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Waterways Experiment Station

A Floristic Inventory of Vascular and Cryptogam Plant Species at Fort Richardson, Alaska

by Robert Lichvar, WES
Charles Racine, CRREL
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University of Alaska Anchorage

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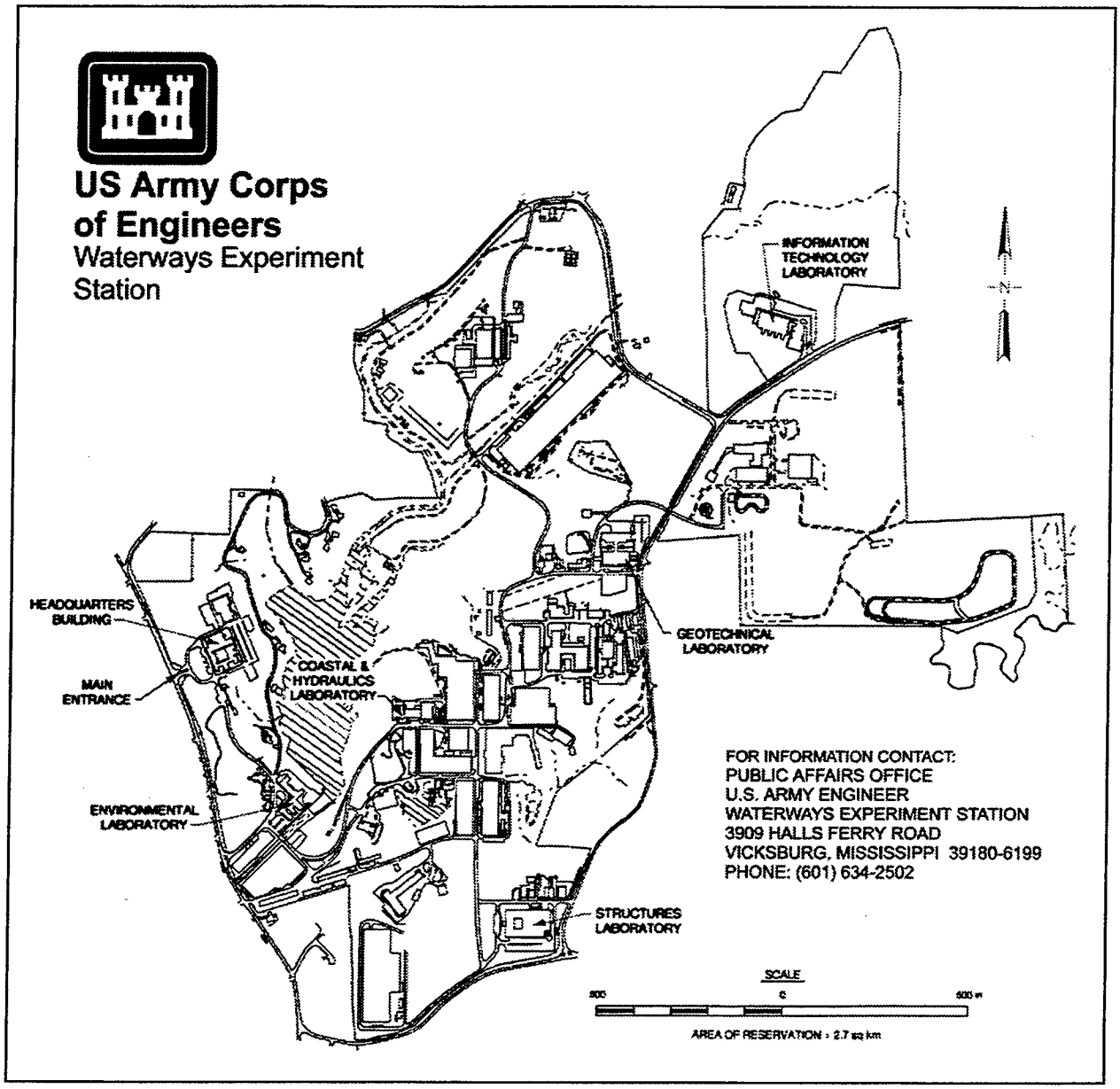

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Preface

The report herein describes the methods and results for the floristic inventory of Fort Richardson, Alaska. This floristic inventory includes both vascular plants and cryptogams (mosses, lichens, and liverworts).

The work was performed by the U.S. Army Engineer Waterways Experiment Station (WES) and U.S. Army Cold Regions Research and Engineering Laboratory (CRREL). The report was prepared by Mr. Robert Lichvar, Environmental Laboratory (EL), WES, and Dr. Charles Racine, CRREL. Dr. Barbara Murray, University of Alaska, Fairbanks, authored Appendix F, the cryptogam inventory; Mr. Gerry Tande, Alaska Natural Heritage Program (AKNHP), authored Appendix A on the vegetation; and Mr. Rob Lipkin, AKNHP, authored the summary on rare vascular species. Field collectors for both vascular and cryptogam inventories include Mr. Tande, Mr. Michael Duffy, AKNHP; Mr. Lichvar, Mr. Lipkin, Mr. Scott Marler, WES; Dr. Barbara Murray, Alaska Science Museum (ALA); Dr. Roy Perry, National Museum of Wales; Dr. Racine; and Ms. Marilyn Racine, volunteer. Botanists involved with verification and processing of specimens at ALA were Mr. Al Batten, Ms. Carolyn Parker, Dr. Barbara Murray, Dr. David Murray, and Dr. Samuel Hammer of Boston University.

The work was conducted under the direct supervision of Dr. Morris Mauney, Chief, Wetlands Branch, WES, and Mr. Darryl Calkins, Chief, Geological Sciences Division, CRREL. General supervision for the study was provided by Dr. Conrad J. Kirby, Chief, Ecological Research Division, EL, WES, and Dr. John Harrison, Director, EL, WES. Cartographic work was done by Dr. Rose Kress and Ms. May Causey, EL, WES. Technical support was provided by Messrs. Dale Yocum, Robert Busch, and Ms. Kimberly Seeley, WES.

Director of WES at the time of publication of this report was Dr. Robert W. Whalin, and the Director at CRREL was Dr. Edward Link. Commander of WES was COL Bruce K. Howard, EN, and the Commander of CRREL was COL Mark Nelson.

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1 Introduction

A floristic inventory was initiated at U.S. Army, Fort Richardson (FRA), Alaska, in 1994. The floristic inventory is in support of the U.S. Army Land-Condition Trend Analysis (LCTA) program, which is a major component of the Integrated Training Area Management program. The scope of the inventory included both vascular plants and ground-inhabiting cryptogams (mosses, lichens, and liverworts). The study design was developed specifically to support the LCTA field-sampling teams and program.

This inventory provides a baseline record of the existing flora for LCTA and other installation requirements. This floristic record also helps support data needs in response to the Endangered Species Act, the National Environmental Policy Act, and AR 420-74 for Natural Resources-Land, Forest, and Wildlife Management.

Objectives of this study were as follows:

a. To compile a preliminary list of potential species that might occur at FRA from herbarium and literature sources.

b. To subdivide FRA into floristic inventory areas to provide for representative collections from all parts of the facility.

c. To collect triplicate sets of all voucher specimens for vascular species and a duplicate set for cryptogams from FRA. This included an effort to make a comprehensive collection of vascular plants but only common ground cover cryptogams.

d. To identify the specimens collected in the field to the appropriate subspecific level. Final verifications of specimens were to be completed with assistance from specialists at the Alaska Science Museum, University of Alaska, Fairbanks, (ALA).

e. To briefly characterize the landscape and floristic setting at FRA.

f. To provide a species list for FRA that provided occurrence data by major landscape types.

The following chapters briefly describe the setting for and the methods used to describe the flora of FRA.

2 Description of the Study Area

Location and Topography

FRA covers 21,193 hectares (ha) (59,735 acres) in south-central Alaska and is located within the municipality of Anchorage (Figure 1). Anchorage is located on the tip of a broad flat peninsula protruding into Cook Inlet. Two fjord-type arms of Cook Inlet extend northeast and southeast from the tip of this peninsula. FRA is located on Knik Arm, the northeast-tending branch.

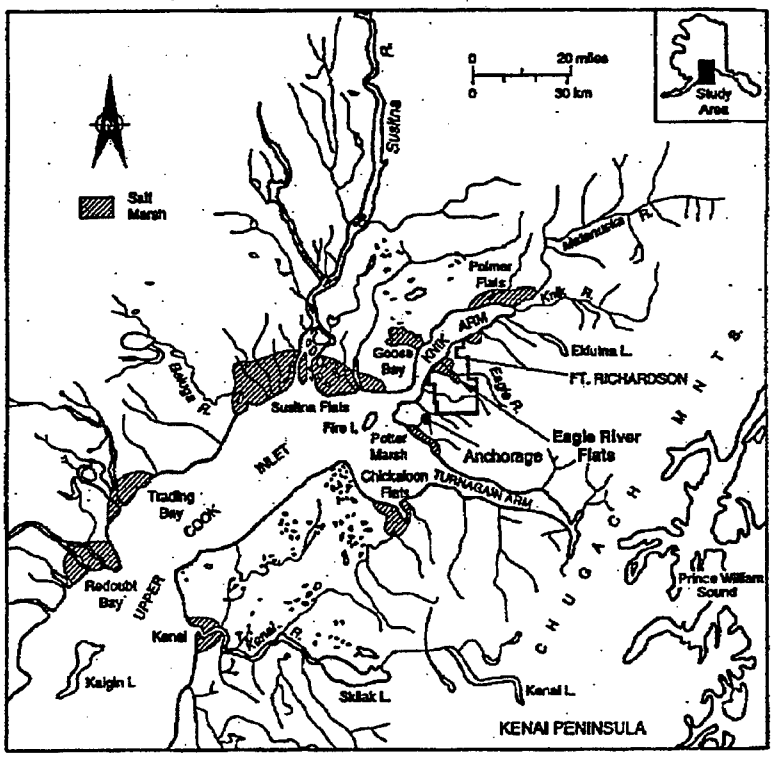


Figure 1. General locality map of Cook Inlet and Fort Richardson also showing coastal marshes

Behind the flat coastal strip of land is the western extremity of the Chugach Mountain Range, which extends eastward along the Gulf Coast of Alaska into Canada. FRA is located at the west end of this range. It therefore includes a broad diversity of topographic, geologic, and climatic environments ranging from tidal flats on Knik Arm to flat coastal lowland forests and up to the peaks of the Chugach Mountains over 1,524 m (5,000 ft) in elevation. This change occurs over a distance of less than 16 km (10 miles) (Figure 1).

Several major rivers originate in the Chugach Mountains and flow across FRA to Knik Arm. Eagle River is the largest river on the installation and the only one fed by glacial runoff. Although it originates off the base, it flows through the middle of FRA and forms a canyon, floodplain, and large estuarine salt marsh at its mouth (Eagle River Flats) on FRA. Ship Creek, a clear water creek, also flows west out of the Chugach Mountains across part of FRA and empties into Cook Inlet in Anchorage. Ship Creek, parts of Snowhawk Creek, and the North Fork of Campbell Creek form large deep valleys in the Chugach Mountain portions of FRA. Above these valleys are important mountain peaks, including Site Summit at 1,190 m (3,900 ft), Tanaina Peak, and Temptation Peak at 1,615 m (5,300 ft). Treeline occurs at an elevation of about 750 m (2,500 ft) on the Chugach slopes.

Lakes, bogs, and smaller kettles are abundant in the forested coastal lowlands, with the larger lakes including Otter and Clunie. Snowhawk Lake is a glacial tarn in the mountains at the head of Snowhawk Creek (Figure 2).

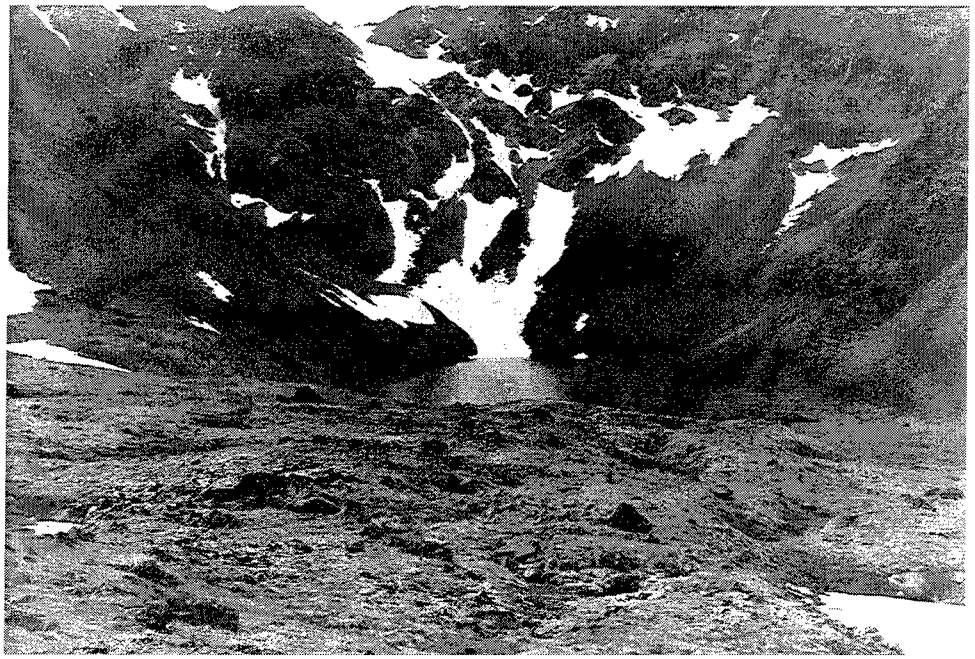


Figure 2. Head of Snowhawk Creek drainage

Although much development has removed wetlands, forests, and other natural habitats in and around Anchorage, most of FRA is well preserved. The cantonment area covers about 5 percent of the base, and numerous roads and trails provide access to much of the base.

Geology

The landscape of FRA is strongly controlled by the mountains and, in the lowlands, by past glacial events described by Miller and Dobrovolny (1959) for the Anchorage area. The description below is taken from Rothe et al. (1983), who summarized the glacial geology for Elmendorf Air Force Base, which does not include the mountains.

The bedrock of the Anchorage area consists of moderately consolidated rocks of conglomerate, sandstone, mudstone, and coal that covered the Cook Inlet-Susitna Lowlands during the Tertiary Period (U.S. Army corps of Engineers (USACE) 1979). The bedrock of the Chugach Mountain Range is a relatively uniform acidic greywacke. Unconsolidated material (a mixture of unstratified gravel, sand, silt, and clay) was deposited during the latter part of the Ice Age or Pleistocene Epoch one million to 10,000 years ago. These deposits include a thin veneer of windlaid silt covering much of the lowlands, alluvium along present streams, clay and silt deposited in recent lakes and the present tidal zones, and organic material or peat in wetlands. The Matanuska-Knik lobe of the Naptowne glacier of the Wisconsin Epoch moved from the northeast toward the Anchorage area, and south to approximately the position marked by the Elmendorf Moraine. Stagnant blocks of ice were left as it retreated. A lake was created when the glacier blocked the drainage of the Eagle River valley. When this lake overflowed, it cut channels along the south side of the Eagle River valley and water flowed toward Knik Arm along the south side of the Elmendorf Moraine. As the lake drained, the flat outwash plain was deposited parallel to the south side of the end moraine. Eagle River periodically changed its course, at some time flowing along each of the several abandoned channels. Depressions (kettles) that have resulted in lake, pond, and wetland basins were formed where buried ice melted.

The Elmendorf Moraine extends onto FRA with a steep south slope and a gentle north slope. Much of its surface is covered by kettles and kames. North of the Elmendorf terminal moraine there is ground moraine that extends to Knik Arm and forms high steep bluffs. Away from the Arm the surface is pitted with kettles and many drumlins that are oriented toward the southwest.

Soils

The soils of FRA have been partially mapped by the U.S. Department of Agriculture, Natural Resources Conservation Service as part of a Metropolitan Anchorage Urban Study (USACE 1979). Twenty-one soil series are described and mapped. The map area only includes the footslopes of the Chugach Mountains up to about 457 m (1,500 ft). Most of the well-drained soils are formed in gravelly glacial till with a thin mantle of silty loess at the surface. Some overlie thick deposits of very gravelly sand, and a few are formed in deep sandy materials. Poorly drained soils occur in shallow depressions, swales, drainageways, and on slopes affected by seepage. They are commonly formed in or are underlain by firm or compact glacial till. Areas of very poorly drained peat occupy broad depressions and other low-lying areas.

Climate

Anchorage is located in a climate transitional from maritime to interior-continental with generally moderate annual temperatures (daily mean = 1.9 °C; average daily maximum = 6 °C; average daily minimum = -2.2 °C). Precipitation averages 400 mm (15.8 in.) annually, about half of which falls as snow. Approximately two-thirds of the total precipitation occurs during the second half of the calendar year.

The freezing season usually begins at the end of October and lasts about 157 days or 5 months. The thawing season lasts about 200 days with spring beginning about April 1 and ending in late October. Precipitation is light during the spring.

The Chugach range acts as a barrier to the influx of warm, moist air from the Gulf of Alaska, so the average annual precipitation in Anchorage is only 10 to 15 percent of that at stations on the Gulf of Alaska side of the Chugach Range. At the same time the Alaska Mountain Range, 161 km (100 miles) north of Anchorage, acts as a barrier to the influx of very cold air from the interior. Therefore, summers are cooler and winters warmer than at more inland stations.

Numerous sporadic pockets of permafrost have been found in wetlands in the Anchorage area. To date, no permafrost has been located on FRA, but it may be present in wetland peat areas or at higher elevations in the Chugach Mountains. Snowbeds are common at higher elevations in the mountains and in some years may persist throughout the summer months.

Tides on Cook Inlet are among the highest on earth, with an amplitude of over 12 m (39 ft). The Eagle River Flats tidal marsh on FRA floods during tides that exceed 9 m (31 ft) based on the Anchorage tidal charts. This occurs about once per month.

Floristic Zones and Vegetation Types

Because of the above-described topographic and geologic diversity of FRA, the reservation was divided into five floristic zones (Plate1). These zones were different to describe species occurrences within FRA. The five zones were classified further into 39 vegetation types by Tande (Appendix A). Each of these floristic zones is described below and is shown on the Landsat image on Plate 1.

Coastal halophytic zone

The coastal halophytic zone influenced by salt water along Cook Inlet (Knik Arm), principally comprising Eagle River Flats, is an 865-ha (2,136-acre) salt marsh on Knik Arm (Figure 3).

Figure 3. Eagle River Flats facing inland to the east

Lowland interior forest zone

The lowland interior forest zone of expansive boreal forest habitats below is approximately 460 m (1,500 ft) elevation. This zone covers the largest area on FRA and includes bogs, alders, shrublands, and a broad range of mesic to dry forest types (including white spruce, white spruce-paper birch, paper birch, white spruce-cottonwood, black cottonwood, balsam poplar, and quaking aspen) (Figure 4).

Figure 4. Lowland boreal forest and Eagle River Flats/Knik Arm in foreground with Chugach Mountains in the background

Subalpine zone

The subalpine zone of intermittent forested areas, shrub, and meadow habitats is from approximately 460 m (1,500 ft) elevation to treeline at about 760 m (2,500 ft). This is a fairly restricted zone. Mesic to dry sites include white spruce, white spruce-paper birch, balsam poplar, and mountain hemlock (Figure 5). Forests are interspersed with alder shrub and grass forb meadows. Treeless bogs are occasionally present in the subalpine zone.

Alpine zone

The alpine zone consists of mountain landscape habitats above treeline at about 760 m (2,500 ft). Low shrubs and dwarf shrubs occupy wet and mesic to dry habitats. The latter include mesic to dry vegetated sites and dry nonvegetated sites such as rock talus and blockfields (Figure 2). Wetter habitats include late-melting snowfields and snowbeds.

Artificially cleared or disturbed zone

The artificially cleared or disturbed zone of the cantonment area, powerlines, roadsides, railroad rights-of-way, borrow pits, and other human-modified areas are shown in Figure 6.

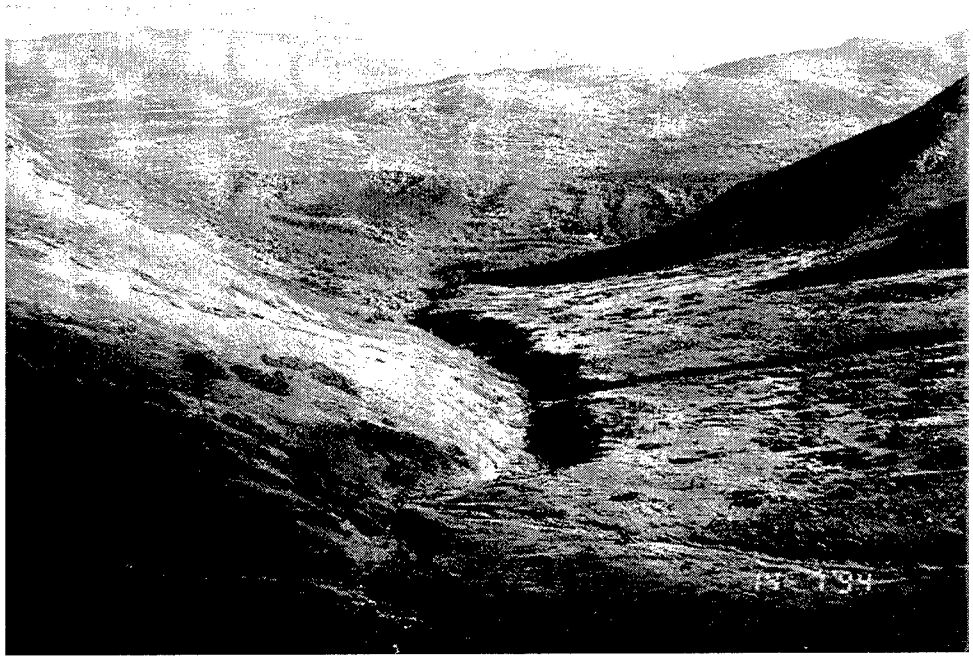


Figure 5. Snowhawk Creek drainage

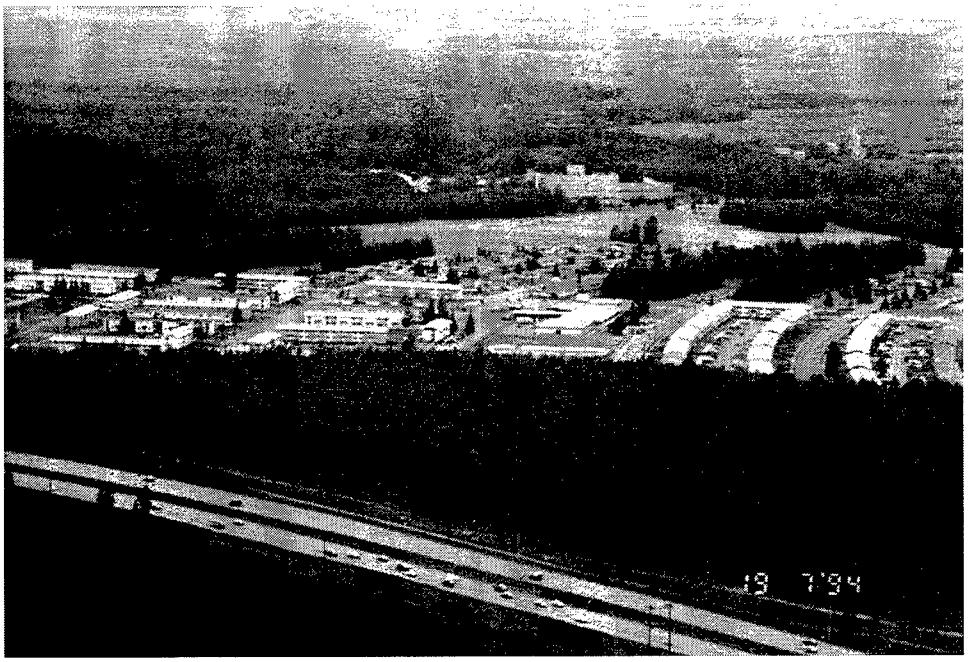


Figure 6. Cantonment area and Glen Highway

3 Methods

Sampling Protocol

The inventory of the flora of FRA was designed to meet the needs of the LCTA program. The inventory included vascular plant species throughout FRA at a more comprehensive level, while cryptogams were inventoried at a more general level. The cryptogam survey focused more on common ground cover species, but many other taxa from different habitats were collected.

Preliminary inventory of vascular plants

The inventory included compiling known species occurrences from the literature and field collections to produce a potential species list. Initially, a herbarium search was planned to develop a known list of species from within the area. Because a limited number of collecting records for the area were available at the ALA herbarium, no effort was made to compile existing specimen data for FRA. Instead, a potential species occurrence list was developed for FRA. The potential list comprised 739 taxa and was developed from the following sources: *Flora of Alaska and Neighboring Territories* (Hultén 1968), *A Floristic Survey of the Eklutna Valley, Chugach State Park* (Marvin 1986), *Natural Resource Inventory of Elmendorf Air Force Base* (Tande 1983), and the database from ALA. Most of the collections were made by the Alaska Natural Heritage Program (AKNHP) team with some help from Mr. Lichvar and Dr. Racine, two of the authors of this report.

Preliminary inventory of cryptogams

Available taxonomic and distributional data were gathered from numerous sources, primarily the personal library of books, journals, and reprints of Dr. Barbara Murray, ALA. Those useful for field and preliminary identification were taken into the field along with microscopes and reagents to aid in preliminary sorting. Collections were made by Drs. Murray and Roy Perry. Most of the identifications of cryptogams were made by Dr. Murray.

Orientation in the field

The goal for field collections was based on several factors: a representative collection for the installation, phenology, and collection of representative habitat or landscape types. To provide for a representative survey of the installation, a collecting area map was developed for FRA. This collecting map was developed based on a combination of access, watershed, and elevation data (Plate 2). The six collecting areas were divided along east-west tending borders along a north-south axis. The nine LCTA cover types developed from a classification of satellite images were considered when the floristic collecting area map was developed.

To ensure adequate collecting within each area, other specialized habitats were identified and sampled (Tables 1 and 2). In all, 98 collecting sites were surveyed within the six collecting areas for both vascular and cryptogam plants. Many of these collecting sites were visited and resampled several times during the growing season to collect specimens in proper anthesis or fruit. The six collecting areas were as follows:

Area I. North of Clunie Lake and Clunie Creek
(bogs, lake margins, spruce-hardwood forest)

Area II. Eagle River Area
(coastal marsh, floodplain, spruce-hardwood forest)

Area III. Cantonment Area (disturbed)
(roadsides, etc.)

Area IV. Site Summit (Nike Site)
(several forest types, subalpine meadows, shrub alder, alpine)

Area V. Ship Creek
(spruce-hardwood forest, floodplain)

Area VI. Snowhawk Creek, Long Lake
(high alpine scree, rock glaciers)

Plant inventory work was performed throughout the 1994 field season. Collections of vascular plants began in late May and continued until mid September. The lowlands and mountain slopes were surveyed during the early to mid part of the season. The high montane and alpine areas were mostly collected in August. Areas that were productive in providing previously uncollected species were revisited several times. Cryptogam collections were made from late June until mid July (sites are shown on Plate 2). Access to all the areas except Snowhawk Creek was achieved by vehicle or on foot. The Snowhawk Creek drainage was surveyed with helicopter support from the Alaska National Guard. Several 1-day collecting trips were made by teams of vascular and cryptogam specialists transported by helicopter to various areas in these drainages.

Table 1
Vascular Plant Collection Sites

Locality	Locality Number	Latitude	Longitude
Eagle River Flats General	9802	61°19'00"N	149°43'00"W
Otter Lake-Northeast Corner	9804	61°17'30"N	149°43'10"W
Fort Richardson, Site Summit	9805	61°22'30"N	149°34'30"W
Eagle River Bridge Bluffs	9806	61°18'45"N	149°41'0"W
Malamute Drop Zone	9807	61°21'40"N	149°39'00"W
Arctic Valley Roadside	9809	61°14'06"N	149°34'25"W
Arctic Valley Alpine-East	9810	61°14'40"N	149°34'00"W
Otter Lake West Corner	9811	61°17'26"N	149°44'40"W
Otter Lake West Corner	9812	61°17'26"N	149°44'40"W
Gwen Lake	9813	61°17'55"N	149°40'45"W
Artillery Road Bog	9814	61°19'30"N	143°82'20"W
Route Bravo, 1 mile North of Eagle River Bridge	9815	61°19'28"N	149°40'29"W
Route Bravo, South of Eagle River Bridge	9816	61°18'30"N	149°40'45"W
Nike Site High Alpine-West	9817	61°15'38"N	149°31'24"W
Ship Creek Riparian Forest	9818	61°14'27"N	149°42'15"W
Arctic Valley Alpine-West	9819	61°14'30"N	149°34'58"W
Arctic Valley Subalpine Meadow	9820	61°14'37"N	149°35'00"W
Arctic Valley Subalpine Bog	9821	61°14'50"N	149°35'15"W
Nike Site High Alpine-West	9822	61°15'42"N	149°32'15"W
The Dome Subalpine	9823	61°10'30"N	149°39'00"W
The Dome Alpine	9824	61°10'38"N	149°38'37"W
Northwest Boundary Trail	9825	61°17'59"N	149°46'11"W
Northwest Boundary Forest	9826	61°19'15"N	149°46'15"W
Northwest Boundary Muskeg	9827	61°19'15"N	149°46'00"W
Northwest Shoreline Beach	9828	61°19'45"N	149°46'00"W
Northwest Eagle River Flats	9829	61°19'32"N	149°45'40"W
Poleline Forest	9830	61°18'14"N	149°38'02"W
Northwest Eagle River Flats Access Roadcut	9831	61°18'59"N	149°45'06"W

(Continued)

Table 1 (Concluded)

Locality	Locality Number	Latitude	Longitude
Otter Lake Boathouse Shoreline	9832	61°17'32"N	149°44'10"W
Ship Creek Dam Roadside	9833	61°13'35"N	149°38'00"W
Ship Creek Dam Canyon Area	9834	61°13'35"N	149°37'55"W
Spur Road North of David Highway-Railroad Bed	9835	61°15'48"N	149°44'09"W
Upper Snowhawk-East Ridgetops	9837	61°09'44"N	149°33'11"W
Upper Snowhawk Cabin Meadow	9838	61°10'15"N	149°34'10"W
Upper Snowhawk Lake	9839	61°08'42"N	149°32'00"W
Upper Snowhawk Canyon	9840	61°09'30"N	149°33'00"W
Walden Lake Aquatics	9841	61°20'15"N	149°39'12"W
Waldon Lake Bog	9842	61°20'55"N	149°37'55"W
Building 700 Parking Lot/D St. Roadside	9843	61°15'45"N	149°42'40"W
Eagle River Bluffs-North	9844	61°18'35"N	149°49'30"W
Eagle River Bridge-South	9845	61°18'43"N	149°41'28"W
Eagle River Flats-Southwest Meadows	9846	61°18'05"N	149°42'25"W
Eagle River Flats-Dead Birch Island	9847	61°18'02"N	149°42'05"W
Eagle River Flats-Spruce Island	9848	61°17'57"N	149°42'12"W
Eagle River Flats-Otter Creek	9849	61°18'05"N	149°42'25"W
Lower Snowhawk-Ridgetops	9850	61°11'45"N	149°33'15"W
Lower Snowhawk-Upper Subalpine	9851	61°12'04"N	149°33'45"W
Lower Snowhawk-Upper Subalpine	9852	61°12'00"N	149°35'00"W
Lower Snowhawk-North Rock Outcrops	9853	61°12'15"N	149°34'30"W
Lower Snowhawk-Lower Subalpine	9854	61°12'02"N	149°33'31"W
Lower Snowhawk-Lower Subalpine	9855	61°11'57"N	149°34'26"W
North Campbell Creek Canyon-Pass	9856	61°07'10"N	149°29'45"W
North Campbell Creek Canyon-Rock Glaciers	9857	61°06'39"N	149°30'49"W
North Campbell Creek Canyon-Snowbelt Stream	9858	61°07'14"N	149°31'00"W
Eagle River Bridge-North	9859	61°18'46"N	149°41'22"W
Muldoon Bog	9860	61°12'13"N	143°42'62"W
Otter Creek @ Loop Roadside	9861	61°17'73"N	149°43'56"W

Table 2
Cryptogram Plant Collection Sites

No. on Map	Locality Number	Locality	Latitude/Longitude
1	10190	Beach Lake 0.15-1 km W	61°40'00"N 149°34'00"W
2	10183	Engineer Expressway, Firing Point 7	61°15'55"N 149°39'00"W
3	10192	Lake Clunie, N end	61°00'00"N 149°36'00"W
4	10191	Artillery Road, 0.7 km SE of jct. with Route Bravo	61°19'30"N 149°38'00"W
5	10193	Otter Lake, S and SW end of 6117	61°17'26"N 149°45'00"W
6	10181	Loop Road, 2.5 km W of Otter Lake	61°26'00"N 149°42'00"W
7	10188	Site Summit, 1 km W of Arctic Valley Ski Area	61°15'36"N 149°33'00"W
8	10179	Site Summit, 1.5 km N of Arctic Valley Ski Area	61°15'21"N 149°31'00"W
9	10187	Site Summit Road, 2.5 km W of Arctic Valley Ski Area	61°25'00"N 149°31'00"W
10	10186	Cottonwood Park, Arctic Valley Road by Ship Creek	61°23'00"N 149°41'00"W
11	10199	Ski Bowl Road	61°23'00"N 149°37'00"W
12	10198	Site Summit Road, just N of junction with Ski Bowl Road	61°23'00"N 149°33'00"W
13	10182	Ski Bowl Road	61°23'00"N 149°33'00"W
14	10189	Site Summit Road, just N of junction with Ski Bowl Road	61°25'00"N 149°33'00"W
15	10194	Ship Creek, off Ski Bowl Road	61°21'00"N 149°38'00"W
16	10195	Ship Creek, S side, Gaging Station off Ski Bowl Road	61°22'00"N 149°37'00"W
17	10196	Ship Creek, S, off Ski Bowl Road	61°21'00"N 149°37'00"W
18	10185	Bulldog Trail	61°20'00"N 149°41'00"W
19	10184	North Fork Campbell Creek, near junction with Bulldog Trail	61°20'00"N 149°42'00"W
20	10197	Snowhawk Lake and ground on W-facing slopes	61°15'00"N 149°32'00"W

All floristic zones were sampled numerous times except for Area I, north of Clunie Creek and Lake. Collecting in Area I was less intense because of continual training maneuvers.

Specimens and Labels

Specimens were collected in triplicate for vascular plants when possible and in duplicates for the cryptogams. Specimens for vascular plants were placed in standard plant presses and dried under moderate heat with electric plant driers for a minimum of 2 days. Cryptogams were air-dried and stored in field packets.

Field data were entered into a computerized database throughout the collecting season. Using a customized *Fourth Dimension Database* in MACINTOSH developed by ALA, field notes were recorded for all collections. This database system had the capability of recording all site data, locations, and taxa names. Later, during the specimen verification process, any necessary changes were made in the database. Plant labels were developed directly from the database.

Collections from the study were prepared as various types of specimens. For vascular species, two sets were developed into herbarium specimens and one set into laminated mounts. Laminated specimens were intended to be used in the field for reference material during the LCTA sampling. One set of specimens will be retained at ALA as a voucher set for the study, and the two sets, laminated and herbarium mounted, will be stored at FRA for support of the additional LCTA program. Cryptogam specimens supplied to FRA were provided in small bags and petri dishes for field use. One set was retained at ALA as a voucher set, and the other will be stored at FRA.

Identification and Verification of Specimens

Vascular plant specimens collected by field botanists were identified in several steps. Many of the specimens were collected and tentatively identified during the collecting season using local keys and other references. Later, all specimens were either verified or identified at ALA with known specimens to ensure proper identification.

4 Results and Discussion

Vascular Plants

Floristic affinities

The flora of FRA reflects the transitional nature of the climate and geography between Pacific maritime southeastern Alaska and continental interior Alaska. Species typical of the Pacific maritime area such as western hemlock (*Tsuga heterophylla* (Raf.) Sarg.) and sitka spruce (*Picea sitchensis* (Bong.) Carr.) occur south along Turnagain Arm but do not reach FRA. However, some understory species of the Pacific maritime forest such as devil's club (*Oplopanax horridus* Miq.) do occur on FRA. In addition, Mountain Hemlock (*Tsuga mertensiana* (Bong.) Carr.), a Pacific coast species, occurs in subalpine forests on FRA. The majority of forests located on FRA are a spruce-hardwood boreal forest similar to those found in interior Alaska.

The halophytic salt marsh flora of Eagle River Flats on FRA is more similar to the lower latitude Pacific coast flora than to the Bering Sea coast-Arctic salt marsh flora with species such as *Carex lyngbyei* Hornem. typical of the Pacific Coast.

Summary of vascular plant checklist

One thousand eighty-seven collections were made during the field season, representing 561 species, or 588 taxa (including subspecies and varieties), 75 families, and 246 genera (Appendix B). The 561 species were 187 fewer than the potential species list. The difference probably resulted from the interpretation that all species with a range depicted in Hultén for the Anchorage area would possibly occur at FRA. The collection shows a high floristic diversity for such a northern location. Including infraspecific taxa, FRA has approximately 30 percent of Alaska's vascular flora. This floristic diversity reflects the great variety of habitats from estuarine to alpine, as well as FRA's biogeographic position at the juncture of several floristic regions.

Species occurrence by vegetation zones

Species occurrences from FRA were developed into a generalized vegetation and habitat matrix (Appendixes C and D). Each species was assigned to each habitat location as it was either observed or collected. The major zones that the species were assigned to were lowland, subalpine, and alpine. Each of these zones was further divided into a wet and mesic to dry habitat. The vascular species at FRA were distributed as follows within these three zones: (a) 318 in lowlands with 166 occurring in wet areas and 152 in mesic to dry habitats, (b) 226 in the subalpine with 72 in wet areas and 154 in mesic to dry habitats, and (c) 206 in the alpine with 30 in the wet areas and 176 in the mesic to dry habitats (Figure 7).

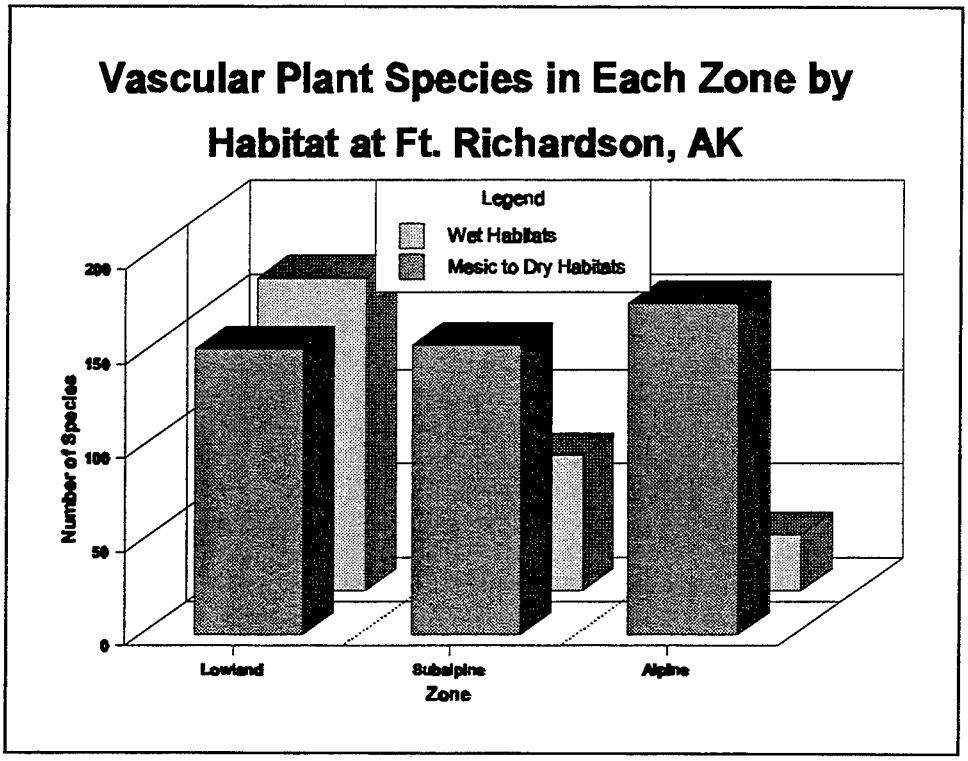


Figure 7. Number of vascular plant species in each zone by habitat at Fort Richardson, Alaska

Range extensions

The floristic survey found many range extensions for species and new locations for rare taxa. At least 75 of the taxa collected represent minor or major extensions of their range as mapped in Hultén (1968). A number of these species are introduced or have escaped from cultivation, and others are minor, peripheral extensions or range connections. Approximately 40 of these taxa may be considered significant range extensions.

The floristic survey located several populations of rare plants being tracked by AKNHP Biological and Conservation Database (Appendix E). Many of these rare taxa were found in alpine habitats or in aquatic and wetland sites.

Rare vascular plants

Of the rare taxa, only one species has status as a U.S. Fish and Wildlife Service Category 2 Candidate Species for threatened or endangered status. This species, *Taraxacum carneocoloratum* A. Nels., is an alpine endemic of Alaska and the Yukon Territory and has recently been found at an increasing number of sites; its status as a Category 2 candidate may need to be reevaluated. It is now known from several locations in the Chugach Mountains where it favors high alpine screes and tundra.

A number of the other taxa are also considered to be rare over their entire range. Many of these are endemic to Alaska or to Alaska and adjacent parts of Canada and the Russian Far East. These taxa are all found in alpine or rocky, gravelly, disturbed areas. Although some of them are being found at more locations as the flora of Alaska becomes better known, they are all known from fewer than 50 locations. They include *Aphragmus eschscholtzianus* Andrz., *Douglasia alaskana* (Cov. and Stand. ex Hult.) S. Kelso, *Draba borealis* DC. var. *maxima* (Hult.) Welsh, *Draba kamtschatica* (Ledeb.) N. Busch, *Draba ruaxes* Payson and St. John, *Draba stenopetala* Trautv., *Papaver alboroseum* Hult., *Taraxacum carneocoloratum* Nels., and *Thlaspi arcticum* Pors.

A second group of rare taxa are common in other parts of their range but are rare within Alaska. Often these are widely disjunct from the main portions of their ranges. Some of these, especially those from aquatic sites, are easily overlooked and are likely to prove more common as additional areas are surveyed. They include *Anemone multifida* Poir. var. *saxicola* B. Boivin, *Carex deweyana* Schwein., *Eleocharis kamtschatica* (C.A. Meyer) Kam., *Eriophorum viridi-carinatum* (Englem.) Fern., *Glyceria striata* (Lam.) Hitchc. ssp. *stricta* (Scribn.) Hult., *Hammarbya paludosa* (L.) Ktze., *Malaxis monophylla* (L.) Sw. var. *brachypoda* (A. Gray) Morris and Ames, *Myriophyllum verticillatum* L., *Najas flexilus* (Willd.) Rost. and Schmidt, *Phalaris arundinacea* L., *Salicornia europaea* L., *Saxifraga adscendens* L. ssp. *oregonensis* (Raf.) Bacigalupi, *Smilacina stellata* (L.) Desf., *Stellaria umbellata* Turcz., *Viola selkirkii* Pursh, and *Zannichella palustrus* Pursh.

Cryptogams

Cryptogam distribution patterns

Distribution and frequency of bryophytes and lichens are heavily influenced by moisture and substrate pH. FRA is relatively uniform with somewhat dry and acidic substrates, so many of the most common bryophytes and lichens tended to be widely distributed from lowland to the alpine and in several communities in each zone. Hyperoceanic taxa were not seen, and very few taxa that indicate calcareous substrates were collected.

Summary of cryptogam plant checklist

A total of 986 collections were made (including 69 observations not documented by specimens). These collections represent 239 identified species, or 256 taxa (including subspecies and varieties). These represented 19 hepatics, 112 lichens, and 108 mosses (Figure 8) (Appendix F).

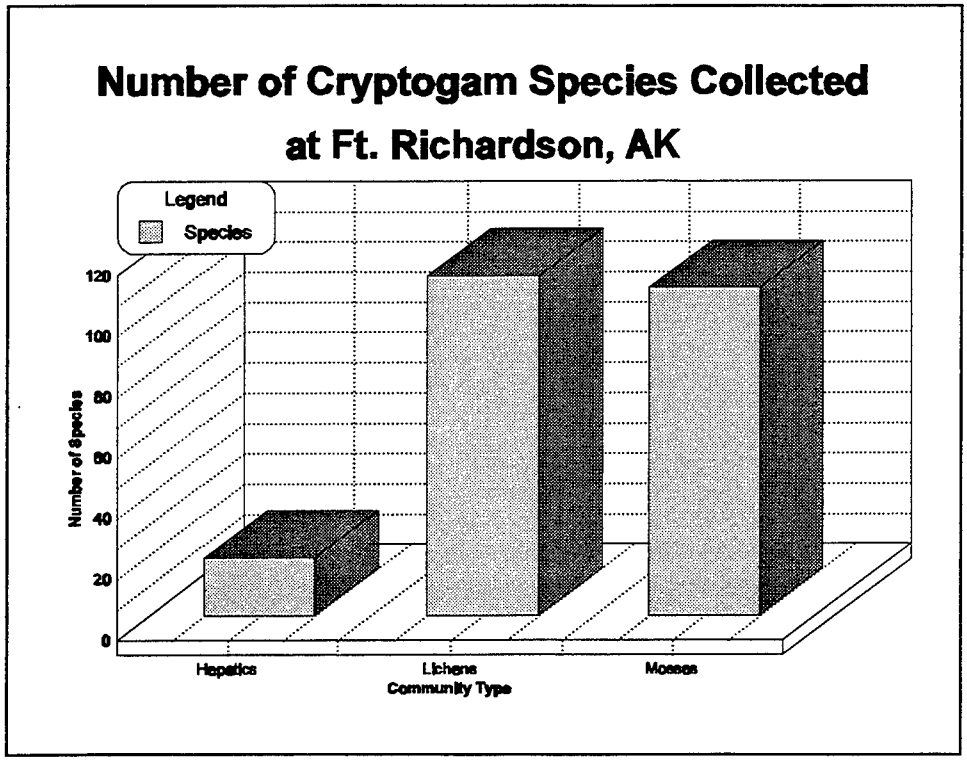


Figure 8. Number of cryptogam species collected at Fort Richardson, Alaska

Cryptogam occurrences by vegetation zones

Using the generalized vegetation zones, cryptogam occurrences for identified species at FRA were as follows: (a) 279 species in the lowlands, (b) 126 species in the subalpine, and (c) 171 species in the alpine areas (Figure 9). Two hundred and eighty-one terricolous (on ground) species were collected (excluding those on rotting wood or soil over rock). Collection of the 281 terricolous species included 13 hepatics, 137 lichens, and 131 mosses (Figure 10) (Appendix G).

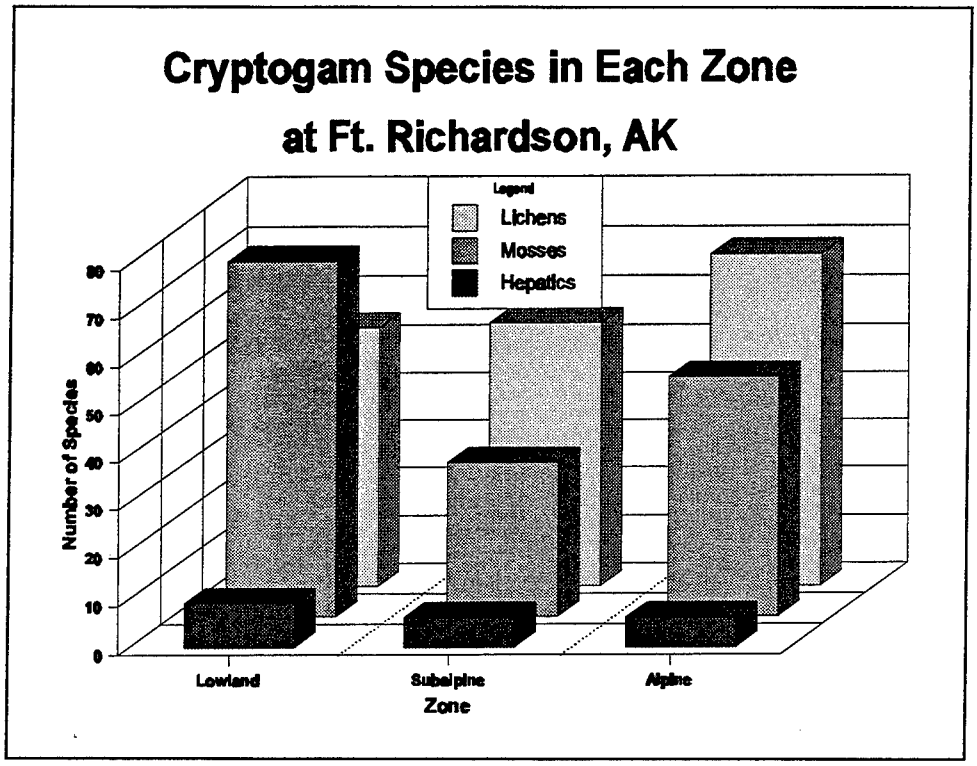


Figure 9. Number of cryptogam species in each zone at Fort Richardson, Alaska

In the lowlands, 282 collections were from forested areas. These included open birch, closed birch, closed birch-white spruce, open balsam poplar, closed white-spruce, closed white spruce-birch, and black spruce-birch. Other collections were from riparian alder scrub, disturbed sites such as roadsides and banks, a sphagnum bog, and a marsh at the edge of a lake. Of these 282 collections, 22 represent hepatics, 60 lichens (mainly *Peltigera* and *Cladonia*), and 200 mosses (including 50 sphagna from bogs and marshy edges of lakes only, and 15 Polytrichaceae).

Bryophytes dominated the wet habitats, and lichens dominated the mesic sites in the subalpine zone. One hundred and thirty of the collections, representing 81 ground cover species, were from the subalpine zone,

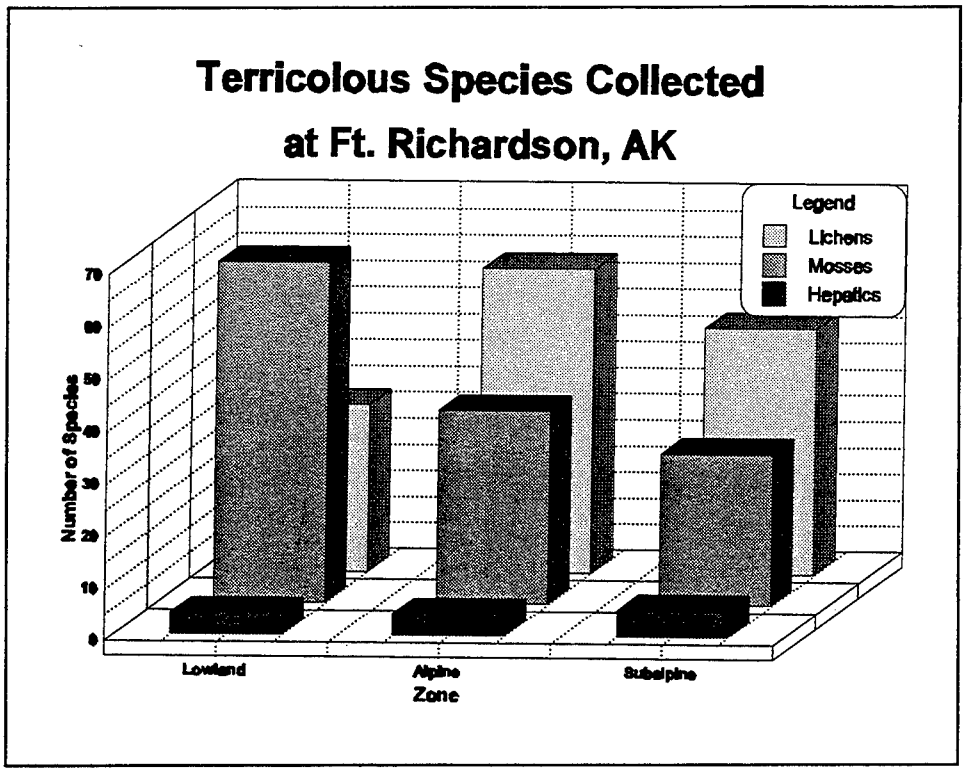


Figure 10. Number of terricolous species collected at Fort Richardson, Alaska

including 20 hepatic taxa, 70 lichen taxa (including about 20 species *Cladonia*), and 40 moss taxa. In the alpine zone, lichen taxa included 26 *Cladonia* taxa, 13 *Cetraria*, and 13 *Stereocaulon*, while mosses in the alpine zone included 14 Polytrichaceae and 12 *Racomitrium* species.

Records for identified cryptogam species from substrates other than ground (trees, logs, rocks, etc.) included 74 species of which 36 are from lowland forest, 12 from the subalpine zone, and 26 from the alpine.

Rare cryptogam plants

One taxon was located at FRA that has not been reported outside of southeast Alaska. This taxon is *Schistostega pennata* (Luminous moss). It occurs in deep shade and has a persistent protonema with convex cells that refract light and give off a yellow-green glow.

Recommendations for Further Studies

Based on the level of effort and the results of this study, several recommendations can be made for any further floristic surveys. These include the following:

a. Conduct surveys for phenologically early species. During this survey, relatively few taxa were collected prior to mid-June.

b. Conduct more detail collecting in floristic collecting Zone 1. Specifically, collect wetlands, drainageways, and coastal areas. This zone was undercollected due to continuous training maneuvers during this survey period.

c. Conduct further surveys in specific habitats for those "potential species" not located during this survey but known to occur elsewhere in the Anchorage area.

d. Additional surveys could be conducted in the following areas: vicinity and north of the National Cemetery, Fossil Creek drainage, alpine and subalpine areas north of the Nike Site summit, subalpine/ treeline *Populus* and grass-forb communities on the southwest slopes of Campbell Creek canyon, Ship Creek valley, and Chester Creek, Ship Creek riparian areas west of the hatchery, wetlands north of the golf course, alpine dome west of Snowhawk Creek valley, and high alpine areas west and northwest of Temptation Peak.

e. Make additional collections of *Salix* and *Betula* across FRA.

f. Develop the distinguishing characteristics for the more common cryptogam species for field identifications. This effort might include an interactive, illustrated set of keys supported by useful handbooks and lists of published color photographs.

References

Hultén, E. (1968). *Flora of Alaska and neighboring territories*. Stanford University Press, Stanford, CA.

Marvin, L. C. (1986). "A floristic survey of the Eklutna valley, Chugach State Park, Alaska," M.S. thesis, Brigham Young University, Provo, UT.

Miller, R. D., and Dobrovolny, E. (1959). "Surficial geology of Anchorage and vicinity, Alaska," U.S. Geological Survey Bulletin 1093.

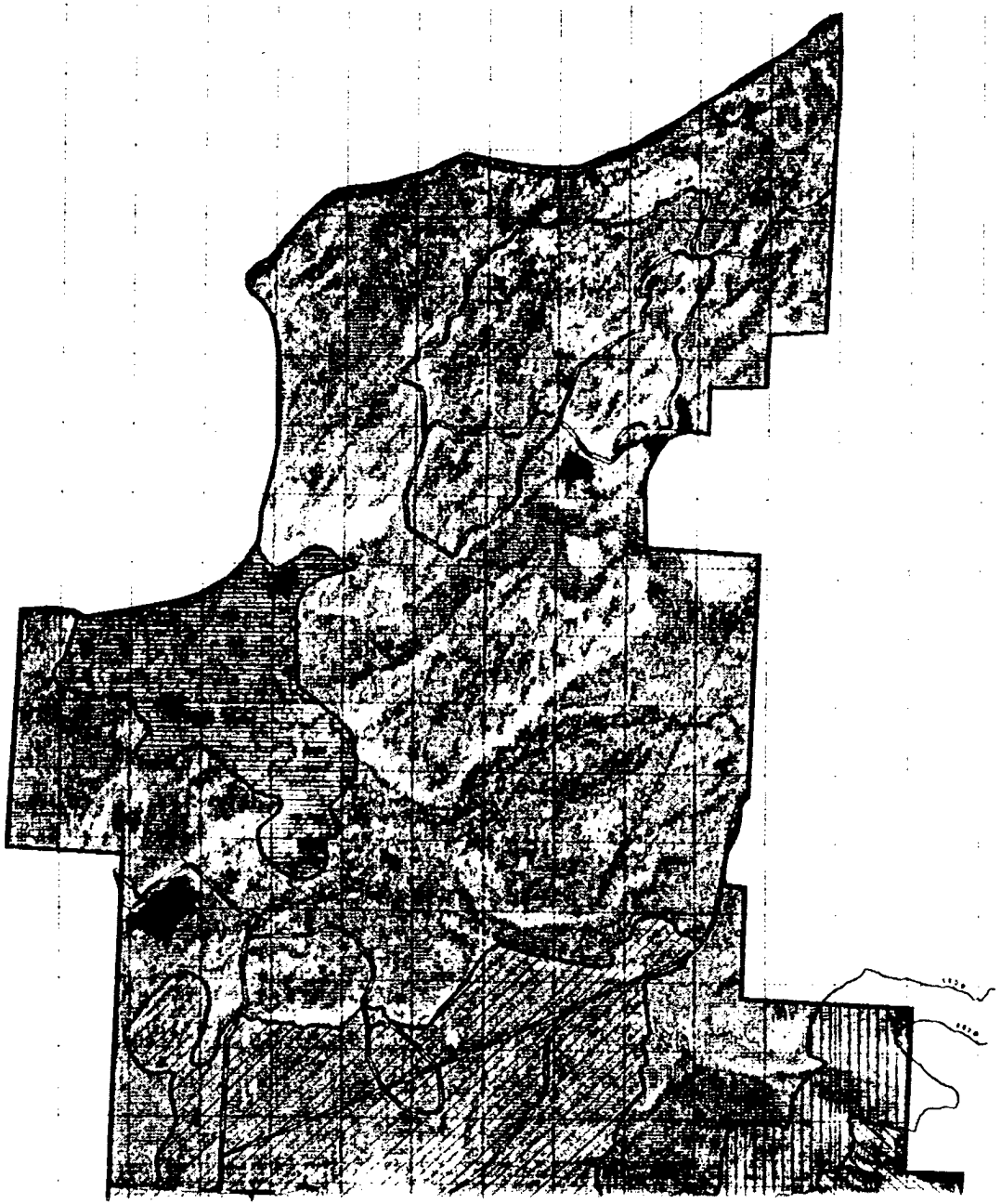
Rothe, T. C., Lanigan, S. H., Martin, P. A., and Tande, G. F. (1983). *Natural resource inventory of Elemendorf Air Force Base, Alaska: Part II.* U.S. Fish and Wildlife Service, Region 7, Special Studies, Anchorage, AK.

Tande, G. F. (1983). "Vegetation." *Natural resource inventory of Elmendorf Air Force Base, Alaska: Part I.* T. C. Rothe, S. H. Lanigan, P. A. Martin, and G. F. Tande, ed., U. S. Fish and Wildlife Service, Region 7, Special Studies, Anchorage, AK.

U. S. Army Corps of Engineers. (1979). Anchorage Area Soil Survey Vol. 7 Metropolitan Anchorage Urban Study.

Fort Richardson, Alaska

Vegetation Zones



Lowland Interior Forest

Coastal Halophytic

Sub_Alpine (1500 ft - 2500 ft.)

Alpine (> 2500 ft.)

Disturbed or Artificially Cleared

Roads

Universal Transverse Mercator
Zone 8
Datum NAD27

(2)

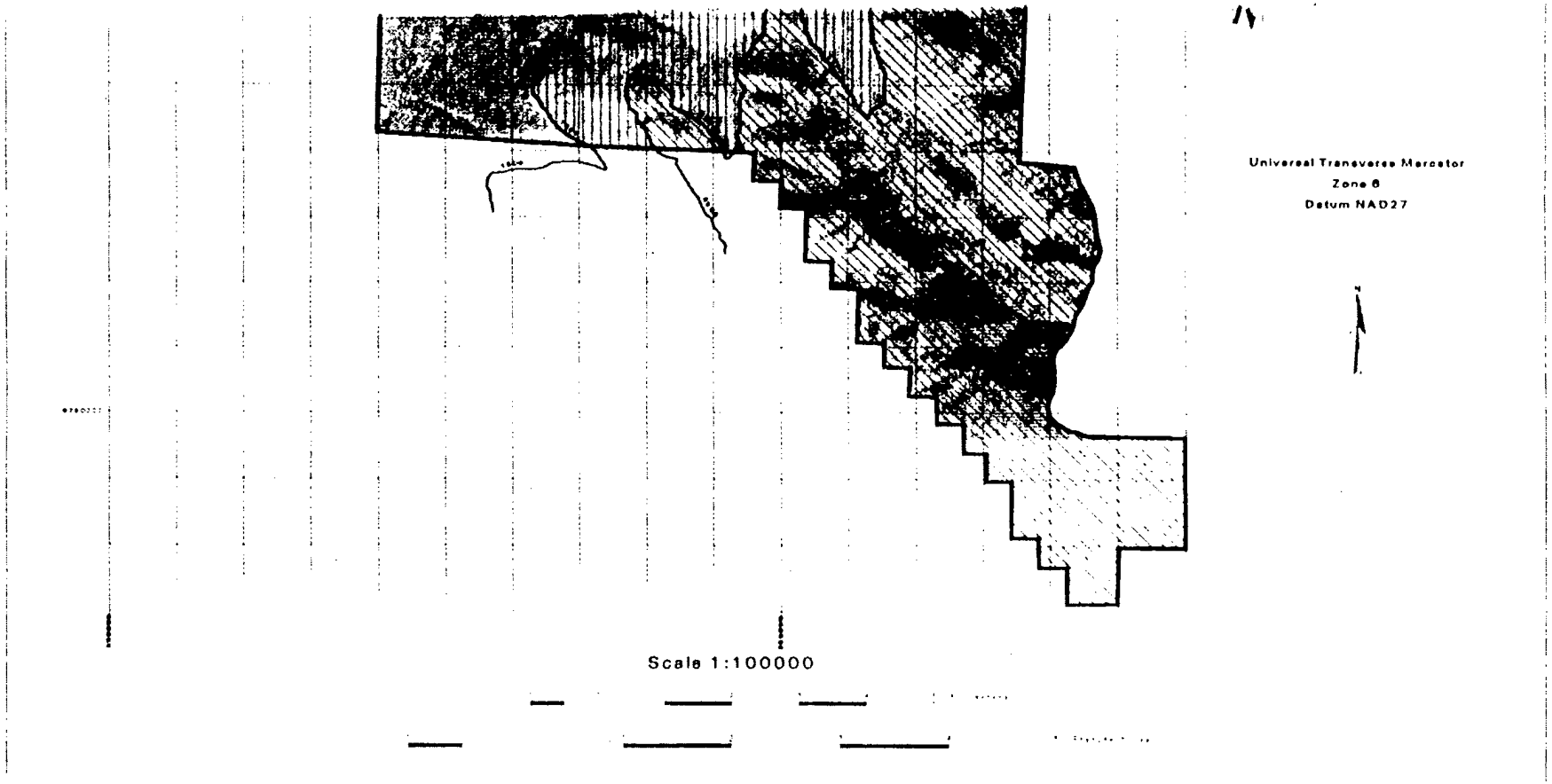
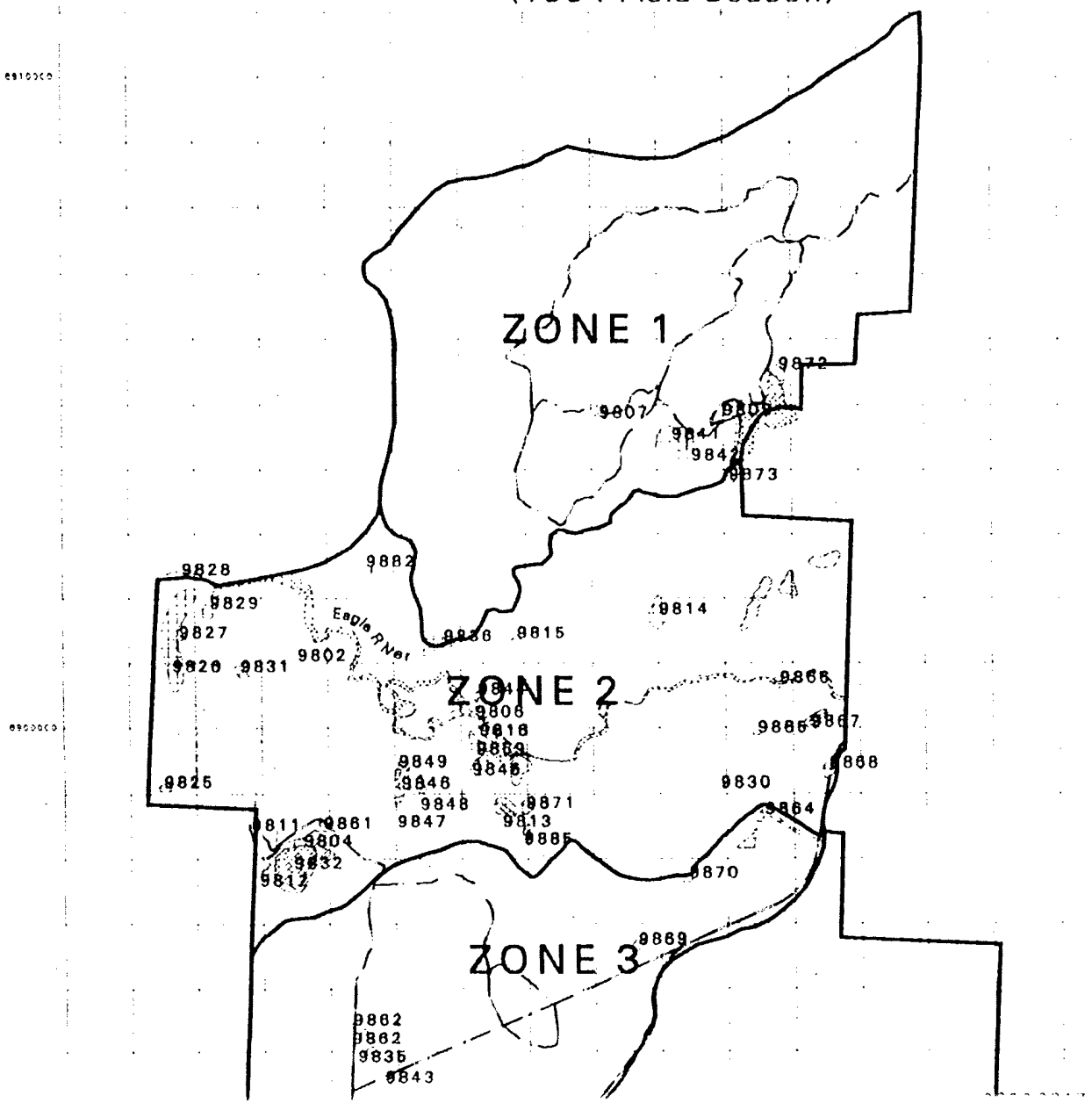


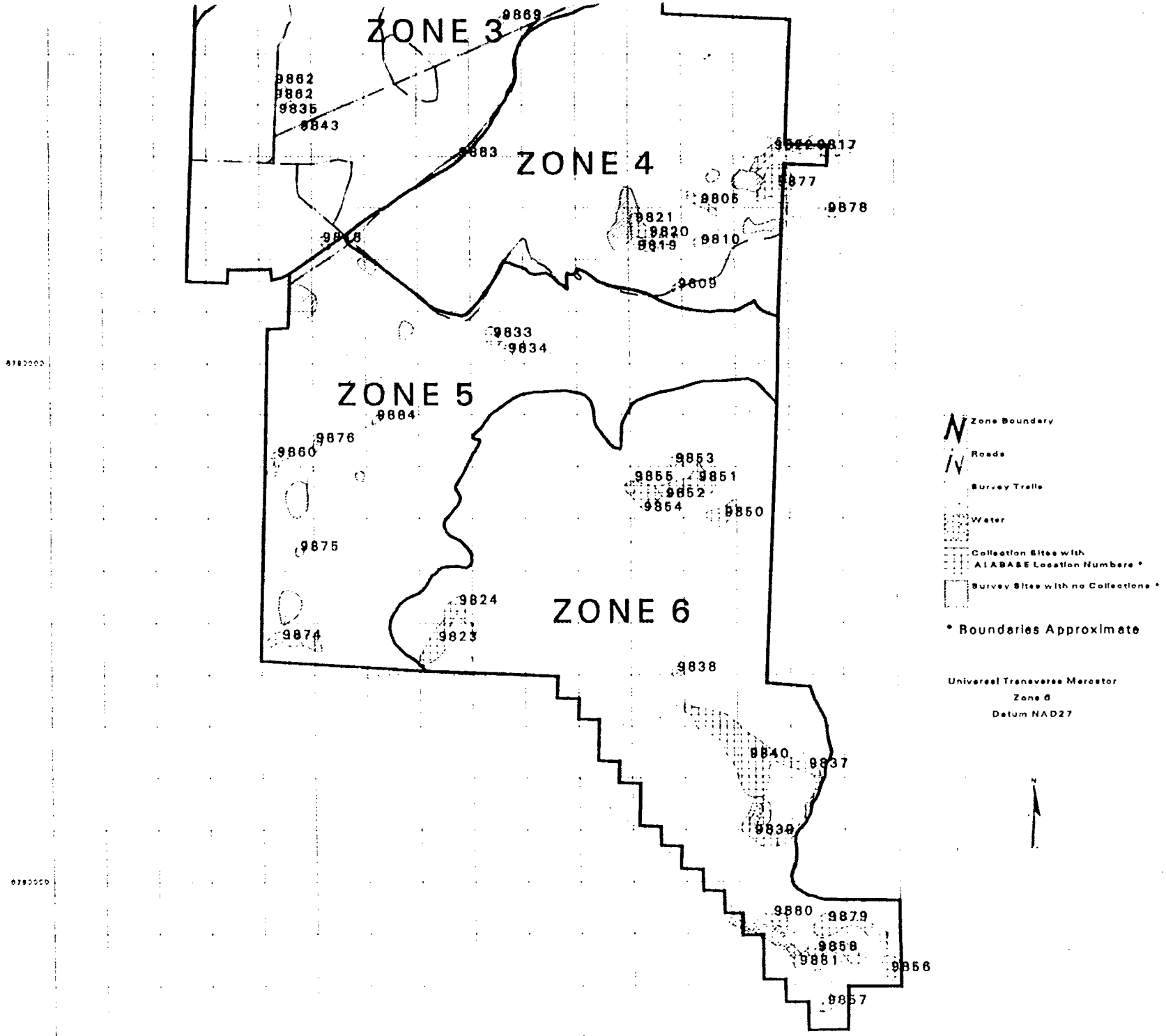
Plate 1. Fort Richardson, Alaska negetation zones

Fort Richardson, Alaska

Vascular Plant Collection Sites

(1994 Field Season)

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ZONE 4
ZONE 5
ZONE 6
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9858
9881
9856
9857
Zone Boundary
Roads
Survey Trails
Water
Collection Sites with
AIABASE Location Numbers *
Survey Sites with no Collections *
* Boundaries Approximate
Universal Transverse Mercator
Zone 6
Datum NAD27
N
Scale 1:100000

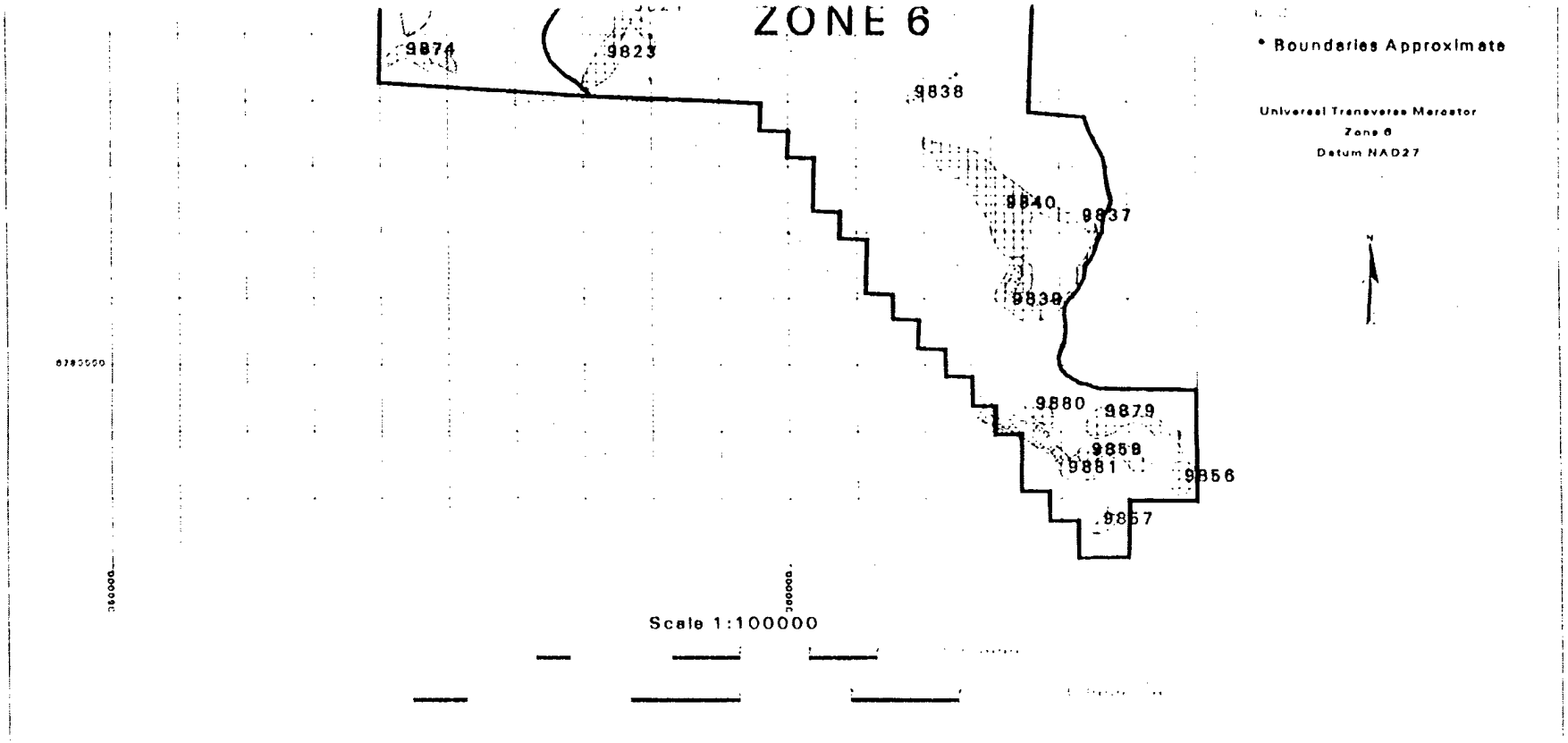

Plate 2. Vascular and cryptogam plant collection sites

Appendix A
Vegetation of Fort Richardson

Prepared by Gerry Tande

Past Vegetation Studies in the Cook Inlet Region

Very few vegetation studies have been conducted on or in the vicinity of Fort Richardson Military Reservation (FRA) even though the Anchorage area accounts for nearly half the population of Alaska. Henley et al. (1955) completed a timber inventory and map of FRA (updated 1962) as part of a natural resources inventory; however, only rudimentary vegetation descriptions were provided, and no inventories were conducted in nonforested types such as treeless bog or alpine areas. Racine (1994) has described the Eagle River Flats estuarine wetland zones and associated plant communities. Detailed descriptions are provided in terms of their composition, spatial patterns and processes, and comparisons are made to other estuarine wetland complexes in Alaska.

The alpine and subalpine zones are the least studied areas of FRA. A series of permanent vegetation plots, however, has been established in the Chugach Mountains as part of a climate change study. These are anticipated to provide some level of vegetation description for upper subalpine and alpine portions of the base (D. Walker, Univ. of Colorado, in progress).

Vegetation of the Anchorage area has been described by Tande (1983) for Elmendorf Air Force Base (EAFB); subalpine forest types are currently being described for the Chugach National Forest by DeVelice et al. (1994). A number of wetland studies have been completed within the Municipality (FUGRO 1981, Municipality of Anchorage 1982, Dowl Engineers 1983, Hogan and Tande 1983, Tande 1988); Potter Marsh (Batten et al. 1978, McCormick and Pinchon 1978); and Birchwood area (Frohne 1953).

Southcentral Alaskan wetlands have also been studied at Palmer Hayflats north of the base (Batten et al. 1978, Ritchie et al. 1981) and Susitna Flats across Knik Arm to the west (Sellers 1979, Snow 1982, Snow and Vince 1984, Vince and Snow 1979, 1984). Many of these studies are broadly applicable to the lowland forests and treed and treeless bogs and marshes in the Anchorage vicinity.

No alpine vegetation investigations have been completed for the Chugach Mountain Range of southcentral Alaska; Barker (1977) and Marvin (1986), however, have conducted floristic inventories with information applicable to FRA. Long term ecophysiological studies of trees at treeline have also been carried out in the subalpine zone above Anchorage (S. Bjornson University of Alaska, Anchorage). Additional vegetation-related studies with information potentially applicable to FRA is listed in Table 1.

Table 1
Vegetation or vegetation-related studies with information potentially applicable to Fort Richardson Military Reservation Alaska

Susitna River Basin	Kenai Peninsula	Alaska, General
USDA (1986)	Batten (1979)	Batten et al. (1978)
Acres American (1983)	Crow & Koppen (1977)	Batten (1986)
Clausen & Matthews (1988)	DeVelice (1994)	Dachnowski-Stokes (1941)
Div. of Habitat (1986)	Davis et al. (1980)	Eco. Steering Comm. (1992)
Div. of Habitat (1988)	Hjeljord (1971)	Foote (1976)
Env. Research (1984)	Jorgenson & Berg (1987)	Foote (1983)
Hanson (1951)	Krasnow & Halpin (1981)	Hall (1988)
Hegg (1970)	Neiland (1971)	Hanson (1958)
Helm (1982)	Oldemeyer & Regelin (1984)	Lee et al. (1982)
Helm (1984)	Piper (1905)	Lensink & Rothe (1986)
McKendrick et al. (1982)	Quimby (1972)	Lutz (1956)
Michaelson (1992)	Reynolds (1989)	Mitchell (1968)
Pegau (1972)	Rosenberg (1989)	Mitchell & Evans (1966)
Reed & Harms (1956)	Seguin (1979)	Neiland & Viereck (1977)
Setzer et al. (1984)	Seguin & Mangan (1977)	Selkregg et al. (1972)
SCS (1986)	Talbot et al. (1985)	Selkregg (1975)
Steigers et al. (1983)	WAES (1981)	Sjors (1985)
Talbot et al. (1992)		Van Hees (1990)
Zazada et al. (1981)		Viereck (1975)
		Viereck (1979)
		Viereck et al. (1986)
		Viereck et al. (1992)

Vegetation of Fort Richardson Military Reservation

Fort Richardson falls within the Cook Inlet Lowlands Section of the Coastal Trough Humid Taiga Province of Bailey's Ecoregions of the United States (McNab et al. 1994). Vegetation of this region is a transition between a Pacific coast, western hemlock-Sitka spruce (*Tsuga heterophylla-Picea sitchensis*) forest and the

interior boreal forest (taiga). It has been variously described as an open, low-growing spruce forest type by Viereck and Little (1972), and as a lowland spruce-hardwood forest by the JFSLUPCA (1973).

Packee (1994), in examining Alaska's forest vegetation zones, characterizes the region as an area where white spruce (*Picea glauca*) and Sitka spruce (*Picea sitchensis*) naturally hybridize; balsam poplar (*Populus balsamifera*) and black cottonwood (*Populus trichocarpa*) intergrade; and mountain hemlock (*Tsuga mertensiana*) may form the subalpine forest. Vegetation reflects the transitional nature of the climate between maritime and continental. This maritime climatic influence has resulted in a lower incidence of natural fire than the spruce-hardwood forests of interior Alaska (Gabriel and Tande 1983).

The plant species associations of the upper Cook Inlet area, including FRA, appear to be more closely aligned with Viereck and Little's (1972) description for closed spruce-hardwood forest. Upland sites are dominated by paper birch (*Betula paperifera*), white spruce, and, on drier sites, quaking aspen (*Populus tremuloides*). South along Turnagain Arm, however, the most common tree is Sitka spruce.

Cottonwood and poplar are common in areas bordering principal streams. Black spruce (*Picea mariana*) is the dominant tree in wetter areas and on some well-drained sites. Most bogs are treeless or support stands of stunted black spruce. Grasses, herbs, willows, and alders dominate the vegetation in a narrow band along the Inlet and at elevations above 1,500 ft (450 m) in the Anchorage area.

White spruce, mountain hemlock and, to a lesser extent, balsam poplar, are the dominant treeline species in southcentral Alaska (Viereck 1979, Viereck et al. 1992). At upper elevations, graminoid forb meadows, alder, and dwarf birch (*Betula glandulosa/nana*) thickets give way to low-growing alpine vegetation in the Chugach Mountains.

Fort Richardson Military Reservation is a topographically diverse area varying from mudflats inundated by the tides of Cook Inlet to peaks of over 5,300 ft (1650 m). Many different vegetation communities are represented, from coastal salt marsh and boreal forest types to high alpine tundra, talus slopes and blockfields. The following five zones of vegetation and plant habitats were recognized for the purposes of the floristic inventory: Figure 2 shows the general location of these five zones.

COASTAL HALOPHYTIC ZONE influenced by salt water, principally including shoreline tidal flats and the 865 ha Eagle River Flats estuarine marsh on Cook Inlet.

LOWLAND INTERIOR FOREST ZONE of boreal forest habitats below approximately 1,500 ft (460 m). Mesic to dry forest types include: white spruce; white spruce-paper birch; paper birch; white spruce-cottonwood; black cottonwood; balsam poplar; and quaking aspen. Wetlands are predominantly black spruce treed bogs and treeless bogs with a variety of low shrub and graminoid forb communities. Alder shrub is a dominant type of the Lowland Interior Forest Zone.

SUBALPINE ZONE of forest, shrub, and meadow habitats from approximately 1,500 ft (460 m) elevation to treeline. Mesic to dry sites include white spruce; white spruce-paper birch; balsam poplar; and mountain hemlock. Forests are interspersed with alder shrub and grass forb meadows. Treeless bogs are occasionally present in the Subalpine Zone.

ALPINE ZONE consists of mountain landscape habitats above treeline. Low shrubs and dwarf shrubs occupy wet and mesic to dry habitats. The latter include mesic to dry vegetated sites and dry non-vegetated sites such as rock talus and blockfields. Wetter habitats include late-melting snowfields and snowbeds.

ARTIFICIALLY CLEARED OR DISTURBED ZONE of the Cantonment Area, powerlines, roadsides, railroad right-of-ways, borrow pits and other human-modified areas.

Halophytic Zone

This zone is found along the shores of Knik Arm and is influenced by the rise and fall of the tides. It includes tidal flats and estuarine marshes.

Tidal Flats. These exist below the steep forested bluffs and are regularly inundated by high tides. They are usually unvegetated except for a moss-like marine alga *(Ulva* spp.) that is evident from mid-July into the autumn as a brilliant green swath at low tide. Sparse stands of rye grass (*Leymus mollis*) and lyngbye sedge *(Carex lyngbyei*) may grow on the flats; however, the tidal deposits of gravels, sand and clay are generally barren of terrestrial vegetation.

Estuarine Marsh. Eagle River Flats represents one of the largest estuarine marshes along the eastern shores of Cook Inlet. Estuarine marshes are wetlands influenced by marine tidal water in river estuaries or connecting bays where tidal flats, channels and pools are periodically inundated by water of varying salinity. Although the areas are a few feet above the level of the average tides, they are occasionally flooded by exceptionally high tides and by the overflow from freshwaters of Eagle River.

Complicated vegetation patterns result from this complex interaction between oceanographic, biological, geological, chemical and hydrological processes. The vegetation of Eagle River Flats, like that of many estuarine marshes, exhibits zonal patterns that are relatively well defined and arranged in relation to both the coastline of Knik Arm and the estuarine channel of Eagle River. These zones and their respective plant communities identified by Racine (1994), are briefly described below.

Mudflats make up about 30% of Eagle River Flats and occur coastally and inland along the lower estuarine channel of the river. Barren mudflats are characterized by scattered plants of glasswort (*Salicornia europea*), alkali grass (*Puccinellia hultenii*) and maritime arrow grass (*Triglochin maritima*). Vegetated mudflats are covered by maritime arrow grass, goose tongue (*Plantago maritima*) or beach rye communities. Arrow grass communities occur at slightly lower elevations than the elevated goose tongue and beach rye types. The former two communities are nearly pure whereas levees of beach rye have understories of silverweed (*Potentilla egedii*), goose tongue and small amounts of arrow grass.

Scattered elevated mounds and ridges occur sporadically on the Flats and are covered by a dense grass forb type. Species include *Calamogrostis* spp., *Hordeum brachyantherum*, beach pea (*Lathyrus palustris*), blue flag (*Iris setosa*), beach lovage (*Ligusticum scoticum*), *Chrysanthemum arcticum*, sweetgale (*Myrica gale*), shooting star (*Dodecatheon pulchellum*) and *Salix ovalifolia.*

A *Carex ramenskii* sedge meadow covers gully banks and separates vegetated mudflats from a pond/marsh complex roughly paralleling the lower estuarine channel of the river. Arrow grass, silverweed and *Atriplex gmelini* are associated species in the lawnlike growth of Ramenskii's sedge.

Carex lyngbaei sedge marsh is perhaps the dominant vegetation type on Eagle River Flats. Patches of it surround the numerous ponds inland from the Ramenskii sedge meadow. Lyngbaei sedge marsh extends S and E from the EOD Pad constituting approximately 30% of the Flats. This nearly monospecific type includes understory species of silverweed and *Stellaria humifusa*.

A low, brownish, emergent bulrush (*Scirpus paludosus*) forms extensive stands of its own or forms thin stands in some ponds found within the *Carex lyngbyaei* sedge marsh. A tall, green, great bulrush (*S. validus*) community is more restricted to borders around the deeper, mostly freshwater ponds closer to the uplands.

Floating sedge forb mats occur along the east side of the Flats bordering the uplands. Relatively low salinities support *Carex mackenzii, C. pleuriflora, C. aquatilis*, spike rush (*Eleocharis uniglumis*), water hemlock (*Cicuta mackenzieana*), marsh arrow grass (*Triglochin palustris*) and bedstraws (*Galium spp.*). Heavy mats

of submerged aquatic vegetation characterize deep ponds (e.g., horned pondweed *(Zannichellia palustria)*, pondweed (*Potamogeton pectinatus*). Emergents in these estuarine marsh ponds include emergent bulrush and four-leaved marestail (*Hippuris tetraphylla*).

Lowland Interior Forest Zone

Lower elevation upland forests extending from the Stuckagain Heights and EAFB boundaries and eastward to the foothills are largely young (<100 yr old) paper birch and mixed older-growth (>200 yr old) white spruce-paper birch forests.

White Spruce-Paper Birch Forest. The dominant vegetation type of FRA is a mixed forest of white spruce-paper birch. Nearly all of the higher elevation forested area of the Foot Hills from the Glenn Highway to treeline consists of this forest type. Large patches occupy the ground moraine coastally and south of Eagle River Flats along the EAFB boundary; uplands of the Elmendorf Moraine N of the Cantonment Area SW and NE of Fossil Creek; Eagle River bottomlands extending upstream from Eagle River Flats; and uplands NE of Eagle River Flats extending to Artillery Road and bisected by Route Bravo Road. Large patches of white spruce-paper birch also occur along the N-NE boundary N of Clunie Lake. The largest area of this forest type covers most of the large promontory of land N of Eagle Bay and W of Engineer Expressway.

This type is similar to the Old Growth Birch-White Spruce Closed Mixed Forest and Mixed Forest with Alder on EAFB (Types 8,9; Tande 1983). These birch and spruce are well-spaced and large (17-24 in DBH (43-61 cm)), and range in age from 150-225 yr.

Fungal decay of birch and insect damage in spruce have weakened many trees. Consequently, winds have caused extensive blowdowns in portions of these forests. The forest floor is generally littered with dead and downed individuals in all stages of decomposition, hampering travel in this vegetation type. Hummocky microrelief has resulted from numerous blown down trees where the root systems have been tipped up and revegetated. The forest type is interspersed with numerous, small, circular (<200 m dia), nonforested depressions. Runoff collects in these wetland depressions and standing water may remain into early summer. These sites are dominated by dense stands of alder (*Alnus tenuifolia, A. sinuata*), devil's club *(Oplopanax horridus)* and/or bluejoint grass (*Calamagrostis canadensis*).

Old-growth spruce-birch forest may be open and park-like, and the understory may be dominated by low herbs and feathermoss. Pure carpets of oak fern, dwarf dogwood (*Cornus canadensis*), twinflower (*Linnaea borealis*) and

feathermoss cover the forest floor and decomposing trees. Associated herb and grass species include: bluejoint grass, northern starflower (*Trientalis europaea*), fireweed (*Epilobium angustifolium*), wintergreen (*Pyrola chlorantha*), liverleaf wintergreen (*P. asarifolia*), one-sided wintergreen (*Orthilia secunda*), lesser rattlesnake plantain (*Goodyera repens*), stiff clubmoss (*Lycopodium annotinum*), lowbush cranberry, and woodland horsetail (*Equisetum silvaticum*). Low shrubs include highbush cranberry (*Viburnum edule*), wild rose (*Rosa acicularis*), red elderberry (*Sambucus racemosa*), beauverd's spiraea (*Spiraea beauverdiana*), and false azalea (*Menziesia ferruginea*).

Birch Forest. The second most common upland forest type on FRA is a younger forest of paper birch (<125 yr old) with a distinct understory of white spruce. These forests date from fires around the turn of the century (Henley 1955) and generally occur as large, pure, even-aged stands surrounding the old-growth white spruce-paper birch mixed forest previously described. It is the dominant upland type N of the Eagle River and on the N and S sides of the Elmendorf Moraine. Birch forest is also the dominant vegetation type of low elevation forests S of the golf course extending to the Muldoon boundary.

Scattered balsam poplar occasionally complement a birch overstory; thinleaf alder (*Alnus tenuifolia*) grow into the canopy on poorly drained sites especially close to the mountains. Scattered forest openings are covered by devil's club and bluejoint grass. The birch forest understory is dominated by alder, devil's club, bluejoint grass, and patches of woodland horsetail, lady fern (*Athyrium filix-femina*) and shield fern (*Dryopteris dilitata*). Associated species include: shrubs - red elderberry, highbush cranberry, wild rose and american red currant (*Ribes triste*); herbs - dwarf dogwood, twinflower and northern star flower.

White Spruce Forests. These forests cover a very small portion of FRA. A 320 A (133 ha) stand is found on well-drained gravelly soils downstream from the south end of Clunie Lake. Another forest stand (130 A (89 ha)) occupies a north-facing slope of Eagle River 0.75 mi (2 km) downstream from the eastern boundary. Scattered patches of pure white spruce occur within old growth white spruce-paper birch forest. Similar spruce stands have been dated at 200-225 yr on neighboring EAFB (Tande 1983).

Understory of the old-growth spruce is open and covered by schrebers (*Pleurozeum schreberi*) and knights plume feathermoss (*Rhytidiadelphus triquetrus*) with large patches of dwarf dogwood, oak fern (*Gymnocarpium dryopteris*), and twinflower. Associated species include: widely scattered shrubs - wild rose, false azalea, red elderberry, and beauverd's spiraea; dwarf shrub - lowbush cranberry; herbs - northern star flower, liverleaf, large-flower (*Pyrola grandiflora*), and one-sided wintergreen.

Black Cottonwood and White Spruce-Black Cottonwood Forests. These forest types occur on the floodplains of various streams and rivers. Large stands of black cottonwood forest occupy the banks of the Eagle River from the Eagle River bridge N of the landfill downstream to the beginning of Eagle River Flats. The largest mixed forests of spruce-cottonwood occur on the Ship Creek floodplain, extending downstream from the golf course onto EAFB. Significant but smaller stands occur along Otter Creek, and along upper Chester Creek and the North Fork of Campbell Creek where they are crossed by Bulldog Trail. Stands occupy a floodplain defined by old stream terraces. Sites are generally very hummocky and crisscrossed with old stream channels that meander through coarse gravels.

These cottonwood and mixed spruce-cottonwood forests exhibit very large, widely-spaced trees. Similar forests on EAFB are reported to consist of 90 ft (28 m) cottonwood trees 28-45 in DBH (71-114 cm) interspersed among somewhat smaller white spruce (8-12 in; 20-30 cm DBH), birch, and cottonwood (5-8 in; 13-20 cm DBH). One cottonwood stump was aged at 200-215 years. Old trees have numerous fungal conks, and many old, fallen trees litter the forest floor.

Dense patches of alder and wild rose occur over a rich herb understory dominated by bluejoint grass, oak fern and woodland horsetail. Associated species include: shrubs - red raspberry (*Rubus idaeus*), lowbush cranberry, american red currant; herbs -northern bedstraw (*Galium boreale*), cow parsnip (*Heracleum lanatum*), bluebells (*Mertensia paniculata*), meadowrue (*Thalictrum sparsiflorum*), and monkshood (*Aconitum delphinifolium*).

Quaking Aspen Forests. These forests occur on well-drained sites at low elevation inland from the coast. The largest stands occur on coarse outwash deposits of ancient glacial drainageways such as the westerly reaches of Fossil Creek near Gwen and Kiowa Lakes. Another large aspen forest occurs as an easterly crescent around the McLaughlin Range, extending SW towards Eagle River Flats. Shorter, smaller diameter trees characterize dense aspen forest that occupies the steep, dry, south-facing slopes and ridge tops along rivers and streams. Examples include the Fossil Creek drainageway that bisects the Elmendorf Moraine north of the Cantonment Area; Eagle River bluffs E of Eagle River Flats; and various drumlin slopes on the outwash plain of the Elmendorf Moraine S of Ship Creek. Raised island-like areas of coarser materials in ancient drainageways also support aspen forest. Examples occur S of Clunie Lake.

Closed aspen forests on mesic sites exhibit similar understories to surrounding birch forests. Drier and more open sites exhibit a willow understory. A distinctive feature of this latter aspen type is a winter hedge line on the willow and aspen regeneration caused by heavy use by moose during the winter. Moose have also removed chunks of bark from aspen trees over many years of use. In many cases, this has left a blackened, browsed, bark line up to approximately 10 ft (3 m).

The dominant tall willow is Bebb's willow (*Salix bebbiana*). Low shrubs include labrador tea (*Ledum palustre groenlandicum*), rose, lowbush cranberry, crowberry (*Empetrum nigrum*) and dwarf dogwood. Herbs include lupine (*Lupinus nootkatensis*), labrador lousewort (*Pedicularis labradorica*), northern bedstraw, fireweed, ticklegrass (*Agrostis scabra*), and a number of other grass species.

Balsam Poplar Forest. These forests occur as pure young stands on well-drained revegetated sites of the Cantonment Area. Smaller stands of large trees occupy treeline sites on south-facing slopes of Ship Creek, Chester Creek and the North Fork of Campbell Creek drainage. Pure stands may also be found on the outwash plain along the S side of the Elmendorf Moraine.

Alder and devil's club may form a dense tall shrub layer in balsam poplar forests at treeline or on the outwash plain. The understory is dominated by a low shrub layer of highbush cranberry and american red currant, and a grass-herb layer of bluejoint grass and ferns. Associated species are similar to young birch forests.

Alder Shrub. An alder tall shrub type is one of the largest vegetation types on FRA and is characterized by an open to closed canopy of alder species and an understory of bluejoint grass, meadow horsetail (*Equisetum pratense*) and/or devil's club. Alder shrub occupies openings in the old-growth white spruce-paper birch forest canopy. It is the dominant vegetation near treeline where it intermingles with spruce-birch forests and graminoid forb meadows of lower elevations, and mountain hemlock groves and dwarf birch low shrub at treeline. A large expanse of this type covers the mountain slopes east of the Small Arms Range.

Alder is also a successional plant community type on old alluvial deposits of creeks and rivers, and disturbed sites such as old trails, roadways, powerlines and clearings. Alder and grass aggressively increase and exclude forest regeneration on such disturbed sites in southcentral Alaska (Hegg 1970, Neiland and Viereck 1977, Tande 1983). It has successfully colonized old roadways nearly to the top of Nike Summit (3,900 ft, 1,210 m).

Alder occurs on topographically variable sites. It may be found on flat to undulating terrain, steep hillsides and ravines. Alder forms dense pure stands in ice pits or kettle depressions on the Elmendorf Moraine. At higher elevations and in riparian zones, it occupies swampy sites and may have standing water in hummocky depressions into late summer. Alder shrub on the ground moraine and many disturbed sites, however, occurs on moderately well-drained compacted gravels.

A dense alder overstory may vary in height from 3-30 ft (3-10 m). The three most conspicuous codominants are bluejoint grass, meadow horsetail and devil's club. The understory may also include: shrubs - elderberry, red raspberry, wild

rose; herbs - oak fern, shield fern, dwarf dogwood, northern starflower, cloudberry (*Rubus chamaemorus*), marsh five finger (*Comarum palustris*) and buckbean (*Menyanthes trifoliata*). Upland forest species occur beneath alder on better drained sites and in cutover areas.

Lowland Interior Forest Wetlands

Treed and treeless bogs occupy upland depressions (ice block pits), ancient glacial drainageways, streamsides, and the edges of many lakes and ponds of FRA. Black spruce forest and woodland and other low shrub and herbaceous types that dominate these wetlands change with changing moisture regimes as one moves away from open water. Tande (1983) identified eight zones of vegetation surrounding bog lakes and ponds on EAFB occupying deeper kettles and drainageways on the ground moraine. These zones are also present on FRA wetlands:

Treed Bogs:
1) closed black spruce forest
2) open black spruce forest
3) open black spruce dwarf tree
4) dwarf black spruce

Treeless Bogs:
5) sweet gale - ericaceous shrub
6) sphagnum moss floating bog mat
7) rooted floating emergents
8) open water (with/without submerged rooted aquatics)

Scattered throughout the upland forests are wet, graminoid meadows occupying small kettles or ice pit depressions. These wetlands are dominated by bluejoint grass. Slightly wetter sites have one or two zones of sedges which may surround a small pond.

Treed Bogs

Black Spruce Forest. These forests occur on poorly-drained, cold sites although they may extend onto upland, better-drained sites and mix with their white spruce counterparts (Tande 1983). Black spruce forests may also occupy colder, north-facing slopes in low elevation forests.

The largest extents of black spruce on FRA occur along the Muldoon border; Fossil Creek bottomlands; large, poorly-drained depressions of the ground moraine SW of Eagle River Flats; and the extensive network of ancient glacial drainageways S and W of Clunie Lake. Nearly all lakes and ponds have a black

spruce forest or woodland margin. Although this forest is never flooded, large depressions near upturned trees may have standing water in late summer.

Dominant understory plants include: shrubs - thinleaf alder, prickly rose, labrador tea; dwarf shrubs - lowbush cranberry, dwarf dogwood; herbs - woodland horsetail, meadow horsetail (*Equisetum arvense*), cloudberry; mosses - schrebers feathermoss, and green sphagnum (*Sphagnum* spp.) Associated species remain the same for black spruce forests on better drained sites. Green sphagnum, however, is replaced by dry-site species including cranesbill mosses (*Dicranum* spp.) and reindeer lichens (*Cladonia* spp., *Cladina* spp.).

Black Spruce Woodland. Treed bogs grade from a closed canopy of tall black spruce to more widely-spaced trees of less stature (10-16 ft, 3-5 m). The latter sites become wetter with standing water between frost-heaved hummocks; peat may be saturated to the surface year round. Dominant species include: trees - black spruce; shrubs - labrador tea, shrubby black spruce; dwarf shrubs - lowbush cranberry; herbs - cloudberry; mosses - green sphagnum, schreber feathermoss. As the canopy becomes less dense, horsetails and feathermoss decrease, and labrador tea, shrubby spruce and green sphagnum increase. Thinleaf alder and bluejoint grass may be important components of this type as in the wildlife viewing areas on the S and E sides of Otter Lake.

This black spruce woodland grades to scattered small patches of prostrate black spruce and low, matted, dwarf shrubs covering a hummocky sphagnum peat. The peat mat is dry to saturated but rarely flooded in mid-summer. This is a common plant community on bog ridges (strangs).

Species composition is variable, responding to small changes in soil moisture. Black spruce, northern labrador tea and brown sphagnum (*Sphagnum fuscum*) are common but other shrubs and mosses vary. On moister sites, sweet gale, bog rosemary (*Andromeda polifolia*), green sphagnum and red sphagnum (*Sphagnum warnstorfianum*) are evident. On drier raised sites, crowberry, tufted clubrush (*Trichophorum caespitosum*), shrubby cinquefoil (*Pentaphylloides floribunda*), feathermoss and lichens are common.

Treeless Bogs

Sweetgale-Ericaceous Shrub. Treeless bogs are predominantly covered by low shrub types dominated by sweet gale, ericaceous shrubs such as northern labrador tea (*Ledum palustre decumbens*), bog rosemary or bog blueberry (*Vaccinium uliginosum*), and sphagnum moss. These are very wet, usually with standing water between hummocks into late summer, and flooded after extended rainy periods. Water and exposed muck are not uncommon in this type.

Sweetgale-ericaceous shrub may form its own uniform covertype, or it may occupy ovoid to elongate depressions (flarks) between raised bog ridges (strangs). Sweet gale hummocks and mats within these areas are surrounded by standing water in early summer, and later by an exposed, saturated, moss-sedge peat. Tufted clubrush forms tussocks, and squarrose sphagnum (*Sphagnum squarrosum*), flat leaf and common bladderworts (*Utricularia intermedia, U. vulgaris macrorhiza, U. minor*) occupy depressions.

Associated species include tall cottongrass (*Eriophorum angustifolia*), buckbean, long-leaf and round-leaf sundew (*Drosera anglica, D. rotundifolia*), livid and shore sedge (*Carex livida, C. limosa*), maritime arrowgrass, northern asphodel (*Tofieldia coccinea*), and brown fen moss (*Thomenthypnum* spp.).

A variation of this sweet gale-dominated type has less exposed, mucky, depressional areas between hummocks and is most commonly found as a floating bog mat along lakeshores such as the SW shore of Otter Lake. Sweet gale and squarrose sphagnum are dominant but ericaceous shrubs are more important than in the first subtype. Ericaceous shrub dominants include: crowberry, dwarf birch (*Betula nana*), lowbush cranberry, and bog blueberry. Swamp horsetail (*Equisetum fluviatile*) and brown sphagnum are conspicuous codominants.

Associated species include: sweet gale, cloudberry, bog cranberry (*Oxycoccus microcarpus*), bog sedge (*Carex magellanica irrigua*), tall cottongrass, and Alaska bog willow (*Salix fuscescens*).

Sphagnum Moss Floating Bog Mat. Bouncy floating bog mats of sphagnum moss may occur near open water of treeless bogs. Scattered ericaceous shrubs include: dwarf birch, bog cranberry, bog rosemary, northern labrador tea. Herb diversity is generally low, but chamiss' cottongrass (*Eriophorum russeolum*), white cottongrass (*E. scheuchzeri*), rotund sedge (*C. rotundata*), shore sedge, and bog sedge may occur in dense patches. The peaty mat is springy and saturated throughout the year.

Rooted Floating Emergents. Rooted, floating aquatic vegetation is found in the shallow water zone (1-5 ft; 0.5-1.5 m) of all open water bodies on FRA. Dominants include yellow pond lily (*Nuphar polysepalum*), pond weeds (*Potamogeton* spp.) and marestail (*Hippuris* spp.).

Graminoid Meadow. Open kettle depressions of the Lowland Interior and Subalpine Zone mixed forests are sinks for seasonal runoff that support a dense bluejoint grass and sedge meadow. These hummocky, wet graminoid meadows may also occur along the upland margin of treeless bogs or lakes such as Gwen and Kiowa lakes.

They are characterized by a deep, fibrous, sedge-grass peat increasingly saturated toward the center of the depression. A zone of emergent *Carex rhynophysa* extends shoreward from the center of these depressions. Better-drained areas closer to upland forest are dominated by bluejoint grass. Associated species are marsh five-finger, marsh and woodland horsetail, chamiss' cottongrass, shore sedge, fen moss, and green sphagnum.

Subalpine Zone

This zone covers a relatively narrow band from approximately 1500 ft (480 m) to the Alpine Zone at treeline at approximately 2500 ft (775 m). Much of the subalpine zone of the Chugach Mountains is characteristically an open to closed spruce-birch forest intermingled with large areas of alder shrub and bluejoint-forb meadows. Occasional white spruce forests may be found on north-facing slopes and the upper reaches of mountain drainages. These forests generally exhibit similar structure and species compositions to Lowland Interior old-growth spruce-birch and spruce forests as previously described. Alder, devil's club and bluejoint grass, however, are increasingly important with elevation in each of these types.

The south-facing subalpine slopes, of Arctic Valley, Chester Creek and the North Fork of Campbell Creek are considerably drier, and may be floristically quite diverse. A balsam poplar forest is common on these sites. These slopes, dominated by numerous herbaceous species and low shrubs, show strong resemblances to the understories of the Lowland Interior Forest Zone below. Shrubby species include willows (*Salix* spp.), highbush cranberry, soapberry (*Shepherdia canadensis*), raspberry, saskatoon berry (*Amelanchier alnifolia*) and juniper (*Juniperus communis*). Herbaceous species include siberian fescue (*Festuca altaica*), indian paintbrush (*Castelleja unalaschcensis*), fireweed, sage (*Artemesia* spp.), wild geranium (*Geranium erianthum*), three-tooth saxifraga (*Saxifrage tricuspidata*), jacob's ladder (*Polemonium* spp.) and field chickweed (*Cerastium* spp.).

Throughout the Subalpine Zone, alder shrub (as previously described) is interspersed with these forest types, and becomes the dominant vegetation type near treeline where it meets a mix of mountain hemlock groves and the dwarf birch low shrub of the lower alpine.

Bluejoint Grass-Forb Meadow. This type is also an extensive component of the Subalpine Zone. It is dominated by bluejoint reed grass although composition may vary from nearly pure stands to stands in which forbs and ferns are represented by a large number of species and form a major portion of the vegetation. A very rich meadow exists near treeline west of mile 0.5 of the Nike Summit Road. Common forbs and ferns include fireweed, shield fern, lady fern, cow parsnip, oak fern, horsetail, *Arnica* spp., watermelon berry (*Streptopus*

amplexifolius), larkspur (*Delphinium glaucum*), monkshood, chockolate lily (*Fritillaria camschatcensis*) wild geranium, Sitka burnet (*Sanguisorba stipulata*), harebells (*Campanula rotundifolia*) and northern starflower. Grasses other than bluejoint and various sedges may be present in minor amounts.

Occasional thickets and scattered shrubs may also be present in bluejoint-forb meadows. Common shrubs include alder, green mountain ash (*Sorbus scopulina*), red elderberry, willows and beauverd's spiraea.

Mountain Hemlock Forest. This species occurs singly and as dense, nearly impenetrable forest groves at the upper limits of white spruce at treeline. Mountain hemlock is at the northern limits of its range on FRA. Prostrate individuals occupy windy, exposed sites, while individuals near the center of forest patches may attain a height of 15 ft (5 m). A hummocky understory exhibits low vascular plant diversity. However, crowberry, blueberry, cassiope (*Cassiope tetragona*) and moss species may form continuous mats on the forest floor.

Alpine Zone

This zone occupies mountain slopes above approximately 2500 ft (775 m) and consists of plants capable of withstanding very cold temperatures and short growing seasons. Alpine plants are generally low growing and tend to be mat-forming where moisture is not a limiting factor. However, in protected hollows, this zone can also support low thickets of willow and dwarf birch and moist meadows populated with herbaceous species. Alpine areas also include elevations so high, or environments so severe, that virtually no vascular plants are capable of surviving; vegetation can be sparse or almost non-existent on dry exposed ridges. This wide variety and combination of environmental conditions, however, may result in a relatively high species diversity. Many rare plants or species of limited distribution occur in this zone of FRA.

Major portions of the area N and W of Arctic Valley Ski Area, Snowhawk Creek Valley, the headwaters of Chester Creek, and the North Fork of Campbell Creek drainage lie within the Alpine Zone. Six broad vegetation types and plant habitats can be recognized:

1) Dwarf Birch Low Shrub Tundra
2) Crowberry/Blueberry Dwarf Shrub Tundra
3) Cassiope Dwarf Shrub Tundra
4) Dryas-Sedge-Lichen Dwarf Shrub Tundra
5) Snowbeds
6) Talus Slopes and Blockfields

Dwarf Birch Low Shrub Tundra. A hummocky, low shrub community of dwarf birch (*Betula glandulosa, B. nana*) covers a large area of the lower alpine where it mingles with alder shrub and bluejoint-herb meadows at treeline. Ericaceous shrubs are an important component and include: bog blueberry, lowbush cranberry, northern Labrador tea and crowberry. Willows become an important component on poorly drained sites and along drainages (e.g.: (*Salix lanata, S. glauca, S. planifolia*). Common herbs include Siberian fescue, bluejoint, *Hierochloe alpina* and *Carex* spp. on mesic to wet sites. Feathermosses may also be important.

Crowberry/Blueberry Dwarf Shrub Tundra. Most of the vegetated portion of the Alpine Zone is covered by crowberry/blueberry dwarf shrub tundra. Crowberry and blueberry intermingle; however, shallow, stony, fairly well-drained soils support blueberry tundra at slightly higher elevations than crowberry tundra. Sites are generally exposed to the wind and do not accumulate much snow in the winter but usually are not as exposed as sites supporting Dryas sedge-lichen tundra (Viereck et al. 1992). Crowberry tundra, on the other hand, occurs in more protected areas at slightly lower elevations on thin, well-drained, mineral soil or poorly-drained peats. It follows that these site differences support slightly different species associations.

Where crowberry is dominant, other dwarf shrubs include bog blueberry, lowbush cranberry, *Arctous alpina, Cassiope tetragona, Salix arctica*, and *Vaccinium caespitosum*. Herb cover is variable but generally provides little cover. It may include: *Luetkea pectinata, Acomastylis rossii, Arnica* spp., *Campanula* spp., *Pedicularis* spp., *Artemesia arctica*, and *Carex* spp.

Where blueberry is common, other ericaceous shrubs, especially northern Labrador tea, *Arctous rubra, A. alpina*, crowberry, and *Cassiope tetragona*, may be abundant or codominant. Dwarf willows also may be common. Herbs include *Hierochloe alpina, Bistorta vivipara, Anemone* spp., Siberian fescue, *Luzula* spp.; fruticose lichens may provide substantial cover.

Cassiope Dwarf Shrub Tundra. This tundra type occurs on moist sites, commonly on north-facing slopes, gelifluction lobes or snow accumulation areas. It is found on sites well protected by snow in winter that become snow-free in the early to middle part of the growing season (Viereck et al. 1992). This type is dominated by a complete cover of *Cassiope tetragona*. Common associated dwarf shrubs may sometimes be codominant and include lowbrush cranberry, bog blueberry, crowberry, and *Salix* spp. Herbs are minor components in this type; mosses are generally abundant. Lichens may be abundant but provide little cover (Viereck et al. 1992).

Dryas-Sedge-Lichen Dwarf Shrub Tundra. Exposed, wind-swept, alpine sites are dominated by species of the genus *Dryas* which form mats a few

centimeters thick and have a strong sedge and fruticose lichen component. Sedges include *Carex scirpoidea, C. misandra*, and *C. bigelowii*. A substantial amount of the total cover may be contributed by fruticose lichens such as *Cladonia* spp., *Cladina* spp., *Alectoria* spp., *Thamnolia* spp. and *Cetraria* spp. Other associated species may include *Salix reticulata, Arctous* spp., *Hierochloe alpina, Hedysarum spp., Festuca* spp., *Oxytropis nigrescens, Minuartia* spp., and *Saxifraga* spp. Various mosses may also grow intertwined with the dryas mat. Exposure to strong winds leads to deflation of fines and organic material producing various-sized mats or islands of vegetation along many ridges and slopes in the study area.

Snowbeds. These communities occur below outcrops and in depressions, steambeds or other topographic features that break the wind and allow substantial snowdrifts to accumulate. Although snowbeds may be dry late in the season, they are generally irrigated by water from late-melting snow drifts upslope (Viereck et al. 1992). The sites themselves are covered with snow through part or most of the summer. Large snowbeds occur on the westerly slopes of Nike Summit; at the heads of the valleys below Tanaina and Temptation Peaks; and the east end of Long Lake and associated rock glaciers at the head of the North Fork of Campbell Creek drainage.

Dominant species may be herbs (e.g., *Oxyria digyna, Koenigia islandica, Saxifraga rivularis, Cardamine bellidifolia, Poa arctica, Carex lachenalii, Claytonia sarmentosa*), mosses and lichens. Woody plants are absent. Cover is sparse, and much bare ground may be present.

Talus Slopes, Rock Outcrops and Blockfields. These habitats are sparsely vegetated with alpine herbs. A wide variety may be present with no particular dominant species. Common species may include *Draba* spp., *Saxifraga* spp., *Festuca brachyphylla, Potentilla* spp., *Diapensia lapponica, Oxyria digyna, Androsace* spp. and *Epilobium latifolium*. Lichens, especially crustose lichens, may be common.

Artificially Cleared or Disturbed Zone

In general, vegetation on artificially cleared or disturbed sites is not well organized into discrete plant communities. Instead, the vegetation consists of a heterogenous mix of a wide variety of native and introduced plant species, the composition of which varies considerably from place to place over relatively short distances. This heterogeneity is in part due to soil and site conditions, which range from relatively undisturbed native soils, to shallow topsoil over coarse textured fill, to deep fill without topsoil. In addition, management of these areas has been a combination of varying degrees of soil disturbance, introduction and spread of numerous introduced forage plants and weeds, and natural revegetation by native plants, all coupled with periodic mowing or other forms of manmade disturbances.

Natural soils, which have been cleared long ago and subsequently received little additional disturbances, may exhibit distinct vegetation communities. These include alder shrub, bluejoint meadow, balsam poplar scrub, and a fireweed mesic forb herbaceous type described by Viereck et al. (1992) consisting of native plants characteristic of early-to-mid seral forests.

At the other extreme are periodically disturbed areas that tend to be dominated more by native and introduced weeds. Tickle grass, foxtail barley (*Hordeum jubatum*), bluegrass (*Poa pratensis*), clovers (*Trifolium* spp.), common dandelion (*Taraxicum officinale*), common groundsel (*Senecio vulgaris*), dock (*Rumex crispus*), knotweed (*Polygonum aviculare*), pineapple weed (*Matricaria matricarioides*), and a number of other species are very common.

Literature Cited

Acres American. 1983. Botanical resources. In: Alaska Power Authority, Susitna hydroelectric project. Volume 6A, Exhibit E, Chapter 3: E-3-191-E-3-293. Report prepared for Alaska Power Authority. Anchorage, AK (?).

Barker, M. 1977. Field studies in alpine tundra. [Place of publication unknown]: Technical session papers, science information exchange in Alaska. Alaska Division American Ass. for the Advancement of Science and AEIDC, Univ. of Alaska. 28th Alaska Science Conference, September 22-24, 1977: 74-81.

Batten, A.R., S. Murphy, and D.F. Murray. 1978. Definition of Alaska coastal wetlands by floristic criteria. EPA Rep. No. 804965-01. Corvallis Environmental Research Laboratory, Corvallis, OR. 490 p.

Batten, A.R. 1979. Wetlands of the Kenai River corridor. Unpubl. rep. Univ. of Alaska, Herbarium, Fairbanks, AK. 2 p. + maps.

Batten, A.R. 1986 A synopsis of Alaska wetland vegetation. pp. 23-44 In: Van der Valk, A. and J. Hall (organizers). Alaska: Regional Wetland Functions. Proceedings of a Workshop held at Anchorage, Alaska May 28-29, 1986. The Environmental Institute, Univ. Mass. Amherst.

Clausen, D. and J. Matthews. 1988. Susitna Flats State Game Refuge management plan. Alaska Dept. of Fish and Game, Division of Game and Division of Habitat. 80 p.

Crow, J.H., and J.D. Koppen. 1977. The salt marshes of China Poot Bay, Alaska. Vol. 10: Environmental studies of Kachemak Bay and lower Cook Inlet. Alaska Dept. Fish and Game, Anchorage, AK. 29 p.

Dachnowski-Stokes, A.P. 1941. Peat resources in Alaska. Tech. Bull. 769. U.S. Dept. of Agriculture, Washington, D.C. 84 p.

DeVelice, R.L., C. Hubbard, M. Potkin, and T. Boucher. 1994. Preliminary classification of vegetation types of Prince William Sound (Draft 1). USDA Forest Service, Chugach National Forest, Anchorage, AK. 40 pp.

Davis, A., D. Rak, D. Davidson, and R. Huecker. 1980. Soil resource inventory of the Kenai Peninsula, Chugach National Forest, Alaska, Alaska Reg. Rep. 110. U.S. Forest Service, Juneau, AK. 148 p. + maps.

Divisions of Habitat and Game. 1986. Palmer Hayflats State Game Refuge management plan. Alaska Dept. of Fish and Game, Divisions of Habitat and Game, Anchorage, AK. 54 p.

Divisions of Habitat and Game. 1988. Susitna Flats State Game Refuge resource inventory. Appendix A. In: Susitna Flats State Game Refuge management plan. A1-A46. Alaska Dept. of Fish and Game, Divisions of Habitat and Game, Anchorage, AK.

Dowl Engineers. 1983. University of Alaska Mosquito Lake wetlands study. Part IV. Unpubl. rep. prepared for Univ. of Alaska, Anchorage, AK 18 p.

Ecology Steering Committee. 1992. Final report: ecological definitions for old-rowth forest types in southcentral Alaska. Tech. rep. R10-TP-28. U.S. Dept. Agriculture, Forest Service, Anchorage, AK. 30 p.

Environmental Research and Technology. 1984. Diamond Chuitna Project. Vegetation baseline studies report. Prepared for Diamond Shamrock-Chuitna Coal Joint Venture, Anchorage, AK.

Federal Energy Regulatory Commission. 1984. Terrestrial botanical resources. Appendix J. 5:J3-J97 + maps. In: Federal Energy Regulatory Commission. 1984. Draft environmental impact statement: Susitna hydroelectric project, Alaska. Federal Energy Regulatory Commission, Div. of Public Information, Washington, D.C.

Frohne, W.C. 1953. Mosquito breeding in Alaskan salt marshes, with special reference to AEDES PUNCTODES Dyar. Mosquito News 13:96-103.

Foote, M.J. 1976. Classification, description and dynamics of plant communities following fire in the taiga of interior Alaska. Final rep. for Bureau of Land Management. On file at Fairbanks, AK: U.S. Forest Service, Institute of Northern Forestry. 211 p.

Foote, M.J. 1983. Classification, description, and dynamics of plant communities after fire in the taiga of interior Alaska. Res. Pap. PNW-307. Portland, OR: U.S. Forest Service, Pacific Northwest Forest and Range Experiment Station. 108 p.

FUGRO Northwest, Inc. 1981. Citation needed from Chuck R.

Gabriel, H.W. and G.F. Tande. 1983. A regional approach to fire history in Alaska. United States Dept. of the Interior, Bureau of Land Management Technical Report 9. BLM/AK/TR-83/09.

Hall, J. 1988. Alaska coastal wetlands survey. National Wetlands Inv., Alaska. U.S. Fish and Wildlife Survey. Unpublished report.

Hanson, H.C. 1951. Characteristics of some grassland, marsh, and other plant communities in western Alaska. Ecol. Monogr. 21(4):317-378.

Hanson, H.C. 1958. Caribou management studies: analysis of Nelchina caribou range. Job completion reports: Proj. W-3-R-12 wildlife investigations; work plan B, Job 6, Vol. 12, No. 4. 68 p.

Hegg, K.M. 1970. Forest resources of the Susitna Valley, Alaska. PNW-32. U.S. Forest Service, Pacific Northwest Forest and Range Experiment Station, Juneau, AK and Portland, OR. 42 p.

Helm, D. 1982. Vegetation studies for the proposed Susitna Hydroelectric Project. Agroborealis 14:52-55.

Helm, D., W. Collins, and J. McKendrick. 1984. Floodplain succession in southcentral Alaska. Pp. 114-118. In: LaBau, V.J., and C.L. Kerr (eds.). Inventorying forest and other vegetation of the high latitude and high altitude regions: Proceedings of an international symposium, Society of American Foresters regional technical conference; 1984 July 23-26; Fairbanks, AK. Society of American Foresters. Bethesda, MD.

Henley, K.D., D.E. Pruss, and R.E. Reichle. 1955. Woodland management supplement to land management plan for Fort Richardson, Alaska. Report prepared by U.S. Army Corps of Engineers for Ft. Richardson Army Base, Alaska.

Hogan, M., and G.F. Tande. 1983. Vegetation types and bird use of Anchorage wetlands. U.S. Fish and Wildlife Service, Special Studies, Anchorage, AK. 134 p.

JFSLUP (Joint Federal-State Land Use Planning Commission for Alaska). 1973. Major ecosystems of Alaska. Fairbanks, AK; Denver, CO; Washington, D.C.: U.S. Geological Survey. Map. 1:2,500,000.

Jorgenson, M.T., and E.E. Berg. 1987. Wetlands of Homer. Final report prepared for city of Homer, Ak. Alaska Biological Research, Inc., Fairbanks, AK. 52 p.

Lee, L.C., R.O. Teskey, and T.M. Hinckley. 1982. Impact of water level changes on woody riparian and wetland communities. Vol. 11: Alaska. Univ. of Washington, College of Forest Resources, Seattle, WA. 170 p.

Lensink, C.J., and T.C. Rothe. 1986. Value of Alaskan wetlands for waterfowl. Unpubl. symposium proceedings. Pp. 78-137. In: Van der Valk, A., and J. Hall (co-organizers). Proceedings of a workshop. U.S. Fish and Wildlife Service, Anchorage, AK.

Lutz, H.J. 1956. Ecological effects of forest fires in the interior of Alaska. Tech. Bull. 1133. [Place of publication unknown]: U.S. Dept. of Agriculture. 121 p.

McNab, W. H., and P.E. Avers, comps. 1994. Ecological subregions of the United States: Section descriptions. Administrative Publication WO-WAS-5. Washington, D.C.: U.S. Dept. of Agriculture, Forest Service. 267 p.

Marvin, L.C. 1986. A floristic survey of the Eklutna Valley, Chugach State Park, Alaska. M.S. thesis. Brigham Young Univ., Provo, UT. 147 p.

McCormick, J., and W. Pichon. 1978. Wetlands of Potter Marsh, Point Campbell to Potter. WAPORA Proj. 681. WAPORA, Inc., Washington, D.C. 79 p.

McKendrick, J., W. Collins, D. Helm, J. McMullen, and J. Koranda. 1982. Susitna hydroelectric project. Phase I Final Report, Environmental Studies, Subtask 7.12: Plant Ecology Studies. Prepared for Alaska Power Authority, Anchorage, AK. Univ. of Alaska Agricultural Experiment Station, Palmer, AK.

Michaelson, J. 1992. Site evaluation of Spring Creek Farm belonging to Louise Kellogg. Field report. Alaska Natural Heritage Program, Anchorage, AK. 6 p.

Mitchell, W.W. 1968. On the ecology of Sitka alder in the subalpine zone of southcentral Alaska. Pp. 45-56. In: Trappe, J.M., J.F. Franklin, R.F. Tarrant, and G.M. Hansen (eds.). Biology of alder: Proceedings of a symposium held at Northwest Scientific Association 40th annual meeting; 1967 April 14-15; Pullman, WA. U.S. Forest Service, Pacific Northwest Forest and Range Experiment Station, Portland, OR.

Mitchell, W.W., and J. Evans. 1966. Composition of two disclimax bluejoint stands in southcentral Alaska. J. Range Manage. 19(2):65-68.

Municipality of Anchorage. 1982. Anchorage wetlands management plan. Municipality of Anchorage, Planning Dept., Anchorage, AK.

Neiland, B.J. 1971. Survey of vegetational and environmental patterns of the Chickaloon Flats, Kenai Peninsula, Alaska. Unpubl. report prepared for Dept. of Interior, Bureau of Sports Fish and Wildlife, Kenai National Moose Range. Univ. of Alaska, Dept. of Biological Sciences, Fairbanks, AK. 21 p.

Neiland, B.J., and L.A. Viereck. 1977. Forest types and ecosystems. Pp. 109-136. In: North American forest lands at latitudes north of 60 degrees: Proceedings of a symposium; 1977 September 19-22; Fairbanks, AK. Univ. of Alaska, School of Agriculture and Land Resources Management, Agricultural Experiment Station, Cooperative Extension Service, Fairbanks, AK.

Oldemeyer, J.L., and W.L. Regelin. 1984. Forest succession, habitat management, and moose on the Kenai National Wildlife Refuge. Final rep. U.S. Fish and Wildlife Service, Denver Wildlife Research Center, Fort Collins, CO. 422 p.

Pegau, R.E. 1972. Caribou investigations-analysis of range. Pp. 1-216. In: Pegau, R.E., and J.E. Hemming (ed.). Caribou report. Volume 12. Progress rep. Federal Aid in Wildlife Restoration, Proj. W-17-2 and W-17-3, Job 3.3R. Alaska Dept. of Fish and Game, Juneau, AK.

Piper, C.V. 1905. Grasslands of the south Alaska coast. Bull. No. 82. U.S. Dept. of Agriculture, Bureau of Plant Industry, Washington, D.C. 38 p.

Quimby, R.L. 1972. Waterbird habitat and use of Chickaloon Flats. M.S. thesis. Univ. of Alaska, Fairbanks, AK. 86 p.

Racine, C. 1994. Habitat and vegetation. In:

Reed, J.C., Jr., and J.C. Harms. 1956. Rates of tree growth and forest succession in the Anchorage-Matanuska Valley area, Alaska. Arctic 9(4):238-248.

Reynolds, K.M. 1989. Preliminary classification of forest vegetation of the Kenai Peninsula, Alaska. Research Paper PNW-RP-424. U.S. Forest Service, Pacific Northwest Research Station, Portland, OR. 67 p.

