United States
Department of
Agriculture

Forest Service
Alaska Region

R10-PR-023
June 2010

Nonforested Plant Associations of the Stikine-Taku River Valleys and Stikine River Delta Ecological Subsections in Southeastern Alaska

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Rick L. Turner
Ecologist

Forest Service, U.S. Department of Agriculture
Tongass National Forest
8510 Mendenhall Loop Road
Juneau, Alaska 99801

June 2010

CITATION:

Turner, R. L. 2010. Nonforested plant associations of the Stikine-Taku River Valleys and Stikine River Delta ecological subsections in southeastern Alaska. Forest Service, Alaska Region Publication, R10-PR-023, Juneau, Alaska, 115 p.

SUMMARY

This document describes a classification of nonforested (shrubland, herbaceous, and nonvascular) plant associations that occur within the southeastern Alaska portions of the Stikine-Taku River Valleys and Stikine River Delta ecological subsections. The study area encompasses approximately 46,804 hectares (115,655 acres) and includes the two largest river valleys and the only large river delta located within the Tongass National Forest.

Agglomerative cluster analysis and indicator species analysis of floristic data from 208 sample plots containing 287 taxa resulted in the description of 22 plant associations (10 shrubland, 11 herbaceous, and 1 nonvascular). Multi-response permutation procedures indicate a strong separation between plant associations and fairly high within-group agreement. Ordination results suggest that water table depth represents an important environmental gradient in determining vegetation composition, and it may be related to minor differences in site elevation. Soil pH is also an important factor and appears to be related to the relative amounts of fresh or brackish water that a site receives.

Dichotomous keys and cover/constancy tables are included to assist with field identification of plant associations. Descriptions of each type include general concept, geographic distribution, environmental setting, vegetation dynamics, and comparisons to other vegetation types. Summaries of life form, ground cover, vegetation composition, and important indicator species are also included.

Cover photos:

Top - Taku River near the terminus of Taku Glacier, looking south toward Taku Inlet.
Bottom - Sergief Island (foreground), looking northeast toward the Stikine River valley.

ACKNOWLEDGMENTS

The USDA Forest Service, Tongass National Forest provided the financial and technical support for this study, and staff from the Forest Supervisor's Office, Juneau Ranger District, and Wrangell Ranger District contributed to its success. This study is part of a nonforested vegetation classification program initiated in 2000 on the Tongass National Forest and managed by Patricia Krosse. Thanks are due to Charley Streuli, Carol Seitz-Warmuth, and Patricia O'Connor for being strong advocates of this project. David Rak and Maria Burke generously shared their extensive knowledge of the Stikine River and put in many long hours safely piloting the crew boat. Carolyn Parker (University of Alaska – Fairbanks) and Ellen Anderson helped identify many of the collected vascular plant specimens. Kitty LaBounty (University of Alaska – Southeast) identified several of the mosses and liverworts, and Karen Dillman assisted with lichen identification. Patricia Krosse, Pam Fletcher, and Jacquie Foss provided soil sampling, classification, and interpretation expertise. Karen Dillman, Jackie deMontigny, Mary Friberg, Patricia Krosse, Rob DeVelice (Chugach National Forest), Barbara Schrader (USFS Alaska Region), and Keith Boggs (Alaska Natural Heritage Program) provided helpful comments on the draft manuscript. This study would not have been possible without the hard work and dedication of the field crew: Maria Burke, Pam Fletcher, Jacquie Foss, Jennifer Nu, Eric Ressel, and Agnes Velloso. They endured alder thickets, muddy sloughs, constant rain, and hordes of mosquitoes while performing their duties with enthusiasm and good humor.

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INTRODUCTION

This document describes the classification of nonforested (shrubland, herbaceous, and nonvascular) plant associations that occur within the Stikine-Taku River Valleys and the Stikine River Delta ecological subsections of southeastern Alaska (Nowacki et al. 2001). These ecological subsections are part of the National Hierarchical Framework of Ecological Units (Cleland et al. 1997). This plant association classification covers the portions of these two subsections that occur within the Tongass National Forest, including 30,353 hectares (75,004 acres) in the Taku-Stikine River Valleys Subsection and 13,238 hectares (32,712 acres) on the Stikine River Delta Subsection (Figure 1).

A plant association is defined by Jennings et al. (2009) as "a vegetation classification unit defined on the basis of a characteristic range of species composition, diagnostic species occurrence, habitat conditions, and physiognomy." It is the most basic vegetation unit in the Federal Geographic Data Committee's National Vegetation Classification Standard (NVCS). According to the USDA Forest Service's Existing Vegetation Classification and Mapping Technical Guide, floristic composition and diagnostic species occurrence are the primary criteria for classifying existing vegetation, and physiognomy is a secondary criterion that is often

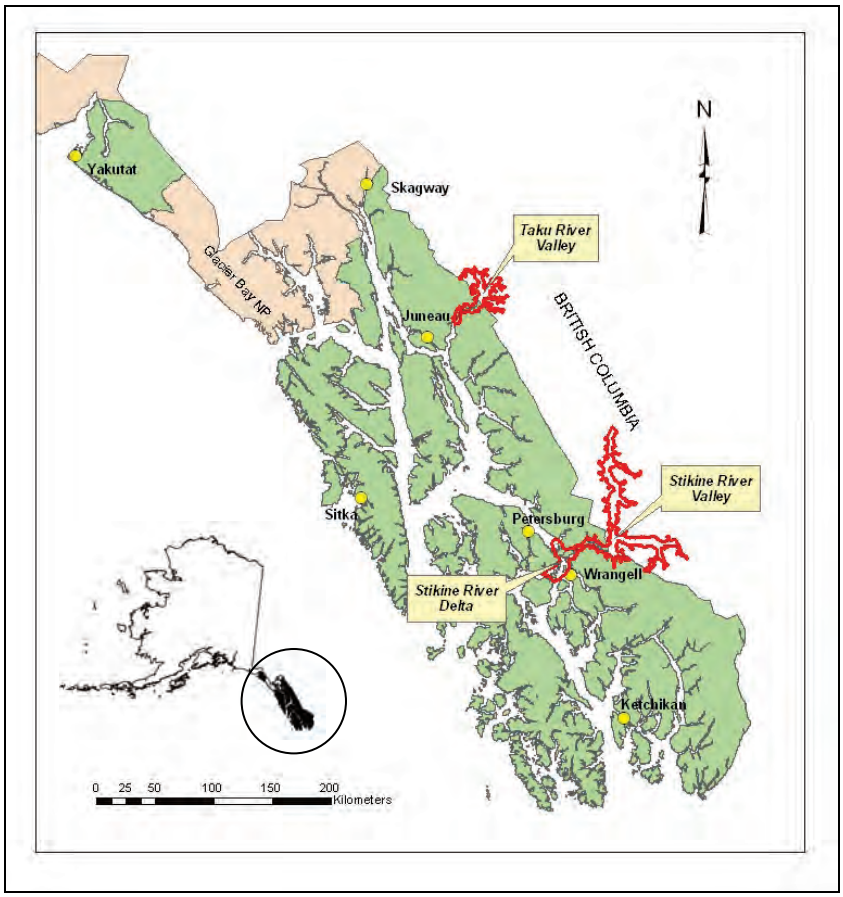


Figure 1. Map of the Tongass National Forest showing locations of the Stikine-Taku River Valleys and Stikine River Delta ecological subsections (Nowacki et al. 2001).

correlated with floristics (Brohman and Bryant 2005). Habitat is not a criterion but is used to describe the environmental range of a vegetation type, interpret successional relationships, and relate existing vegetation to potential natural vegetation. See Gabriel and Talbot (1984), Viereck et al. (1992), and Brohman and Bryant (2005) for glossaries of other terms and concepts commonly used in this document.

This plant association classification provides a consistent, standardized framework for cataloguing, describing, and communicating information about nonforested plant communities, and it can be used to address numerous research inquiries and management issues. The NVCS includes nine hierarchical levels of vegetation classification, and the appropriate level of detail can be chosen for a specific issue. Some examples of potential uses include project- and watershed-level analyses, assessment of threatened or endangered wildlife or plant habitat, and evaluation of biodiversity, climate change effects, and plant community successional relationships. See Brohman and Bryant (2005) for more information about the potetnial uses of vegetation classifications and the Forest Service policies and regulations that require the information that vegetation classifications provide.

Previous Studies

Classifications have been completed for the most common, late-successional forested plant associations on the Tongass National Forest (Pawuk and Kissinger 1989, DeMeo et al. 1992, Martin et al. 1995, Shephard 1995), but nonforested plant associations have been described only for the Yakutat Forelands (Shephard 1995). A few other vegetation classifications that include nonforested communities have been developed for southeastern and southcentral Alaska coast. Hanson (1951) classified plant communities in central and western coastal Alaska, with emphasis on graminoid communities. Stephens and Billings (1967) described three estuarine meadow communities along a tidal gradient on Chichagof Island. Shephard (1995) developed a plant community classification for the Yakutat Forelands area of the northern Tongass National Forest that included forested, shrubland, and herbaceous plant communities. On the southcentral coast of Alaska, DeVelice et al. (1999) and Boggs (2000) developed plant association classifications for the Chugach National Forest and Copper River Delta, respectively, that included a variety of shrub and herbaceous plant communities. Mackenzie and Moran (2004) developed a classification of wetland site associations in British Columbia, including nonforested communities that are broadly similar to nonforested vegetation in southeastern Alaska. Boggs et al. (2008a, 2008b) developed classifications for Kenai Fjords National Park in southcentral Alaska and Glacier Bay National Park, both of which include nonforested plant associations.

Few quantitative vegetation classification studies have been conducted for the Stikine River Valley and Delta. Pawuk and Kissinger (1989) developed a plant association classification for the former Stikine Area of the Tongass National Forest, which corresponds to the current Wrangell and Petersburg Ranger Districts. However, the classification includes only forested community types, and it does not include vegetation in the Stikine-Le Conte Wilderness. Del Moral and Watson (1978) classified eleven forested and nonforested community types on Sergief Island In the Stikine River Delta, consisting of a small, rocky, forested highland surrounded by extensive tidal flats and marsh vegetation. Sparks et al. (1977) related the distribution of various vascular plant species to the Sergief Island community types. Ducks Unlimited, in cooperation with the USDA Forest Service Alaska Region, is currently classifying and mapping broad forested and nonforested dominance types in the Stikine River Valley and

Delta using aerial plots and satellite data. No published studies of nonforested vegetation at the plant association level have been conducted in the Taku River Valley.

ENVIRONMENTAL SETTING

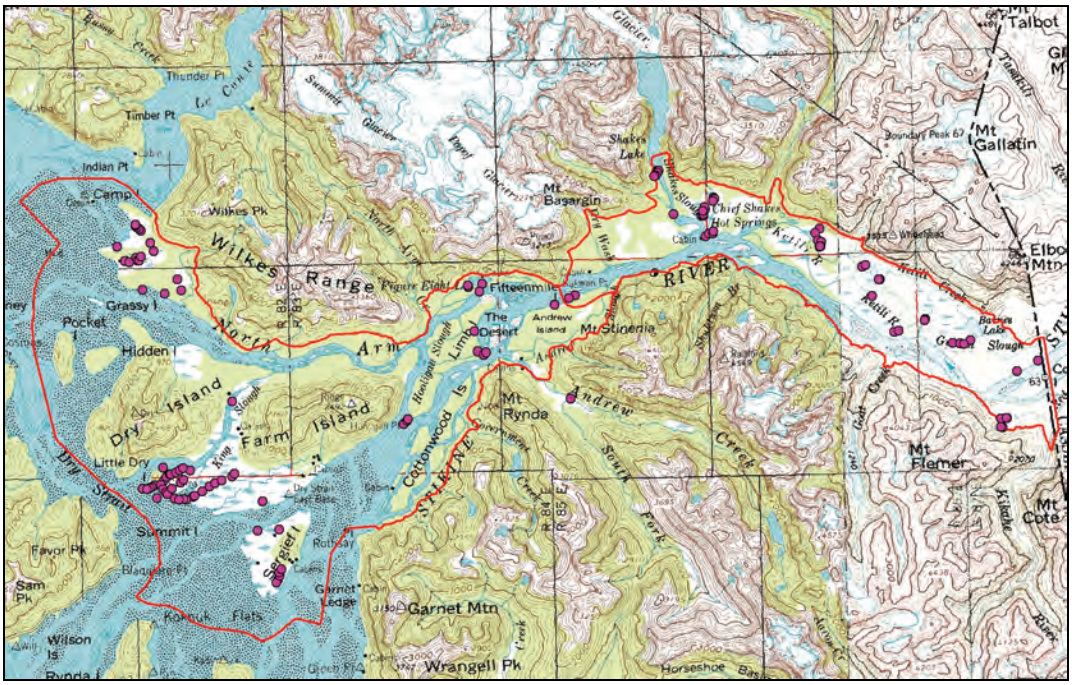
Location

The Stikine River originates in northwestern British Columbia and flows for about 539 kilometers (335 miles), flowing through the rugged Coast Mountains and emptying into the tidal flats of the Stikine River Delta, just north of Wrangell (Figure 2a). Only the last 64 kilometers (40 miles) is within Alaska and the Tongass National Forest. Both the Stikine River Valley and Delta in Alaska are part of the 181,640-hectare (448,841-acre) Stikine-LeConte Wilderness. About 300 glaciers occur along the river's course, including Great Glacier in British Columbia and Shakes Glacier in Alaska. Meltwater from these glaciers
supply immense quantities of silt to the river and boost the flow from melting snow during the peak summer months. The Stikine River supports a highly productive salmon fishery, and its tidewater delta supports the largest Dungeness crab fishing area in southeast Alaska. The extensive marshes and tidal flats of the Stikine River Delta serves as important bird habitat for large numbers of geese, swans, ducks, and other migratory birds.

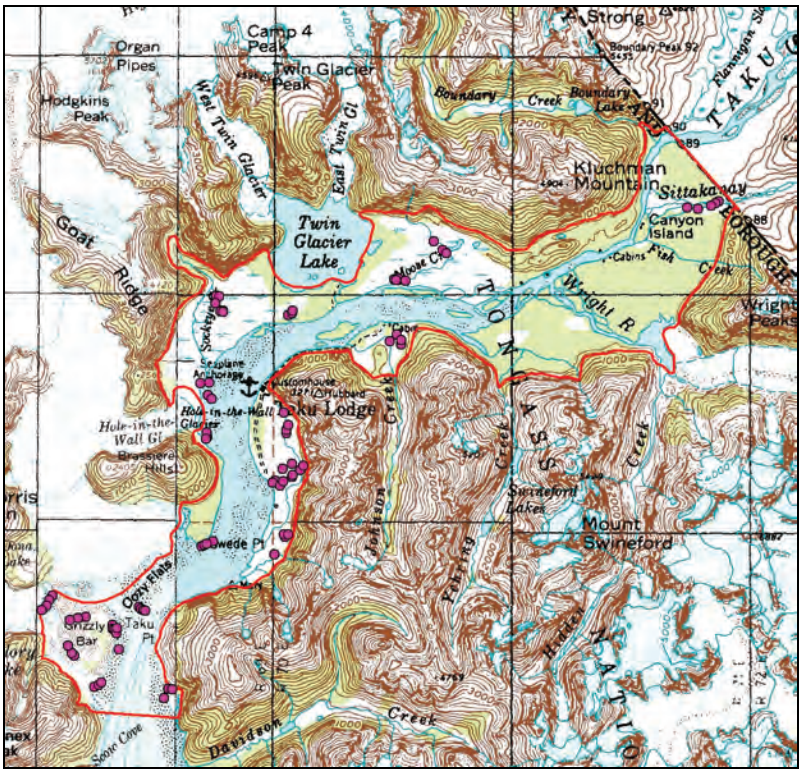
The Taku River, like the Stikine River, originates in northwestern British Columbia, and it drains one of the largest roadless watersheds remaining along the Pacific coast of North America. The Taku River flows for about 87 kilometers (54 miles) from the confluence of the Inklin and Naniika rivers through the Coast Mountains and empties into Taku Inlet just south of Juneau (Figure 2b). The Alaska portion of the Taku River watershed is located within the Taku-Snettisham Roadless Area (277,498 hectares) of the Tongass National Forest (USDA Forest Service 2003). About ninety percent of the Taku River discharge is during the 6-month period from May to November (Neal 2007). During the summer months the river is subject to periodic outburst floods known as "jökulhlaups," originating from two glacier-dammed lakes along the margin of the Tulsequah Glacier in British Columbia. These outburst floods can dramatically increase river levels for short periods but usually cause little damage. Taku Glacier is a large tidewater glacier which terminates near the mouth of the Taku River. The Taku River supports a highly productive fishery, including all five native Pacific salmon species. It also provides a diversity of habitats for land and marine mammals, migratory waterfowl, shorebirds, and raptors. The watershed is the ancestral home of the Taku River Tlingit people, who today continue many aspects of their traditional and subsistence lifestyle in this watershed.

Climate

The climate of the Stikine and Taku River Valleys and delta is maritime, with the cool summers and cold winters typical of southeast Alaska. Mean summer temperature is about 18 degrees C (65 F) and winter temperature is -4 degrees C (24 F). The river valleys are exposed to cold air flowing downslope from glaciers and ice fields, so average temperatures may be cooler than surrounding areas by several degrees even in the growing season, and snowfall may also be greater. Precipitation can vary widely due to influences of topography but generally ranges from 200 cm (80 in) to over 380 cm (150 in). The large river valleys form climatic corridors to the drier continental climate of interior British Columbia and are subjected to strong down-valley winds during the winter (Nowacki et al. 2001). These winds carry large amounts of sand and silt



a) Stikine River portion of the study area.



b) Taku River portion of the study area.

Figure 2. Study areas and sample site locations in the Stikine-Taku River Valleys and Stikine River Delta ecological subsections. Dots indicate sample site locations.

(loess) from river bars and streambanks, and deposit the materials downriver, often creating large dunes along the river channel.

Geology and Soils

The Stikine and Taku valleys were probably formed by ancestral rivers that ran from the interior of the continent to the sea (Nowacki et al. 2001). These rivers cut corridors through the Coast Mountains as they were being formed. Large amounts of glacial sediments carried by these rivers were deposited, eroded, and redeposited in the river valleys, resulting in relatively young, poorly developed soils, the majority of which are in the Entisol and Inceptisol soil orders. In areas with less influence from flood cycles, layers of peat have built up over time to form deep organic soils of the Histosol order. The fan-shaped delta at the mouth of the Stikine River formed over long periods of sediment deposition, with strong down-valley winds adding deposits of loess carried downriver from exposed bars during the winter low-flow period. Streams in the delta are mostly estuarine, with brackish water and daily tidal fluctuations. The Taku River has no delta due to its smaller size and the deep, narrow inlet into which it empties.

Vegetation

In the river valleys, a high water table and seasonal flooding results in abundant wetland and riparian vegetation. New sediment deposits, such as stream levees, river bars, and glacial outwash areas are usually colonized in a general sequence of lichens and bryophytes, herbaceous vegetation, deciduous or evergreen shrublands, and cottonwood forests. Over time, Sitka spruce/western hemlock forests may become established on well-drained sites. Shallow depressions and ponds support sedge marsh vegetation which may succeeed to fens or bogs as organic matter accumulates. In the Stikine River Delta, extensive sedge and grass meadows dominate the intertidal flats. Older, slightly higher surfaces not affected by tidal action are dominated by alder and willow shrublands. On well-drained loess deposits, forests of cottonwood and Sitka spruce may become established and eventually succeed to Sitka spruce-western hemlock forest. Spruce and hemlock forests are usually dominant on the rocky highlands of some river delta islands.

Resource Management Issues

The National Forest System (NFS) lands located within the Stikine-Taku River Valleys and Stikine River Delta ecological subsections are managed primarily for remote recreation, biodiversity, and wilderness characteristics. Both the Stikine and Taku watersheds support abundant fish and wildlife populations, including waterfowl, moose, deer, bear, and all five species of Pacific salmon. On the river floodplains, willow and alder shrublands are commonly browsed by moose. The Stikine River Delta is an important migratory bird stopover during the spring and autumn, and it is one of the three Key Coastal Wetlands designated by the USDA Forest Service Alaska Region. The extensive marshes and meadows provide important forage, and waterfowl often graze intensely on the tidal sedge marshes of the Stikine River Delta and at the mouths of both rivers. Shorebirds feed on various benthic organisms on the intertidal flats. The sparsely vegetated outwash areas near the terminus of glaciers serve as habitat for ground-nesting birds such as the arctic tern.

Recreational use consists mainly of hunting, birdwatching, boating, and sightseeing. All NFS lands in the Stikine River Valley and Delta are designated as wilderness, and operation of motorized vehicles and equipment are prohibited except in river channels, tidal sloughs, and lakes. Active dunes accessible by boat on the Stikine River are popular sites for picnicking and camping. Concentrated foot traffic in these areas could cause erosion and damage to vegetation. Impacts on terrestrial plant communities are possible on parts of the Taku River Valley that have not been designated as closed to motorized transportation. These impacts could come in the form of all-terrain vehicle use and temporary aircraft landing strips. Recreational use on the sparsely vegetated glacial outwash and alluvial flats may be heavy at times, as indicated by networks of all-terrain vehicle tracks that were observed at some sample sites.

Current and historic mining sites are located in the Canadian portions of both river valleys and are subject to further development. Recently a private mining company proposed transporting equipment and products to and from a mine in Canada via the Alaska portion of the Taku River using hover-barges pulled by amphibious tracked vehicles. Since nonforested vegetation is often located adjacent to the main river channel, vegetation damage and soil erosion could occur. Accidental spills of toxic materials during transport could have long-term negative effects on vegetation. Although the plan was postponed for economic reasons, it highlights the need to consider the vulnerability of plant communities to the effects of proposed projects within the Stikine and Taku watersheds.

Both river valleys are susceptible to invasion by nonnative plant species. For example, white sweet clover (*Melilotus officinalis)* has invaded extensive areas of the Stikine River floodplain, particularly on river sand bars and dunes. Infestations in river valleys often originate from roads or agricultural fields adjacent to river floodplains, allowing the species to be dispersed downriver (Conn 2008). The Stikine and Taku River Valleys within the Tongass National Forest are roadless with no agricultural activity, but invasive plants can be transported downriver from developed portions of the watershed in Canada. Invasive plants and seeds can also "hitchhike" either upstream or downstream on the fur or feathers of wildlife, or on the clothing, boats, or fishing gear of recreational users and commercial outfitters and guides. A combination of monitoring and appropriate control techniques will be needed to limit the spread of invasive plants into the river valleys and delta.

Climate change has the potential to profoundly influence the distribution and function of both species and ecosystems in the area. Many parts of Alaska are already showing some evidence of climate change, including loss of permafrost and polar sea ice, the retreat of almost all nontidewater glaciers, widespread spruce bark beetle infestations, and increases in forest fire frequency and intensity. The suspected cause of the decline of Alaska yellow cedar (*Cupressus nootkatensis*) in southeast Alaska is warmer winter temperatures and the accompanying reduction of low-elevation snow cover, which insulates the tree’s shallow roots and protects them from spring freezing injury (Hennon et al. 2006). Model-based climate projections for southeast Alaska indicate that both temperature and precipitation is expected to increase throughout this century. Possible effects include a longer growing season, increased plant growth and evapotranspiration, changing storm patterns, and a rising sea level (Scenarios Network for Alaska Planning 2010). A net decrease in sea level may be likely in much of southeast Alaska due to the land surface uplift (isostatic rebound) in response to the diminished weight of glaciers and icefields as they further recede, which could cause some coastal wetlands to dry out (Larsen et al. 2004, Kelly et al. 2007).

METHODS

Site Selection

Simple random or systematic sampling methods are generally not used for vegetation classification because it is usually inefficient and costly to obtain the density of sample points required to represent all the variation within a landscape (Brohman and Bryant 2005). The difficulty of access to this study area, which is entirely roadless and partly in a designated wilderness, presented additional restraints to field sampling. To achieve a representative sample, the study area was stratified based on gross vegetation structure and geomorphology, and sample sites within each stratum were selected by preferential methods (Jennings et al. 2009) by reviewing 1:15,480 aerial photographs to locate examples of nonforested vegetation on a gradsect, which for this study is defined as a transect oriented along a perceived significant environmental gradient (Gillison and Brewer 1985, Austin and Heylingers 1991). Sites along a gradsect were selected for sampling if the vegetation structure, species composition, and environmental conditions appeared to be homogeneous, and the site covered a contiguous area of at least 0.2 hectares. Smaller sites were occasionally sampled in vegetation complexes containing small occurrences of two or more different vegetation types in a repeating pattern. Plot locations were selected "without preconcieved bias" (Mueller-Dombois and Ellenberg 1974); that is, without preconceptions as to placement within the classification. Sites containing greater than 10 percent overstory tree cover, less than 2 percent total vegetation cover, or that were located in vegetation ecotones were rejected from consideration for sampling.

Field Sampling

Field sampling occurred from 2006 to 2009 during the summer growing season (approximately mid-June and mid-August). Methods followed the standards listed in Brohman and Bryant (2005) and are generally consistent with other classifications of nonforested vegetation in the region (Shephard 1995, DeVelice et al. 1999, Boggs 2000).

A 5 x 10 m (16 x 33 ft) quadrat plot was established within relatively homogenous nonforested (less than 10 percent cover of overstory trees) vegetation. Plots were randomly placed within larger sites but were placed in the center of smaller sites to avoid edge effects. Plots were established with their long axis oriented east to west. The latitude and longitude of the plot was recorded with a GPS unit, and digital photographs of the plots from each cardinal direction were taken.

Vegetation data recorded include life form, percent canopy cover, and predominant height for all species. For shrub life forms, additional data include percent cover of tall (> 2 m), medium (0.5 m – 2 m), and low (< 0.5 m) shrub layers. For tree life forms, additional data included the following for both overstory and regeneration layers: percent cover, predominant crown height, predominant stem diameter (at breast height or root collar), predominant age, and stem count. Total percent canopy cover of vascular plants in aggregate and by major life form (trees, shrubs, dwarf shrubs, herbs, grasses, and forbs), and relative percent ground cover by type were also recorded. Voucher specimens of species encountered during field sampling were collected, identified, and preserved in the Tongass National Forest herbarium. Some specimens were sent to University of Alaska – Fairbanks Herbarium for identification. Nomenclature for all vascular and nonvascular plant taxa follows the NRCS PLANTS database (USDA Natural Resources Conservation Service 2009).

Physiographic data recorded include elevation, slope gradient, horizontal and vertical slope shape, and slope complexity. General soil data include parent material type, drainage class, observed water table depth, and taxonomic subgroup classification. Soil pedon data include horizon designation, upper and lower depth, field pH, color, textural class, percent fiber rubbed/unrubbed, percent and type of rock fragments, and special features (redoximorphic features, root channels, etc.).

Data Analysis

Vegetation cover and soil/physiographic data were entered into a Microsoft Access database and analyzed with PC-ORD, a software package for multivariate analysis of ecological data (McCune and Medford 2006). To reduce noise in the data and improve analysis results, all varieties and subspecies identified during field sampling were subsumed into their respective species, and records that were identified only to the genus level or higher were removed from the data set (Jennings et al. 2009). Several modifications were applied to the species cover values in preparation for multivariate analysis, following the general procedure suggested by McCune et al. (2002). All rare species (defined in this context as a species that occurs in less than 4 plots in the data set) were removed from the data set, which was then square-root transformed and relativized by species maxima to improve assumptions of normality and avoid over-emphasis on dominant species. Sample plots with a standard deviation > 2.0 as determined by outlier analysis were removed from the data set and described separately.

Hierarchical agglomerative cluster analysis was performed to define groups of plots based on their similarities in species composition. The Sorensen (Bray-Curtis) distance measure and flexible beta group linkage method (beta = -0.25) were used in the cluster analysis. Multi-response permutation procedures (MRPP) with 1000 permutations was used to test the null hypothesis of no difference between the resulting groups. To assist with interpreting the groups in relation to species adundances and with environmental gradients, ordination was performed using non-metric multidimensional scaling and the Sorenson distance measure in PC-ORD's "slow and thorough" default setting. Indicator species analysis (Dufrene and Legendre 1997) was used to detect and describe the relative value of species for identifying groups and to assist in determining the most appropriate level of the cluster hierarchy to use in describing plant associations.

RESULTS

A total of 208 plots containing 287 taxa were inventoried during field sampling (Figure 2). A first-order jackknife estimate indicates that the database contains 78% of the total species in the study area. After removing rare species and outlier plots, the remaining data set used for cluster analysis and ordination contained a total of 204 plots and 146 species.

Cluster analysis resulted in 24 groups based on floristic composition. The MRPP test statistic *T* was -79.23. The substantially negative value of *T* indicates a strong separation between groups (McCune and Medford 2002). The chance-corrected within-group agreement *A* was 0.36 with $p < .01$. The highest possible value for *A* is 1, when all items are identical within groups. In most community data, *A* is usually less than 0.1, and values greater than 0.3 are considered fairly high (McCune and Medford 2002). Ecological interpretation and comparison of the groups resulted in two groups being eliminated and their plots combined with groups whose plots had

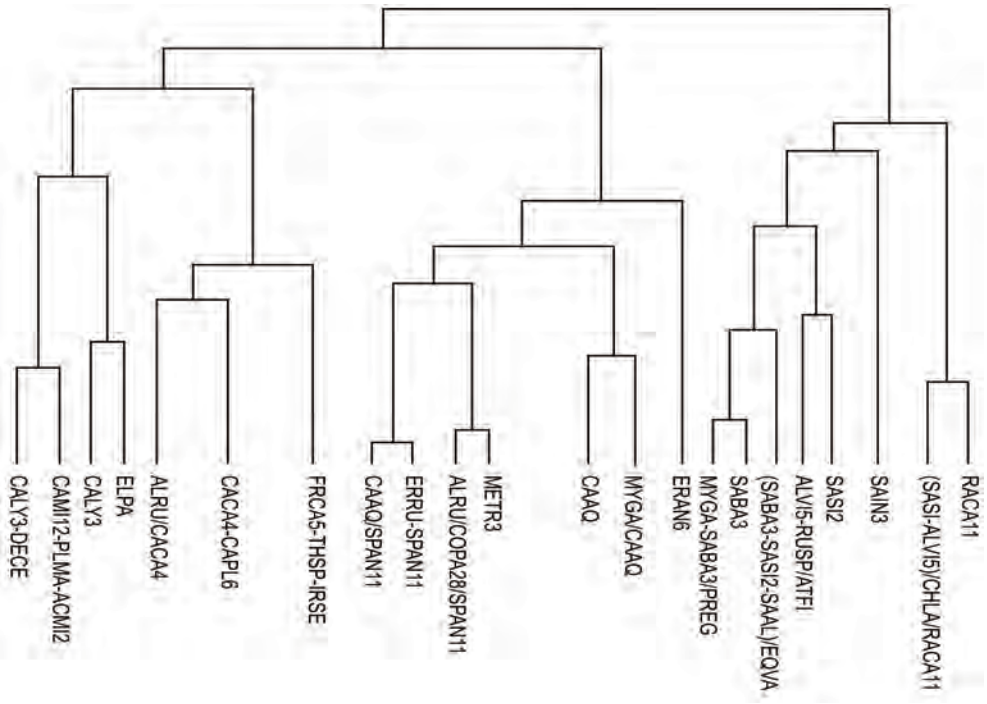


Figure 3. Cluster dendrogram of plant associations in the classification. See Table 1 for names of plant associations.

similar species composition and environmental characteristics, resulting in a total of 22 groups that were described as plant associations (Figure 3).

Table 1 shows the named plant associations organized into five structural groups: Evergreen Shrubland (2 types), Deciduous Shrubland (8 types), Forb Herbaceous (3 types), Graminoid Herbaceous (8 types), and Nonvascular (1 type). Plant association names are based on dominant and indicator species and follow guidelines in Brohman and Bryant (2005) and Jennings et al. (2009). Appendix A explains the specific criteria used for naming the plant associations.

Ordination results indicate moderate correlations with two measured environmental gradients (Table 2). Water table depth showed a negative correlation with the second axis, which likely represents a gradient from well-drained to intermittently flooded to saturated or permanently flooded sites. Soil pH was negatively correlated with the third axis and appears to be related to increasing surface soil acidity and decreasing salinity in a gradient from saline intertidal communities to circumneutral[1] fens to acidic bogs. None of the measured environmental variables were notably correlated with the first axis, although elevation showed a weak positive association. It is likely that elevation is an important environmental factor in the study area, as slight elevation changes in floodplains and deltas can often result in notable changes in vegetation composition (Stephens and Billings 1967). However, errors inherent in collecting field elevation data without survey-grade equipment may have obscured this relationship.

[1] Circumneutral refers to a pH of 5.5 to 7.4; commonly used in reference to water chemistry.

Table 1. Plant associations described from analysis of plot data from the Stikine-Taku River Valleys and Stikine River Delta ecological subsections. Short names are derived from species codes in the PLANTS database (USDA Natural Resources Conservation Service 2009).

Structural group Short name	Plant association name
Shrubland - Evergreen	
MYGA/CAAQ	*Myrica gale/Carex aquatilis*
MYGA-SABA3/PREG	*Myrica gale-Salix barclayi/Primula egaliksensis*
Shrublands - Deciduous	
ALRU/CACA4	*Alnus rubra/Calamagrostis canadensis*
ALRU/COPA28/SPAN11	*Alnus rubra/Comarum palustre/Sphagnum angustifolium*
ALVI5-RUSP/ATFI	*Alnus viridis-Rubus spectabilis/Athyrium filix-femina*
SABA3	*Salix barclayi*
SAIN3	*Salix interior*
SASI2	*Salix sitchensis*
(SASI-ALVI5)/ CHLA/RACA11	*(Salix sitchensis-Alnus viridis)/Chamerion latifolium/Racomitrium canescens*
(SABA3-SASI2-SAAL)/EQVA	*(Salix barclayi-Salix sitchensis-Salix alaxensis)/Equisetum variegatum*
Herbaceous - Forb	
CAMI12-PLMA-ACMI2	*Castilleja miniata-Plantago macrocarpa-Achillea millefolium*
FRCA5-THSP-IRSE	*Fritillaria camschatcensis-Thalictrum sparsiflorum-Iris setosa*
METR3	*Menyanthes trifoliata*
Herbaceous - Graminoid	
CACA4-CAPL6	*Calamagrostis canadensis-Carex pluriflora*
CAAQ	*Carex aquatilis*
CAAQ/SPAN11	*Carex aquatilis/Sphagnum angustifolium*
CALY3	*Carex lyngbyei*
CALY3-DECE	*Carex lyngbyei-Deschampsia cespitosa*
ELPA	*Eleocharis palustris*
ERAN6	*Eriophorum angustifolium*
ERRU-SPAN11	*Eriophorum russeolum/Sphagnum angustifolium*
Nonvascular	
RACA11	*Racomitrium canescens*

Table 2. Pearson correlations of NMS ordination axes with selected environmental factors.

	Ordination axis					
	1		2		3	
Environmental factor	r	r^2	r	r^2	r	r^2
Elevation	.345	.119	-.266	.071	.223	.050
Latitude	.124	.015	-.261	.068	.260	.068
Longitude	-.056	.003	.207	.043	-.101	.010
Organic matter depth	.001	.000	.413	.171	.255	.065
Soil depth	.034	.001	-.224	.050	-.017	.000
Soil pH	-.088	.008	-.264	.070	-.463	.215
Water table depth	-.148	.022	-.599	.359	-.201	.041

Table 3. Pearson correlations of species with NMS ordination axes ($r^2 > 0.2$ for at least one axis).

	Ordination axis					
	1		2		3	
Species	r	r^2	r	r^2	r	r^2
Argentina egedii	-.347	.120	.176	.031	-.523	.274
Calamagrostis canadensis	-.485	.235	.143	.021	.198	.039
Carex aquatilis	.327	.107	.243	.059	.573	.329
Carex lyngbyei	-.111	.012	.239	.057	-.712	.507
Carex pluriflora	-.167	.028	.473	.224	.038	.001
Comarum palustre	.006	.000	.247	.061	.521	.271
Deschampsia cespitosa	-.251	.063	.148	.022	-.509	.259
Galium trifidum	-.525	.275	.146	.021	.013	.000
Glaux maritima	-.189	.036	.140	.020	-.465	.216
Iris setosa	-.473	.223	.018	.000	-.007	.000
Salix sitchensis	.249	.062	-.594	.353	.122	.015
Sphagnum angustifolium	.125	.016	.451	.204	.271	.074
Triglochin maritima	-.270	.073	.166	.028	-.542	.293

Galium trifidum and *Calamagrostis canadensis* were negatively correlated and *Carex aquatilis* was positively correlated with the first axis (Table 3), although there was no strong correlation between this axis and measured environmental factors. *Salix sitchensis* had a negative correlation and *Carex pluriflora* and *Sphagnum angustifolium* showed positive correlations with the second axis, which is negatively correlated with water table depth. These correlations indicate that this axis represents a soil drainage gradient, from more or less well-drained shrublands to saturated bogs and fens. The positive correlation of the third axis with *Carex aquatilis* and *Comarum palustre*, and a negative correlation with *Carex lyngbyei, Triglochin maritima, Argentina egedii, Deschampsia cespitosa,* and *Glaux maritima,* indicate a soil reaction gradient, as is also suggested by the negative correlation of soil pH with this axis. It may also represent a salinity gradient, since positively correlated species are generally found in

freshwater habitats and negatively correlated species are found in brackish or saltwater habitats.

Figure 4 shows the relative distance between plots in shrubland and herbaceous/nonvascular plant associations in relation to the second and third ordination axes, along with important environmental gradients including depth to water table and soil pH. The *Myrica gale / Carex aquatilis* and *Alnus rubra / Comarum palustre / Sphagnum angustifolium* shrubland communities tend to occur on sites with shallow water tables and acidic soils. In contrast, *Salix interior* and *(Salix sitchensis - Alnus viridis) / Chamerion latifolium / Racomitrium canescens* shrubland plant associations occur in areas with deep water tables (although brief seasonal flooding may occur) and circumneutral soils. Other communities such as *Alnus rubra / Calamagrostis canadensis* and *Salix barclayi* can occur on a wide variety of sites relative to these two gradients. Some herbaceous communities including *Menyanthes trifoliata, Carex aquatilis / Sphagnum angustifolium,* and *Eriophorum russeolum / Sphagnum angustifolium* tend to occur on saturated, somewhat acidic sites, while *Carex lyngbyei*-dominated communities occupy brackish wetlands with high soil pH, and the nonvascular *Racomitrium canescens* community occurs on well-drained sites with circumneutral pH.

Undersampled Plant Communities

Four outlier plots were evaluated seperately, resulting in three provisional vegetation types that are represented by less than three plots each: a graminoid herbaceous type dominated by *Puccinellia tenella* found on sparsely vegetated, lower intertidal sites, a freshwater aquatic herbaceous type dominated by *Nuphar lutea*, and a freshwater aquatic herbaceous vegetation type dominated by *Sparganium hyperboreum* (Table 4). Further sampling and analysis is needed to classify and describe these vegetation types as plant associations.

Table 4. Undersampled vegetation types in the Taku-Stikine River Valleys and Stikine River Delta ecological subsections.

Vegetation type	Number of plots
Nuphar polysepalum	2
Puccinellia tenella	1
Sparganium hyperboreum	1

Unsampled Plant Communities

Several previously described plant communities that may occur in the study area were not encountered during field work (Table 5). Some of these types, such as del Moral and Watson's (1978) *Juncus arcticus* and *Schoenoplectus tabernaemontani* types and the *Hippuris tetraphylla* type of Stone (1993) may occur at a finer spatial scale than was detectable by this study. Additional inventory is needed to determine the occurrence and abundance of these types in the study area.

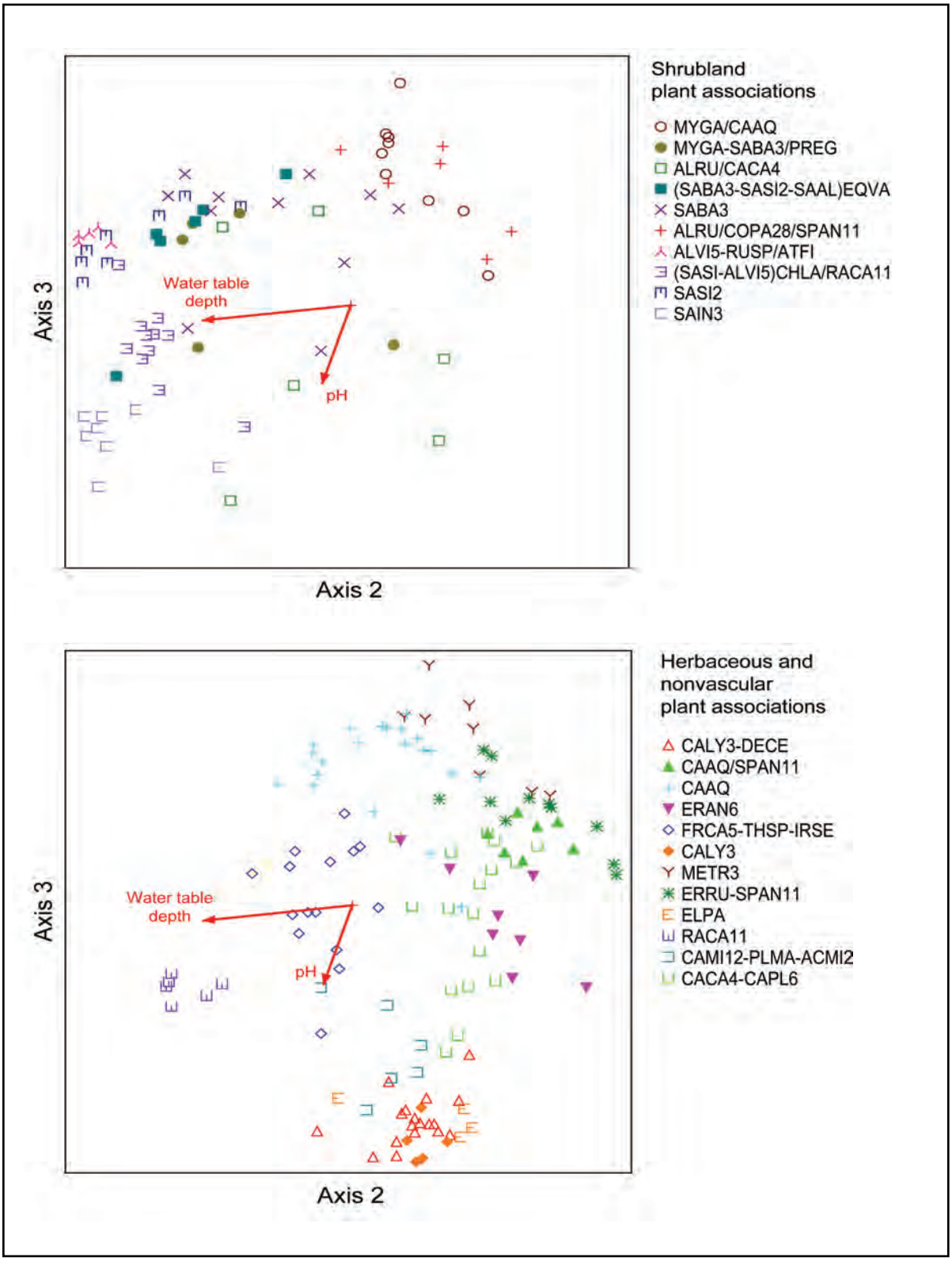


Figure 4. Biplot of shrubland, herbaceous, and nonvascular sample plots and correlated environmental vectors ($r^2 > 0.2$) graphed on the second and third NMS ordination axes. See Table 3 for names of plant associations.

Table 5. Potential unsampled vegetation types in the Taku-Stikine River Valleys and Stikine River Delta ecological subsections.

Community type	Source
Argentina egedii - Festuca rubra	del Moral and Watson (1978)
Carex mackenziei	del Moral and Watson (1978)
Hippuris tetraphylla	Stone (1993)
Juncus arcticus	del Moral and Watson (1978)
Leymus mollis	Stone (1993), Shephard (1995)
Schoenoplectus tabernaemontani	del Moral and Watson (1978)

KEY TO PLANT ASSOCIATIONS

The following dichotomous key can be used to help identify nonforested plant associations in the Stikine-Taku River Valleys and Stikine River Delta ecological subsections in southeast Alaska. First, locate a representative portion of the site in question. The vegetation structure and composition and environmental conditions should be relatively homogeneous. Estimate the percent canopy cover of all vegetative layers (shrub, herb, nonvascular) and diagnostic species, which are those species that are named in the key. Dominant species generally have greater than 50 percent absolute or relative cover in a vegetative layer or within a genus. Codominant species have greater than 25 percent cover individually and greater than 50 percent cover in aggregate. Follow the key beginning at the first couplet to identify the plant association, and validate the identification using synthesis tables (Appendix C) and plant association descriptions.

1. Total vegetation cover less than 2%.....Nonvegetated
   Total vegetation cover greater than 2%.....2

2. Total tree* canopy cover greater than 10% .....Forested**
   Total tree canopy cover greater than 10% 3

3. Total shrub canopy cover less than 25%.....4
   Total shrub canopy cover greater than 25% 6

4. Total herb canopy cover less than 25%.....5
   Total herb canopy cover greater than 25%.....15

5. Herb cover less than nonvascular cover.....*Racomitrium canescens* Nonvascular Vegetation
   Herb cover greater than nonvascular cover.....15

6. Evergreen shrubs with greater canopy coverage than deciduous shrubs 7
   Deciduous shrubs with greater canopy canopy coverage than evergreen shrubs.....8

7. *Myrica gale* dominant ..... *Myrica gale / Carex aquatilis* Shrubland
   Myrica gale dominant, *Salix barclayi* codominant .....
   .....*Myrica gale - Salix barclayi / Primula egaliksensis - Argentina egedii* Shrubland

8. *Alnus* spp. with greater canopy coverage than *Salix* spp.....9
   Salix spp. with greater canopy coverage than *Alnus* spp.....11

9. *Alnus viridis* dominant ..... *Alnus viridis - Rubus spectabilis / Athyrium filix-femina* Shrubland
   Alnus rubra dominant.....10

10. *Calamagrostis canadensis* the dominant herb.....
    .....*Alnus rubra / Calamagrostis canadensis* Shrubland
    Comarum palustre the dominant herb .....
    .....*Alnus rubra / Comarum palustre / Sphagnum angustifolium* Shrubland

11. *Salix barclayi* dominant .....*Salix barclayi* Shrubland
    Not as above 12

12. *Salix sitchensis* dominant. ..... *Salix sitchensis* Shrubland
    Not as above 13

13. *Salix interior* dominant .....*Salix interior* Shrubland
    No dominant shrub species 14

14. *Equisetum variegatum* commonly present .....
    .....*(Salix barclayi - Salix sitchensis - Salix alaxensis) / Equisetum variegatum* Shrubland
    Chamerion latifolium and *Racomitrium canscens* commonly present. .....
    ...*(Salix sitchensis - Alnus viridis) / Chamerion latifolium / Racomitrium canescens* Shrubland

15. Forbs contribute greater than 50% of total herbaceous canopy 16
    Graminoids contribute greater than 50% of total herbaceous canopy 18

16. *Menyanthes trifoliata* dominant..... *Menyanthes trifoliata* Herbaceous Vegetation
    No dominant forb in the herb layer 17

17. *Plantago macrocarpa, Castilleja miniata,* and *Achillea millefolium* commonly present. .....
    ..... *Plantago macrocarpa - Castilleja miniata - Achillea millefolium* Herbaceous Vegetation
    Fritillaria camschatcensis, Thalictrum sparsiflorum, and *Iris setosa* commonly present .....
    ..... *Fritillaria camschatcensis - Thalictrum sparsiflorum - Iris setosa* Herbaceous Vegetation

18. Sedges dominant 19
    Grasses dominant ..... *Calamagrostis canadensis - Carex pluriflora* Herbaceous Vegetation

19. *Carex* spp. dominant. 20
    Not as above 24

20. *Carex lyngbyei* dominant 21
    Not as above 22

21. *Carex lyngbyei* greater than 80% cover ..... *Carex lyngbyei* Herbaceous Vegetation
    Carex lyngbyei less than 80% cover .....
    ..... *Carex lyngbyei - Deschampsia cespitosa* Herbaceous Vegetation

22. *Carex pluriflora* dominant .....
    ..... *Calamagrostis canadensis - Carex pluriflora* Herbaceous Vegetation
    Carex aquatilis dominant 23

23. *Carex aquatilis* greater than 60% cover ..... *Carex aquatilis* Herbaceous Vegetation
    Carex aquatilis less than 60% cover .....
    ..... *Carex aquatilis / Sphagnum angustifolium* Herbaceous Vegetation

24. *Eleocharis palustris* dominant ..... *Eleocharis palustris* Herbaceous Vegetation
    Eriophorum spp. dominant 25

25. *Eriophorum angustifolium* dominant .....*Eriophorum angustifolium* Herbaceous Vegetation
Eriophorum russeolum dominant.....
.....*Eriophorum russeolum / Sphagnum angustifolium* Herbaceous Vegetation

* Trees = woody plant species > 5 m tall at maturity and with a single main stem.

**For keys and descriptions of forested plant associations see Pawuk and Kissinger (1989) for the Stikine River area and Martin et al. (1995) for the Taku River area.

SHRUBLAND PLANT ASSOCIATIONS

***Myrica gale / Carex aquatilis* Shrubland**
Sweetgale / Water Sedge Shrubland
MYGA / CAAQ Shrubland

Number of plots: 9

Type Concept

This plant association has an open shrub layer dominated by *Myrica gale*. *Carex aquatilis* dominates the herbaceous layer, and *Comarum palustre, Calamagrostis canadensis,* and *Equisetum* spp. are common associates. Some sites may have a substantial moss ground cover dominated by *Sphagnum angustifolium.* Standing water may be present on some sites due to seasonal flooding.

Geographic Distribution

Located on currently or recently active floodplains near glacier outwash areas in the Taku River Valley. Sites are located within the Juneau Ranger District.

Environmental Setting

Occurs on seasonally to semi-permanently flooded alluvial flats in large river floodplains. Landform class is Flood Plains (53) in the Valley Floors association (Brock et al. 1996). Soils are very poorly drained, coarse-silty to sandy Histic Cryaquepts and Typic Cryaquents, or on organic soils such as Terric or Fluvaquentic Cryohemists. Average pH of the surface soil is 5.8. Observed water table depth averages 17 cm, but sites often have standing water during much of the growing season. Organic matter depth averages 32 cm and can range from 16 cm to 57 cm.

Vegetation Dynamics

This plant association is probably a mid seral type on floodplain alluvial flats that succeeds from herbaceous wet meadows to shrubland. However, it may also represent a phase in the transition from shrubland back to herbaceous marsh, due to changes in hydrology and a higher water table, or to ombrotrophic bog if a layer of peat continues to accumulate.

Comparison to Other Types

Viereck et al. (1992) lists several *Myrica gale*-dominated shrub communities in the Open Low Sweetgale-Graminoid Bog (II.C.2.j), including a *Myrica gale / Carex* spp. type. They occupy wet lowland sites, and standing water usually is present. Shephard (1995) described four *Myrica gale*-dominated shrub communities on the Yakutat Foreland, including a *Myrica gale / Carex aquatilis* var. *dives* community type that occurs on older uplifted tidal flats, and a *Myrica gale / Equisetum variegatum* type that occurs in young ephemeral channels. DeVelice et al. (1999) identified seven shrub communities on the Chugach National Forest that are dominated by *Myrica gale,* including a *Myrica gale / Carex aquatilis* var. *dives* type with *Carex aquatilis* var. *dives, Comarum palustre, Calamagrostis canadensis,* and *Equisetum fluviatile* as common to abundant herbaceous species. Boggs (2000) described a *Myrica gale / