
Open Forest	22.8	0.6
Open Tall Shrub	453.9	11.7
Closed Tall Shrub	1,211.9	31.3
Open Low Shrub	504.4	13.0
Dwarf Shrub	37.4	1.0
Dry to Moist Herbaceous	37.9	1.0
Wet Herbaceous Types	12.8	0.3
Open Water	1,130.3	29.2
Unvegetated Cover Types	458.4	11.8
Total Mapping Area	**3,869.9**	**100.0**

a. All numbers are rounded. Apparent inconsistencies in sums are the result of rounding.

PHOTO 38-1. A common vegetation type in the Cook Inlet drainages mapping area: Closed Alder Tall Shrub .

PHOTO 38-2. A common vegetation type in the Cook Inlet drainages mapping area: Open Alder Tall Shrub.

153°42'0"W 153°36'0"W 153°30'0"W 153°24'0"W

59°42'0"N

59°39'0"N

59°36'0"N

Bristol Bay Drainages

Cook Inlet Drainages

Williamsport

Iliamna Bay

Iniskin Bay

Knoll Head

South Head

Turtle Reef

Cook Inlet

Project Vegetation Type (Acres in Cook Inlet Drainages Mapping Area)

Forested Types

- Open Sitka Spruce Forest (1)
- Open White Spruce Forest (9)
- White Spruce Woodland (11)
- Broadleaf Woodland (1)

Shrub Types

- Closed Willow Tall Shrub (1)
- Closed Alder Tall Shrub (1,205)
- Closed Alder Willow Tall Shrub (5)
- Open Willow Tall Shrub (1)
- Open Alder Tall Shrub (451)
- Open Alder Willow Tall Shrub (2)
- Open Mixed Shrub Sedge Tussock (3)
- Open Dwarf Birch Shrub (33)
- Low Ericaceous Shrub Tundra (8)
- Open Dwarf Birch-Ericaceous Shrub Bog (5)
- Ericaceous Shrub Bog (1)
- Open Willow Low Shrub (1)
- Open Sweetgale Graminoid Bog (<1)
- Open Alder Willow Low Shrub (3)
- Open Alder Low Shrub (450)
- Dwarf Ericaceous Shrub Lichen Tundra (12)
- Dwarf Ericaceous Shrub Tundra (25)
- Dwarf Ericaceous Shrub Tundra-Hummocks (<1)

Herbaceous Types

- Halophytic Dry Graminoid (3)
- Bluejoint Tall Grass (6)
- Bluejoint Herb (13)
- Subarctic Sedge Moss Wet Meadow (3)
- Fresh Sedge Marsh (3)
- Halophytic Graminoid Wet Meadow (6)
- Mesic Herb (16)
- Fresh Herb Marsh (1)

Land Cover Types

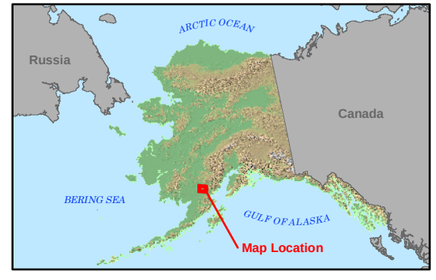
- Barren (142)
- Partially Vegetated (316)
- Open Water (1,130)

THE pebble PARTNERSHIP

Figure 38-1
Overview
Vegetation Mapping,
Cook Inlet Drainages Study Area,
2004 and 2005

Legend

- Cook Inlet Drainages Mapping Area
- Cook Inlet Drainages Study Area
- Bristol Bay/Cook Inlet Drainages Boundary
- Communities



0 0.5 1 1.5 2 2.5 Miles

0 0.5 1 1.5 2 2.5 3 Kilometers

N

Scale 1:70,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

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