Ritchie, R., J. Curatolo, and A.R. Batten. 1981. Knik Arm wetland study: final report. Alaska Biological Research, Inc., Fairbanks, AK. 195 p.

Rosenberg, D.H. 1986. Wetland types and bird use of Kenai lowlands. U.S. Fish and Wildlife Service, Region 7, Special Studies, Anchorage, AK 189 p.

Rothe, T.C., S.H. Lanigan, P.A. Martin, and G.F. Tande. 1983. Natural resource inventory of Elmendorf Air Force Base, Alaska: Part I. U.S. Fish and Wildlife Service, Region 7, Special Studies, Anchorage, AK. 368 p.

Rothe, T.C., S.H. Lanigan, P.A. Martin, and G.F. Tande. 1983. Natural resource inventory of Elmendorf Air Force Base, Alaska: Part II. U.S. Fish and Wildlife Service, Region 7, Special Studies, Anchorage, AK. 43 p.

Seguin, R.J. 1979. Wildlife habitat evaluation in the Portage Flats area, Alaska. M.S. thesis. Univ. of Alaska, Fairbanks, AK. 116 p.

Seguin, R.J., and L.S. Mangan (eds.). 1977. Portage Flats wildlife habitat inventory and analysis. Western Interstate Commission for Higher Education, Resources Development Internship Program, Boulder, CO. 64 p.

Selkregg, L.L. and others. 1972. Environmental atlas of the Greater Anchorage Area Borough, Alaska. Arctic Environmental Information and Data Center, Univ. of Alaska, Anchorage. Anchorage, AK.

Selkregg, L.L. 1975. Alaska regional profiles: southcentral region. Vol. 1. Univ. of Alaska, Arctic Environmental Information and Data Center, Anchorage, AK. 265 p.

Sellers, R. 1979. Waterbird use of and management considerations for Cook Inlet State Game Refuges. Unpubl. rep. Alaska Dept. of Fish and Game, Anchorage, AK. 42 p.

Setzer, T.S., B.R. Mead, and G.L. Carroll. 1984. Timber resource statistics for the Willow Block, Susitna River Basin Multiresource Inventory Unit, Alaska, 1978. Resour. and Range Experiment Station, Portland, OR. 47 p.

Sjors, H. 1985. A comparison between mires of southern Alaska and Fennoscandia. Aquilo 21:89-94.

Snow, A.A. 1982. Plant zonation in an Alaskan salt marsh: an experimental study of the role of edaphic conditions. Ph.D. dissertation. Univ. Massachusetts, Amherst, MA. 214 p.

Snow, A.A., and S.W. Vince. 1984. Plant zonation in an Alaskan salt marsh: II. An experimental study of the role of edaphic conditions. J. Ecol. 72:669-684.

Soil Conservation Service. 1986. Timber and vegetation resources of the Susitna River Basin, Alaska. Susitna River basin study, Alaska. U.S. Dept. of Agriculture (Pacific Northwest Research Station, and U.S. Forest Service, and Soil Conservation Service), and Alaska Dept. of Natural Resources, Anchorage, AK. 49 p. + appendices.

Steigers, W.D., Jr., D. Helm, J.G. MacCracken, J.D. McKendrick, and P.V. Mayer. 1983. Alaska Power Authority, Susitna hydroelectric project, environmental studies, Subtask 7.12: 1982 plant ecology studies. Final rep. Univ. of Alaska, Agricultural Experiment Station, Palmer, AK 288 p.

Stone, K.H. 1950. Aerial photographic interpretation of natural vegetation in the Anchorage area, Alaska. Surveying and Mapping 10:199-207.

Talbot, S.S., M.B. Shasby, and T.N. Bailey. 1985. Landsat-facilitated vegetation classification of the Kenai National Wildlife Refuge and adjacent areas, Alaska. Pp. 333-345. In: Pecora 10. Remote sensing in forest and range resource management: Proceedings 10th W.T. Pecora Memorial Remote Sensing Symposium; 1985 Aug. 20-22; Ft. Collins, CO.

Talbot, S.S., S.L. Talbot, and J.W. Thomson. 1992. Lichens of Tuxedni Wilderness Area, Alaska. The Bryologist 95(1):20-30.

Tande, G.F. 1983. Vegetation. Pp. 14-85. In: Rothe, T.C., S.H. Lanigan, P.A. Martin, and G.F. Tande. 1983. Natural resource inventory of Elmendorf Air Force Base, Alaska: Part I. U.S. Fish and Wildlife Service, Region 7, Special Studies, Anchorage, AK.

Tande, G.F. 1988. Changes in Anchorage wetlands between 1982 and 1988. Prepared for U.S. Fish and Wildlife Service, Western Area Ecological Services, Anchorage, AK. 52 p.

USDA (U.S. Soil Conservation Service, U.S. Forest Service, and Alaska Dept. of Natural Resources). 1986. Susitna River Basin land cover type map atlas.

U.S. Soil Conservation Service. 1991. Alaska plant cover types. Unpubl. manuscript for Alaska portion of U.S. Soil Conservation Service National Range Classification System. Dept. of Agriculture, Anchorage, AK.

Van Hees, W.W.S. 1990. Boreal forested wetlands, what and where in Alaska. For. Ecol. Manage. 33/34:425-438.

Viereck, L.A. 1975. Forest ecology of the Alaska taiga. Pp. I-1 to I-22. In: Proceedings of the circumpolar conference on northern ecology; 1975 September 15-18; Ottawa, Ontario. National Research Council of Canada, Ottawa, Ontario, Canada.

Viereck, L.A., K. Van Cleve, and C.T. Dyrness. 1986. Forest ecosystem distribution in the taiga environment. Pp. 22-43. In: Van Cleve, K., F.S. Chapin, III, P.W. Flanagan, L.A. Viereck, and C.T. Dyrness (eds.). Forest ecosystems in the Alaskan taiga: a synthesis of structure and function. Springer Verlag, New York, NY.

Viereck, L.A., C.T. Dyrness, A.R. Batten and K.J. Wenzlick. 1992. The Alaska vegetation classification. Gen. Tech. Rep. PNW-GTR-286. Pacific Northwest Research Station, U.S. Forest Service, Portland, OR. 278 p.

Vince, S.W., and A.A. Snow. 1979. Preliminary study of the plant ecology of Susitna Flats, Alaska. Draft rep. Alaska Dept. of Fish and Game, Anchorage, AK. 25 p.

Vince, S.W., and A.A. Snow. 1984. Plant zonation in an Alaskan salt marsh: I. Distribution, abundance, and environmental factors. J. Ecol. 72:651-667.

WAES (Western Alaska Ecological Services), U.S. Fish and Wildlife Service. 1981. Bradley Lake habitat evaluation procedures report. Unpubl. rep. U.S. Fish and Wildlife Service, Anchorage, AK.

Zasada, J.C., L.A. Viereck, M.J. Foote, R.H. Parkenson, J.O. Wolff and L.A. Lankford, Jr. 1981. Natural regeneration of balsam poplar following harvesting in the Susitna Valley, Alaska. Forest. Chron. 57(2):57-65.

Appendix B
Checklist of the Vascular Plants of Fort Richardson Military Reservation, Alaska

Achillea millefolium L.
Achillea ptarmica L.
Achillea sibirica Ledeb.
Acomastylis rossii (R. Br.) E. Greene [=*Geum rossii* (R. Br.) Ser. ex DC.]
Aconitum delphiniifolium DC.
Aconitum delphiniifolium DC. ssp. *paradoxicum* (Reichb.) Maguire & Hult.
Actaea rubra (Ait.) Willd.
Adoxa moschatellina L.
Agrostis scabra Willd.
Allium schoenoprasum L.
Alnus sinuata (Regel) Rydb. [=*A. crispa* (Ait.) Pursh ssp. *sinuata* (Regel) Hult.]
Alnus tenuifolia Nutt. [=*A. incana* (L.) Moench ssp. *tenuifolia* (Nutt.) Breitung]
Alnus viridis Villar ssp. *crispa* (Ait.) Loeve & Loeve [= *A. crispa* (Ait.) Pursh ssp. *crispa*]
Alopecuris aequalis Sobol.
Alopecuris alpinus Smith
Amaranthus retroflexus L.
Amelanchier alnifolia (Nutt.) Nutt.
Andromeda polifolia L.
Anemone multifida Poir. var. *saxicola* B. Boivan
Anemone narcissiflora L. ssp. *villosissima* (DC.) Hult.
Anemone narcissiflora L. var. *monantha* DC.
Anemone parviflora Michx.
Anemone richardsonii Hock.
Angelica genuflexa Nutt.
Angelica lucida E. Nels.
Antennaria alpina (L.) Gaertn.
Antennaria friesiana (Trautv.) Ekman
Antennaria friesiana (Trautv.) Ekman ssp. *alaskana* (Malte) Hult.
Antennaria monocephala DC.
Antennaria rosea E. Greene ssp. *pulvinata* (E. Greene) Bayer
Antennaria rosea (D.C. Eaton) E. Greene
Anthemis cotula L.
Anthemis tinctoria L.
Aphragmus eschscholtzianus Andrz.
Aquilegia formosa Fisch.
Arabis hirsuta (L.) Scop. ssp. *eschscholtziana* (Andrz.) Hult.
Arabis holboellii Hornem.
Arabis lyrata L. ssp. *kamchatica* (Fisch.) Hult.
Arctagrostis latifolia (R. Br.) Griseb.

Arctagrostis poaeoides Nash
Arctogrostis latifolia (R. Br.) Griseb. var. *arundinacea* (Trin.) Griseb.
Arctogrostis latifolia (R. Br.) Griseb. var. *latifolia*
Arctostaphylos uva-ursi (L.) Sprengel
Arctous alpina (L.) Niedenzu [=*Arctostaphylos alpina* (L.) Spreng.]
Arctous rubra (Rehd. & Wilson) Nakai [=*Arctostphylos rubra* (Rehd. & Wilson) Fern.]
Armeria maritima (Mill.) Willd. ssp. *arctica* (Cham.) Hult.
Arnica griscomii Fern. ssp. *frigida* (C. Meyer ex Iljin) S. J. Wolf
Arnica latifolia Bong.
Arnica lessingii Greene
Arnica ovata E. Greene
Artemisia arctica Less.
Artemisia tilesii Ledeb.
Aster junciformis Rydb.
Aster sibiricus L.
Astragalus alpinus L.
Astragalus alpinus L. ssp. *alpinus*
Astragalus polaris Benth.
Astragalus umbellatus Bunge
Athyrium filix-femina (L.) Roth
Atriplex gmelinii C.A. Meyer
Avena fatua L.
Barbarea orthoceras Ledeb.
Beckmannia eruciformis (L.) Host ssp. *baicalensis* (Kusn.) Hult.
Betula glandulosa Michx.
Betula hybrids
Betula kenaica Evans
Betula papyrifera Marshall
Bistorta vivipara (L.) Gray [=*Polygonum viviparum* L.]
Boschniakia rossica (Cham & Schldl.) B. Fedtsch.
Botrychium boreale (E.Fries) Milde (=*Botrichium pinnatum* H. St. John In: FNA)
Botrychium lanceolatum (Gmel.) Angstr.
Botrychium lunaria (L.) Sw.
Brassica rapa L.
Bromopsis inermis (Leyss.) Holub [=*Bromus inermis* Leyss.]
Bromus tectorum L.
Calamagrostis canadensis (Michx.) Beauv.
Calamagrostis descampsioides Trin.
Calamagrostis inexpansa Gray
Calamagrostis lapponica (Wahlenb.) Hartman. F.
Calamagrostis nutkaensis (C. Presl) Steudel
Callitriche verna L. emend. Lonnr.
Caltha palustris L. ssp. *asarifolia* (DC.) Hult.
Campanula lasiocarpa Cham.

Campanula rotundifolia L.
Campanula uniflora L.
Capsella bursa-pastoris (L.) Medic.
Capsella rubella Reut.
Cardamine bellidifolia L.
Cardamine pratensis L. ssp. *angustifolia* (Hook.) O.E. Schultz
Cardamine umbellata Greene
Carex aquatilis Wahlenb. ssp. *aquatilis*
Carex atrosquama Mackenzie
Carex bigelowii Torr.
Carex buxbaumii Wahlenb.
Carex canescens L.
Carex chordorrhiza Ehrh.
Carex circinata C. A. Mey.
Carex deweyana Schwein.
Carex diandra Schrank
Carex dioica L. ssp. *gynocrates* (Wormsk.) Hult.
Carex garberi Fern. ssp. *bifaria* (Fern.) Hult.
Carex gmelinii Hook. & Arn.
Carex kelloggii W. Boott
Carex lachenalii Schkuhr.
Carex lasiocarpa Ehrh. ssp. *americana* (Fern.) Hult.
Carex leptalea Wahlenb.
Carex limosa L.
Carex livida (Wahlenb.) Willd.
Carex loliacea L.
Carex lyngbyei Hornem.
Carex mackenziei V. Krecz.
Carex macloviana Urv.
Carex macrochaeta C.A. Mey.
Carex magellanica Lam. ssp. *irrigua* (Wahlenb.) Hult.
Carex media R. Br.
Carex membranacea Hook.
Carex mertensii Prescott
Carex microchaeta Holm.
Carex microchaeta Holm. ssp. *nesophila* (Holm.) D. Murray
Carex micropoda C.A. Meyer [=*C. pyrenaica* Wahlenb. ssp. *micropoda* (C. A. Meyer) Hult.]
Carex nigricans C.A. Meyer
Carex obtusata Lilj.
Carex oederi Retz.
Carex pauciflora Lightf.
Carex pluriflora Hult.
Carex podocarpa C.B. Clarke
Carex praticola Rydb.

Carex ramenskii Kom.
Carex rariflora (Wahlenb.) Smith
Carex rostrata Stokes
Carex rotundata Wahlenb.
Carex saxatilis L.
Carex scirpoidea Michx.
Carex spectabilis Dewey
Carex tenuiflora Wahlenb.
Carex utriculata F. Boott
Carex vaginata Tausch
Cassiope lycopodioides (Pall.) D. Don
Cassiope stelleriana (Pall.) DC.
Cassiope tetragona (L.) D. Don
Castilleja unalaschcensis (Cham. & Schlecht.) Malte
Cerastium arvense L.
Cerastium beeringianum Cham. & Schlecht. var. *beeringianum*
Cerastium fontanum Baumg.
Chamaedaphne calyculata (L.) Moench
Chenopodium album L.
Chrysanthemum arcticum L.
Chrysanthemum leucanthemum L.
Chrysosplenium tetrandrum (Lund) T. Fries
Cicuta douglasii (DC.) J. Coulter & Rose
Cicuta virosa L. [=*C. mackenzieana* Raup]
Circaea alpina L.
Claytonia sarmentosa C. Meyer
Coeloglossum viride (L.) Hartm. ssp. *bracteatum* (Muhl.) Hult.
Comarum palustre L. [=*Potentilla palustris* (L.) Scop.]
Conioselinum pacificum (S. Wats.) Coult. & Rose [=*C. chinense* (L.) BSP.]
Corallorrhiza trifida Chatel.
Cornus canadensis L.
Cornus suecica L.
Corydalis pauciflora (Steph.) Pers.
Corydalis sempervirens (L.) Pers.
Crepis elegans Hook.
Crepis nana Richards.
Crepis tectorum L.
Cryptogramma acrostichoides R. Br. [=*C. crispa* (L.) R. Br. var. *acrostichoides* (R. Br.) Clarke]
Cystopteris fragilis (L.) Bernh.
Cystopteris montana (Lam.) Bernh.
Dactylis glomerata L.
Delphinium glaucum S. Wats.
Deschampsia cespitosa (L.) P. Beauv. ssp. *caespitosa*
Descurainia sophioides (Fisch.) O.E. Shultz

Diapensia lapponica L.
Dodecatheon pulchellum (Raf.) Merr.
Douglasia alaskana (Cov. & Stand. ex Hult.) S. Kelso [=*Androsace alaskana* Cov. & Stand.]
Draba alpina L.
Draba aurea Vahl
Draba borealis DC.
Draba cana Rydb. [=*D. lanceolata* Royle In: Hulten)
Draba crassifolia Graham
Draba fladnizensis Wulf.
Draba glabella Pursh
Draba lactea Adams
Draba lonchocarpa Rydb.
Draba longipes Raup
Draba nivalis Liljebl.
Draba ruaxes Payson & H. St. John
Draba stenoloba Ledeb.
Draba stenopetala Trautv.
Drosera anglica Huds.
Drosera rotundifolia L.
Dryas alaskensis Pors. [=*D. octopetala* L. ssp. *alaskensis* (Pors.) Hult.]
Dryas drummondii Richards.
Dryas integrifolia Vahl.
Dryas octopetala L.
Dryopteris dilatata (Hoffm.) A.Gray
Dryopteris fragrans (L.) Schott
Eleocharis kamtschatica (C.A. Meyer) V. Komarov
Eleocharis palustris (L.) Roem. & Schult.
Eleocharis quinqueflora (F. Hartmann) O. Schwarz
Elymus alaskanus (Scribn. & Merr.) A. Loeve ssp. *alaskanus* [=*Agropyron violaceum* (Hornem.) Lange]
Elymus glaucus Buckley
Elymus sibiricus L.
Elymus trachycaulus (Link) Gould ex Shinners ssp. *andinus* (Schribner & Smith) A.
Elymus trachycaulus (Link) Gould ex Shinners ssp. *novae-angliae* (Scribn.) Tzvelev [=*Agropyron pauciflorum* (Schwein.) Hitchc. ssp. *novae-angliae* (Scribn.) Meldris]
Elytrigia repens (L.) Nevski [=*Agropyron repens* (L.) Beauv.]
Empetrum hermaphroditum (Lange) Hagerup [=*E. nigrum* L. ssp. *hermaphroditum* (Lange) Boecher]
Empetrum nigrum L.
Epilobium anagallidifolium Lam.
Epilobium angustifolium L.
Epilobium ciliatum Raf. ssp. *glandulosum* (Lehm.) Hoch & Raven [=*E.glandulosum* Lehm.]
Epilobium hornemannii Reichb. ssp. *hornemannii*

Epilobium latifolium L.
Epilobium palustre L.
Equisetum arvense L.
Equisetum fluviatile L. ampl. Ehrh.
Equisetum palustre L.
Equisetum pratense L.
Equisetum scirpoides Michx.
Equisetum sylvaticum L.
Equisetum variegatum Schleich.
Erigeron acris L.
Erigeron humilis Graham
Erigeron peregrinus (Pursh) Greene
Erigeron purpuratus Greene
Eriophorum angustifolium Honck. ssp. *subarcticum* (V. Vassiljev) Hult.
Eriophorum gracile Koch
Eriophorum russeolum Fries
Eriophorum russeolum Fries var. *albidum* W. Nyl.
Eriophorum scheuchzeri Hoppe
Eriophorum viridicarinatum (Englem.) Fern.
Erucastrum gallicum (Willd.) O. E. Schulz [=*Brassica erucastrum*]
Erysimum cheiranthoides L.
Erysimum cheiranthoides L. ssp. *altum* Ahti
Euphrasia disjuncta Fern & Wieg.
Eutrema edwardsii R. Br.
Festuca altaica Trin.
Festuca brevissima Yurtsev
Festuca rubra L.
Festuca vivipara (L.) Smith
Fragaria chiloensis (L.) Duchesne
Fritillaria camschatcensis (L.) Ker-Gawl.
Galeopsis bifida Boem.
Galium boreale L.
Galium trifidum L. ssp. *trifidum*
Galium triflorum Michx.
Gastrolychnis apetala (L.) Tolm & Koz. [=*Melandrium apetalum* (L.) Fenzl.]
Gentiana glauca Pallas
Gentianella amarella (L.) Boerner [=*Gentiana amarella* L. ssp. *acuta* (Michx.) Hult.]
Gentianella propinqua (Richards.) Gillet var. *propinqua* [=*Gentiana propinqua* Richards. ssp. *propinqua*]
Geocaulon lividum (Richards.) Fern.
Geranium erianthum DC.
Geranium pusillum Burm.
Geum macrophyllum Willd. ssp. *macrophyllum*

Geum perincisum Rydb. [=*Geum macrophyllum* Willd. ssp. *perincisum* (Rydb.) Raup.]
Glaux maritima L.
Glyceria borealis (Nash) Batch.
Glyceria striata (Lam.) A. Hitchc. ssp. *stricta* (Scribn.) Hult.
Goodyera repens (L.) R. Br. var. *ophioides* Fern.
Gymnocarpium dryopteris (L.) Newm.
Hammarbya paludosa (L.) Ktze.
Hedysarum alpinum L.
Helianthus annuus L.
Heracleum lanatum Michx.
Heuchera glabra Willd.
Hieracium triste Willd.
Hierochloe alpina (Sw.) Roem. & Schult.
Hierochloe odorata (L.) P. Beauv.
Hippuris montana Ledeb.
Hippuris tetraphylla L.F.
Hippuris vulgaris L.
Hordeum brachyantherum Nevski
Hordeum jubatum L.
Huperzia selago (L.) C. Martius [=*H. haleakalae* (Brackenridge) Holub In: FNA*]
Huperzia selago (L.) C. Martius ssp. *chinense* (C.Chr.) Loeve & Loeve [=*Lycopodium selago* L. ssp. *chinense* (C. Chr.) Hult.; = *H. myoshiana* (Makino) Ching In: FNA*]
Impatiens noli-tangere L.
Iris setosa Pall. ssp. *setosa*
Isoetes echinospora Durieu
Juncus alpinus Villers
Juncus biglumis L.
Juncus bufonius L.
Juncus castaneus Smith
Juncus castaneus Sm. ssp. *castaneus*
Juncus castaneus Sm. ssp. *leucochlamys* (Zinz.) Hult.
Juncus drummondii E. Mey.
Juncus ensifolius Wikstrom
Juncus mertensianus Bong.
Juncus stygius L. ssp. *americanus* (Buchenau) Hult.
Juncus triglumis L.
Juniperus communis L.
Lathyrus palustris L. ssp. *pilosus* (Cham.) Hult.
Ledum groenlandicum Oeder [=*L. palustre* L. ssp. *groenlandicum* (Oeder) Hult.]
Ledum palustre L. ssp. decumbens (Ait.) Hult.
Lemna minor L.
Lepidium densiflorum Schrad.
Leptarrhena pyrolifolia (D. Don) Ser.

Leymus mollis (Trin.) Hara ssp. *mollis* [=*Elymus arenarius* L. ssp. *mollis* (Trin.) Hult.]
Ligusticum scothicum L. ssp. *hultenii* (Fern.) Cald. & Tayl.
Linaria vulgaris Mill.
Linnaea borealis L.
Listera cordata (L.) R. Br.
Lloydia serotina (L.) Rchb.
Loiseleuria procumbens (L.) Desv.
Lolium multiflorum Lam.
Luetkea pectinata (Pursh) Ktze.
Lupinus nootkatensis Donn
Lupinus polyphyllus Lindl.
Luzula arcuata (Wahlenb.) Sw.
Luzula arcuata (Wahlenb.) Sw. ssp. *unalaschensis* (Buchenau) Hult.
Luzula confusa Lindeb.
Luzula multiflora (Retz.) Lej. var. *frigida* (Buchenau) Hult.
Luzula parviflora (Ehrh.) Desv.
Luzula spicata (L.) DC.
Luzula wahlenbergii Rupr.
Lycopodium alpinum L. [=*Diphasiastrum alpinum* (L.) Holub In: FNA*]
Lycopodium annotinum L.
Lycopodium clavatum L. ssp. *monostachyon* (Grev. & Hook.) Sel. [=*L. lagopus* (Laest. ex C. Hartman) In: FNA*]
Lycopodium complanatum L. [=*Diphasiastrum complanatum* (L.) Holub In: FNA*]
Lycopodium sabinifolium Willd. var. *sitchense* (Rupt.)Fern. [=*Diphasiastrum sitchense* (Ruprecht) Holub In: FNA*]
Lysimachia thyrsiflora L.
Malaxis monophyllos (L.) Sw. var. *brachypoda* (A. Gray) Morris & Ames
Matricaria matricarioides (Less.) Porter
Matteuccia struthiopteris (L.) Tod.
Medicago falcata L.
Medicago sativa L.
Melandrium noctiflorum (L.) Fries
Melilotus albus Desr.
Melilotus officinalis (L.) Lam.
Mentha arvensis L.
Menyanthes trifoliata L.
Menziesia ferruginea Sm.
Mertensia paniculata (Ait.) G. Don
Mimulus guttatus DC.
Minuartia biflora (L.) Sching & Thell.
Minuartia macrocarpa (Pursh) Ostenf.
Minuartia rubella (Wahlenb.) Graebn.
Mitella pentandra Hook.
Moehringia lateriflora (L.) Fenzl

Moneses uniflora (L.) Gray
Myosotis alpestris F. W. Schmidt
Myrica gale L.
Myriophyllum exalbescens Fern. [=*M. spicatum* L.]
Myriophyllum verticillatum L.
Najas flexilis (Willd.) Rost. & Schmidt
Nuphar polysepala Engelm.
Oplopanax horridus (Smith) Miquel [=*Echinopanax horridum* (Sm.) Decne. & Planch.]
Orthilia secunda (L.) House [=*Pyrola secunda* L. ssp. *secunda*]
Osmorhiza depauperata Phill.
Oxycoccus microcarpos Turcz. ex Rupr.
Oxyria digyna (L.) Hill
Oxytropis bryophila (E. Greene) Yurtsev
Oxytropis huddelsonii Pors.
Oxytropis maydelliana Trautv.
Oxytropus varians (Rydb.) Schumann
Papaver alboroseum Hult.
Papaver nudicaule L.
Papaver radicatum Rottb. ssp. *radicatum*
Parnassia kotzebuei Cham. & Schlecht.
Parnassia palustris L.
Parnassia palustris L. ssp. *neogaea* (Fern.) Hult.
Pedicularis capitata Adams.
Pedicularis labradorica Wirsing
Pedicularis lanata Cham. & Schlecht
Pedicularis langsdorfii Fisch. ex Steven
Pedicularis verticillata L.
Pentaphylloides floribunda (Pursh.) Loeve [=*Potentilla fruticosa* L.]
Petasites frigidus (L.) Franchet
Petasites sagittatus (Banks) Gray
Phalaris arundinacea L.
Phleum commutatum Gaudin var. *americanum* (Fourn.) Hult.
Phleum pratense L.
Phyllodoce aleutica (Spreng.) A. A. Heller
Picea glauca (Moench) Voss
Picea mariana (Mill.) Britt., Sterns & Pogg
Pinguicula villosa L.
Plantago major L. var. *major*
Plantago maritima L. ssp. *juncoides* (Lam.) Hult.
Platanthera dilatata Pursh
Platanthera hyperborea (L.) Lindl. var. *hyperborea*
Platanthera hyperborea (L.) Lindl. var. *viridiflora* (Cham.) Luer
Platanthera obtusata (Pursh) Lindl.
Poa alpigena (E. Fries) Lindm.

Poa alpina L.
Poa annua L.
Poa arctica R. Br.
Poa eminens Presl
Poa glauca M. Vahl.
Poa palustris L.
Poa paucispicula Scribn. & Merr.
Poa pratensis L.
Poa psuedoabbreviata Rosh.
Polemonium acutiflorum Willd.
Polemonium pulcherrimum Hook.
Polygonum amphibium L.
Polygonum aviculare L.
Polygonum convolvulus L.
Polygonum fowleri Robins.
Polygonum lapathifolium L.
Polygonum pensylvanicum L. ssp. *oneillii* (Brenckle) Hult.
Populus balsamifera L.
Populus balsamifera L. ssp. *balsamifera*
Populus balsamifera L. ssp. *trichocarpa* (Torr. & Gray) Brayshaw
Populus tremuloides Michx.
Potamogeton alpinus Balb.
Potamogeton epihydrus Raf.
Potamogeton filiformis Pers.
Potamogeton gramineus L.
Potamogeton natans L.
Potamogeton pectinatus L.
Potamogeton praelongus Wulf.
Potamogeton richardsonii (A. Bennett) Rydb. [=*P. perfoliatus* L. ssp. *richardsonii* (A. Bennett) Hult.]
Potamogeton vaginatus Turcz.
Potamogeton zosterifolius Schum.
Potentilla anserina L.
Potentilla diversifolia Lehm.
Potentilla egedii Wormsk. ssp. *grandis* (Torr. & Gray) Hult.
Potentilla hyparctica Malte
Potentilla multifida L.
Potentilla norvegica L.
Potentilla uniflora Ledeb.
Primula cuneifolia Ledeb. ssp. *saxifragifolia* (Lehm.) Smith & Forrest
Puccinellia grandis Swallen
Puccinellia nutkaensis (Presl) Fern. & Weath.
Puccinellia phryganodes (Trin.) Scribner & Marr.
Pyrola asarifolia Michx.
Pyrola asarifolia Michx. var. *purpurea* (Bunge) Fern.

Pyrola chlorantha Sw.
Pyrola minor L.
Ranunculus arbortivus L.
Ranunculus cymbalaria Pursh
Ranunculus eschscholtzii Schlecht.
Ranunculus gmelinii DC. ssp. *gmelini*
Ranunculus hyperboreus Rottb.
Ranunculus lapponicus L.
Ranunculus macounii Britt.
Ranunculus nivalis L.
Ranunculus occidentalis Nutt.
Ranunculus pygmaeus Wahl.
Ranunculus sceleratus L. ssp. *multifidus* (Nutt.) Hult.
Ranunculus trichophyllus Chaix
Ranunculus trichophyllus Chaix var. *trichophyllus*
Rhinanthus minor L.
Rhodiola integrifolia Raf. [=*Sedum rosea* (L.) Scop. ssp. *integrifolia* (Raf.) Hult.]
Ribes hudsonianum Richards.
Ribes laxiflorum Pursh
Ribes triste Pall.
Romanzoffia sitchensis Bong.
Rorippa barbareifolia (DC.) Kitigawa
Rorippa palustris (L.) Besser ssp. *hispida* (Desv.) Jonsell
Rorippa palustris (L.) Besser ssp. *palustris*
Rorippa sylvestris (L.) Besser
Rosa acicularis Lindl.
Rosa nutkana Presl
Rubus arcticus L.
Rubus chamaemorus L.
Rubus idaeus L.
Rubus pedatus Sm.
Rubus stellatus Sm. [=*R. arcticus* L. ssp. *stellatus* (Sm.) Boiv. emend. Hult.]
Rumex acetosella L.
Rumex arcticus Trautv.
Rumex crispus L.
Rumex fenestratus Greene
Rumex transitorius K. H. Resch
Ruppia spiralis L.
Sagina nivalis (Lindblom) Fries
Sagina saginoides (L.) Karst.
Salicornia europaea L.
Salix alaxensis (Anderss.) Cov.
Salix arctica Pall.
Salix barclayi Anderss.

Salix bebbiana Sarg. [=*S. depressa* L. ssp. *rostrata* (Anderss.) Hiitonen) *niphoclada*]
Salix brachycarpa Nutt. ssp. *niphoclada* (Rydb.) Argus
Salix fuscescens Anderss.
Salix glauca L.
Salix lucida Muhl. ssp. *lasiandra* (Benth.) Argus [=*S. lasiandra* Benth.]
Salix ovalifolia Trautv.
Salix planifolia Pursh ssp. *pulchra* (Cham.) Argus [=*S. pulchra* Cham.]
Salix reticulata L.
Salix rotundifolia Trautv.
Salix scouleriana Barratt
Salix sitchensis Sanson
Sambucus racemosa L.
Sanguisorba stipulata Raf.
Saxifraga adscendens L.
Saxifraga bronchialis L.
Saxifraga cespitosa L.
Saxifraga calycina Sternb.
Saxifraga cernua L.
Saxifraga eschscholtzii Sternb.
Saxifraga flagellaris Willd.
Saxifraga foliolosa R. Br.
Saxifraga hirculus L.
Saxifraga lyallii Engler ssp. *hultenii* (Cald. & Sav.) Cald. & Sav.
Saxifraga nelsoniana D. Don [=*S. punctata* L. ssp. *pacifica* Hult.]
Saxifraga nivalis L.
Saxifraga oppositifolia L.
Saxifraga rivularis L.
Saxifraga serpyllifolia Pursh
Saxifraga tricuspidata Rottb.
Scheuchzeria palustris L.
Schizachne purpurascens (Torr.) Swallen
Scirpus paludosus Nels.
Scirpus validus M. Vahl
Scutellaria galericulata L.
Selaginella selaginoides (L.) Link
Senecio lugens Richards
Senecio pauciflorus Pursh
Senecio triangularis Hook.
Senecio vulgaris L.
Shepherdia canadensis (L.) Nutt.
Sibbaldia procumbens L.
Silene acaulis L.
Smilacina stellata (L.) Desf.
Solidago lepida DC.

Solidago multiradiata Ait.
Sorbus scopulina Greene
Sparganium angustifolium Michx.
Sparganium hyperboreum Laest.
Sparganium minimum (Hartm.) E. Fries
Spergula arvense L.
Spergularia canadensis (Pers.) G. Don
Spiraea beauverdiana Schneid.
Spiranthes romanzoffiana Cham.
Stellaria borealis Bigelow
Stellaria borealis Bigelow ssp. *sitchana* Steud.
Stellaria calycantha (Ledeb.) Bong.
Stellaria crassifolia Ehrh.
Stellaria humifusa Rottb.
Stellaria laeta Richards.
Stellaria longifolia Muhl. ex Willd.
Stellaria media (L.) Villars
Stellaria monantha Hult.
Stellaria umbellata Turcz.
Streptopus amplexifolius (L.) DC.
Swertia perennis L.
Swida stolonifera (Michx.) Rydb. [=*Cornus stolonifera* Michx.]
Taraxacum alaskanum Rydb.
Taraxacum carneocoloratum Nels.
Taraxacum officinale Weber
Thalictrum alpinum L.
Thalictrum sparsiflorum Trucz.
Thelypteris phegopteris (L.) Solsson
Thlaspi arcticum Pors.
Tofieldia coccinea Richards.
Tofieldia glutinosa (Michx.) Pers.
Tofieldia pusilla (Michx.) Pers.
Trichophorum alpinum (L.) Pers.
Trichophorum cespitosum (L.) Hartm.
Trientalis europaea L.
Trifolium hybridum L.
Trifolium pratense L.
Trifolium repens L.
Triglochin maritimum L.
Triglochin palustre L.
Tripleurospermum inodorum (L.) Schultz-Bip.
Trisetum spicatum (L.) Richter
Trisetum spicatum (L.) Richter ssp. *alaskanum* (Nash) Hult.
Trisetum spicatum (L.) Richter ssp. *molle* (Michaux) Hult.
Triticum aestivum L.

Tsuga mertensiana (Bong.) Sarg.
Typha latifolia L.
Urtica dioica L. ssp. *gracilis* (Aiton) Selander
Utricularia intermedia Hayne
Utricularia minor L.
Utricularia vulgaris L. ssp. *macrorhiza* (LeConte) Clauson
Vaccinium cespitosum Michx.
Vaccinium ovalifolium Sm.
Vaccinium uliginosum L.
Vaccinium vitis-idaea L.
Vahlodea atropurpurea (Wahlenb.) E. Fries ssp. *paramushirensis* (Kudo) Hult.
Valeriana capitata Pall.
Valeriana sitchensis Bong.
Veratrum viride Ait.
Veronica americana Schwein.
Veronica wormskjoldii Roem & Schult.
Viburnum edule (Michx.) Raf.
Vicia cracca L.
Viola epipsila Ledeb.
Viola langsdorfii Fisch.
Viola renifolia Gray
Viola selkirkii Pursh
Woodsia ilvensis (L.) R. Br.
Zannichellia palustris L.
Zigadenus elegans Pursh

FNA* Flora North America North of Mexico (FNAEC 1993).

Appendix C
Fort Richardson Vascular Plant Survey With Generalized Vegetation Zone and Habitat Matrix (Alphabetical Listing)

** Rare species currently being tracked in the Alaska Natural Heritage Program's Biological Conservation Database for southcentral Alaska.

RE Major range extensions using the maps of Hulten (1968)
re Minor range extensions using the maps of Hulten (1968)
i Introduced taxa

See text for Zone and Habitat definitions

W Wet Habitats
MD Moist to Dry Habitats
DISTURBED Disturbed Habitats

FNA* Flora North America North of Mexico (FNAEC 1993)

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Achillea millefolium L.								X	rei
Achillea ptarmica L.								X	rei
Achillea sibirica Ledeb.		X							RE
Acomastylis rossii (R. Br.) E. Greene [=*Geum rossii* (R. Br.) Ser. ex DC.]						X			
Aconitum delphinifolium DC.		X		X					
Aconitum delphinifolium DC. ssp. *paradoxicum* (Reichb.) Maguire & Hult.						X			RE
Actaea rubra (Ait.) Willd.		X		X					
Adoxa moschatellina L.		X							
Agrostis scabra Willd.		X						X	
Allium schoenoprasum L.	X			X					
Alnus sinuata (Regel) Rydb. [=*A. crispa* (Ait.) Pursh ssp. *sinuata* (Regel) Hult.]		X		X					
Alnus tenuifolia Nutt. [=*A. incana* (L.) Moench ssp. *tenuifolia* (Nutt.) Breitung]	X	X							
Alnus viridis Villar ssp. *crispa* (Ait.) Loeve & Loeve [=*A. crispa* (Ait.) Pursh ssp. *crispa*]				X					
Alopecuris aequalis Sobol.	X								
Alopecuris alpinus Smith			X						RE
Amaranthus retroflexus L.								X	rei
Amelanchier alnifolia (Nutt.) Nutt.		X		X					
Andromeda polifolia L.	X								
Anemone multifida Poir. var. *saxicola* B. Boivan						X			re,**
Anemone narcissiflora L. ssp. *villosissima* (DC.) Hult.		X		X		X			RE
Anemone narcissiflora L. var. *monantha* DC.						X			
Anemone parviflora Michx.						X			
Anemone richardsonii Hock.	X		X						
Angelica genuflexa Nutt.			X						
Angelica lucida E. Nels.		X	X	X					
Antennaria alpina (L.) Gaertn.						X			
Antennaria friesiana (Trautv.) Ekman						X			

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Antennaria friesiana (Trautv.) Ekman ssp. *alaskana* (Malte) Hult.						X			RE
Antennaria monocephala DC.						X			
Antennaria rosea E. Greene ssp. *pulvinata* (E. Greene) Bayer		X							
Antennaria rosea (D.C. Eaton) E. Greene		X							
Anthemis cotula L.								X	rei
Anthemis tinctoria L.								X	rei
Aphragmus eschscholtzianus Andrz.					X				re,**
Aquilegia formosa Fisch.		X		X					
Arabis hirsuta (L.) Scop. ssp. *eschscholtziana* (Andrz.) Hult.		X		X					
Arabis holboellii Hornem.		X							
Arabis lyrata L. ssp. *kamchatica* (Fisch.) Hult.		X		X		X			
Arctagrostis latifolia (R. Br.) Griseb.						X			
Arctagrostis poaeoides Nash	X								
Arctogrostis latifolia (R. Br.) Griseb. var. *arundinacea* (Trin.) Griseb.						X			
Arctogrostis latifolia (R. Br.) Griseb. var. *latifolia*	X								
Arctostaphylos uva-ursi (L.) Sprengel		X		X		X			
Arctous alpina (L.) Niedenzu [=*Arctostaphylos alpina* (L.) Spreng.]				X		X			
Arctous rubra (Rehd. & Wilson) Nakai [=*Arctostphylos rubra* (Rehd. & Wilson) Fern.]						X			
Armeria maritima (Mill.) Willd. ssp. *arctica* (Cham.) Hult.						X			RE
Arnica griscomii Fern. ssp. *frigida* (C. Meyer ex Iljin) S. J. Wolf						X			
Arnica latifolia Bong.			X	X					
Arnica lessingii Greene						X			re
Arnica ovata E. Greene				X		X			
Artemisia arctica Less.				X		X			
Artemisia tilesii Ledeb.		X						X	
Aster junciformis Rydb.	X								
Aster sibiricus L.		X				X			

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Astragalus alpinus L.		X				X		X	
Astragalus alpinus L. ssp. *alpinus*		X				X		X	
Astragalus polaris Benth.						X			RE
Astragalus umbellatus Bunge				X					re
Athyrium filix-femina (L.) Roth		X		X		X			
Atriplex gmelini C.A. Meyer							X		**
Avena fatua L.								X	rei
Barbarea orthoceras Ledeb.	X								
Beckmannia erucaeformis (L.) Host ssp. *baicalensis* (Kusn.) Hult.		X						X	
Betula glandulosa Michx.				X					
Betula hybrids	X		X		X	X			
Betula kenaica Evans		X							
Betula papyrifera Marshall	X	X							
Bistorta vivipara (L.) Gray [=*Polygonum viviparum* L.]				X		X			
Boschniakia rossica (Cham & Schldl.) B. Fedtsch.		X							
Botrichium boreale (E. Fries) Milde (=*B. pinnatum* H. St. John In: FNA*)				X					
Botrichium lanceolatum (Gmel.) Angstr.		X		X					
Botrichium lunaria (L.) Sw.				X					
Brassica rapa L.								X	
Bromopsis inermis (Leyss.) Holub [=*Bromus inermis* Leyss.]								X	
Bromus tectorum L.								X	
Calamagrostis canadensis (Michx.) Beauv.	X	X		X		X			
Calamagrostis deschampsioides Trin.							X		re
Calamagrostis inexpansa Gray	X	X							
Calamagrostis lapponica (Wahlenb.) Hartman. F.	X	X							
Calamagrostis nutkaensis (C. Presl) Steudel	X								
Callitriche verna L. emend. Lonnr.	X		X						

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Caltha palustris L. ssp. *asarifolia* (DC.) Hult.	X								
Campanula lasiocarpa Cham.						X			
Campanula rotundifolia L.		X		X					
Campanula uniflora L.						X			RE
Capsella bursa-pastoris (L.) Medic.								X	
Capsella rubella Reut.								X?	
Cardamine bellidifolia L.					X	X			
Cardamine pratensis L. ssp. *angustifolia* (Hook.) O.E. Schultz	X								
Cardamine umbellata Greene			X						
Carex aquatilis Wahlenb. ssp. *aquatilis*	X								
Carex atrosquama Mackenzie				X					RE
Carex bigelowii Torr.				X		X			
Carex buxbaumii Wahlenb.	X								
Carex canescens L.	X								
Carex chordorrhiza Ehrh.	X								
Carex circinnata C. A. Mey.	X								
Carex deweyana Schwein.						X			
Carex diandra Schrank	X								re
Carex dioica L. ssp. *gynocrates* (Wormsk.) Hult.	X								
Carex garberi Fern. ssp. *bifaria* (Fern.) Hult.	X								
Carex gmelinii Hook. & Arn.		X							
Carex kelloggii W. Boott	X								
Carex lachenalii Schkuhr.						X			
Carex lasiocarpa Ehrh. ssp. *americana* (Fern.) Hult.	X								
Carex leptalea Wahlenb.	X		X						
Carex limosa L.	X								
Carex livida (Wahlenb.) Willd.	X								

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Carex loliacea L.	X								
Carex lyngbyaei Hornem.	X						X		
Carex mackenziei V. Krecz.							X		
Carex macloviana Urv.	X	X		X		X			
Carex macrochaeta C.A. Mey.		X	X	X					
Carex magellanica Lam. ssp. *irrigua* (Wahlenb.) Hult.	X								
Carex media R. Br.	X	X	X	X					
Carex membranacea Hook.	X		X						
Carex mertensii Prescott		X		X					
Carex microchaeta Holm.					X				
Carex microchaeta Holm. ssp. *nesophila* (Holm.) D. Murray						X			
Carex micropoda C.A. Meyer [=*C. pyrenaica* Wahlenb. ssp. *micropoda* (C. A. Meyer) Hult.]					X				
Carex nigricans C.A. Meyer					X				
Carex obtusata Lilj.				X		X			RE
Carex oederi Retz.	X								
Carex pauciflora Lightf.	X								
Carex pluriflora Hult.	X								
Carex podocarpa C.B. Clarke					X	X			
Carex praticola Rydb.		X		X					
Carex ramenskii Kom.							X		
Carex rariflora (Wahlenb.) Smith	X								RE
Carex rostrata Stokes	X								
Carex rotundata Wahlenb.	X								
Carex saxatilis L.			X						
Carex scirpoidea Michx.				X		X			RE
Carex spectabilis Dewey				X					

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Carex tenuiflora Wahlenb.	X		X						
Carex utriculata F. Boott	X								
Carex vaginata Tausch			X	X					RE
Cassiope lycopodioides (Pall.) D. Don						X			
Cassiope stelleriana (Pall.) DC.				X		X			
Cassiope tetragona (L.) D. Don				X		X			
Castilleja unalaschcensis (Cham. & Schlecht.) Malte			X	X				X	
Cerastium arvense L.				X					
Cerastium beeringianum Cham. & Schlecht. var. *beeringianum*						X			
Cerastium fontanum Baumg.								X	
Chamaedaphne calyculata (L.) Moench	X								
Chenopodium album L.								X	
Chrysanthemum arcticum L.							X		
Chrysanthemum leucanthemum L.								X	
Chrysosplenium tetrandrum (Lund) T. Fries	X		X						
Cicuta douglasii (DC.) J. Coulter & Rose			X						
Cicuta virosa L. [=*C. mackenzieana* Raup]	X								
Circaea alpina L.	X								
Claytonia sarmentosa C. Meyer						X			
Coeloglossum viride (L.) Hartm. ssp. *bracteatum* (Muhl.) Hult.				X					
Comarum palustre L. [=*Potentilla palustris* (L.) Scop.]	X								
Conioselinum pacificum (S. Wats.) Coult. & Rose [=*C. chinense* (L.) BSP.]	X	X		X			X		
Corallorrhiza trifida Chatel.		X							
Cornus canadensis L.		X							
Cornus suecica L.						X			
Corydalis pauciflora (Steph.) Pers.					X				
Corydalis sempervirens (L.) Pers.		X						X	

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Crepis elegans Hook.						X			
Crepis nana Richards.						X			re
Crepis tectorum L.								X	rei
Cryptogramma acrostichoides R. Br. [=*C. crispa* (L.) R. Br. var. *acrostichoides* (R. Br.) Clarke]						X			
Cystopteris fragilis (L.) Bernh.		X		X		X			
Cystopteris montana (Lam.) Bernh.		X	X	X					
Dactylis glomerata L.								X	rei
Delphinium glaucum S. Wats.		X		X					
Deschampsia caespitosa (L.) P. Beauv. ssp. *caespitosa*	X								
Descurainia sophioides (Fisch.) O.E. Shultz								X	
Diapensia lapponica L.						X			
Dodecatheon pulchellum (Raf.) Merr.							X		
Douglasia alaskana (Cov. & Stand. ex Hult.) S. Kelso [=*Androsace alaskana* Cov. & Stand.]						X			**
Draba alpina L.					X	X			
Draba aurea Vahl				X		X		X	
Draba borealis DC.				X				X	
Draba cana Rydb. [=*D. lanceolata* Royle In: Hulten 1968)				X					RE?
Draba crassifolia Graham						X			RE
Draba fladzinensis Wulf.						X			
Draba glabella Pursh						X			
Draba lactea Adams						X			
Draba lonchocarpa Rydb.				X		X			RE
Draba longipes Raup						X			
Draba nivalis Liljebl.						X			
Draba ruaxes Payson & H. St. John						X			RE, **
Draba stenoloba Ledeb.						X			

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Draba stenopetala Trautv.						X			RE, **
Drocera anglica Huds.		X							
Drocera rotundifolia L.		X		X					
Dryas alaskensis Pors. [=*D. octopetala* L. ssp. *alaskensis* (Pors.) Hult.]						X			
Dryas drummondii Richards.		X							
Dryas integrifolia Vahl.						X?			
Dryas octopetala L.						X			
Dryopteris dilatata (Hoffm.) A.Gray		X		X		X			
Dryopteris fragrans (L.) Schott		X							
Eleocharis kamtschatica (C.A. Meyer) V. Komarov							X		
Eleocharis palustris (L.) Roem. & Schult.	X								
Eleocharis quinquefolia (F. Hartmann) O. Schwarz	X								RE,**
Elymus alaskanus (Scribn. & Merr.) A. Loeve ssp. *alaskanus* [=*Agropyron violaceum* (Hornem.) Lange]		X		X		X			
Elymus glaucus Buckley		X							RE
Elymus sibiricus L.		X						X	
Elymus trachycaulis (Link) Gould ex Shinners ssp. *andinus* (Schribner & Smith) A.								X	
Elymus trachycaulis (Link) Gould ex Shinners ssp. *novae-angliae* (Scribn.) Tzvelev [=*Agropron pauciflorum* (Schwein.) Hitchc. ssp. *novae-angliae* (Scribn.) Meldris]		X		X				X	
Elytrigia repens (L.) Nevski [=*Agropyron repens* (L.) Beauv.]								X	
Empetrum hermaphroditum (Lange) Hagerup [=*E. nigrum* L. ssp. *hermaphroditum* (Lange) Boecher]		X		X		X			
Empetrum nigrum L.		X		X		X			
Epilobium anagallidifolium Lam.			X	X	X				
Epilobium angustifolium L.		X							

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Epilobium ciliatum Raf. ssp. *glandulosum* (Lehm.) Hoch & Raven [*E. glandulosum* Lehm.)			X		X				
Epilobium hornemannii Reichb. ssp. *hornemannii*			X						
Epilobium latifolium L.		X		X		X		X	
Epilobium palustre L.	X								
Equisetum arvense L.	X	X	X	X		X	X	X	
Equisetum fluviatile L. ampl. Ehrh.	X		X						
Equisetum palustre L.			X						
Equisetum pratense L.		X							
Equisetum scirpoides Michx.				X		X			
Equisetum silvaticum L.		X							
Equisetum variegatum Schleich.		X							
Erigeron acris L.		X						X	
Erigeron humilis Graham						X			
Erigeron peregrinus (Pursh) Greene			X	X		X			
Erigeron purpuratus Greene						X			re
Eriophorum angustifolium Honck. ssp. *subarcticum* (V. Vassiljev) Hult.	X		X						
Eriophorum gracile Koch	X								
Eriophorum russeolum Fries	X		X		X				
Eriophorum russeolum Fries var. *albidum* W. Nyl.	X		X		X				
Eriophorum scheuchzeri Hoppe	X								
Eriophorum viridi-carinatum (Englem.) Fern.	X								
Erucastrum gallicum (Willd.) O. E. Schulz [=*Brassica erucastrum*]		X						X	
Erysimum cheiranthoides L.		X						X	
Erysimum cheiranthoides L. ssp. *altum* Ahti		X							
Euphrasia disjuncta Fern & Wieg.		X				X		X	
Eutrema edwardsii R. Br.			X	X					RE

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Festuca altaica Trin.				X		X			
Festuca brevissima Yurtsev						X			
Festuca rubra L.		X					X		
Festuca vivipara (L.) Smith					X				RE
Fragaria chiloensis (L.) Duchesne								X	
Fritillaria camschatcensis (L.) Ker-Gawl.		X		X					
Galeopsis bifida Boem.								X	
Galium boreale L.		X		X				X	
Galium trifidum L. ssp. *trifidum*	X								
Galium triflorum Michx.	X								
Gastrolychnis apetala (L.) Tolm & Koz. [=*Melandrium apetalum* (L.) Fenzl.]						X			
Gentiana glauca Pallas				X		X			
Gentianella amarella (L.) Boerner [=*Gentiana amarella* L. ssp. *acuta* (Michx.) Hult.]				X					
Gentianella propinqua (Richards.) Gillet var. *propinqua* [=*Gentiana propinqua* Richards. ssp. *propinqu*]				X					
Geocaulon lividum (Richards.) Fern.		X		X					
Geranium erianthum DC.		X		X					
Geranium pusillum Burm.								X	
Geum macrophyllum Willd. ssp. *macrophyllum*		X							
Geum perincisum Rydb. [=*G. macrophyllum* Willd. ssp. *perincisum* (Rydb.) Raup.]		X							RE
Glaux maritima L.							X		
Glyceria borealis (Nash) Batch.	X								
Glyceria striata (Lam.) A. Hitchc. ssp. *stricta* (Scribn.) Hult.	X								
Goodyera repens (L.) R. Br. var. *ophioides* Fern.		X							
Gymnocarpium dryopteris (L.) Newm.		X		X					
Hammarbya paludosa (L.) Ktze.	X								
Hedysarum alpinum L.		X				X			

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Helianthus anuus L.								X	rei
Heracleum lanatum Michx.		X		X				X	
Heuchera glabra Willd.	X	X	X	X					
Hieracium triste Willd.						X			re
Hierchloe alpina (Sw.) Roem. & Schult.				X		X			
Hierchloe odorata (L.) P. Beauv.		X		X					
Hippuris montana Ledeb.	X		X		X				
Hippuris tetraphylla L.F.							X		
Hippuris vulgaris L.	X								
Hordeum brachyantherum Nevski		X							
Hordeum jubatum L.		X						X	
Huperzia selago (L.) C. Martius [=*H. haleakalae* (Brackenridge) Holub In: FNA*]				X		X			
Huperzia selago (L.) C. Martius ssp. *chinense* (C.Chr.) Loeve & Loeve [=*Lycopodium selago* (L.) ssp. *chinense* (C. Chr.) Hult.; =*H. myoshiana* (Makino) Ching In: FNA*]		X							
Impatiens noli-tangere L.	X								
Iris setosa Pall. ssp. *setosa*	X		X						
Isoetes echinospora Durieu	X								
Juncus alpinus Villers	X								
Juncus biglumis L.						X			
Juncus bufonius L.	X								
Juncus castaneus Smith		X				X			
Juncus castaneus Sm. ssp. *castaneus*	X								
Juncus castaneus Sm. ssp. *leucochlamys* (Zinz.) Hult.	X								
Juncus drummondii E. Mey.					X				
Juncus ensifolius Wikstrom	X								
Juncus mertensianus Bong.	X								
Juncus stygius L. ssp. *americanus* (Buchenau) Hult.	X								

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Juncus triglumis L.	X								
Juniperus communis L.		X		X		X			
Lathyrus palustris L. ssp. *pilosus* (Cham.) Hult.		X					X		
Ledum groenlandicum Oeder [=*L. palustre* L. ssp. *groenlandicum* (Oeder) Hult.]	X	X							
Ledum palustre L. ssp. *decumbens* (Ait.) Hult.				X		X			
Lemna minor L.	X								
Lepidium densiflorum Schrad.								X	
Leptarrhena pyrolifolia (D. Don) Ser.			X		X				
Leymus mollis (Trin.) Hara ssp. *mollis* [=*Elymus arenarius* L. ssp. *mollis* (Trin.) Hult.]		X					X	X	
Ligusticum scoticum L. ssp. *hultenii* (Fern.) Cald. & Tayl.							X		
Linaria vulgaris Mill.								X	
Linnaea borealis L.		X		X		X			
Listera cordata (L.) R. Br.		X		X		X			
Lloydia serotina (L.) Rchb.						X			
Loiseleuria procumbens (L.) Desv.				X		X			
Lolium multiflorum Lam.								X	rei
Luetkea pectinata (Pursh) Ktze.				X	X	X			
Lupinus nootkatensis Donn		X		X					
Lupinus polyphyllus Lindl.		X		X					
Luzula arcuata (Wahlenb.) Sw.						X			
Luzula arcuata (Wahlenb.) Sw. ssp. *unalaschensis* (Buchenau) Hult.						X			
Luzula confusa Lindeb.						X			
Luzula multiflora (Retz.) Lej. var. *frigida* (Buchenau) Hult.	X								
Luzula parviflora (Ehrh.) Desv.				X		X			
Luzula spicata (L.) DC.						X			
Luzula wahlenbergii Rupr.						X			
Lycopodium alpinum L. [=*Diphasiastrum alpinum* (L.) Holub In: FNA*]				X		X			

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Lycopodium annotinum L.		X							
Lycopodium clavatum L. ssp. *monostachyon* (Grev. & Hook.) Sel. [=*L. lagopus* (Laest. ex C. Hartman) In: FNA*]		X		X		X			
Lycopodium complanatum L. [=*Diphasiastrum complanatum* (L.) Holub In: FNA*]		X		X					
Lycopodium sabinaefolium Willd. var. *sitchense* (Rupt.) Fern. [=*Diphasiastrum sitchense* (Ruptrecht) Holub In: FNA*]				X					
Lysimachia thyrsiflora L.	X						X?		
Malaxis monophylla (L.) Sw. var. *brachypoda* (A. Gray) Morris & Ames	X								
Matricaria matricarioides (Less.) Porter								X	
Matteuccia struthiopteris (L.) Tod.		X							
Medicago falcata L.								X	rei
Medicago sativa L.								X	rei
Melandrium noctiflorum (L.) Fries								X	rei
Melilotus albus Desr.								X	
Melilotus officinalis (L.) Lam.								X	
Mentha arvensis L.	X								
Menyanthes trifoliata L.	X		X						
Menziesia ferruginea Sm.		X							
Mertensia paniculata (Ait.) G. Don		X		X					
Mimulus guttatus DC.	X								
Minuartia biflora (L.) Sching & Thell.						X			re
Minuartia macrocarpa (Pursh) Ostenf.						X			
Minuartia rubella (Wahlenb.) Graebn.						X			
Mitella pentandra Hook.			X	X					
Moehringia lateriflora (L.) Fenzl		X		X					
Moneses uniflora (L.) Gray		X							
Myosotis alpestris F. W. Schmidt						X			

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Myrica gale L.	X								
Myriophyllum exalbescens Fern. [=*M. spicatum* L.]	X								RE
Myriophyllum verticillatum L.	X								RE
Najas flexilis (Willd.) Rost. & Schmidt	X								RE
Nuphar polysepalum Engelm.	X								
Oplopanax horridus (Smith) Miquel [=*Echinopanax horridum* (Sm.) Decne. & Planch.]		X							
Orthilia secunda (L.) House [=*Pyrola secunda* L. ssp. *secunda*]		X		X		X			
Osmorhiza depauperata Phill.		X							RE
Oxycoccus microcarpus Turcz. ex Rupr.	X		X						
Oxyria digyna (L.) Hill				X	X	X			
Oxytropis bryophila (E. Greene) Yurtsev						X			
Oxytropis huddelsonii Pors.						X			RE, **
Oxytropis maydelliana Trautv.						X			
Oxytropus varians (Rydb.) Schumann						X			
Papaver alboroseum Hult.						X			**
Papaver nudicaule L.								X	
Papaver radicatum Rottb. ssp. *radicatum*						X			
Parnassia kotzebuei Cham. & Schlecht.	X		X	X					
Parnassia palustris L.	X		X						
Parnassia palustris L. ssp. *neogaea* (Fern.) Hult.	X		X						
Pedicularis capitata Adams.				X		X			
Pedicularis labradorica Wirsing	X		X	X		X			
Pedicularis lanata Cham. & Schlecht						X			RE
Pedicularis langsdorfii Fisch. ex Steven			X	X					
Pedicularis verticillata L.				X		X			
Pentaphylloides floribunda (Pursh.) Loeve [=*Potentilla fruticosa* L.]	X	X		X					
Petasites frigidus (L.) Franchet	X		X						re

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Petasites sagittatus (Banks) Gray	X								
Phalaris arundinacea L.	X								
Phleum commutatum Gaudin var. *americanum* (Fourn.) Hult.				X		X			
Phleum pratense L.								X	
Phyllodoce aleutica (Spreng.) A. A. Heller						X			
Picea glauca (Moench) Voss		X		X					
Picea mariana (Mill.) Britt., Sterns & Pogg	X	X	X						
Pinguicula villosa L.			X						
Plantago major L. var. *major*								X	
Plantago maritima L. ssp. *juncoides* (Lam.) Hult.							X		
Platanthera dilatata Pursh	X		X						re
Platanthera hyperborea (L.) Lindl. var. *hyperborea*	X		X	X					
Platanthera hyperborea (L.) Lindl. var. *viridiflora* (Cham.) Luer	X								
Platanthera obtusata (Pursh) Lindl.			X						
Poa alpigena (E. Fries) Lindm.		X							
Poa alpina L.						X			
Poa annua L.	X								
Poa arctica R. Br.				X					
Poa eminens Presl		X							
Poa glauca M. Vahl.		X		X		X		X	
Poa palustris L.	X								
Poa paucispicula Scribn. & Merr.						X			
Poa pratensis L.								X	
Poa psuedoabbreviata Rosch.						X			re
Polemonium acutiflorum Willd.	X		X						
Polemonium pulcherrimum Hook.		X						X	
Polygonum amphibium L.	X								

FORT RICHARDSON VASCULAR PLANT SPECIES LIST								APRIL 18, 1995	
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Polygonum aviculare L.								X	
Polygonum convolvulus L.								X	
Polygonum fowleri Robins.							X		RE
Polygonum lapathifolium L.	X								rei
Polygonum pennsylvanicum L. ssp. *oneillii* (Brenckle) Hult.	X								
Populus balsamifera L.		X		X					
Populus balsamifera L. ssp. *balsamifera*		X		X					
Populus balsamifera L. ssp. *trichocarpa* (Torr. & Gray) Brayshaw		X							
Populus tremuloides Michx.		X		X					
Potamogeton alpinus Balb.	X								
Potamogeton epihydrus Raf.	X								
Potamogeton filiformis Pers.	X								
Potamogeton gramineus L.	X								
Potamogeton natans L.	X								
Potamogeton pectinatus L.	X						X?		
Potamogeton praelongus Wulf.	X								
Potamogeton richardsonii (A. Bennett) Rydb. [=*P. perfoliatus* L. ssp. *richardsonii* (A. Bennett) Hult.]	X								
Potamogeton vaginatus Turcz.	X								
Potamogeton zosterifolius Schum.	X								
Potentilla anserina L.								X	
Potentilla diversifolia Lehm.						X			
Potentilla egedii Wormsk. ssp. *grandis* (Torr. & Gray) Hult.							X		
Potentilla hyparctica Malte						X			re
Potentilla multifida L.		X		X		X		X	
Potentilla norvegica L.								X	
Potentilla uniflora Ledeb.						X			

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Primula cuneifolia Ledeb. ssp. *saxifragifolia* (Lehm.) Smith & Forrest					X?	X			
Puccinellia grandis Swallen							X		
Puccinellia nutkaensis (Presl) Fern. & Weath.							X		RE
Puccinellia phryganodes (Trin.) Scribner & Marr.							X		RE
Pyrola asarifolia Michx.		X		X					
Pyrola asarifolia Michx. var. *purpurea* (Bunge) Fern.		X		X					
Pyrola chlorantha Sw.		X							
Pyrola minor L.		X		X		X			
Ranunculus arborvitus L.								X	
Ranunculus cymbalaria Pursh							X		
Ranunculus eschscholtzii Schlecht.					X	X			
Ranunculus gmelini DC. ssp. *gmelini*	X								
Ranunculus hyperboreus Rottb.	X?		X		X				
Ranunculus lapponicus L.	X								
Ranunculus macounii Britt.	X								
Ranunculus nivalis L.						X			
Ranunculus occidentalis Nutt.			X	X					
Ranunculus pygmaeus Wahl.						X			
Ranunculus scleratus L. ssp. *multifidus* (Nutt.) Hult.	X								
Ranunculus trichophyllus Chaix	X								
Ranunculus trichophyllus Chaix var. *trichophyllus*	X								
Rhinanthus minor L.	X	X	X	X				X	
Rhodiola integrifolia Raf. [=*Sedum rosea* (L.) Scop. ssp. *integrifolia* (Raf.) Hult.]						X			
Ribes hudsonianum Richards.		X							
Ribes laxiflorum Pursh		X							
Ribes triste Pall.		X							
Romanzoffia sitchensis Bong.					X	X			

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Rorippa barbareaefolia (DC.) Kitigawa		X						X	
Rorippa palustris (L.) Besser ssp. *hispida* (Desv.) Jonsell	X								
Rorippa palustris (L.) Besser ssp. *palustris*	X								
Rorippa sylvestris (L.) Besser								X	
Rosa acicularis Lindl.		X		X					
Rosa nutkana Presl		X							
Rubus arcticus L.			X		X				
Rubus chamaemorus L.	X		X						
Rubus idaeus L.		X		X					
Rubus pedatus Sm.			X	X					
Rubus stellatus Sm. [=*R. arcticus* L. ssp. *stellatus* (Sm.) Boiv. emend. Hult.]				X					
Rumex acetosella L.								X	
Rumex arcticus Trautv.			X						
Rumex crispus L.								X	
Rumex fenestratus Greene	X								
Rumex transitorius K. H. Resch	X								RE
Ruppia spiralis L.							X		RE
Sagina nivalis (Lindblom) Fries						X			
Sagina saginoides (L.) Karst.		X		X					
Salicornia europaea L.							X		**
Salix alaxensis (Anderss.) Cov.		X		X					
Salix arctica Pall.						X			
Salix barclayi Anderss.		X?	X						
Salix bebbiana Sarg. [=*S. depressa* L. ssp. *rostrata* (Anderss.) Hiitonen) *niphoclada*]		X							
Salix brachycarpa Nutt. ssp. *niphoclada* (Rydb.) Argus			X	X	X	X			
Salix fuscescens Anderss.	X								
Salix glauca L.				X		X			

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Salix lucida Muhl. ssp. *lasiandra* (Benth.) Argus [=*S. lasiandra* Benth.]	X								
Salix ovalifolia Trautv.							X		
Salix planifolia Pursh ssp. *pulchra* (Cham.) Argus [=*S. pulchra* Cham.]				X		X			
Salix reticulata L.				X		X			
Salix rotundifolia Trautv.						X			
Salix scouleriana Barratt		X							
Salix sitchensis Sanson	X		X?						
Sambucus racemosa L.		X							
Sanguisorba stipulata Raf.	X	X	X	X					
Saxifraga adscendens L.						X			
Saxifraga bronchialis L.						X			
Saxifraga caespitosa L.						X			
Saxifraga calycina Sternb.						X			re
Saxifraga cernua L.						X			re
Saxifraga eschscholtzii Sternb.						X			RE
Saxifraga flagellaris Willd.						X			re
Saxifraga foliolosa R. Br.					X?	X			RE
Saxifraga hirculis L.					X				re
Saxifraga lyallii Engler ssp. *hultenii* (Cald. & Sav.) Cald. & Sav.			X		X				
Saxifraga nelsoniana D. Don [=*S. punctata* L. ssp. *pacifica* Hult.]					X	X			
Saxifraga nivalis L.						X			
Saxifraga oppositifolia L.						X			
Saxifraga rivularis L.					X				
Saxifraga serpyllifolia Pursh						X			re
Saxifraga tricuspidata Rottb.						X			
Scheuchzeria palustris L.	X								
Schizachne purpurascens (Torr.) Swallen				X					

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Scirpus paludosus Nels.	X								
Scirpus validus M. Vahl	X								
Scutellaria galericulata L.	X								
Selaginella selaginoides (L.) Link	X		X						
Senecio lugens Richardson			X						
Senecio pauciflorus Pursh		X							
Senecio triangularis Hook.				X					
Senecio vulgaris L.								X	
Shepherdia canadensis (L.) Nutt.		X		X					
Sibbaldia procumbens L.				X		X			
Silene acaulis L.						X			
Smilacina stellata (L.) Desf.				X					
Solidago lepida DC.		X						X	
Solidago multiradiata Ait.				X		X			
Sorbus scopulina Greene		X		X					
Sparganium angustifolium Michx.	X								
Sparganium hyperboreum Laest.	X								
Sparganium minimum (Hartm.) E. Fries	X								
Spergula arvensis L.								X	rei
Spergularia canadensis (Pers.) G. Don							X		RE
Spiraea beauverdiana Schneid.	X			X					
Spiranthes romanzoffiana Cham.	X								
Stellaria borealis Bigelow	X	X	X	X					re
Stellaria borealis Bigelow ssp. *sitchana* Steud.	X	X	X	X					RE
Stellaria calycantha (Ledeb.) Bong.	X	X	X	X					
Stellaria crassifolia Ehrh.		X							RE
Stellaria humifusa Rottb.							X		re

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Stellaria laeta Richards.						X			
Stellaria longifolia Muhl. ex Willd.		X							
Stellaria media (L.) Villars								X	
Stellaria monantha Hult.				X		X			
Stellaria umbellata Turcz.						X			RE, **
Streptopus amplexifolius (L.) DC.				X					
Swertia perennis L.			X						
Swida stolonifera (Michx.) Rydb. [=*Cornus stolonifera* Michx.]		X							
Taraxacum alaskanum Rydb.						X			
Taraxacum carneocoloratum Nels.		X?				X			re, **
Taraxacum officinale Weber								X	
Thalictrum alpinum L.						X			re
Thalictrum sparsiflorum Trucz.		X							
Thelypteris phegopteris (L.) Solsson		X		X					
Thlaspi arcticum Pors.						X			re, **
Tofieldia coccinea Richards.						X			
Tofieldia glutinosa (Michx.) Pers.	X								
Tofieldia pusilla (Michx.) Pers.			X						
Trichophorum alpinum (L.) Pers.	X								
Trichophorum caespitosum (L.) Hartm.	X		X						
Trientalis europaea L.	X	X	X	X		X			
Trifolium hybridum L.								X	
Trifolium pratense L.								X	
Trifolium repens L.								X	
Triglochin maritimum L.							X		
Triglochin palustris L.			X				X		
Tripleurospermum inodoratum (L.) Schultz-Bip.								X	rei

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Trisetum spicatum (L.) Richter								X	
Trisetum spicatum (L.) Richter ssp. *alaskanum* (Nash) Hult.				X		X			
Trisetum spicatum (L.) Richter ssp. *molle* (Michaux) Hult.				X		X			
Triticum aestivum L.								X	
Tsuga mertensiana (Bong.) Sarg.				X					
Typha latifolia L.	X								
Urtica dioica L. ssp. *gracilis* (Aiton) Selander	X								
Utricularia intermedia Hayne	X								
Utricularia minor L.	X								
Utricularia vulgaris L. ssp. *macrorhiza* (LeConte) Clauson	X								
Vaccinium caespitosum Michx.				X		X			
Vaccinium ovalifolium Sm.				X					
Vaccinium uliginosum L.	X	X		X		X			
Vaccinium vitis-idaea L.		X		X		X			
Vahlodea atropurpurea (Wahlenb.) E. Fries ssp. *paramushirensis* (Kudo) Hult.				X		X			
Valeriana capitata Pall.				X					
Valeriana sitchensis Bong.				X					
Veratrum viride Ait.				X					
Veronica americana Schwein.	X								
Veronica wormskjoldii Roem & Schult.				X		X			
Viburnum edule (Michx.) Raf.		X							
Vicia cracca L.								X	
Viola epipsila Ledeb.	X								
Viola langsdorffii Fisch.			X	X					
Viola renifolia Gray		X							
Viola selkirkii Pursh				X					**
Woodsia ilvensis (L.) R. Br.						X			

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Zannichellia palustris L.							X		RE, **
Zygadenus elegans Pursh		X		X					

Appendix D
Fort Richardson Vascular Plant Survey With Generalized Vegetation Zone and Habitat Matrix (Taxonomic Listing)

** Rare species currently being tracked in the Alaska Natural Heritage Program's Biological Conservation Database for southcentral Alaska.

RE	Major range extensions using the maps of Hulten (1968)
re	Minor range extensions using the maps of Hulten (1968)
i	Introduced taxa

See text for Zone and Habitat definitions

W	Wet Habitats
MD	Moist to Dry Habitats
DISTURBED	Disturbed Habitats

FNA* Flora North America North of Mexico (FNAEC 1993)

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Division LYCOPHYTA									
LYCOPODIACEAE									
Huperzia selago (L.) C. Martius [=*H. haleakalae* (Breckenridge) Holub In: FNA*]				X		X			
Huperzia selago (L.) C. Martius ssp. *chinense* (C.Chr.) Loeve & Loeve [=*Lycopodium selago* L. ssp. *chinense* (C.Chr.) Hult.; = *H. myoshiana* (Makino) Ching In: FNA*]		X							
Lycopodium alpinum L. [=*Diphasiastrum alpinum* (L.) Holub In: FNA*]				X		X			
Lycopodium annotinum L.		X							
Lycopodium clavatum L. ssp. *monostachyon* (Grev. & Hook.) Sel. [=*L. lagopus* (Laest. ex C. Hartman) In: FNA*]		X		X		X			
Lycopodium complanatum L. [=*Diphasiastrum complanatum* (L.) Holub In: FNA*]		X		X					
Lycopodium sabinaefolium Willd. var. *sitchense* (Rupt.)Fern. [=*Diphasiastrum sitchense* (Ruprecht) Holub In: FNA*]				X					
SELAGINELLACEAE									
Selaginella selaginoides (L.) Link	X		X						
ISOETACEAE									
Isoetes echinospora Durieu	X								
Division SPHENOPHYTA									
EQUISETACEAE									
Equisetum arvense L.	X	X	X	X		X	X	X	
Equisetum fluviatile L. ampl. Ehrh.	X		X						
Equisetum palustre L.			X						
Equisetum pratense L.		X							
Equisetum scirpoides Michx.				X		X			
Equisetum silvaticum L.		X							
Equisetum variegatum Schleich.		X							
Division PTEROPHYTA									
ADIANTACEAE (includes CRYPTOGRAMMACEAE)									
Cryptogramma acrostichoides R. Br. [=*C. crispa* (L.) R. Br. var. *acrostichoides* (R. Br.) Clarke]						X			
ASPLENIACEAE (includes ASPIDIACEAE and ATHYRIACEAE)									
Athyrium filix-femina (L.) Roth		X		X		X			
Cystopteris fragilis (L.) Bernh.		X		X		X			
Cystopteris montana (Lam.) Bernh.		X	X	X					
Dryopteris dilatata (Hoffm.) A.Gray		X		X		X			
Dryopteris fragrans (L.) Schott		X							

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Gymnocarpium dryopteris (L.) Newm.		X		X					
Matteuccia struthiopteris (L.) Tod.		X							
Woodsia ilvensis (L.) R. Br.						X			
OPHIOGLOSSACEAE									
Botrichium boreale (E. Fries) Milde (=*B. pinnatum* H. St. John In: FNA*)				X					
Botrichium lanceolatum (Gmel.) Angstr.		X		X					
Botrichium lunaria (L.) Sw.				X					
THELYPTERIDACEAE									
Thelypteris phegopteris (L.) Solsson		X		X					
Division CONIFEROPHYTA									
CUPRESSACEAE									
Juniperus communis L.		X		X		X			
PINACEAE									
Picea glauca (Moench) Voss		X		X					
Picea mariana (Mill.) Britt., Sterns & Pogg	X	X	X						
Tsuga mertensiana (Bong.) Sarg.				X					
Division ANTHOPHYTA: MONOCOTYLEDONAE									
CYPERACEAE									
Carex aquatilis Wahlenb. ssp. *aquatilis*	X								
Carex atrosquama Mackenzie				X					RE
Carex bigelowii Torr.				X		X			
Carex buxbaumii Wahlenb.	X								
Carex canescens L.	X								
Carex chordorrhiza Ehrh.	X								
Carex circinnata C. A. Mey.	X								
Carex deweyana Schwein.						X			
Carex diandra Schrank	X								re
Carex dioica L. ssp. *gynocrates* (Wormsk.) Hult.	X								
Carex garberi Fern. ssp. *bifaria* (Fern.) Hult.	X								
Carex gmelinii Hook. & Arn.		X							
Carex kelloggii W. Boott	X								
Carex lachenalii Schkuhr.						X			
Carex lasiocarpa Ehrh. ssp. *americana* (Fern.) Hult.	X								
Carex leptalea Wahlenb.	X		X						
Carex limosa L.	X								

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Carex livida (Wahlenb.) Willd.	X								
Carex loliacea L.	X								
Carex lyngbyaei Hornem.	X						X		
Carex mackenziei V. Krecz.							X		
Carex macloviana Urv.	X	X		X		X			
Carex macrochaeta C.A. Mey.		X	X	X					
Carex magellanica Lam. ssp. *irrigua* (Wahlenb.) Hult.	X								
Carex media R. Br.	X	X	X	X					
Carex membranacea Hook.	X		X						
Carex mertensii Prescott		X		X					
Carex microchaeta Holm.					X				
Carex microchaeta Holm. ssp. *nesophila* (Holm.) D. Murray						X			
Carex micropoda C.A. Meyer [=*C. pyrenaica* Wahlenb. ssp. *micropoda* (C. A. Meyer) Hult.]					X				
Carex nigricans C.A. Meyer					X				
Carex obtusata Lilj.				X		X			RE
Carex oederi Retz.	X								
Carex pauciflora Lightf.	X								
Carex pluriflora Hult.	X								
Carex podocarpa C.B. Clarke					X	X			
Carex praticola Rydb.		X		X					
Carex ramenskii Kom.							X		
Carex rariflora (Wahlenb.) Smith	X								RE
Carex rostrata Stokes	X								
Carex rotundata Wahlenb.	X								
Carex saxatilis L.			X						
Carex scirpoidea Michx.				X		X			RE
Carex spectabilis Dewey				X					
Carex tenuiflora Wahlenb.	X		X						
Carex utriculata F. Boott	X								
Carex vaginata Tausch			X	X					RE
Eleocharis kamtschatica (C.A. Meyer) V. Komarov							X		
Eleocharis palustris (L.) Roem. & Schult.	X								
Eleocharis quinquefolia (F. Hartmann) O. Schwarz	X								RE,**
Eriophorum angustifolium Honck. ssp. *subarcticum* (V. Vassiljev) Hult.	X		X						

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Eriophorum gracile Koch	X								
Eriophorum russeolum Fries	X		X		X				
Eriophorum russeolum Fries var. *albidum* W. Nyl.	X		X		X				
Eriophorum scheuchzeri Hoppe	X								
Eriophorum viridi-carinatum (Englem.) Fern.	X								
Scirpus paludosus Nels.	X								
Scirpus validus M. Vahl	X								
Trichophorum alpinum (L.) Pers.	X								
Trichophorum caespitosum (L.) Hartm.	X		X						
IRIDACEAE									
Iris setosa Pall. ssp. *setosa*	X		X						
JUNCACEAE									
Juncus alpinus Villers	X								
Juncus biglumis L.						X			
Juncus bufonius L.	X								
Juncus castaneus Smith		X				X			
Juncus castaneus Sm. ssp. *castaneus*	X								
Juncus castaneus Sm. ssp. *leucochlamys* (Zinz.) Hult.	X								
Juncus drummondii E. Mey.					X				
Juncus ensifolius Wikstrom	X								
Juncus mertensianus Bong.	X								
Juncus stygius L. ssp. *americanus* (Buchenau) Hult.	X								
Juncus triglumis L.	X								
Luzula arcuata (Wahlenb.) Sw.						X			
Luzula arcuata (Wahlenb.) Sw. ssp. *unalaschensis* (Buchenau) Hult.						X			
Luzula confusa Lindeb.						X			
Luzula multiflora (Retz.) Lej. var. *frigida* (Buchenau) Hult.	X								
Luzula parviflora (Ehrh.) Desv.				X		X			
Luzula spicata (L.) DC.						X			
Luzula wahlenbergii Rupr.						X			
JUNCAGINACEAE									
Triglochin maritimum L.							X		
Triglochin palustris L.			X				X		
LEMNACEAE									
Lemna minor L.	X								

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
LILIACEAE									
Allium schoenoprasum L.	X			X					
Fritillaria camschatcensis (L.) Ker-Gawl.		X		X					
Lloydia serotina (L.) Rchb.						X			
Smilacina stellata (L.) Desf.				X					
Streptopus amplexifolius (L.) DC.				X					
Tofieldia coccinea Richards.						X			
Tofieldia glutinosa (Michx.) Pers.	X								
Tofieldia pusilla (Michx.) Pers.			X						
Veratrum viride Ait.				X					
Zygadenus elegans Pursh		X		X					
NAJADACEAE									
Najas flexilis (Willd.) Rost. & Schmidt	X								RE
ORCHIDACEAE									
Coeloglossum viride (L.) Hartm. ssp. bracteatum (Muhl.) Hult.				X					
Corallorrhiza trifida Chatel.		X							
Goodyera repens (L.) R. Br. var. *ophioides* Fern.		X							
Hammarbya paludosa (L.) Ktze.	X								
Listera cordata (L.) R. Br.		X		X		X			
Malaxis monophylla (L.) Sw. var. *brachypoda* (A. Gray) Morris & Ames	X								
Platanthera dilatata Pursh	X		X						re
Platanthera hyperborea (L.) Lindl. var. *hyperborea*	X		X	X					
Platanthera hyperborea (L.) Lindl. var. *viridiflora* (Cham.) Luer	X								
Platanthera obtusata (Pursh) Lindl.			X						
Spiranthes romanzoffiana Cham.	X								
POACEAE (=GRAMINAE)									
Agrostis scabra Willd.		X						X	
Alopecuris aequalis Sobol.	X								
Alopecuris alpinus Smith			X						RE
Arctagrostis latifolia (R. Br.) Griseb.						X			
Arctagrostis poaeoides Nash	X								
Arctogrostis latifolia (R. Br.) Griseb. var. *arundinacea* (Trin.) Griseb.						X			
Arctogrostis latifolia (R. Br.) Griseb. var. *latifolia*	X								
Avena fatua L.								X	rei
Beckmannia erucaeformis (L.) Host ssp. *baicalensis* (Kusn.) Hult.		X						X	

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Bromopsis inermis (Leyss.) Holub [=*Bromus inermis* Leyss.]								X	
Bromus tectorum L.								X	
Calamagrostis canadensis (Michx.) Beauv.	X	X		X		X			
Calamagrostis deschampsioides Trin.							X		re
Calamagrostis inexpansa Gray	X	X							
Calamagrostis lapponica (Wahlenb.) Hartman. F.	X	X							
Calamagrostis nutkaensis (C. Presl) Steudel	X								
Dactylis glomerata L.								X	rei
Deschampsia caespitosa (L.) P. Beauv. ssp. *caespitosa*	X								
Elymus alaskanus (Scribn. & Merr.) A. Loeve ssp. *alaskanus* [=*Agropyron violaceum* (Hornem.) Lange]		X		X		X			
Elymus glaucus Buckley		X							RE
Elymus sibiricus L.		X						X	
Elymus trachycaulis (Link) Gould ex Shinners ssp. *andinus* (Schribner & Smith) A.								X	
Elymus trachycaulis (Link) Gould ex Shinners ssp. *novae-angliae* (Scribn.) Tzvelev [=*Agropyron pauciflorum* (Schwein.) Hitchc. ssp. *novae-angliae* (Scribn.) Melderis]		X		X				X	
Elytrigia repens (L.) Nevski [=*Agropyron repens* (L.) Beauv.]								X	
Festuca altaica Trin.				X		X			
Festuca brevissima Yurtsev						X			
Festuca rubra L.		X					X		
Festuca vivipara (L.) Smith					X				RE
Glyceria borealis (Nash) Batch.	X								
Glyceria striata (Lam.) A. Hitchc. ssp. *stricta* (Scribn.) Hult.	X								
Hierchloe alpina (Sw.) Roem. & Schult.				X		X			
Hierchloe odorata (L.) P. Beauv.		X		X					
Hordeum brachyantherum Nevski		X							
Hordeum jubatum L.		X						X	
Leymus mollis (Trin.) Hara ssp. *mollis* [=*Elymus arenarius* L. ssp. *mollis* (Trin.) Hult.]		X					X	X	
Lolium multiflorum Lam.								X	rei
Phalaris arundinacea L.	X								
Phleum commutatum Gaudin var. *americanum* (Fourn.) Hult.				X		X			
Phleum pratense L.								X	
Poa alpigena (E. Fries) Lindm.		X							
Poa alpina L.						X			
Poa annua L.	X								

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Poa arctica R. Br.				X					
Poa eminens Presl		X							
Poa glauca M. Vahl.		X		X		X		X	
Poa palustris L.	X								
Poa paucispicula Scribn. & Merr.						X			
Poa pratensis L.								X	
Poa psuedoabbreviata Rosch.						X			re
Puccinellia grandis Swallen							X		
Puccinellia nutkaensis (Presl) Fern. & Weath.							X		RE
Puccinellia phryganodes (Trin.) Scribner & Marr.							X		RE
Schizachne purpurascens (Torr.) Swallen				X					
Trisetum spicatum (L.) Richter								X	
Trisetum spicatum (L.) Richter ssp. *alaskanum* (Nash) Hult.				X		X			
Trisetum spicatum (L.) Richter ssp. *molle* (Michaux) Hult.				X		X			
Triticum aestivum L.								X	
Vahlodea atropurpurea (Wahlenb.) E. Fries ssp. *paramushirensis* (Kudo) Hult.				X		X			
POTAMOGETONACEAE									
Potamogeton alpinus Balb.	X								
Potamogeton epihydrus Raf.	X								
Potamogeton filiformis Pers.	X								
Potamogeton gramineus L.	X								
Potamogeton natans L.	X								
Potamogeton pectinatus L.	X						X?		
Potamogeton richardsonii (A. Bennett) Rydb. [=*P. perfoliatus* L. ssp. *richardsonii* (A. Bennett) Hult.]	X								
Potamogeton praelongus Wulf.	X								
Potamogeton vaginatus Turcz.	X								
Potamogeton zosterifolius Schum.	X								
Ruppia spiralis L.							X		RE
Zannichellia palustris L.							X		RE, **
SCHEUCHZERIACEAE									
Scheuchzeria palustris L.	X								
SPARGANIACEAE									
Sparganium angustifolium Michx.	X								
Sparganium hyperboreum Laest.	X								

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Sparganium minimum (Hartm.) E. Fries	X								
TYPHACEAE									
Typha latifolia L.	X								
Division ANTHOPHYTA: DICOTYLEDONAE									
ADOXACEAE									
Adoxa moschatellina L.		X							
AMARANTHACEAE									
Amaranthus retroflexus L.								X	rei
APIACEAE (=UMBELLIFERAE)									
Angelica genuflexa Nutt.			X						
Angelica lucida E. Nels.		X	X	X					
Cicuta douglasii (DC.) J. Coulter & Rose			X						
Cicuta virosa L. [=*C. mackenzieana* Raup]	X								
Conioselinum pacificum (S. Wats.) Coult. & Rose [=*C. chinense* (L.) BSP.]	X	X		X			X		
Heracleum lanatum Michx.		X		X				X	
Ligusticum scoticum L. ssp. *hultenii* (Fern.) Cald. & Tayl.							X		
Osmorhiza depauperata Phill.		X							RE
ARALIACEAE									
Oplopanax horridus (Smith) Miquel [=*Echinopanax horridum* (Sm.) Decne. & Planch.]		X							
ASTERACEAE (=COMPOSITAE)									
Achillea millefolium L.								X	rei
Achillea ptarmica L.								X	rei
Achillea sibirica Ledeb.		X							RE
Antennaria alpina (L.) Gaertn.						X			
Antennaria friesiana (Trautv.) Ekman						X			
Antennaria friesiana (Trautv.) Ekman ssp. *alaskana* (Malte) Hult.						X			RE
Antennaria monocephala DC.						X			
Antennaria rosea (D.C. Eaton) E. Greene		X							
Antennaria rosea E. Greene ssp. *pulvinata* (E. Greene) Bayer		X							
Anthemis cotula L.								X	rei
Anthemis tinctoria L.								X	rei
Arnica griscomii Fern. ssp. *frigida* (C. Meyer ex Iljin) S. J. Wolf						X			
Arnica latifolia Bong.			X	X					
Arnica lessingii Greene						X			re
Arnica ovata E. Greene				X		X			

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Artemisia arctica Less.				X		X			
Artemisia tilesii Ledeb.		X						X	
Aster junciformis Rydb.	X								
Aster sibiricus L.		X				X			
Chrysanthemum arcticum L.							X		
Chrysanthemum leucanthemum L.								X	
Crepis elegans Hook.						X			
Crepis nana Richards.						X			re
Crepis tectorum L.								X	REi
Erigeron acris L.		X						X	rei
Erigeron humilis Graham						X			
Erigeron peregrinus (Pursh) Greene			X	X		X			
Erigeron purpuratus Greene						X			re
Helianthus anuus L.								X	rei
Hieracium triste Willd.						X			re
Matricaria matricarioides (Less.) Porter								X	
Petasites frigidus (L.) Franchet	X		X						re
Petasites sagittatus (Banks) Gray	X								
Senecio lugens Richardson			X						
Senecio pauciflorus Pursh		X							
Senecio vulgaris L.								X	
Senecio triangularis Hook.				X					
Solidago lepida DC.		X						X	
Solidago multiradiata Ait.				X		X			
Taraxacum alaskanum Rydb.						X			
Taraxacum carneocoloratum Nels.		X?				X			re, **
Taraxacum officinale Weber								X	
Tripleurospermum inodoratum (L.) Schultz-Bip.								X	rei
BALSAMINACEAE									
Impatiens noli-tangere L.	X								
BETULACEAE									
Alnus sinuata (Regel) Rydb. [=*A. crispa* (Ait.) Pursh ssp. *sinuata* (Regel) Hult.]		X		X					
Alnus tenuifolia Nutt. [=*A. incana* (L.) Moench ssp. *tenuifolia* (Nutt.) Breitung]	X	X							
Alnus viridis Villar ssp. *crispa* (Ait.) Loeve & Loeve [=*A. crispa* (Ait.) Pursh ssp. *crispa*]				X					
Betula glandulosa Michx.				X					

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Betula hybrids	X		X		X	X			
Betula kenaica Evans		X							
Betula papyrifera Marshall	X	X							
BORAGINACEAE									
Mertensia paniculata (Ait.) G. Don		X		X					
Myosotis alpestris F. W. Schmidt						X			
BRASSICACEAE (=CRUCIFERAE)									
Aphragmus eschscholtzianus Andrz.					X				RE,**
Arabis hirsuta (L.) Scop. ssp. *eschscholtziana* (Andrz.) Hult.		X		X					
Arabis holboellii Hornem.		X							
Arabis lyrata L. ssp. *kamchatica* (Fisch.) Hult.		X		X		X			
Barbarea orthoceras Ledeb.	X								
Brassica rapa L.								X	
Capsella bursa-pastoris (L.) Medic.								X	
Capsella rubella Reut.								X?	
Cardamine bellidifolia L.					X	X			
Cardamine pratensis L. ssp. *angustifolia* (Hook.) O.E. Schultz	X								
Cardamine umbellata Greene			X						
Descurainia sophioides (Fisch.) O.E. Shultz								X	
Draba alpina L.					X	X			
Draba aurea Vahl				X		X		X	
Draba borealis DC.				X				X	
Draba cana Rydb. [=*D. lanceolata* Royle In: Hulten (1968)]				X					RE?
Draba crassifolia Graham						X			RE
Draba fladzinensis Wulf.						X			
Draba glabella Pursh						X			
Draba lactea Adams						X			
Draba lonchocarpa Rydb.				X		X			RE
Draba longipes Raup						X			
Draba nivalis Liljebl.						X			
Draba ruaxes Payson & H. St. John						X			RE, **
Draba stenoloba Ledeb.						X			
Draba stenopetala Trautv.						X			RE, **
Erucastrum gallicum (Willd.) O. E. Schulz [=*Brassica erucastrum*]		X						X	
Erysimum cheiranthoides L.		X						X	

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Erysimum cheiranthoides L. ssp. *altum* Ahti		X							
Eutrema edwardsii R. Br.			X	X					RE
Lepidium densiflorum Schrad.								X	
Rorippa barbareaefolia (DC.) Kitigawa		X						X	
Rorippa palustris (L.) Besser ssp. *hispida* (Desv.) Jonsell	X								
Rorippa palustris (L.) Besser ssp. *palustris*	X								
Rorippa sylvestris (L.) Besser								X	
Thlaspi arcticum Pors.						X			re, **
CALLITRICHACEAE									
Callitriche verna L. emend. Lonnr.	X		X						
CAMPANULACEAE									
Campanula lasiocarpa Cham.						X			
Campanula rotundifolia L.		X		X					
Campanula uniflora L.						X			RE
CAPRIFOLIACEAE									
Linnaea borealis L.		X		X		X			
Sambucus racemosa L.		X							
Viburnum edule (Michx.) Raf.		X							
CARYOPHYLLACEAE									
Cerastium arvense L.				X					
Cerastium beeringianum Cham. & Schlecht. var. *beeringianum*						X			
Cerastium fontanum Baumg.								X	
Gastrolychnis apetala (L.) Tolm & Koz. [=*Melandrium apetalum* (L.) Fenzl.]						X			
Melandrium noctiflorum (L.) Fries								X	rei
Minuartia biflora (L.) Sching & Thell.						X			re
Minuartia macrocarpa (Pursh) Ostenf.						X			
Minuartia rubella (Wahlenb.) Graebn.						X			
Moehringia lateriflora (L.) Fenzl		X		X					
Sagina nivalis (Lindblom) Fries						X			
Sagina saginoides (L.) Karst.		X		X					
Silene acaulis L.						X			
Spergula arvensis L.								X	rei
Spergularia canadensis (Pers.) G. Don							X		RE
Stellaria borealis Bigelow	X	X	X	X					re
Stellaria borealis Bigelow ssp. *sitchana* Steud.	X	X	X	X					RE

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Stellaria calycantha (Ledeb.) Bong.	X	X	X	X					
Stellaria crassifolia Ehrh.		X							RE
Stellaria humifusa Rottb.							X		re
Stellaria laeta Richards.						X			
Stellaria longifolia Muhl. ex Willd.		X							
Stellaria media (L.) Villars								X	
Stellaria monantha Hult.				X		X			
Stellaria umbellata Turcz.						X			RE, **
CHENOPODIACEAE									
Atriplex gmelini C.A. Meyer							X		**
Chenopodium album L.								X	
Salicornia europaea L.							X		**
CORNACEAE									
Cornus canadensis L.		X							
Cornus suecica L.						X			
Swida stolonifera (Michx.) Rydb. [=*Cornus stolonifera* Michx.]		X							
CRASSULACEAE									
Rhodiola integrifolia Raf. [=*Sedum rosea* (L.) Scop. ssp. *integrifolia* (Raf.) Hult.]						X			
DIAPENSACEAE									
Diapensia lapponica L.						X			
DROSERACEAE									
Drocera anglica Huds.		X							
Drocera rotundifolia L.		X		X					
ELAEAGNACEAE									
Shepherdia canadensis (L.) Nutt.		X		X					
EMPETRACEAE									
Empetrum hermaphroditum (Lange) Hagerup [=*E. nigrum* L. ssp. *hermaphroditum* (Lange) Boecher]		X		X		X			
Empetrum nigrum L.		X		X		X			
ERICACEAE									
Andromeda polifolia L.	X								
Arctostaphylos uva-ursi (L.) Sprengel		X		X		X			
Arctous alpina (L.) Niedenzu [=*Arctostaphylos alpina* (L.) Spreng.]				X		X			
Arctous rubra (Rehd. & Wilson) Nakai [=*Arctostphylos rubra* (Rehd. & Wilson) Fern.]						X			

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Cassiope lycopodioides (Pall.) D. Don						X			
Cassiope stelleriana (Pall.) DC.				X		X			
Cassiope tetragona (L.) D. Don				X		X			
Chamaedaphne calyculata (L.) Moench	X								
Ledum groenlandicum Oeder [=*L. palustre* L. ssp. *groenlandicum* (Oeder) Hult.]	X	X							
Ledum palustre L. ssp. *decumbens* (Ait.) Hult.				X		X			
Loiseleuria procumbens (L.) Desv.				X		X			
Menziesia ferruginea Sm.		X							
Oxycoccus microcarpus Turcz. ex Rupr.	X		X						
Phyllodoce aleutica (Spreng.) A. A. Heller						X			
Vaccinium caespitosum Michx.				X		X			
Vaccinium ovalifolium Sm.				X					
Vaccinium uliginosum L.	X	X		X		X			
Vaccinium vitis-idaea L.		X		X		X			
FABACEAE (=LEGUMINOSAE)									
Astragalus alpinus L.		X				X		X	
Astragalus alpinus L. ssp. *alpinus*		X				X		X	
Astragalus polaris Benth.						X			RE
Astragalus umbellatus Bunge				X					re
Hedysarum alpinum L.		X				X			
Lathyrus palustris L. ssp. *pilosus* (Cham.) Hult.		X					X		
Lupinus nootkatensis Donn		X		X					
Lupinus polyphyllus Lindl.		X		X					
Medicago falcata L.								X	rei
Medicago sativa L.								X	rei
Melilotus albus Desr.								X	
Melilotus officinalis (L.) Lam.								X	
Oxytropis bryophila (E. Greene) Yurtsev						X			
Oxytropis huddelsonii Pors.						X			RE, **
Oxytropis maydelliana Trautv.						X			
Oxytropus varians (Rydb.) Schumann						X			
Trifolium hybridum L.								X	
Trifolium pratense L.								X	
Trifolium repens L.								X	
Vicia cracca L.								X	

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
FUMARIACEAE									
Corydalis pauciflora (Steph.) Pers.					X				
Corydalis sempervirens (L.) Pers.		X						X	
GENTIANACEAE									
Gentiana glauca Pallas				X		X			
Gentianella amarella (L.) Boerner [=*Gentiana amarella* L. ssp. *acuta* (Michx.) Hult.]				X					
Gentianella propinqua (Richards.) Gillet var. *propinqua* [=*Gentiana propinqua* Richards. ssp. *propinqua*]				X					
Menyanthes trifoliata L.	X		X						
Swertia perennis L.			X						
GERANIACEAE									
Geranium erianthum DC.		X		X					
Geranium pusillum Burm.								X	
GROSSULARIACEAE (from SAXIFRAGACEAE)									
Ribes hudsonianum Richards.		X							
Ribes laxiflorum Pursh		X							
Ribes triste Pall.		X							
HALORAGACEAE									
Hippuris montana Ledeb.	X		X		X				
Hippuris tetraphylla L.F.							X		
Hippuris vulgaris L.	X								
Myriophyllum exalbescens Fern. [=*M. spicatum* L.]	X								RE
Myriophyllum verticillatum L.	X								RE
HYDROPHYLLACEAE									
Romanzoffia sitchensis Bong.					X	X			
LAMIACEAE									
Galeopsis bifida Boem.								X	
Mentha arvensis L.	X								
Scutellaria galericulata L.	X								
LENTIBULARIACEAE									
Pinguicula villosa L.			X						
Utricularia intermedia Hayne	X								
Utricularia minor L.	X								

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Utricularia vulgaris L. ssp. *macrorhiza* (LeConte) Clauson	X								
MYRICACEAE									
Myrica gale L.	X								
NYMPHACEAE									
Nuphar polysepalum Engelm.	X								
ONAGRACEAE									
Circaea alpina L.	X								
Epilobium anagallidifolium Lam.			X	X	X				
Epilobium angustifolium L.		X							
Epilobium ciliatum Raf. ssp. *glandulosum* (Lehm.) Hoch & Raven [=*E. glandulosum* Lehm.]			X		X				
Epilobium hornemannii Reichb. ssp. *hornemannii*			X						
Epilobium latifolium L.		X		X		X		X	
Epilobium palustre L.	X								
OROBANCHACEAE									
Boschniakia rossica (Cham & Schldl.) B. Fedtsch.		X							
PAPAVERACEAE									
Papaver alboroseum Hult.						X			**
Papaver nudicaule L.								X	
Papaver radicatum Rottb. ssp. *radicatum*						X			
PLANTAGINACEAE									
Plantago major L. var. *major*								X	
Plantago maritima L. ssp. *juncoides* (Lam.) Hult.							X		
PLUMBAGINACEAE									
Armeria maritima (Mill.) Willd. ssp. *arctica* (Cham.) Hult.						X			RE
POLEMONIACEAE									
Polemonium acutiflorum Willd.	X		X						
Polemonium pulcherrimum Hook.		X						X	
POLYGONACEAE									
Bistorta vivipara (L.) Gray [=*Polygonum viviparum* L.]				X		X			
Oxyria digyna (L.) Hill				X	X	X			
Polygonum amphibium L.	X								
Polygonum aviculare L.								X	

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PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Polygonum convolvulus L.								X	
Polygonum fowleri Robins.							X		RE
Polygonum lapathifolium L.	X								rei
Polygonum pennsylvanicum L. ssp. *oneillii* (Brenckle) Hult.	X								
Rumex acetosella L.								X	
Rumex arcticus Trautv.			X						
Rumex crispus L.								X	
Rumex fenestratus Greene	X								
Rumex transitorius K. H. Resch	X								RE
PORTULACEAE									
Claytonia sarmentosa C. Meyer						X			
PRIMULACEAE									
Dodecatheon pulchellum (Raf.) Merr.							X		
Douglasia alaskana (Cov. & Stand. ex Hult.) S. Kelso [=*Androsace alaskana* Cov. & Stand.]						X			**
Glaux maritima L.							X		
Lysimachia thyrsiflora L.	X						X?		
Primula cuneifolia Ledeb. ssp. *saxifragifolia* (Lehm.) Smith & Forrest					X?	X			
Trientalis europaea L.	X	X	X	X		X			
PYROLACEAE									
Moneses uniflora (L.) Gray		X							
Orthilia secunda (L.) House [=*Pyrola secunda* L. ssp. *secunda*]		X		X		X			
Pyrola asarifolia Michx.		X		X					
Pyrola asarifolia Michx. var. *purpurea* (Bunge) Fern.		X		X					
Pyrola chlorantha Sw.		X							
Pyrola minor L.		X		X		X			
RANUNCULACEAE									
Aconitum delphinifolium DC.		X		X					
Aconitum delphinifolium DC. ssp. *paradoxicum* (Reichb.) Maguire & Hult.						X			RE
Actaea rubra (Ait.) Willd.		X		X					
Anemone multifida Poir. var. *saxicola* B. Boivan						X			re,**
Anemone narcissiflora L. var. *monantha* DC.						X			
Anemone narcissiflora L. ssp. *villosissima* (DC.) Hult.		X		X		X			RE
Anemone parviflora Michx.						X			
Anemone richardsonii Hock.	X		X						
Aquilegia formosa Fisch.		X		X					

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Caltha palustris L. ssp. *asarifolia* (DC.) Hult.	X								
Delphinium glaucum S. Wats.		X		X					
Ranunculus arborvitus L.								X	
Ranunculus cymbalaria Pursh							X		
Ranunculus eschscholtzii Schlecht.					X	X			
Ranunculus gmelini DC. ssp. *gmelini*	X								
Ranunculus hyperboreus Rottb.	X?		X		X				
Ranunculus lapponicus L.	X								
Ranunculus macounii Britt.	X								
Ranunculus nivalis L.						X			
Ranunculus occidentalis Nutt.			X	X					
Ranunculus pygmaeus Wahl.						X			
Ranunculus scleratus L. ssp. *multifidus* (Nutt.) Hult.	X								
Ranunculus trichophyllus Chaix	X								
Ranunculus trichophyllus Chaix var. *trichophyllus*	X								
Thalictrum alpinum L.						X			re
Thalictrum sparsiflorum Trucz.		X							
ROSACEAE									
Acomastylis rossii (R. Br.) E. Greene [=*Geum rossii* (R. Br.) Ser. ex DC.]						X			
Amelanchier alnifolia (Nutt.) Nutt.		X		X					
Comarum palustre L. [=*Potentilla palustris* (L.) Scop.]	X								
Dryas alaskensis Pors. [=*D. octopetala* L. ssp. *alaskensis* (Pors.) Hult.]						X			
Dryas drummondii Richards.		X							
Dryas integrifolia Vahl.						X?			
Dryas octopetala L.						X			
Fragaria chiloensis (L.) Duchesne								X	
Geum macrophyllum Willd. ssp. *macrophyllum*		X							
Geum perincisum Rydb. [=*G. macrophyllum* Willd. ssp. *perincisum* (Rydb.) Raup.]		X							RE
Luetkea pectinata (Pursh) Ktze.				X	X	X			
Pentaphylloides floribunda (Pursh.) Loeve [=*Potentilla fruticosa* L.]	X	X		X					
Potentilla anserina L.								X	
Potentilla diversifolia Lehm.						X			
Potentilla egedii Wormsk. ssp. *grandis* (Torr. & Gray) Hult.							X		
Potentilla hyparctica Malte						X			re
Potentilla multifida L.		X		X		X		X	

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Potentilla norvegica L.								X	
Potentilla uniflora Ledeb.						X			
Rosa acicularis Lindl.		X		X					
Rosa nutkana Presl		X							
Rubus arcticus L.			X		X				
Rubus chamaemorus L.	X		X						
Rubus idaeus L.		X		X					
Rubus pedatus Sm.			X	X					
Rubus stellatus Sm. [=*R. arcticus* L. ssp. *stellatus* (Sm.) Boiv. emend. Hult.]				X					
Sanguisorba stipulata Raf.	X	X	X	X					
Sibbaldia procumbens L.				X		X			
Sorbus scopulina Greene		X		X					
Spiraea beauverdiana Schneid.	X			X					
RUBIACEAE									
Galium boreale L.		X		X				X	
Galium trifidum L. ssp. *trifidum*	X								
Galium triflorum Michx.	X								
SALICACEAE									
Populus balsamifera L.		X		X					
Populus balsamifera L. ssp. *balsamifera*		X		X					
Populus balsamifera L. ssp. *trichocarpa* (Torr. & Gray) Brayshaw		X							
Populus tremuloides Michx.		X		X					
Salix alaxensis (Anderss.) Cov.		X		X					
Salix arctica Pall.						X			
Salix barclayi Anderss.		X?	X						
Salix bebbiana Sarg. [=*S. depressa* L. ssp. *rostrata* (Anderss.) Hiitonen) *niphoclada*]		X							
Salix brachycarpa Nutt. ssp. *niphoclada* (Rydb.) Argus			X	X	X	X			
Salix fuscescens Anderss.	X								
Salix glauca L.				X		X			
Salix lucida Muhl. ssp. *lasiandra* (Benth.) Argus [=*S. lasiandra* Benth.]	X								
Salix ovalifolia Trautv.							X		
Salix planifolia Pursh ssp. *pulchra* (Cham.) Argus [=*S. pulchra* Cham.]				X		X			
Salix reticulata L.				X		X			
Salix rotundifolia Trautv.						X			
Salix scouleriana Barratt		X							

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Salix sitchensis Sanson	X		X?						
SANTALACEAE									
Geocaulon lividum (Richards.) Fern.		X		X					
SAXIFRAGACEAE									
Chrysosplenium tetrandrum (Lund) T. Fries	X		X						
Heuchera glabra Willd.	X	X	X	X					
Leptarrhena pyrolifolia (D. Don) Ser.			X		X				
Mitella pentandra Hook.			X	X					
Parnassia kotzebuei Cham. & Schlecht.	X		X	X					
Parnassia palustris L.	X		X						
Parnassia palustris L. ssp. *neogaea* (Fern.) Hult.	X		X						
Saxifraga adscendens L.						X			
Saxifraga bronchialis L.						X			
Saxifraga caespitosa L.						X			
Saxifraga calycina Sternb.						X			re
Saxifraga cernua L.						X			RE
Saxifraga eschscholtzii Sternb.						X			RE
Saxifraga flagellaris Willd.						X			re
Saxifraga foliolosa R. Br.					X?	X			RE
Saxifraga lyallii Engler ssp. *hultenii* (Cald. & Sav.) Cald. & Sav.			X		X				
Saxifraga hirculis L.					X				re
Saxifraga nelsoniana D. Don [=*S. punctata* L. ssp. *pacifica* Hult.]					X	X			
Saxifraga nivalis L.						X			
Saxifraga oppositifolia L.						X			
Saxifraga rivularis L.					X				
Saxifraga serpyllifolia Pursh						X			re
Saxifraga tricuspidata Rottb.						X			
SCROPHULACEAE									
Castilleja unalaschcensis (Cham. & Schlecht.) Malte			X	X				X	
Euphrasia disjuncta Fern & Wieg.		X				X		X	
Linaria vulgaris Mill.								X	
Mimulus guttatus DC.	X								
Pedicularis capitata Adams.				X		X			
Pedicularis labradorica Wirsing	X		X	X		X			
Pedicularis lanata Cham. & Schlecht						X			RE

FORT RICHARDSON VASCULAR PLANT SPECIES LIST									APRIL 18, 1995
PLANT NAME	LOWLAND FOREST		SUB ALPINE		ALPINE		HALO-PHYTIC	DISTURBED	NOTES
	W	MD	W	MD	W	MD			
Pedicularis langsdorfii Fisch. ex Steven			X	X					
Pedicularis verticillata L.				X		X			
Rhinanthus minor L.	X	X	X	X				X	
Veronica americana Schwein.	X								
Veronica wormskjoldii Roem & Schult.				X		X			
URTICACEAE									
Urtica dioica L. ssp. *gracilis* (Aiton) Selander	X								
VALERIANACEAE									
Valeriana capitata Pall.				X					
Valeriana sitchensis Bong.				X					
VIOLACEAE									
Viola epipsila Ledeb.	X								
Viola langsdorffii Fisch.			X	X					
Viola renifolia Gray		X							
Viola selkirkii Pursh				X					**

Appendix E
Fort Richardson Vascular Plants Currently Being Tracked by the Alaska Natural Heritage Program's Biological Conservation Database for South-Central Alaska With Global (G) and State (S) Rankings

FORT RICHARDSON VASCULAR PLANTS CURRENTLY BEING TRACKED BY AKNHP'S BIOLOGICAL CONSERVATION DATABASE FOR SOUTHCENTRAL ALASKA WITH GLOBAL (G) AND STATE (S) RANKINGS.

COL#	TAXON	RANK
360	*Anemone multifida* Poir. var. *saxicola* B. Boivan	G4G5QS2S3
703	*Aphragmus eschscholtzianus* Andrz.	G3S2S3
860		
1012	*Atripex gmilini* C.A. Meyer	G5SR
1120		
1147		
1168		
8070		
422	*Carex deweyana* Schwein	G5S1SE
8020	*Douglasia alaskana* (Cov. & Stand. ex Hult.) S. Kelso	G2G3S2S3
8076		
795		
695	*Draba ruaxes* Payson & St. John	G2G3S2
8038		
191	*Draba stenopetala* Trautv.	G3S2
389		
471	*Eleocharis kamtschatica* (C.A. Meyer) Kam.	G4S2
472		
1141		
1146		
939	*Eleocharis quinquefolia* (F. Hartmann) O. Schwarz	G5S1

923	*Eriophorum viridi-carinatum* (Englem.) Fern.	G5S2
1042		
135	*Glyceria striata* (Lam.) Hitchc. ssp. *stricta* (Scribn.) Hult.	G5T5QS2
955		
225	*Hammarbya paludosa* (L.) Ktze.	G5S2
545		
932		
988	*Malaxis monophylla* (L.) Sw. var. *brachypoda* (A. Gray) Morris & Ames	G5T5S3S4
715		
8032		
8077A		
1019	*Myriophyllum verticillatum* L.	G5S3
1030	*Najas flexilis* (Willd.) Rost. & Schmidt	G5S1S2
1117		
1100	*Oxytropis huddelsonii* Pors.	G3S2S3
689	*Papaver alboroseum* Hult.	G3S3
8093		
487	*Salicornia europaea* L.	G5NES2
381	*Saxifraga adscendens* L. ssp. *oregonensis* (Raf.) Bacigalupi	G5T4T5S2S3
700		
180	*Saxifraga eschscholtzii* Sternb.	G4S3S4
375		
699		
883		
8101		

409	*Smilacina stellata* (L.) Desf.	G5S2
1086	*Stellaria umbellata* Turcz.	G4S1S2
1115		
8082A	*Taraxacum carneocoloratum* Nels.	G2QS2
698	*Thlaspi arcticum* Pors.	G3S3
8037		
8085		
414	*Viola selkirkii* Pursh	G5?S3
626	*Zannichellia palustris* L.	G5S2S3
1169		

Appendix F
Identified Cryptogams at Fort Richardson (With Synonyms)

Prepared by Dr. Barbara Murray

IDENTIFIED CRYPTOGAMS AT FORT RICHARDSON (WITH COMMON SYNONYMS)
PREPARED BY BARBARA MURRAY
MAY 1995

Lichens

Alectoria nigricans (Ach.) Nyl.
Alectoria ochroleuca (Hoffm.) A.Massal.
Asahinea chrysantha (Tuck.) W.L.Culb.& C.F.Culb.
    Cetraria chrysantha Tuck.
Asahinea scholanderi
Bryocaulon divergens (Ach.) Kärnefelt
    Cornicularia divergens Ach.
Bryoria nitidula (Th.Fr.) Brodo & D.Hawksw.
    Alectoria lanea auct.
Candelariella terrigena Räsänen
Cetraria chlorophylla
Cetraria hepatizon
Cetraria islandica (L.) Ach.
Cetraria kamczatica Savicz
Cetraria muricata (Ach.) Eckfeldt
    Coelocaulon muricatum (Ach.) J.R.Laundon
    Cornicularia muricata (Ach.) Ach.
Cetraria nigricans Nyl.
Cetraria sepincola
Cetrariella delisei (Bory ex Schaer.) Kärnefelt & A.Thell
    Cetraria delisei (Bory ex Schaer.) Nyl.
    Cetraria hiascens (Fr.) Th.Fr.
Cetrariella fastigiata (Delise ex Nyl.in Norrl.) Kärnefelt & A.Thell
    Cetraria fastigiata (Delise ex Nyl.in Norrl.) Kärnefelt
Cladina aberrans (Abbayes) Hale & W.L.Culb.
    Cladonia aberrans (Abbayes) Stuck.
    Cladina stellaris (Opiz) Brodo var. *aberrans* (Abbayes) Ahti
Cladina arbuscula (Wallr.) Hale & W.L.Culb.
    Cladonia arbuscula (Wallr.) Flot.
Cladina mitis (Sandst.) Hustich
    Cladonia mitis Sandst.
Cladina rangiferina (L.) Nyl.
    Cladonia rangiferina (L.) F.H.Wigg.
Cladina stellaris (Opiz) Brodo
    Cladonia alpestris (L.) Rabenh.
    Cladonia stellaris (Opiz) Pouzar & Vezda
Cladonia acuminata (Ach.) Norrl.

Cladonia amaurocraea (Flörke) Schaer.
Cladonia amaurocraea (Flörke) Schaer. forma *celotea* Ach.
Cladonia bellidiflora (Ach.) Schaer.
Cladonia borealis S.Stenroos
Cladonia cariosa (Ach.) Spreng.
Cladonia carneola (Fr.) Fr.
Cladonia cenotea
Cladonia cervicornis (Ach.) Flot.
Cladonia chlorophaea (Flörke ex Sommerf.) Spreng.
    Cladonia pyxidata (L.) Hoffm. subsp. *chlorophaea* (Flörke ex Sommerf.) Spreng.
Cladonia coccifera (L.) Willd.
    Cladonia coccifera (L.) Willd. var. *coccifera*
Cladonia cornuta (L.) Hoffm.
Cladonia crispata (Ach.) Flot.
Cladonia crispata (Ach.) Flot. var. *crispata*
Cladonia deformis (L.) Hoffm.
Cladonia ecmocyna Leight.
Cladonia ecmocyna Leight. subsp. *ecmocyna*
Cladonia fimbriata (L.) Fr.
    Cladonia major (K.Hagen) Sandst.
Cladonia gracilis (L.) Willd. subsp. *gracilis*
    Cladonia gracilis (L.) Willd.var. *gracilis*
Cladonia gracilis (L.) Willd. subsp. *turbinata* (Ach.) Ahti
    Cladonia gracilis (L.) Willd. var. *dilatata* (Hoffm.) Vain.
Cladonia gracilis (L.) Willd. subsp. *vulnerata* Ahti
Cladonia kanewskii Oksner
    Cladonia nipponica Asahina var. *aculeata* Asahina
    Cladonia nipponica Asahina var. *sachalinensis*
Cladonia ochrochlora Flörke
Cladonia phyllophora Ehrh.ex Hoffm.
    Cladonia degenerans (Flörke) Spreng.
Cladonia pleurota (Flörke) Schaer.
    Cladonia coccifera (L.) Willd. var. *pleurota* (Flörke) Vain.
Cladonia pocillum (Ach.) Grognot
Cladonia pseudostellata Asahina
Cladonia pyxidata (L.) Hoffm.
Cladonia singularis S.Hammer
    [Note: a recently described species, new to Alaska]
Cladonia squamosa Hoffm. var. *squamosa*
Cladonia subulata (L.) F.Weber ex F.H.Wigg.
Cladonia sulphurina (Michx.) Fr.
    Cladonia deformis (L.) Hoffm. var. *gonecha* (Ach.) Arnold
Cladonia thomsonii Ahti
Cladonia uncialis (L.) F.Weber ex F.H.Wigg.
Dactylina arctica (Richardson) Nyl.

Dactylina ramulosa (Hook.) Tuck.
Flavocetraria cucullata (Bellardi) Kärnefelt & A.Thell
    Cetraria cucullata (Bellardi) Ach.
Flavocetraria nivalis (L.) Kärnefelt & A.Thell subsp. *nivalis*
    Cetraria nivalis (L.) Ach.
Hypogymnia austerodes
Hypogymnia bitteri
Hypogymnia physodes
Hypogymnia subobscura (Vain.) Poelt
Lobaria linita (Ach.) Rabenh.
Lobaria pulmonaria
Lobaria scrobiculata
Lopadium pezizoideum (Ach.) Körb.
Nephroma arcticum (L.) Torss.
Nephroma bellum
Nephroma expallidum (Nyl.) Nyl.
Nephroma parile
Ochrolechia frigida (Sw.) Lynge
Ophioparma lapponicum
Pannaria pezizoides (Weber) Trevisan
Parmelia hygrophila
Parmelia omphalodes (L.) Ach.
Parmelia saxatilis
Parmelia squarrosa
Parmelia stygia
Parmelia sulcata
Parmeliopsis ambigua
Peltigera aphthosa (L.) Willd.
    Peltigera aphthosa (L.) Willd.var. *aphthosa*
Peltigera canina (L.) Willd.
Peltigera didactyla (With.) J.R.Laundon
    Peltigera spuria (Ach.) DC.
Peltigera horizontalis (Huds.) Baumg.
Peltigera lepidophora (Nyl. ex Vain.) Bitter
Peltigera leucophlebia (Nyl.) Gyeln.
    Peltigera aphthosa (L.) Willd. var. *leucophlebia* Nyl.
Peltigera malacea (Ach.) Funck
Peltigera membranacea (Ach.) Nyl.
Peltigera praetextata (Flörke ex Sommerf.) Zopf
Peltigera rufescens (Weiss) Humb.
    Peltigera canina (L.) Willd. var. *rufescens* (Weiss) Mudd
Peltigera scabrosa Th.Fr.
Physica dubia
Platismatia glauca
Pseudephebe pubescens

Pseudocyphellaria crocata
Psoroma hypnorum (Vahl) S.Gray
Ramalina thrausta
Rhizocarpon geographicum
Solorina crocea (L.) Ach.
Sphaerophorus fragilis (L.) Pers.
Sphaerophorus globosus (Huds.) Vain.
    Sphaerophorus coralloides Pers.
Stereocaulon alpinum Laurer ex Funck
Stereocaulon arenarium (Savicz) I.M.Lamb
Stereocaulon glareosum (Savicz) H.Magn.
Stereocaulon glareosum (Savicz) H.Magn.var. *brachyphylloides* I.M.Lamb
Stereocaulon glareosum (Savicz) H.Magn.var. *glareosum*
Stereocaulon grande (H.Magn.) H.Magn.
Stereocaulon groenlandicum (Å.E.Dahl) I.M.Lamb
Stereocaulon paschale (L.) Hoffm.
Stereocaulon rivulorum H.Magn.
Stereocaulon tomentosum Fr.
Thamnolia subuliformis (Ehrh.) W.L.Culb.
Thamnolia vermicularis (Sw.) Ach. ex Schaer.
Umbilicaria proboscidea
Umbilicaria rigida
Umbilicaria torrefacta
Vulpicida pinastri
Vulpicida tilesii (Ach.) J.E.Mattson & M.J.Lai
    Cetraria tilesii Ach.
Xanthoria candelaria

Hepatics

Aneura pinguis (L.) Dumort.
Barbilophozia kunzeana (Huebener) Gams
    Orthocaulis kunzeanus (Huebener) H.Buch
Barbilophozia lycopodioides (Wallr.) Loeske
Barbilophozia quadriloba
Blasia pusilla L.
Blepharostoma trichophyllum (L.) Dumort.
Cephalozia ambigua
Cephalozia bicuspidata (L.) Dumort.
    Cephalozia lammersiana (Huebener) Carring.
Gymnocolea acutiloba (Schiffn.) Müll.Frib.
    Gymnocolea inflata (Huds.) Dumort. var. *acutiloba* (Kaal.) S.W.Arnell
Gymnomitrion obtusum

Jungermannia subelliptica (Lindb. ex Kaal.) Levier
Lophozia longidens (Lindb.) Macoun
Lophozia ventricosa
Pellia neesiana (Gottsche) Limpr.
Pleurocladula albescens (Hook.) Grolle
    Pleuroclada albescens (Hook.) Spruce
Ptilidium californicum
Ptilidium pulcherrimum
Ptilidium ciliare (L.) Hampe
Scapania scandica

Mosses

Abietinella abietina (Hedw.) M.Fleisch.
    Thuidium abietinum (Hedw.) Schimp.in Bruch, Schimp.& W.Gümbel
Andreaea blyttii
Andreaea nivalis
Andreaea rupestris
Aulacomnium androgynum (Hedw.) Schimp.
Aulacomnium palustre (Hedw.) Schwägr.
Bartramia ithyphylla Brid.
Brachythecium turgidum
Bryoerythrophyllum recurvitostre
Bryum caespiticium Hedw.
Bryum pseudotriquetrum (Hedw.) P.Gaertn., B.Mey.& Scherb.
    Bryum neodamense Itzigs.
    Bryum ovatum Jur.
Buxbaumia aphylla Hedw.
Calliergon cordifolium (Hedw.) Kindb.
Calliergon richardsonii (Mitt.) Kindb.
Calliergon stramineum (Brid.) Kindb.
Ceratodon purpureus (Hedw.) Brid.
Climacium dendroides (Hedw.) F.Weber & D.Mohr
Conostomum tetragonum (Hedw.) Lindb.
Cratoneuron filicinum
Dicranella schreberiana
Dicranoweisia crispula (Hedw.) Lindb.ex Milde
Dicranum brevifolium (Lindb.) Lindb.
Dicranum elongatum Schleich.ex Schwägr.
Dicranum majus Sm.
Dicranum polysetum Sw.
Dicranum scoparium Hedw.
Distichium capillaceum (Hedw.) Bruch, Schimp.& W.Gümbel

Ditrichum flexicaule
Drepanocladus aduncus (Hedw.) Warnst.
Drepanocladus badius
Drepanocladus exannulatus
Drepanocladus trichophyllus
Encalypta brevicolla (Bruch & Schimp.in Bruch, Schimp.& W.Gümbel) Bruch ex Ångstr.var. *BREVICOLLA*
Encalypta brevicolla (Bruch & Schimp.in Bruch, Schimp.& W.Gümbel) Bruch ex Ångstr.subsp. *brevicolla*
Encalypta brevipes Schljakov
Encalypta procera
Encalypta rhaptocarpa Schwägr.
Encalypta vulgaris Hedw.var. *rhabdocarpa* (Schwägr.) E.Lawton
Eurhynchium pulchellum (Hedw.) Jenn.
Hylocomiastrum pyrenaicum (Spruce) M.Fleisch.in Broth.
Hylocomium pyrenaicum (Spruce) Lindb.
Hylocomium splendens (Hedw.) Schimp.in Bruch, Schimp.& W.Gümbel
Hylocomium alaskanum (Lesq.& James) Austin
Hylocomium splendens (Hedw.) Schimp.in Bruch, Schimp.& W.Gümbel var. *alaskanum* (Lesq.& James) Limpr.
Hylocomium splendens (Hedw.) Schimp.in Bruch, Schimp.& W.Gümbel var. *obtusifolium* (Geh.) Par.
Hypnum revolutum
Kiaeria blyttii (Schimp.) Broth.
Arctoa blyttii (Schimp.) Loeske
Kiaeria glacialis (Berggr.) I.Hagen
Kiaeria starkei
Leptobryum pyriforme (Hedw.) Wilson
Loeskypnum badium (Hartm.) H.K.G.Paul
Drepanocladus badius (Hartm.) G.Roth
Oligotrichum hercynicum (Hedw.) Lam.& DC.
Oligotrichum parallelum (Mitt.) Kindb.
Oncophorus virens
Orthotrichum obtusifolium
Paludella squarrosa (Hedw.) Brid.
Philonotis fontana (Hedw.) Brid.
Philonotis fontana (Hedw.) Brid.var. *pumila* (Turner) Brid.
Philonotis tomentella Molendo
Plagiomnium ellipticum (Brid.) T.Kop.
Plagiomnium rugicum (Laur.) T.Kop.
Plagiomnium medium (Bruch & Schimp.in Bruch, Schimp.& W.Gümbel) T.Kop.
Mnium medium Bruch & Schimp.in Bruch, Schimp.& W.Gümbel
Pleurozium schreberi (Brid.) Mitt.
Pogonatum dentatum (Brid.) Brid.
Pogonatum capillare (Michx.) Brid.

Pogonatum urnigerum (Hedw.) P.Beauv.
Pohlia cruda (Hedw.) Lindb.
Pohlia crudoides (Sull.& Lesq.) Broth.
Pohlia drummondii (Müll.Hal.) A.L.Andrews
Pohlia filum (Schimp.) O.Mårt.
    Pohlia gracilis (Bruch & Schimp.in Bruch, Schimp.& W.Gümbel) Lindb.
    Pohlia rothii (Correns in Limpr.) Broth.
    Pohlia schleicheri H.A.Crum
Pohlia ludwigii (Spreng.ex Schwägr.) Broth.
Pohlia nutans (Hedw.) Lindb.
    Pohlia schimperi (Müll.Hal.) A.L.Andrews in Grout
Pohlia proligera (Lindb.ex Breidl.) Lindb.ex Arnell
Pohlia wahlenbergii (F.Weber & D.Mohr) A.L.Andrews
    Mniobryum albicans (Wahlenb.) Limpr.
    Mniobryum wahlenbergii (F.Weber & D.Mohr) Jenn.
    Pohlia albicans Lindb.
Polytrichastrum alpinum (Hedw.) G.L.Sm.
    Pogonatum alpinum (Hedw.) Röhl.
Polytrichastrum sexangulare (Brid.) G.L.Sm.var. *sexangulare*
    Polytrichum sexangulare Brid.
Polytrichum commune Hedw.
Polytrichum commune Hedw.var. *commune*
    Polytrichum commune Hedw.var. *perigoniale* (Michx.) Hampe
Polytrichum hyperboreum R.Br.
Polytrichum juniperinum Hedw.
Polytrichum piliferum Hedw.
Polytrichum strictum Brid.
    Polytrichum affine Funck
    Polytrichum juniperinum Hedw.var. *gracilius* Wahlenb.
Polytrichum swartzii Hartm.
    Polytrichum algidum I.Hagen & C.E.O.Jensen
Pseudobryum cinclidioides (Huebener) T.Kop.
    Mnium cinclidioides Huebener
Ptilium crista-castrensis (Hedw.) De Not.
Pylaisiella polyantha
Racomitrium affine (Schleich.ex F.Weber & D.Mohr) Lindb.
Racomitrium canescens (Hedw.) Brid.
Racomitrium ericoides (F.Weber ex Brid.) Brid.
    Racomitrium canescens (Hedw.) Brid.var. *ericoides* (Brid.) Bruch, Schimp.& W.Gümbel
    Racomitrium canescens (Hedw.) Brid.var. *strictum* Schlieph. in Limpr.
Racomitrium fasciculare
Racomitrium lanuginosum (Hedw.) Brid.
Rhizomnium andrewsianum (Steere) T.Kop.
Rhizomnium gracile T.Kop.

Rhizomnium magnifolium (Horik.) T.Kop.
Mnium punctatum Hedw.var. *elatum* Schimp.
Rhizomnium perssonii T.Kop.
Rhizomnium nudum (E.Britton & R.S.Williams) T.Kop.
Rhizomnium pseudopunctatum (Bruch & Schimp.) T.Kop.
Mnium pseudopunctatum Bruch & Schimp.
Rhytidiadelphus triquetrus (Hedw.) Warnst.
Rhytidium rugosum (Hedw.) Kindb.
Sanionia uncinata Hedw.
Drepanocladus uncinatus (Hedw.) Warnst.
Schistostega pennata (Hedw.) F.Weber & D.Mohr
Sphagnum angustifolium (C.E.O.Jensen ex Russow) C.E.O.Jensen in Tolf
Sphagnum recurvum P.Beauv.var. *tenue* H.Klinggr.
Sphagnum aongstroemii C.Hartm.
Sphagnum capillifolium (Ehrh.) Hedw.
Sphagnum capillaceum (Weiss) Schrank
Sphagnum nemoreum Scop.auct.plur.
Sphagnum centrale C.E.O.Jensen in Arnell & C.E.O.Jensen
Sphagnum fuscum (Schimp.) H.Klinggr.
Sphagnum girgensohnii Russow
Sphagnum lenense H.Lindb.in Pohle
Sphagnum magellanicum Brid.
Sphagnum papillosum Lindb.
Sphagnum recurvum P.Beauv.
Sphagnum recurvum P.Beauv.var. *recurvum*
Sphagnum riparium Ångstr.
Sphagnum russowii Warnst.
Sphagnum robustum (Warnst.) Röll
Sphagnum squarrosum Crome
Sphagnum subsecundum Nees in Sturm var. *SUBSECUNDUM*
Sphagnum teres (Schimp.) Ångstr.
Tetraphis pellucida Hedw.
Timmia austriaca Hedw.
Tomentypnum nitens (Hedw.) Loeske
Tortella fragilis (Drumm.) Limpr.
Tortula ruralis (Hedw.) P.Gaertn., B.Mey.& Scherb.
Warnstorfia exannulata (Schimp. in Bruch, Schimp.& W.Gümbel) Loeske
Drepanocladus exannulatus (Schimp. in Bruch, Schimp.& W.Gümbel) Warnst.
Warnstorfia trichophylla (Warnst.) Tuom.& T.Kop.
Drepanocladus trichophyllus (Warnst.) Podp.

Appendix G
Synopsis of Cryptogam Collections for Fort Richardson Military Reservation, Alaska

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	**Family**	**Taxon**	**Occurrence**	**Zone**	**Substrate**	**Moisture**	**DB No.**	**ALA No.**
hepatic	Jungermanniaceae	*Anastrophyllum* sp.		subalpine	terricolous	mesic	1994	B0027807
hepatic	Aneuraceae	*Aneura pinguis*		subalpine	terricolous	mesic	2620	B0028179
hepatic	Antheliaceae	*Anthelia* sp.		alpine	saxicolous-terricolous	wet	1668	B0027688
hepatic	Jungermanniaceae	*Barbilophozia kunzeana*		lowland	terricolous	wet	2122	B0027865
hepatic	Jungermanniaceae	*Barbilophozia kunzeana*		lowland	terricolous	wet	2123	B0027866
hepatic	Jungermanniaceae	*Barbilophozia lycopodioides*		alpine	terricolous	mesic	2039	B0027828
hepatic	Jungermanniaceae	*Barbilophozia lycopodioides*		subalpine	terricolous	mesic	2061	B0027849
hepatic	Jungermanniaceae	*Barbilophozia quadriloba*		lowland	"log,stump,etc"		2288	B0027993
hepatic	Blasiaceae	*Blasia pusilla*		lowland	terricolous	mesic	2097	B0027861
hepatic	Blasiaceae	*Blasia pusilla*		lowland	terricolous	mesic	2304	B0028002
hepatic	Blasiaceae	*Blasia pusilla*		subalpine	terricolous	mesic	2561	B0028172
hepatic	Pseudolepicoleaceae	*Blepharostoma trichophyllum*		alpine	saxicolous-terricolous		1669	B0027689
hepatic	Calypogeiaceae	*Calypogeia* sp.		subalpine	saxicolous-terricolous		2008	B0027818
hepatic	Cephaloziaceae	*Cephalozia ambigua*		alpine	terricolous	wet	2512	B0028133
hepatic	Cephaloziaceae	*Cephalozia bicuspidata*		lowland	"log,stump,etc"		2291	B0027996
hepatic	Cephaloziaceae	*Cephalozia bicuspidata*		lowland	"log,stump,etc"		2395	B0028068
hepatic	Cephaloziaceae	*Cephalozia bicuspidata*		subalpine	terricolous		2571	B0028175
hepatic	Cephaloziellaceae	*Cephaloziella* sp.		lowland	terricolous	mesic	1862	B0027770
hepatic	Cephaloziaceae	*Cladopodiella* sp.		lowland	terricolous	wet	2128	B0027871
hepatic	Scapaniaceae	*Diplophyllum* sp.		alpine	saxicolous	mesic	2425	B0028090
hepatic	Jungermanniaceae	*Gymnocolea acutiloba*		alpine	saxicolous-terricolous	mesic	1674	B0027694
hepatic	Gymnomitriaceae	*Gymnomitrion obtusum*		alpine	saxicolous		2424	B0028089
hepatic	Jungermanniaceae	*Jamesoniella* sp.		lowland	terricolous	wet	2198	B0027938
hepatic	Jungermanniaceae	*Jungermannia* sp.		subalpine	terricolous	mesic	2523	B0028140
hepatic	Jungermanniaceae	*Jungermannia subelliptica*		alpine	terricolous		2469	B0028106
hepatic	Jungermanniaceae	*Lophozia longidens*		lowland	"bark,wood"		1749	B0027739
hepatic	Jungermanniaceae	*Lophozia longidens*		lowland	"bark,wood"		1762	B0027750
hepatic	Jungermanniaceae	*Lophozia longidens*		lowland	"bark,wood"		1817	B0027755
hepatic	Jungermanniaceae	*Lophozia longidens*		lowland	terricolous	mesic	2330	
hepatic	Jungermanniaceae	*Lophozia ventricosa*		lowland	"bark,wood"		1752	B0027742
hepatic	Marchantiaceae	*Marchantia* sp.		lowland	terricolous	mesic	2093	B0027857
hepatic	Gymnomitriaceae	*Marsupella* sp.		alpine	saxicolous-terricolous		1663	B0027683
hepatic	Jungermanniaceae	*Mylia* sp.		lowland	terricolous	wet	2202	B0027942
hepatic	Jungermanniaceae	*Nardia* sp.		subalpine	terricolous	mesic	2056	B0027844

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
hepatic	Pelliaceae	*Pellia neesiana*		subalpine	terricolous	mesic	2560	B0028171
hepatic	Cephaloziaceae	*Pleurocladula albescens*		alpine	saxicolous-terricolous		1670	B0027690
hepatic	Cephaloziaceae	*Pleurocladula albescens*		alpine	terricolous		2482	B0028119
hepatic	Cephaloziaceae	*Pleurocladula albescens*		subalpine	terricolous	mesic	2550	B0028164
hepatic	Ptilidiaceae	*Ptilidium californicum*		subalpine	"bark,wood"		2567	B0028174
hepatic	Ptilidiaceae	*Ptilidium ciliare*		lowland	"log,stump,etc"		2263	B0027980
hepatic	Ptilidiaceae	*Ptilidium ciliare*		lowland	terricolous	mesic	2239	
hepatic	Ptilidiaceae	*Ptilidium pulcherrimum*		lowland	"bark,wood"		1765	B0027751
hepatic	Ptilidiaceae	*Ptilidium pulcherrimum*		lowland	"log,stump,etc"		2265	B0027982
hepatic	Scapaniaceae	*Scapania scandica*		lowland			2396	B0028069
lichen	Alectoriaceae	*Alectoria nigricans*	common	alpine	terricolous	mesic	1617	
lichen	Alectoriaceae	*Alectoria nigricans*	common	alpine	terricolous	mesic	1637	L0014247
lichen	Alectoriaceae	*Alectoria nigricans*	common	subalpine	terricolous	mesic	1932	L0014398
lichen	Alectoriaceae	*Alectoria ochroleuca*	common	alpine	saxicolous	mesic	1582	L0014218
lichen	Alectoriaceae	*Alectoria ochroleuca*	common	alpine	terricolous	mesic	1571	L0014208
lichen	Alectoriaceae	*Alectoria ochroleuca*	common	alpine	terricolous	mesic	1689	
lichen	Alectoriaceae	*Alectoria ochroleuca*	common	subalpine	terricolous	mesic	1929	L0014395
lichen	Parmeliaceae	*Allantoparmelia* sp.		subalpine	saxicolous		1967	L0014430
lichen	Parmeliaceae	*Asahinea chrysantha*		subalpine	terricolous	mesic	1936	L0014403
lichen	Parmeliaceae	*Asahinea chrysantha*		alpine	terricolous	mesic	2484	L0014583
lichen	Parmeliaceae	*Asahinea scholanderi*		alpine	saxicolous		1593	L0014219
lichen	Parmeliaceae	*Asahinea scholanderi*		alpine	saxicolous		2432	L0014558
lichen	Bacidiaceae	*Bacidia* sp.		subalpine	terricolous	mesic	1950	L0014417
lichen	Baeomycetaceae	*Baeomyces* sp.		subalpine	terricolous	dry	2547	L0014605
lichen	Parmeliaceae	*Bryocaulon divergens*	common	alpine	terricolous	mesic	1692	
lichen	Parmeliaceae	*Bryocaulon divergens*	common	subalpine	terricolous	mesic	1933	L0014400
lichen	Alectoriaceae	*Bryoria nitidula*	common	subalpine	terricolous	mesic	1930	L0014396
lichen	Alectoriaceae	*Bryoria nitidula*	common	subalpine	terricolous	mesic	1931	L0014397
lichen	Physciaceae	*Buellia* sp.		alpine	terricolous	mesic	2462	L0014581
lichen	Caliciaceae	*Calicium* sp.		lowland	"bark,wood"		1815	L0014320
lichen	Teloschistaceae	*Caloplaca* sp.		alpine	saxicolous		2399	L0014547
lichen	Candelariaceae	*Candelariella terrigena*		alpine	terricolous	mesic	1578	L0014215
lichen	Parmeliaceae	*Cetraria chlorophylla*		lowland	"bark,wood"		1805	L0014311
lichen	Parmeliaceae	*Cetraria chlorophylla*		lowland	"bark,wood"		1833	L0014336

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
lichen	Parmeliaceae	*Cetraria chlorophylla*		lowland	"bark,wood"		2076	L0014484
lichen	Parmeliaceae	*Cetraria chlorophylla*		lowland	"bark,wood"		2293	L0014530
lichen	Parmeliaceae	*Cetraria hepatizon*		subalpine	saxicolous		1969	L0014432
lichen	Parmeliaceae	*Cetraria hepatizon*		subalpine	saxicolous		1973	L0014436
lichen	Parmeliaceae	*Cetraria islandica*		alpine	saxicolous		1614	L0014233
lichen	Parmeliaceae	*Cetraria islandica*		alpine	terricolous	mesic	1684	
lichen	Parmeliaceae	*Cetraria islandica*		alpine	terricolous	mesic	1685	
lichen	Parmeliaceae	*Cetraria islandica*		subalpine	terricolous	mesic	1908	L0014376
lichen	Parmeliaceae	*Cetraria islandica*		subalpine	terricolous	mesic	1926	L0014392
lichen	Parmeliaceae	*Cetraria islandica*		subalpine	terricolous	mesic	1927	L0014393
lichen	Parmeliaceae	*Cetraria islandica*		alpine	terricolous	mesic	2035	L0014470
lichen	Parmeliaceae	*Cetraria islandica*		subalpine	terricolous	mesic	6168	
lichen	Parmeliaceae	*Cetraria kamczatica*		alpine	terricolous	mesic	2451	L0014570
lichen	Parmeliaceae	*Cetraria nigricans*		alpine	terricolous	mesic	1574	L0014212
lichen	Parmeliaceae	*Cetraria nigricans*		alpine	terricolous	mesic	2499	L0014597
lichen	Parmeliaceae	*Cetraria sepincola*		lowland	"bark,wood"		1767	L0014274
lichen	Parmeliaceae	*Cetraria sepincola*		subalpine	"bark,wood"		1953	L0014420
lichen	Parmeliaceae	*Cetrariella delisei*		alpine	terricolous	wet	2513	L0014599
lichen	Parmeliaceae	*Cetrariella fastigiata*		alpine	terricolous	wet	2514	L0014600
lichen	Cladoniaceae	*Cladina aberrans*		alpine	saxicolous		1612	L0014231
lichen	Cladoniaceae	*Cladina aberrans*	common	alpine	terricolous	mesic	1569	L0014206
lichen	Cladoniaceae	*Cladina aberrans*		alpine	terricolous	mesic	1636	L0014246
lichen	Cladoniaceae	*Cladina aberrans*	common	subalpine	terricolous	mesic	1916	L0014382
lichen	Cladoniaceae	*Cladina aberrans*		subalpine	terricolous	mesic	1920	L0014387
lichen	Cladoniaceae	*Cladina aberrans*	common	alpine	terricolous	mesic	2452	L0014571
lichen	Cladoniaceae	*Cladina aberrans*	common	alpine	terricolous	mesic	1691	
lichen	Cladoniaceae	*Cladina aberrans*	common	subalpine	terricolous	mesic	6170	
lichen	Cladoniaceae	*Cladina arbuscula*		lowland	terricolous	mesic	1700	L0014257
lichen	Cladoniaceae	*Cladina arbuscula*		subalpine	terricolous	mesic	2068	L0014476
lichen	Cladoniaceae	*Cladina mitis*		alpine	terricolous	mesic	2457	L0014576
lichen	Cladoniaceae	*Cladina rangiferina*		alpine	saxicolous	mesic	1611	L0014230
lichen	Cladoniaceae	*Cladina rangiferina*		alpine	terricolous	mesic	1572	L0014209
lichen	Cladoniaceae	*Cladina rangiferina*		subalpine	terricolous	mesic	1917	L0014383
lichen	Cladoniaceae	*Cladina rangiferina*		subalpine	terricolous	mesic	1918	L0014384

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
lichen	Cladoniaceae	*Cladina rangiferina*		lowland	terricolous	mesic	2237	
lichen	Cladoniaceae	*Cladina rangiferina*		subalpine	terricolous	mesic	6169	
lichen	Cladoniaceae	*Cladina rangiferina*		alpine		mesic	6120	L0014045
lichen	Cladoniaceae	*Cladina stellaris*		alpine	terricolous	mesic	2494	L0014592
lichen	Cladoniaceae	*Cladonia acuminata*		alpine	terricolous	mesic	2027	L0014462
lichen	Cladoniaceae	*Cladonia amaurocraea*		lowland	terricolous	mesic	1858	L0014347
lichen	Cladoniaceae	*Cladonia amaurocraea*		lowland	terricolous	mesic	1859	L0014348
lichen	Cladoniaceae	*Cladonia amaurocraea*						
		forma *celotea*		subalpine	terricolous	mesic	1919	L0014385
lichen	Cladoniaceae	*Cladonia bellidiflora*		alpine	terricolous	mesic	2421	L0014554
lichen	Cladoniaceae	*Cladonia bellidiflora*		alpine	terricolous	mesic	2458	L0014577
lichen	Cladoniaceae	*Cladonia borealis*		lowland	terricolous	mesic	1701	L0014258
lichen	Cladoniaceae	*Cladonia borealis*		lowland	terricolous	mesic	1887	L0014360
lichen	Cladoniaceae	*Cladonia borealis*		alpine	terricolous	mesic	2024	L0014459
lichen	Cladoniaceae	*Cladonia cariosa*		lowland	terricolous	mesic	1891	L0014364
lichen	Cladoniaceae	*Cladonia cariosa*		alpine	terricolous	mesic	2022	L0014457
lichen	Cladoniaceae	*Cladonia carneola*		subalpine	terricolous	mesic	2563	L0014610
lichen	Cladoniaceae	*Cladonia cenotea*		lowland	"log,stump,etc"	mesic	1754	L0014269
lichen	Cladoniaceae	*Cladonia cenotea*		lowland	"log,stump,etc"	mesic	1846	L0014344
lichen	Cladoniaceae	*Cladonia cenotea*		lowland	"log,stump,etc"	mesic	2284	L0014526
lichen	Cladoniaceae	*Cladonia cervicornis*		lowland	terricolous	mesic	1704	L0014261
lichen	Cladoniaceae	*Cladonia chlorophaea*		lowland	"log,stump,etc"	mesic	1847	L0014345
lichen	Cladoniaceae	*Cladonia chlorophaea*		lowland	terricolous	mesic	1889	L0014362
lichen	Cladoniaceae	*Cladonia chlorophaea*		alpine	terricolous	mesic	2023	L0014458
lichen	Cladoniaceae	*Cladonia coccifera*		alpine	terricolous	mesic	1566	L0014202
lichen	Cladoniaceae	*Cladonia coccifera*		lowland	terricolous	mesic	1861	L0014350
lichen	Cladoniaceae	*Cladonia cornuta*		lowland	"log,stump,etc"	mesic	2283	L0014525
lichen	Cladoniaceae	*Cladonia cornuta*		lowland	terricolous	mesic	1703	L0014260
lichen	Cladoniaceae	*Cladonia cornuta*		subalpine	terricolous	mesic	1907	L0014375
lichen	Cladoniaceae	*Cladonia crispata*		subalpine	terricolous	mesic	2067	L0014475
lichen	Cladoniaceae	*Cladonia crispata*		alpine	terricolous	mesic	2461	L0014580
lichen	Cladoniaceae	*Cladonia crispata* var. *crispata*		alpine	terricolous	mesic	2453	L0014572
lichen	Cladoniaceae	*Cladonia crispata* var. *crispata*		alpine	terricolous	mesic	2455	L0014574
lichen	Cladoniaceae	*Cladonia deformis*		lowland	terricolous	mesic	2166	L0014497

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	**Family**	**Taxon**	**Occurrence**	**Zone**	**Substrate**	**Moisture**	**DB No.**	**ALA No.**
lichen	Cladoniaceae	*Cladonia deformis*		subalpine	terricolous	mesic	6122	L0014047
lichen	Cladoniaceae	*Cladonia ecmocyna*		alpine	terricolous	mesic	2025	L0014460
lichen	Cladoniaceae	*Cladonia ecmocyna*						
		subsp. *ecmocyna*		alpine	saxicolous-terricolous	mesic	2443	L0014567
lichen	Cladoniaceae	*Cladonia ecmocyna*						
		subsp. *ecmocyna*		subalpine	terricolous	mesic	1921	L0014386
lichen	Cladoniaceae	*Cladonia ecmocyna*						
		subsp. *ecmocyna*		alpine	terricolous	mesic	2460	L0014579
lichen	Cladoniaceae	*Cladonia fimbriata*		lowland	"log,stump,etc"	mesic	1755	L0014270
lichen	Cladoniaceae	*Cladonia fimbriata*		lowland	terricolous	mesic	1888	L0014361
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *gracilis*		lowland	terricolous	mesic	1860	L0014349
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *gracilis*		subalpine	terricolous	mesic	2065	L0014473
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *turbinata*		lowland	"bark,wood"	mesic	2216	L0014501
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *turbinata*		lowland	"log,stump,etc"	mesic	1845	L0014343
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *turbinata*		lowland	"log,stump,etc"	mesic	2285	L0014527
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *turbinata*		lowland	terricolous	mesic	1702	L0014259
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *turbinata*		lowland	terricolous	mesic	1890	L0014363
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *turbinata*		subalpine	terricolous	mesic	1924	L0014390
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *vulnerata*		subalpine	saxicolous-terricolous	mesic	1985	L0014444
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *vulnerata*		subalpine	saxicolous-terricolous	mesic	1997	L0014448
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *vulnerata*		subalpine	terricolous	mesic	1915	L0014381
lichen	Cladoniaceae	*Cladonia gracilis* subsp. *vulnerata*		subalpine	terricolous	dry	2546	L0014604
lichen	Cladoniaceae	*Cladonia kanewskii*		subalpine	terricolous	mesic	1922	L0014388
lichen	Cladoniaceae	*Cladonia kanewskii*		alpine	terricolous	wet	2515	L0014601
lichen	Cladoniaceae	*Cladonia kanewskii*		alpine	terricolous	wet	2516	L0014602
lichen	Cladoniaceae	*Cladonia ochrochlora*		lowland	"bark,wood"	mesic	1763	L0014271
lichen	Cladoniaceae	*Cladonia ochrochlora*		lowland	"bark,wood"	mesic	1764	L0014272
lichen	Cladoniaceae	*Cladonia ochrochlora*		lowland	"log,stump,etc"	mesic	1744	L0014267
lichen	Cladoniaceae	*Cladonia ochrochlora*		lowland	"log,stump,etc"	mesic	2279	L0014523
lichen	Cladoniaceae	*Cladonia ochrochlora*		lowland	terricolous	mesic	1883	L0014356
lichen	Cladoniaceae	*Cladonia ochrochlora*		lowland	terricolous	mesic	1885	L0014358
lichen	Cladoniaceae	*Cladonia phyllophora*		lowland	terricolous	mesic	2271	L0014519
lichen	Cladoniaceae	*Cladonia phyllophora*		lowland	terricolous	mesic	6123	L0014048
lichen	Cladoniaceae	*Cladonia pleurota*		lowland	"bark,wood"	mesic	2215	L0014500

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
lichen	Cladoniaceae	*Cladonia pleurota*		subalpine	"bark,wood"	mesic	2565	L0014611
lichen	Cladoniaceae	*Cladonia pleurota*		subalpine	terricolous	mesic	6121	L0014046
lichen	Cladoniaceae	*Cladonia pocillum*		subalpine	terricolous	wet	1901	L0014370
lichen	Cladoniaceae	*Cladonia pocillum*		alpine	terricolous	mesic	2026	L0014461
lichen	Cladoniaceae	*Cladonia pseudostellata*		subalpine	terricolous	mesic	2069	L0014477
lichen	Cladoniaceae	*Cladonia pyxidata*		lowland	terricolous	mesic	1886	L0014359
lichen	Cladoniaceae	*Cladonia singularis*		alpine	terricolous	mesic	2454	L0014573
lichen	Cladoniaceae	*Cladonia singularis*		alpine	terricolous	mesic	2459	L0014578
lichen	Cladoniaceae	*Cladonia singularis*		alpine	terricolous	mesic	2498	L0014596
lichen	Cladoniaceae	*Cladonia squamosa*						
		var. *squamosa*		lowland	terricolous	mesic	1844	L0014342
lichen	Cladoniaceae	*Cladonia subulata*		lowland	terricolous	mesic	1884	L0014357
lichen	Cladoniaceae	*Cladonia sulphurina*		subalpine	terricolous	dry	2553	L0014606
lichen	Cladoniaceae	*Cladonia thomsonii*		alpine	terricolous	mesic	2488	L0014587
lichen	Cladoniaceae	*Cladonia uncialis*		alpine	terricolous	mesic	2456	L0014575
lichen	Cladoniaceae	*Cladonia uncialis*		subalpine	terricolous	mesic	6124	L0014049
lichen	Collemataceae	*Collema* sp.		alpine	terricolous	mesic	2402	L0014550
lichen	Parmeliaceae	*Dactylina arctica*	common	subalpine	saxicolous-terricolous	mesic	1996	L0014447
lichen	Parmeliaceae	*Dactylina arctica*	common	alpine	terricolous	mesic	1596	L0014224
lichen	Parmeliaceae	*Dactylina arctica*	common	alpine	terricolous	mesic	1693	
lichen	Parmeliaceae	*Dactylina arctica*	common	subalpine	terricolous	mesic	1720	L0014399
lichen	Parmeliaceae	*Dactylina arctica*	common	alpine	terricolous	mesic	2449	L0014568
lichen	Parmeliaceae	*Dactylina arctica*	common	subalpine	terricolous	mesic	6171	
lichen	Parmeliaceae	*Dactylina ramulosa*		alpine	saxicolous		2439	L0014565
lichen	Parmeliaceae	*Dactylina ramulosa*		alpine	terricolous	mesic	1638	L0014248
lichen	Parmeliaceae	*Flavocetraria cucullata*		alpine	saxicolous	mesic	1613	L0014232
lichen	Parmeliaceae	*Flavocetraria cucullata*		alpine	terricolous	mesic	1616	
lichen	Parmeliaceae	*Flavocetraria cucullata*		subalpine	terricolous	mesic	2110	
lichen	Parmeliaceae	*Flavocetraria cucullata*		alpine	terricolous	mesic	2112	
lichen	Parmeliaceae	*Flavocetraria nivalis*	common	alpine	terricolous	mesic	1570	L0014207
lichen	Parmeliaceae	*Flavocetraria nivalis*	common	alpine	terricolous	mesic	1690	
lichen	Parmeliaceae	*Flavocetraria nivalis*	common	subalpine	terricolous	mesic	1928	L0014394
lichen	Parmeliaceae	*Flavocetraria nivalis*	common	lowland	terricolous	mesic	2105	
lichen	Parmeliaceae	*Flavocetraria nivalis*	common	alpine	terricolous		2113	

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
lichen	Haematommataceae	*Ophioparma lapponicum*		alpine	saxicolous		1687	
lichen	Haematommataceae	*Ophioparma lapponicum*		subalpine	saxicolous		2013	L0014451
lichen	Parmeliaceae	*Hypogymnia austerodes*		lowland	"bark,wood"		1773	L0014280
lichen	Parmeliaceae	*Hypogymnia bitteri*		lowland	"bark,wood"		1770	L0014277
lichen	Parmeliaceae	*Hypogymnia bitteri*		lowland	"bark,wood"		1774	L0014281
lichen	Parmeliaceae	*Hypogymnia bitteri*		lowland	"bark,wood"		1806	L0014312
lichen	Parmeliaceae	*Hypogymnia bitteri*		lowland	"bark,wood"		1826	L0014329
lichen	Parmeliaceae	*Hypogymnia bitteri*		subalpine	"bark,wood"		2569	L0014614
lichen	Parmeliaceae	*Hypogymnia physodes*		lowland	"bark,wood"		1769	L0014276
lichen	Parmeliaceae	*Hypogymnia physodes*		lowland	"bark,wood"		1771	L0014278
lichen	Parmeliaceae	*Hypogymnia physodes*		lowland	"bark,wood"		1807	L0014313
lichen	Parmeliaceae	*Hypogymnia physodes*		lowland	"bark,wood"		1825	L0014328
lichen	Parmeliaceae	*Hypogymnia physodes*		lowland	"bark,wood"		2320	
lichen	Parmeliaceae	*Hypogymnia physodes*		subalpine	"bark,wood"		2568	L0014613
lichen	Parmeliaceae	*Hypogymnia physodes*		lowland	"log,stump,etc"		1745	L0014268
lichen	Parmeliaceae	*Hypogymnia subobscura*		alpine	saxicolous		2438	L0014564
lichen	Parmeliaceae	*Hypogymnia subobscura*		alpine	terricolous	mesic	2490	L0014589
lichen	Lecanoraceae	*Lecanora* sp.		alpine	terricolous	mesic	2401	L0014549
lichen	Collemataceae	*Leptogium* sp.		subalpine	saxicolous		2053	L0014471
lichen	Lobariaceae	*Lobaria linita*		lowland	"bark,wood"		1794	L0014301
lichen	Lobariaceae	*Lobaria linita*		lowland	"bark,wood"		1797	L0014304
lichen	Lobariaceae	*Lobaria linita*		subalpine	saxicolous-terricolous		1986	L0014445
lichen	Lobariaceae	*Lobaria linita*	common	alpine	terricolous	mesic	1633	L0014243
lichen	Lobariaceae	*Lobaria linita*	common	subalpine	terricolous	mesic	1909	L0014377
lichen	Lobariaceae	*Lobaria linita*	common	alpine	terricolous	mesic	2029	L0014464
lichen	Lobariaceae	*Lobaria linita*	common	subalpine	terricolous	mesic	6172	
lichen	Lobariaceae	*Lobaria pulmonaria*		lowland	"bark,wood"		1796	L0014303
lichen	Lobariaceae	*Lobaria pulmonaria*		lowland	"bark,wood"		1819	L0014322
lichen	Lobariaceae	*Lobaria pulmonaria*		lowland	"bark,wood"		1824	L0014327
lichen	Lobariaceae	*Lobaria pulmonaria*		lowland	"bark,wood"		2321	
lichen	Lobariaceae	*Lobaria scrobiculata*		lowland	"bark,wood"		1795	L0014302
lichen	Lobariaceae	*Lobaria scrobiculata*		lowland	"bark,wood"		2294	L0014531
lichen	Lobariaceae	*Lobaria scrobiculata*		lowland	"log,stump,etc"		2083	L0014489
lichen	Ectolechiaceae	*Lopadium pezizoideum*		subalpine	saxicolous		2577	L0014621

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
lichen	Ectolechiaceae	*Lopadium pezizoideum*	common	subalpine	terricolous	mesic	1941	L0014408
lichen	Parmeliaceae	*Melanelia* sp.		lowland	"bark,wood"		1775	L0014282
lichen	Nephromataceae	*Nephroma arcticum*	common	alpine	terricolous	mesic	1635	L0014245
lichen	Nephromataceae	*Nephroma arcticum*	common	subalpine	terricolous	mesic	1925	L0014391
lichen	Nephromataceae	*Nephroma arcticum*	common	lowland	terricolous	mesic	2217	L0014502
lichen	Nephromataceae	*Nephroma arcticum*	common	alpine	terricolous	mesic	2487	L0014586
lichen	Nephromataceae	*Nephroma bellum*		lowland	"bark,wood"		1799	L0014306
lichen	Nephromataceae	*Nephroma expallidum*		alpine	terricolous	mesic	1632	L0014242
lichen	Nephromataceae	*Nephroma expallidum*		subalpine	terricolous	mesic	1910	L0014378
lichen	Nephromataceae	*Nephroma expallidum*		subalpine	terricolous	mesic	2064	L0014472
lichen	Nephromataceae	*Nephroma parile*		lowland	"bark,wood"		1800	L0014307
lichen	Nephromataceae	*Nephroma parile*		lowland	"bark,wood"		1801	L0014308
lichen	Nephromataceae	*Nephroma parile*		lowland	"log,stump,etc"		2085	L0014491
lichen	Nephromataceae	*Nephroma* sp.		subalpine	saxicolous		2578	L0014622
lichen	Pertusariaceae	*Ochrolechia frigida*	common	alpine	terricolous	mesic	1577	L0014214
lichen	Pertusariaceae	*Ochrolechia frigida*	common	subalpine	terricolous	mesic	1945	L0014412
lichen	Pannariaceae	*Pannaria pezizoides*		alpine	saxicolous		2441	L0014566
lichen	Pannariaceae	*Pannaria pezizoides*		alpine	terricolous	mesic	2497	L0014595
lichen	Parmeliaceae	*Parmelia hygrophila*		lowland	"bark,wood"		1782	L0014289
lichen	Parmeliaceae	*Parmelia omphalodes*		alpine	saxicolous		1592	L0014223
lichen	Parmeliaceae	*Parmelia omphalodes*		alpine	saxicolous		1595	L0014221
lichen	Parmeliaceae	*Parmelia omphalodes*		alpine	saxicolous		2433	L0014559
lichen	Parmeliaceae	*Parmelia omphalodes*		subalpine	saxicolous-terricolous		1980	L0014443
lichen	Parmeliaceae	*Parmelia omphalodes*		subalpine	terricolous	mesic	1947	L0014414
lichen	Parmeliaceae	*Parmelia saxatilis*		subalpine	saxicolous		2579	L0014623
lichen	Parmeliaceae	*Parmelia squarrosa*		lowland	"bark,wood"		1810	L0014316
lichen	Parmeliaceae	*Parmelia stygia*		alpine	saxicolous		2437	L0014563
lichen	Parmeliaceae	*Parmelia sulcata*		lowland	"bark,wood"		1780	L0014287
lichen	Parmeliaceae	*Parmelia sulcata*		lowland	"bark,wood"		1781	L0014288
lichen	Parmeliaceae	*Parmelia sulcata*		lowland	"bark,wood"		1783	L0014290
lichen	Parmeliaceae	*Parmelia sulcata*		lowland	"bark,wood"		1809	L0014315
lichen	Parmeliaceae	*Parmelia sulcata*		lowland	"bark,wood"		1831	L0014334
lichen	Parmeliaceae	*Parmelia sulcata*		lowland	"bark,wood"		1832	L0014335
lichen	Parmeliaceae	*Parmelia sulcata*		lowland	"bark,wood"		2104	

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
lichen	Parmeliaceae	*Parmeliopsis ambigua*		lowland	"bark,wood"		1811	L0014317
lichen	Parmeliaceae	*Parmeliopsis ambigua*		subalpine	"bark,wood"		2570	L0014615
lichen	Peltigeraceae	*Peltigera aphthosa*	common	lowland	"log,stump,etc"	mesic	1857	L0014346
lichen	Peltigeraceae	*Peltigera aphthosa*	common	lowland	terricolous	mesic	1728	L0014263
lichen	Peltigeraceae	*Peltigera aphthosa*	common	lowland	terricolous	mesic	1734	L0014266
lichen	Peltigeraceae	*Peltigera aphthosa*	common	lowland	terricolous	mesic	1896	L0014369
lichen	Peltigeraceae	*Peltigera aphthosa*	common	subalpine	terricolous	mesic	1911	L0014379
lichen	Peltigeraceae	*Peltigera aphthosa*	common	alpine	terricolous	mesic	2019	L0014454
lichen	Peltigeraceae	*Peltigera aphthosa*	common	lowland	terricolous	mesic	2220	L0014503
lichen	Peltigeraceae	*Peltigera aphthosa*	common	lowland	terricolous	mesic	2221	L0014504
lichen	Peltigeraceae	*Peltigera aphthosa*	common	lowland	terricolous	mesic	2319	
lichen	Peltigeraceae	*Peltigera aphthosa*	common	lowland	terricolous	mesic	2834	L0014848
lichen	Peltigeraceae	*Peltigera aphthosa*	common	subalpine	terricolous	mesic	6173	
lichen	Peltigeraceae	*Peltigera canina*	common	lowland	"bark,wood"		2322	
lichen	Peltigeraceae	*Peltigera canina*	common	lowland	"log,stump,etc"		2297	L0014533
lichen	Peltigeraceae	*Peltigera canina*	common	lowland	terricolous	mesic	1733	L0014265
lichen	Peltigeraceae	*Peltigera canina*	common	subalpine	terricolous	mesic	2109	
lichen	Peltigeraceae	*Peltigera canina*	common	subalpine	terricolous	mesic	2111	
lichen	Peltigeraceae	*Peltigera canina*	common	lowland	terricolous	dry	2380	L0014537
lichen	Peltigeraceae	*Peltigera canina*	common	lowland	terricolous	mesic	2839	L0014847
lichen	Peltigeraceae	*Peltigera didactyla*	common	lowland	"log,stump,etc"		2086	L0014492
lichen	Peltigeraceae	*Peltigera didactyla*	common	lowland	terricolous	mesic	1729	L0014264
lichen	Peltigeraceae	*Peltigera didactyla*	common	lowland	terricolous	mesic	2299	L0014535
lichen	Peltigeraceae	*Peltigera didactyla*	common	lowland	terricolous	dry	2383	L0014540
lichen	Peltigeraceae	*Peltigera didactyla*	common	subalpine	terricolous		6174	
lichen	Peltigeraceae	*Peltigera horizontalis*		lowland	terricolous	mesic	2836	L0014846
lichen	Peltigeraceae	*Peltigera lepidophora*		lowland	terricolous	dry	2384	L0014541
lichen	Peltigeraceae	*Peltigera leucophlebia*	common	lowland	terricolous	mesic	1705	L0014262
lichen	Peltigeraceae	*Peltigera leucophlebia*	common	lowland	terricolous	mesic	1894	L0014367
lichen	Peltigeraceae	*Peltigera leucophlebia*	common	lowland	terricolous	mesic	2273	L0014521
lichen	Peltigeraceae	*Peltigera leucophlebia*	common	lowland	terricolous	dry	2392	L0014546
lichen	Peltigeraceae	*Peltigera malacea*		subalpine	terricolous	mesic	1912	L0014380
lichen	Peltigeraceae	*Peltigera membranacea*		lowland	"bark,wood"		2257	L0014516
lichen	Peltigeraceae	*Peltigera membranacea*		lowland	"log,stump,etc"		1843	L0014341

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
lichen	Peltigeraceae	*Peltigera membranacea*	common	lowland	terricolous	mesic	2087	L0014493
lichen	Peltigeraceae	*Peltigera membranacea*	common	lowland	terricolous	mesic	2222	L0014505
lichen	Peltigeraceae	*Peltigera praetextata*		lowland	terricolous	dry	2385	L0014542
lichen	Peltigeraceae	*Peltigera rufescens*	common	alpine	saxicolous		1644	L0014254
lichen	Peltigeraceae	*Peltigera rufescens*	common	alpine	terricolous	mesic	1565	L0014201
lichen	Peltigeraceae	*Peltigera rufescens*	common	lowland	terricolous	mesic	1892	L0014365
lichen	Peltigeraceae	*Peltigera rufescens*	common	lowland	terricolous	mesic	1893	L0014366
lichen	Peltigeraceae	*Peltigera rufescens*	common	lowland	terricolous	mesic	2272	L0014520
lichen	Peltigeraceae	*Peltigera rufescens*	common	lowland	terricolous	dry	2381	L0014538
lichen	Peltigeraceae	*Peltigera rufescens*	common	lowland	terricolous	dry	2382	L0014539
lichen	Peltigeraceae	*Peltigera scabrosa*		lowland	terricolous	mesic	2167	L0014498
lichen	Peltigeraceae	*Peltigera scabrosa*		alpine	terricolous	mesic	2450	L0014569
lichen	Peltigeraceae	*Peltigera scabrosa*		subalpine	terricolous	mesic	6175	
lichen	Pertusariaceae	*Pertusaria* sp.		subalpine	"bark,wood"		2566	L0014612
lichen	Physciaceae	*Physcia dubia*		lowland	"bark,wood"		1784	L0014291
lichen	Parmeliaceae	*Platismatia glauca*		lowland	"bark,wood"		1823	L0014326
lichen	Parmeliaceae	*Pseudephebe pubescens*		alpine	saxicolous		1591	L0014222
lichen	Parmeliaceae	*Pseudephebe* sp.		subalpine	saxicolous		1978	L0014441
lichen	Lobariaceae	*Pseudocyphellaria crocata*		lowland	"bark,wood"		2082	L0014488
lichen	Pannariaceae	*Psoroma hypnorum*		subalpine	"bark,wood"		2004	L0014449
lichen	Pannariaceae	*Psoroma hypnorum*	common	alpine	terricolous		1686	
lichen	Pannariaceae	*Psoroma hypnorum*	common	subalpine	terricolous	mesic	1902	L0014371
lichen	Pannariaceae	*Psoroma hypnorum*	common	subalpine	terricolous	mesic	1991	L0014446
lichen	Pannariaceae	*Psoroma hypnorum*	common	alpine	terricolous		2028	L0014463
lichen	Pannariaceae	*Psoroma hypnorum*	common	subalpine	terricolous	mesic	2557	L0014608
lichen	Ramalinaceae	*Ramalina* sp.		lowland	"bark,wood"		1786	L0014293
lichen	Ramalinaceae	*Ramalina thrausta*		lowland	"bark,wood"		1834	L0014337
lichen	Rhizocarpaceae	*Rhizocarpon geographicum*		alpine	saxicolous		1688	
lichen	Rhizocarpaceae	*Rhizocarpon geographicum*		subalpine	saxicolous		1961	L0014424
lichen	Physciaceae	*Rinodina* sp.		subalpine	terricolous	mesic	1949	L0014416
lichen	Peltigeraceae	*Solorina crocea*	common	alpine	terricolous	wet	1558	L0014200
lichen	Peltigeraceae	*Solorina crocea*	common	alpine	terricolous		1634	L0014244
lichen	Peltigeraceae	*Solorina crocea*	common	subalpine	terricolous	mesic	2070	L0014478
lichen	Peltigeraceae	*Solorina crocea*	common	subalpine	terricolous		6176	

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
lichen	Sphaerophoraceae	*Sphaerophorus fragilis*		alpine	saxicolous		1594	L0014220
lichen	Sphaerophoraceae	*Sphaerophorus fragilis*		subalpine	saxicolous		1959	L0014422
lichen	Sphaerophoraceae	*Sphaerophorus fragilis*		subalpine	terricolous	mesic	1939	L0014406
lichen	Sphaerophoraceae	*Sphaerophorus fragilis*		subalpine	terricolous	mesic	1979	L0014442
lichen	Sphaerophoraceae	*Sphaerophorus globosus*	common	alpine	terricolous	mesic	1581	L0014217
lichen	Sphaerophoraceae	*Sphaerophorus globosus*	common	alpine	terricolous	mesic	1694	
lichen	Sphaerophoraceae	*Sphaerophorus globosus*	common	subalpine	terricolous	mesic	1940	L0014407
lichen	Sphaerophoraceae	*Sphaerophorus globosus*	common	alpine	terricolous	mesic	2463	L0014582
lichen	Sphaerophoraceae	*Sphaerophorus globosus*	common	alpine	terricolous	mesic	2489	L0014588
lichen	Stereocaulaceae	*Stereocaulon alpinum*	common	subalpine	terricolous	mesic	1904	L0014372
lichen	Stereocaulaceae	*Stereocaulon alpinum*	common	alpine	terricolous	mesic	2031	L0014466
lichen	Stereocaulaceae	*Stereocaulon arenarium*	common	alpine	terricolous	mesic	1567	L0014204
lichen	Stereocaulaceae	*Stereocaulon arenarium*	common	alpine	terricolous	mesic	1579	L0014203
lichen	Stereocaulaceae	*Stereocaulon arenarium*	common	alpine	terricolous	mesic	2500	L0014598
lichen	Stereocaulaceae	*Stereocaulon glareosum*	common	alpine	terricolous	mesic	2032	L0014467
lichen	Stereocaulaceae	*Stereocaulon glareosum*						
		var. *brachyphylloides*	common	alpine	terricolous	mesic	1681	L0014255
lichen	Stereocaulaceae	*Stereocaulon glareosum*						
		var. *glareosum*	common	alpine	terricolous	mesic	2030	L0014465
lichen	Stereocaulaceae	*Stereocaulon grande*		alpine	terricolous	mesic	2485	L0014584
lichen	Stereocaulaceae	*Stereocaulon groenlandicum*		subalpine	terricolous	mesic	1905	L0014373
lichen	Stereocaulaceae	*Stereocaulon groenlandicum*		alpine	terricolous	mesic	2414	L0014553
lichen	Stereocaulaceae	*Stereocaulon groenlandicum*		alpine	terricolous	mesic	2492	L0014591
lichen	Stereocaulaceae	*Stereocaulon paschale*	common	alpine	terricolous	mesic	1568	L0014205
lichen	Stereocaulaceae	*Stereocaulon paschale*	common	lowland	terricolous	mesic	1699	L0014256
lichen	Stereocaulaceae	*Stereocaulon paschale*	common	subalpine	terricolous	mesic	1935	L0014402
lichen	Stereocaulaceae	*Stereocaulon paschale*	common	alpine	terricolous	mesic	2491	L0014590
lichen	Stereocaulaceae	*Stereocaulon rivulorum*	common	alpine	terricolous	mesic	2033	L0014468
lichen	Stereocaulaceae	*Stereocaulon tomentosum*		lowland	terricolous	mesic	1895	L0014368
lichen	Unknown lichen	*Thamnolia vermicularis*		alpine	terricolous	mesic	1580	L0014216
lichen	Unknown lichen	*Thamnolia vermicularis*		subalpine	terricolous	mesic	1937	L0014404
lichen	Unknown lichen	*Thamnolia subuliformis*		subalpine	terricolous	mesic	1938	L0014405
lichen	Bacidiaceae	*Toninia* sp.		alpine	saxicolous		1619	L0014236
lichen	Umbilicariaceae	*Umbilicaria proboscidea*		alpine	saxicolous		1597	L0014225

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
lichen	Umbilicariaceae	*Umbilicaria proboscidea*		subalpine	saxicolous		1974	L0014437
lichen	Umbilicariaceae	*Umbilicaria rigida*		alpine	saxicolous		1599	L0014227
lichen	Parmeliaceae	*Usnea* sp.		lowland	"bark,wood"		1791	L0014298
lichen	Parmeliaceae	*Vulpicida pinastri*		lowland	"bark,wood"		2101	
lichen	Parmeliaceae	*Vulpicida pinastri*		lowland	"bark,wood"		1792	L0014299
lichen	Parmeliaceae	*Vulpicida pinastri*		lowland	"bark,wood"		1812	L0014318
lichen	Parmeliaceae	*Vulpicida tilesii*		alpine	terricolous	mesic	2400	L0014548
lichen	Teloschistaceae	*Xanthoria candelaria*		lowland	"bark,wood"		1866	L0014351
moss	Thuidiaceae	*Abietinella abietina*		lowland	saxicolous	mesic	2364	B0028048
moss	Thuidiaceae	*Abietinella abietina*		lowland	terricolous	mesic	2102	
moss	Thuidiaceae	*Abietinella abietina*		lowland	terricolous	mesic	2103	
moss	Amblystegiaceae	*Amblystegium* sp.		lowland	"bark,wood"		1864	B0027772
moss	Andreaeaceae	*Andreaea blyttii*		alpine	saxicolous		2405	B0028073
moss	Andreaeaceae	*Andreaea nivalis*		alpine	saxicolous		2521	B0028138
moss	Andreaeaceae	*Andreaea rupestris*		alpine	saxicolous		2440	B0028094
moss	Andreaeaceae	*Andreaea rupestris* var. *rupestris*		alpine	saxicolous		1602	B0027649
moss	Andreaeaceae	*Andreaea rupestris* var. *rupestris*		alpine	saxicolous		1645	B0027665
moss	Andreaeaceae	*Andreaea rupestris* var. *rupestris*		subalpine	saxicolous		2016	B0027824
moss	Andreaeaceae	*Andreaea rupestris* var. *rupestris*		subalpine	saxicolous		2055	B0027843
moss	Andreaeaceae	*Andreaea rupestris* var. *rupestris*		alpine	saxicolous		2406	B0028074
moss	Andreaeaceae	*Andreaea rupestris* var. *rupestris*		alpine	saxicolous		2422	B0028087
moss	Andreaeaceae	*Andreaea rupestris* var. *rupestris*		subalpine	saxicolous		2583	B0028176
moss	Aulacomniaceae	*Aulacomnium androgynum*		lowland	terricolous	wet	2214	B0027954
moss	Aulacomniaceae	*Aulacomnium palustre*	common	lowland	terricolous	mesic	1716	B0027713
moss	Aulacomniaceae	*Aulacomnium palustre*	common	alpine	terricolous		2040	B0027829
moss	Aulacomniaceae	*Aulacomnium palustre*	common	subalpine	terricolous	mesic	2107	
moss	Aulacomniaceae	*Aulacomnium palustre*	common	lowland	terricolous	wet	2130	B0027873
moss	Aulacomniaceae	*Aulacomnium palustre*	common	lowland	terricolous	wet	2131	B0027874
moss	Aulacomniaceae	*Aulacomnium palustre*	common	lowland	terricolous	wet	2205	B0027945
moss	Aulacomniaceae	*Aulacomnium palustre*	common	lowland	terricolous	wet	2213	B0027953
moss	Aulacomniaceae	*Aulacomnium palustre*	common	lowland	terricolous	mesic	2270	B0027985
moss	Aulacomniaceae	*Aulacomnium palustre*	common	lowland	terricolous	wet	2308	B0028006
moss	Aulacomniaceae	*Aulacomnium palustre*	common	lowland	terricolous	mesic	2323	
moss	Aulacomniaceae	*Aulacomnium palustre*	common	subalpine	terricolous	mesic	2524	B0028141

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
moss	Aulacomniaceae	*Aulacomnium palustre*	common	subalpine	terricolous	mesic	2556	B0028168
moss	Pottiaceae	*Barbula* sp.		alpine	terricolous		2046	B0027835
moss	Bartramiaceae	*Bartramia ithyphylla*		alpine	saxicolous		1605	B0027652
moss	Bartramiaceae	*Bartramia ithyphylla*		subalpine	terricolous	mesic	2010	B0027820
moss	Bartramiaceae	*Bartramia ithyphylla*		alpine	terricolous		2471	B0028108
moss	Brachytheciaceae	*Brachythecium* sp.		lowland	"bark,wood"		1759	B0027752
moss	Brachytheciaceae	*Brachythecium turgidum*		subalpine	terricolous	mesic	1554	B0027632
moss	Brachytheciaceae	*Brachythecium turgidum*		alpine	terricolous	mesic	1680	B0027700
moss	Pottiaceae	*Bryoerythrophyllum recurvirostre*						
		var. *recurvirostre*		lowland	saxicolous		2366	B0028050
moss	Bryaceae	*Bryum* sp.		lowland	saxicolous		2342	B0028026
moss	Bryaceae	*Bryum caespiticium*		subalpine	terricolous	mesic	1555	B0027631
moss	Bryaceae	*Bryum caespiticium*		lowland	terricolous	mesic	1878	B0027781
moss	Bryaceae	*Bryum pseudotriquetrum*		alpine	terricolous	wet	2505	B0028126
moss	Buxbaumiaceae	*Buxbaumia aphylla*		subalpine	terricolous	dry	2548	B0028162
moss	Amblystegiaceae	*Calliergon cordifolium*		lowland	terricolous	wet	2207	B0027947
moss	Amblystegiaceae	*Calliergon cordifolium*		lowland	terricolous	wet	2208	B0027948
moss	Amblystegiaceae	*Calliergon cordifolium*		lowland	terricolous	wet	2245	B0027963
moss	Amblystegiaceae	*Calliergon cordifolium*		lowland	terricolous	wet	2246	B0027964
moss	Amblystegiaceae	*Calliergon cordifolium*		lowland	terricolous	wet	2352	B0028036
moss	Amblystegiaceae	*Calliergon richardsonii*		lowland	terricolous	wet	2242	B0027960
moss	Amblystegiaceae	*Calliergon richardsonii*		lowland	terricolous	wet	2243	B0027961
moss	Amblystegiaceae	*Calliergon stramineum*	common	lowland	terricolous	wet	2132	B0027875
moss	Amblystegiaceae	*Calliergon stramineum*	common	lowland	terricolous	wet	2133	B0027876
moss	Amblystegiaceae	*Calliergon stramineum*	common	lowland	terricolous	wet	2134	B0027877
moss	Amblystegiaceae	*Calliergon stramineum*		lowland	terricolous	wet	2244	B0027962
moss	Amblystegiaceae	*Campylium* sp.		lowland	terricolous	mesic	1879	B0027782
moss	Ditrichaceae	*Ceratodon purpureus*	common	alpine	terricolous	mesic	1695	
moss	Ditrichaceae	*Ceratodon purpureus*	common	lowland	terricolous	mesic	1710	B0027707
moss	Ditrichaceae	*Ceratodon purpureus*	common	lowland	terricolous	mesic	1721	B0027717
moss	Ditrichaceae	*Ceratodon purpureus*	common	lowland	terricolous	mesic	1881	B0027784
moss	Ditrichaceae	*Ceratodon purpureus*	common	lowland	terricolous	mesic	2114	
moss	Ditrichaceae	*Ceratodon purpureus*	common	lowland	terricolous	mesic	2324	
moss	Ditrichaceae	*Ceratodon purpureus*	common	alpine	terricolous		2477	B0028114

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	**Family**	**Taxon**	**Occurrence**	**Zone**	**Substrate**	**Moisture**	**DB No.**	**ALA No.**
moss	Climaciaceae	*Climacium dendroides*		lowland	terricolous	wet	1875	B0027778
moss	Bartramiaceae	*Conostomum tetragonum*		alpine	terricolous	wet-mesic	1696	
moss	Bartramiaceae	*Conostomum tetragonum*		alpine	terricolous	wet-mesic	2478	B0028115
moss	Amblystegiaceae	*Cratoneuron filicinum*		lowland	saxicolous		2337	B0028021
moss	Pottiaceae	*Desmatodon* sp.		subalpine	terricolous	mesic	2059	B0027847
moss	Dicranaceae	*Dichodontium* sp.		lowland	saxicolous		2333	B0028017
moss	Dicranaceae	*Dicranella* sp.		lowland	"bark,wood"		1756	B0027744
moss	Dicranaceae	*Dicranella schreberiana*		lowland	saxicolous		2372	B0028056
moss	Dicranaceae	*Dicranoweisia crispula*		alpine	saxicolous		1610	B0027657
moss	Dicranaceae	*Dicranoweisia crispula*		subalpine	saxicolous		2015	B0027823
moss	Dicranaceae	*Dicranoweisia crispula*		alpine	saxicolous-terricolous		1658	B0027678
moss	Dicranaceae	*Dicranum brevifolium*		subalpine	terricolous	mesic	2062	B0027850
moss	Dicranaceae	*Dicranum elongatum*		alpine	terricolous	mesic	1583	B0027641
moss	Dicranaceae	*Dicranum majus*	common	alpine	saxicolous-terricolous	mesic	1651	B0027671
moss	Dicranaceae	*Dicranum majus*	common	alpine	saxicolous-terricolous	mesic	1653	B0027673
moss	Dicranaceae	*Dicranum polysetum*	common	subalpine	terricolous	mesic	1955	B0027794
moss	Dicranaceae	*Dicranum polysetum*	common	lowland	terricolous	mesic	2278	B0027989
moss	Dicranaceae	*Dicranum scoparium*	common	lowland	"log,stump,etc"	mesic	1746	B0027736
moss	Dicranaceae	*Dicranum scoparium*	common	lowland	terricolous	mesic	1717	B0027714
moss	Dicranaceae	*Dicranum scoparium*	common	lowland	terricolous	mesic	1840	B0027758
moss	Dicranaceae	*Dicranum scoparium*		subalpine	terricolous	mesic	1954	B0027793
moss	Dicranaceae	*Dicranum scoparium*	common	subalpine	terricolous	mesic	2558	B0028169
moss	Pottiaceae	*Didymodon* sp.		lowland	saxicolous		2363	B0028047
moss	Ditrichaceae	*Distichium capillaceum*		alpine	saxicolous-terricolous	mesic	1660	B0027680
moss	Ditrichaceae	*Ditrichum flexicaule*		lowland	saxicolous		2365	B0028049
moss	Amblystegiaceae	*Drepanocladus aduncus*		lowland	terricolous	wet	2309	B0028007
moss	Amblystegiaceae	*Drepanocladus badius*		lowland	terricolous	wet	2137	B0027880
moss	Amblystegiaceae	*Drepanocladus exannulatus*		lowland	terricolous	wet	2250	2419956
moss	Amblystegiaceae	*Drepanocladus exannulatus*		lowland	terricolous	wet	2251	B0027969
moss	Amblystegiaceae	*Drepanocladus* sp.		lowland	"bark,wood"		1719	B0027716
moss	Amblystegiaceae	*Drepanocladus trichophyllus*		lowland	terricolous	wet	2135	B0027878
moss	Amblystegiaceae	*Drepanocladus trichophyllus*		lowland	terricolous	wet	2136	B0027879
moss	Encalyptaceae	*Encalypta brevicolla*						
		var. *brevicolla*		alpine	terricolous	mesic	1585	B0027643

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
moss	Encalyptaceae	*Encalypta brevipes*		alpine	terricolous	mesic	1584	B0027642
moss	Encalyptaceae	*Encalypta procera*		lowland	saxicolous	mesic	2371	B0028055
moss	Encalyptaceae	*Encalypta rhaptocarpa*		alpine	terricolous	mesic	1586	B0027644
moss	Encalyptaceae	*Encalypta rhaptocarpa*		subalpine	terricolous	mesic	1956	B0027795
moss	Brachytheciaceae	*Eurhynchium pulchellum*		lowland	terricolous	mesic	1873	B0027776
moss	Grimmiaceae	*Grimmia* sp.		alpine	saxicolous		1603	B0027650
moss	Pottiaceae	*Gymnostomum* sp.		lowland	saxicolous		2388	B0028063
moss	Helodiaceae	*Helodium* sp.		lowland	terricolous	wet	2249	B0027967
moss	Amblystegiaceae	*Hygrohypnum* sp.		lowland	saxicolous		2338	B0028022
moss	Hylocomiaceae	*Hylocomium pyrenaicum*		alpine	saxicolous-terricolous		1649	B0027669
moss	Hylocomiaceae	*Hylocomium splendens*	common	alpine	saxicolous-terricolous		1650	B0027670
moss	Hylocomiaceae	*Hylocomium splendens*	common	lowland	terricolous	mesic	1714	B0027711
moss	Hylocomiaceae	*Hylocomium splendens*	common	lowland	terricolous	mesic	1736	B0027728
moss	Hylocomiaceae	*Hylocomium splendens*	common	subalpine	terricolous	mesic	1900	B0027789
moss	Hylocomiaceae	*Hylocomium splendens*	common	lowland	terricolous	mesic	2115	
moss	Hylocomiaceae	*Hylocomium splendens*	common	lowland	terricolous	mesic	2276	B0027987
moss	Hylocomiaceae	*Hylocomium splendens*	common	lowland	terricolous	mesic	2325	
moss	Hypnaceae	*Hypnum revolutum*		alpine	saxicolous		1609	B0027656
moss	Dicranaceae	*Kiaeria blyttii*		alpine	terricolous		2466	B0028103
moss	Dicranaceae	*Kiaeria glacialis*		alpine	terricolous		2483	B0028120
moss	Dicranaceae	*Kiaeria* sp.		alpine	terricolous	wet	2503	B0028124
moss	Dicranaceae	*Kiaeria starkei*		alpine	saxicolous		2520	2419953
moss	Bryaceae	*Leptobryum pyriforme*		lowland	terricolous	mesic	1852	B0027765
moss	Bryaceae	*Leptobryum pyriforme*		lowland	terricolous	wet	2313	B0028011
moss	Bryaceae	*Leptobryum pyriforme*		lowland	wood		2255	B0027973
moss	Mniaceae	*Mnium* sp.		lowland	"log,stump,etc"		2095	B0027859
moss	Neckeraceae	*Neckera* sp.		lowland	"bark,wood"		2079	B0027853
moss	Polytrichaceae	*Oligotrichum hercynicum*		alpine	terricolous		2473	B0028110
moss	Polytrichaceae	*Oligotrichum hercynicum*		subalpine	terricolous	mesic	2526	B0028143
moss	Polytrichaceae	*Oligotrichum hercynicum*		subalpine	terricolous	mesic	2527	B0028144
moss	Polytrichaceae	*Oligotrichum hercynicum*		subalpine	terricolous	mesic	2528	B0028145
moss	Polytrichaceae	*Oligotrichum hercynicum*		subalpine	terricolous	mesic	2529	B0028146
moss	Polytrichaceae	*Oligotrichum parallelum*		alpine	terricolous	mesic	2474	B0028111
moss	Polytrichaceae	*Oligotrichum parallelum*		subalpine	terricolous	mesic	2530	B0028147

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Group	Family	Taxon	Occurrence	Zone	Substrate	Moisture	DB No.	ALA No.
moss	Polytrichaceae	*Oligotrichum parallelum*		subalpine	terricolous	mesic	2531	B0028148
moss	Polytrichaceae	*Oligotrichum parallelum*		subalpine	terricolous	mesic	2532	B0028149
moss	Polytrichaceae	*Oligotrichum parallelum*		subalpine	terricolous	mesic	2533	B0028150
moss	Polytrichaceae	*Oligotrichum parallelum*		subalpine	terricolous	mesic	2534	B0028151
moss	Dicranaceae	*Oncophorus* sp.		lowland	"bark,wood"		1751	B0027741
moss	Dicranaceae	*Oncophorus virens*		lowland	"bark,wood"		2256	B0027974
moss	Dicranaceae	*Oncophorus virens*		lowland	saxicolous		2343	B0028027
moss	Orthotrichaceae	*Orthotrichum obtusifolium*		lowland	"bark,wood"		1865	B0027773
moss	Meesiaceae	*Paludella squarrosa*		lowland	terricolous	wet	2310	B0028008
moss	Bartramiaceae	*Philonotis fontana var. pumila*		subalpine	terricolous		1556	B0027633
moss	Bartramiaceae	*Philonotis fontana*		subalpine	terricolous	wet	1899	B0027788
moss	Mniaceae	*Plagiomnium ellipticum*		lowland	terricolous	wet	2316	B0028014
moss	Mniaceae	*Plagiomnium medium*		lowland	terricolous	mesic	1841	B0027759
moss	Mniaceae	*Plagiomnium medium*		lowland	terricolous	wet	2253	B0027971
moss	Mniaceae	*Plagiomnium medium*		lowland	terricolous	mesic	2254	B0027972
moss	Plagiotheciaceae	*Plagiothecium* sp.		lowland	"bark,wood"		1757	B0027745
moss	Hylocomiaceae	*Pleurozium schreberi*	common	lowland	"log,stump,etc"		1742	B0027734
moss	Hylocomiaceae	*Pleurozium schreberi*	common	alpine	saxicolous-terricolous		1652	B0027672
moss	Hylocomiaceae	*Pleurozium schreberi*	common	lowland	terricolous	mesic	1713	B0027710
moss	Hylocomiaceae	*Pleurozium schreberi*	common	subalpine	terricolous	mesic	1914	B0027792
moss	Hylocomiaceae	*Pleurozium schreberi*	common	lowland	terricolous	mesic	2116	
moss	Hylocomiaceae	*Pleurozium schreberi*	common	lowland	terricolous	wet	2236	
moss	Hylocomiaceae	*Pleurozium schreberi*	common	lowland	terricolous	mesic	2275	B0027986
moss	Hylocomiaceae	*Pleurozium schreberi*	common	lowland	terricolous	mesic	2326	
moss	Hylocomiaceae	*Pleurozium schreberi*	common	subalpine	terricolous		6177	
moss	Polytrichaceae	*Pogonatum dentatum*		subalpine	terricolous		1564	B0027640
moss	Polytrichaceae	*Pogonatum dentatum*	common	lowland	terricolous	mesic	1730	B0027724
moss	Polytrichaceae	*Pogonatum urnigerum*	common	alpine	saxicolous		1606	B0027653
moss	Polytrichaceae	*Pogonatum urnigerum*	common	lowland	terricolous	mesic	1712	B0027709
moss	Polytrichaceae	*Pogonatum urnigerum*	common	lowland	terricolous	mesic	1722	B0027718
moss	Polytrichaceae	*Pogonatum urnigerum*	common	lowland	terricolous	mesic	1723	B0027719
moss	Polytrichaceae	*Pogonatum urnigerum*	common	lowland	terricolous	mesic	1850	B0027763
moss	Polytrichaceae	*Pogonatum urnigerum*	common	lowland	terricolous	mesic	2094	B0027858
moss	Polytrichaceae	*Pogonatum urnigerum*	common	subalpine	terricolous	mesic	2525	B0028142

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Group	**Family**	**Taxon**	**Occurrence**	**Zone**	**Substrate**	**Moisture**	**DB No.**	**ALA No.**
moss	Bryaceae	*Pohlia cruda*	common	lowland	terricolous	mesic	1683	B0027702
moss	Bryaceae	*Pohlia cruda*	common	lowland	terricolous	mesic	1853	B0027766
moss	Bryaceae	*Pohlia cruda*	common	lowland	terricolous	mesic	1856	B0027769
moss	Bryaceae	*Pohlia crudoides*		subalpine	saxicolous-terricolous		1999	B0027810
moss	Bryaceae	*Pohlia drummondii*		alpine	saxicolous		1672	B0027692
moss	Bryaceae	*Pohlia drummondii*		subalpine	terricolous	wet	1559	B0027635
moss	Bryaceae	*Pohlia filum*		alpine	terricolous	mesic	2042	B0027831
moss	Bryaceae	*Pohlia filum*		alpine	terricolous	mesic	2048	B0027837
moss	Bryaceae	*Pohlia ludwigii*		alpine	terricolous	mesic	2052	B0027841
moss	Bryaceae	*Pohlia nutans*	common	lowland	"bark,wood"		1758	B0027746
moss	Bryaceae	*Pohlia nutans*	common	lowland	"log,stump,etc"		1737	B0027729
moss	Bryaceae	*Pohlia nutans*	common	subalpine	terricolous	mesic	1562	B0027638
moss	Bryaceae	*Pohlia nutans*	common	lowland	terricolous	mesic	2120	
moss	Bryaceae	*Pohlia proligera*	common	subalpine	saxicolous-terricolous		2006	B0027816
moss	Bryaceae	*Pohlia proligera*	common	subalpine	saxicolous-terricolous		2007	B0027817
moss	Bryaceae	*Pohlia proligera*	common	lowland	terricolous	mesic	1725	B0027721
moss	Bryaceae	*Pohlia proligera*	common	lowland	terricolous	mesic	1851	B0027764
moss	Bryaceae	*Pohlia proligera*	common	lowland	terricolous	mesic	2303	B0028001
moss	Bryaceae	*Pohlia proligera*	common	lowland	terricolous	mesic	2393	B0028066
moss	Bryaceae	*Pohlia wahlenbergii*		alpine	terricolous		1698	
moss	Polytrichaceae	*Polytrichastrum alpinum*	common	alpine	saxicolous-terricolous		1654	B0027674
moss	Polytrichaceae	*Polytrichastrum alpinum*	common	alpine	saxicolous-terricolous		1655	B0027675
moss	Polytrichaceae	*Polytrichastrum alpinum*	common	subalpine	terricolous	mesic	1998	B0027809
moss	Polytrichaceae	*Polytrichastrum sexangulare*						
		var. *sexangulare*		alpine	saxicolous		2411	B0028078
moss	Polytrichaceae	*Polytrichastrum sexangulare*						
		var. *sexangulare*		alpine	terricolous	wet	2504	B0028125
moss	Polytrichaceae	*Polytrichastrum sexangulare*						
		var. *sexangulare*		alpine	terricolous	wet	2509	B0028130
moss	Polytrichaceae	*Polytrichum commune*	common	lowland	terricolous	mesic	2117	
moss	Polytrichaceae	*Polytrichum commune*	common	lowland	terricolous	mesic	2327	
moss	Polytrichaceae	*Polytrichum commune*	common	lowland	terricolous	mesic	2331	
moss	Polytrichaceae	*Polytrichum commune*						
		var. *commune*	common	subalpine	saxicolous-terricolous		1987	B0027801

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	**Family**	**Taxon**	**Occurrence**	**Zone**	**Substrate**	**Moisture**	**DB No.**	**ALA No.**
moss	Polytrichaceae	*Polytrichum commune*						
		var. *commune*	common	alpine	terricolous		1697	
moss	Polytrichaceae	*Polytrichum commune*						
		var. *commune*	common	lowland	terricolous	mesic	1718	B0027715
moss	Polytrichaceae	*Polytrichum commune*						
		var. *commune*	common	lowland	terricolous	mesic	1735	B0027727
moss	Polytrichaceae	*Polytrichum commune*						
		var. *commune*	common	subalpine	terricolous	mesic	2538	B0028155
moss	Polytrichaceae	*Polytrichum commune*						
		var. *commune*	common	subalpine	terricolous	mesic	2552	B0028166
moss	Polytrichaceae	*Polytrichum hyperboreum*	common	alpine	saxicolous		1608	B0027655
moss	Polytrichaceae	*Polytrichum hyperboreum*	common	alpine	saxicolous-terricolous		1656	B0027676
moss	Polytrichaceae	*Polytrichum hyperboreum*	common	alpine	saxicolous-terricolous		1657	B0027677
moss	Polytrichaceae	*Polytrichum hyperboreum*	common	subalpine	saxicolous-terricolous		1992	B0027805
moss	Polytrichaceae	*Polytrichum hyperboreum*	common	alpine	terricolous	mesic	1587	B0027645
moss	Polytrichaceae	*Polytrichum hyperboreum*	common	alpine	terricolous	mesic	1630	B0027663
moss	Polytrichaceae	*Polytrichum hyperboreum*	common	alpine	terricolous	mesic	2502	B0028123
moss	Polytrichaceae	*Polytrichum hyperboreum*	common	subalpine	terricolous	mesic	6178	
moss	Polytrichaceae	*Polytrichum juniperinum*	common	lowland	terricolous	mesic	1707	B0027704
moss	Polytrichaceae	*Polytrichum juniperinum*	common	subalpine	terricolous	mesic	6179	
moss	Polytrichaceae	*Polytrichum piliferum*	common	subalpine	terricolous	mesic	1563	B0027639
moss	Polytrichaceae	*Polytrichum piliferum*	common	alpine	terricolous	mesic	1607	B0027654
moss	Polytrichaceae	*Polytrichum piliferum*	common	alpine	terricolous	mesic	1631	B0027664
moss	Polytrichaceae	*Polytrichum piliferum*	common	lowland	terricolous	mesic	1706	B0027703
moss	Polytrichaceae	*Polytrichum piliferum*	common	lowland	terricolous	mesic	1724	B0027720
moss	Polytrichaceae	*Polytrichum piliferum*	common	subalpine	terricolous	mesic	6180	
moss	Polytrichaceae	*Polytrichum strictum*	common	alpine	terricolous	mesic	1682	B0027701
moss	Polytrichaceae	*Polytrichum strictum*	common	lowland	terricolous	mesic	1732	B0027726
moss	Polytrichaceae	*Polytrichum strictum*	common	lowland	terricolous	wet	2203	B0027943
moss	Polytrichaceae	*Polytrichum strictum*	common	lowland	terricolous	wet	2212	B0027952
moss	Polytrichaceae	*Polytrichum strictum*	common	alpine	terricolous		2468	B0028105
moss	Polytrichaceae	*Polytrichum strictum*	common	alpine	terricolous	wet	2508	B0028129
moss	Polytrichaceae	*Polytrichum strictum*	common	subalpine	terricolous	mesic	2555	B0028167
moss	Polytrichaceae	*Polytrichum swartzii*		lowland	terricolous	wet	2139	B0027882

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	**Family**	**Taxon**	**Occurrence**	**Zone**	**Substrate**	**Moisture**	**DB No.**	**ALA No.**
moss	Polytrichaceae	*Polytrichum swartzii*		lowland	terricolous	wet	2140	B0027883
moss	Polytrichaceae	*Polytrichum swartzii*		lowland	terricolous	wet	2141	B0027884
moss	Mniaceae	*Pseudobryum cinclidioides*		lowland	terricolous	mesic	2209	B0027949
moss		*Pseudobryum cinclidioides*		lowland	terricolous	mesic	2210	B0027950
moss	Leskeaceae	*Pseudoleskeella* sp.		lowland	saxicolous		2357	B0028041
moss	Hypnaceae	*Ptilium crista-castrensis*	common	lowland	"log,stump,etc"		1743	B0027735
moss	Hypnaceae	*Ptilium crista-castrensis*	common	lowland	terricolous	mesic	1842	B0027760
moss	Hypnaceae	*Ptilium crista-castrensis*	common	lowland	terricolous	mesic	2118	
moss	Hypnaceae	*Ptilium crista-castrensis*	common	lowland	terricolous	mesic	2224	B0027956
moss	Hypnaceae	*Ptilium crista-castrensis*	common	lowland	terricolous	mesic	2269	B0027984
moss	Hypnaceae	*Ptilium crista-castrensis*	common	lowland	terricolous	mesic	2328	
moss	Hypnaceae	*Ptilium crista-castrensis*	common	lowland	terricolous	mesic	2332	
moss	Hypnaceae	*Pylaisiella polyantha*		lowland	"bark,wood"		1753	B0027743
moss	Hypnaceae	*Pylaisiella polyantha*		lowland	"bark,wood"		1761	B0027749
moss	Hypnaceae	*Pylaisiella polyantha*		lowland	"bark,wood"		1838	B0027756
moss	Hypnaceae	*Pylaisiella polyantha*		lowland	"bark,wood"		2092	B0027856
moss	Hypnaceae	*Pylaisiella polyantha*		lowland	"log,stump,etc"		1863	B0027771
moss	Grimmiaceae	*Racomitrium affine*		alpine	terricolous	mesic	2410	B0028077
moss	Grimmiaceae	*Racomitrium affine*		alpine	terricolous	mesic	2415	B0028081
moss	Grimmiaceae	*Racomitrium affine*		alpine	terricolous	mesic	2419	B0028085
moss	Grimmiaceae	*Racomitrium canescens*	common	alpine	terricolous	mesic	1646	B0027666
moss	Grimmiaceae	*Racomitrium ericoides*	common	subalpine	terricolous	mesic	1552	B0027629
moss	Grimmiaceae	*Racomitrium ericoides*	common	subalpine	terricolous	mesic	1553	B0027630
moss	Grimmiaceae	*Racomitrium ericoides*	common	lowland	terricolous	mesic	1708	B0027705
moss	Grimmiaceae	*Racomitrium ericoides*	common	lowland	terricolous	mesic	1711	B0027708
moss	Grimmiaceae	*Racomitrium ericoides*	common	alpine	terricolous	mesic	2476	B0028113
moss	Grimmiaceae	*Racomitrium fasciculare*		alpine	saxicolous		1626	B0027659
moss	Grimmiaceae	*Racomitrium lanuginosum*	common	subalpine	saxicolous		1982	B0027798
moss	Grimmiaceae	*Racomitrium lanuginosum*	common	alpine	terricolous	mesic	1589	B0027647
moss	Mniaceae	*Rhizomnium andrewsianum*		alpine	terricolous	wet	2501	B0028122
moss	Mniaceae	*Rhizomnium gracile*		lowland	terricolous	wet	2314	B0028012
moss	Mniaceae	*Rhizomnium magnifolium*		lowland	terricolous	mesic	2252	B0027970
moss	Mniaceae	*Rhizomnium magnifolium*		lowland	terricolous	wet	2312	B0028010
moss		*Rhizomnium nudum*		lowland	terricolous	mesic	2211	B0027951

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	**Family**	**Taxon**	**Occurrence**	**Zone**	**Substrate**	**Moisture**	**DB No.**	**ALA No.**
moss		*Rhizomnium pseudopunctatum*		lowland	terricolous	mesic	2223	B0027955
moss	Mniaceae	*Rhizomnium pseudopunctatum*		lowland	terricolous	wet	2315	B0028013
moss	Hylocomiaceae	*Rhytidiadelphus triquetrus*	common	lowland	terricolous	mesic	2096	B0027860
moss	Hylocomiaceae	*Rhytidiadelphus triquetrus*	common	lowland	terricolous	mesic	2277	B0027988
moss	Rhytidiaceae	*Rhytidium rugosum*		alpine	saxicolous		1627	B0027660
moss	Rhytidiaceae	*Rhytidium rugosum*		lowland	terricolous	mesic	2394	B0028067
moss	Amblystegiaceae	*Sanionia uncinata*	common	lowland	"bark,wood"		1760	B0027748
moss	Amblystegiaceae	*Sanionia uncinata*	common	lowland	"bark,wood"		2078	B0027852
moss	Amblystegiaceae	*Sanionia uncinata*	common	alpine	saxicolous-terricolous		1648	B0027668
moss	Amblystegiaceae	*Sanionia uncinata*	common	lowland	terricolous	mesic	1715	B0027712
moss	Amblystegiaceae	*Sanionia uncinata*	common	lowland	terricolous	mesic	2106	
moss	Amblystegiaceae	*Sanionia uncinata*	common	subalpine	terricolous	mesic	2108	
moss	Amblystegiaceae	*Sanionia uncinata*	common	lowland	terricolous	mesic	2119	
moss	Amblystegiaceae	*Sanionia uncinata*	common	lowland	terricolous	wet	2138	B0027881
moss	Amblystegiaceae	*Sanionia uncinata*	common	lowland	terricolous	mesic	2238	
moss	Amblystegiaceae	*Sanionia uncinata*	common	lowland	terricolous	mesic	2329	
moss	Grimmiaceae	*Schistidium* sp.		alpine	saxicolous		1604	B0027651
moss	Schistostegaceae	*Schistostega pennata*		lowland	terricolous	mesic	2302	B0028000
moss	Scouleriaceae	*Scouleria* sp.		lowland	saxicolous		2336	B0028020
moss	Sphagnaceae	*Sphagnum aongstroemii*		lowland	terricolous	wet	2155	B0027898
moss	Sphagnaceae	*Sphagnum capillifolium*		lowland	terricolous	wet	2169	B0027910
moss	Sphagnaceae	*Sphagnum centrale*	common	lowland	terricolous	wet	2142	B0027885
moss	Sphagnaceae	*Sphagnum centrale*	common	lowland	terricolous	wet	2145	B0027888
moss	Sphagnaceae	*Sphagnum centrale*	common	lowland	terricolous	wet	2149	B0027892
moss	Sphagnaceae	*Sphagnum centrale*	common	lowland	terricolous	wet	2150	B0027893
moss	Sphagnaceae	*Sphagnum centrale*	common	lowland	terricolous	wet	2175	B0027915
moss	Sphagnaceae	*Sphagnum centrale*	common	lowland	terricolous	wet	2176	B0027916
moss	Sphagnaceae	*Sphagnum fuscum*	common	lowland	terricolous	wet	2151	B0027894
moss	Sphagnaceae	*Sphagnum fuscum*	common	lowland	terricolous	wet	2168	B0027909
moss	Sphagnaceae	*Sphagnum girgensohnii*	common	alpine	saxicolous-terricolous		1647	B0027667
moss	Sphagnaceae	*Sphagnum girgensohnii*	common	alpine	saxicolous-terricolous		1659	B0027679
moss	Sphagnaceae	*Sphagnum girgensohnii*	common	lowland	terricolous	wet	2173	B0027914
moss	Sphagnaceae	*Sphagnum girgensohnii*		lowland	terricolous	wet	2192	B0027932
moss	Sphagnaceae	*Sphagnum girgensohnii*	common	lowland	terricolous	wet	2240	B0027958

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	**Family**	**Taxon**	**Occurrence**	**Zone**	**Substrate**	**Moisture**	**DB No.**	**ALA No.**
moss	Sphagnaceae	*Sphagnum girgensohnii*		alpine	terricolous	wet	2493	B0028121
moss	Sphagnaceae	*Sphagnum lenense*	common	lowland	terricolous	wet	2186	B0027926
moss	Sphagnaceae	*Sphagnum lenense*	common	lowland	terricolous	wet	2188	B0027928
moss	Sphagnaceae	*Sphagnum lenense*	common	lowland	terricolous	wet	2189	B0027929
moss	Sphagnaceae	*Sphagnum lenense*	common	lowland	terricolous	wet	2190	B0027930
moss	Sphagnaceae	*Sphagnum lenense*	common	lowland	terricolous	wet	2191	B0027931
moss	Sphagnaceae	*Sphagnum lenense*	common	lowland	terricolous	wet	2196	B0027936
moss	Sphagnaceae	*Sphagnum magellanicum*	common	lowland	terricolous	wet	2144	B0027887
moss	Sphagnaceae	*Sphagnum magellanicum*	common	lowland	terricolous	wet	2146	B0027889
moss	Sphagnaceae	*Sphagnum magellanicum*	common	lowland	terricolous	wet	2147	B0027890
moss	Sphagnaceae	*Sphagnum magellanicum*	common	lowland	terricolous	wet	2148	B0027891
moss	Sphagnaceae	*Sphagnum magellanicum*	common	lowland	terricolous	wet	2177	B0027917
moss	Sphagnaceae	*Sphagnum magellanicum*	common	lowland	terricolous	wet	2178	B0027918
moss	Sphagnaceae	*Sphagnum magellanicum*	common	lowland	terricolous	wet	2179	B0027919
moss	Sphagnaceae	*Sphagnum papillosum*	common	lowland	terricolous	wet	2143	B0027886
moss	Sphagnaceae	*Sphagnum recurvum*	common	lowland	terricolous	wet	2164	B0027907
moss	Sphagnaceae	*Sphagnum recurvum*	common	lowland	terricolous	wet	2194	B0027934
moss	Sphagnaceae	*Sphagnum recurvum* var. *tenue*	common	lowland	terricolous	wet	2171	B0027912
moss	Sphagnaceae	*Sphagnum riparium*	common	lowland	terricolous	wet	2204	B0027944
moss	Sphagnaceae	*Sphagnum russowii*	common	lowland	terricolous	wet	2163	B0027906
moss	Sphagnaceae	*Sphagnum russowii*	common	lowland	terricolous	wet	2318	B0028016
moss	Sphagnaceae	*Sphagnum squarrosum*	common	lowland	terricolous	wet	2154	B0027897
moss	Sphagnaceae	*Sphagnum squarrosum*	common	lowland	terricolous	wet	2206	B0027946
moss	Sphagnaceae	*Sphagnum subsecundum*						
		var. *subsecundum*	common	lowland	terricolous	wet	2153	B0027896
moss	Sphagnaceae	*Sphagnum subsecundum*						
		var. *subsecundum*	common	lowland	terricolous	wet	2156	B0027899
moss	Sphagnaceae	*Sphagnum teres*	common	lowland	terricolous	wet	2241	B0027959
moss	Tetraphidaceae	*Tetraphis pellucida*		lowland	"log,stump,etc"		1747	B0027737
moss	Tetraphidaceae	*Tetraphis pellucida*		lowland	"log,stump,etc"		2262	B0027979
moss	Tetraphidaceae	*Tetraphis pellucida*		lowland	terricolous	mesic	2225	B0027957
moss	Splachnaceae	*Tetraplodon* sp.		lowland	terricolous	wet	2311	B0028009
moss	Timmiaceae	*Timmia austriaca*		alpine	saxicolous		1673	B0027693
moss	Timmiaceae	*Timmia austriaca*		subalpine	saxicolous-terricolous		2009	B0027819

Synopsis of Cryptogam Collections for Fort Richardson, AK								
Group	**Family**	**Taxon**	**Occurrence**	**Zone**	**Substrate**	**Moisture**	**DB No.**	**ALA No.**
moss	Brachytheciaceae	*Tomentypnum nitens*		lowland	terricolous	wet	2317	B0028015
moss	Pottiaceae	*Tortella fragilis*		alpine	terricolous		1590	B0027648
moss	Pottiaceae	*Tortula ruralis*		lowland	saxicolous		2360	B0028044
moss	Pottiaceae	*Tortula ruralis*		alpine	terricolous		1629	B0027662
moss	Pottiaceae	*Tortula ruralis*		lowland	terricolous	mesic	1882	B0027785

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13. ABSTRACT ***(Maximum 200 words)***

The Army Land-Condition Trend Analysis (LCTA) program, an inventory of vascular and cryptogam plant species, was undertaken to support both the LCTA sampling teams and other natural resource programs at Fort Richardson, Alaska. This inventory provides the baseline record of the existing flora for LCTA. The installation was divided into six collecting zones based on a combination of elevation, geomorphology, and major plant community types. Specimens were collected in triplicate for VASCULAR PLANTS and in duplicates for the cryptogams. Collection of cryptogam plants was restricted to ground-inhabiting cryptogams (mosses, lichens, and liverworts). Specimens were later verified or identified at the University of Alaska Museum. One thousand eighty-seven vascular and 996 cryptogam plant specimens were collected. For vascular plant species, this represented 561 species, or 588 taxa (including subspecies and varieties), 75 families, and 246 genera. For cryptogam plant species, this represented 239 species, or 256 taxa (including subspecies and varieties).

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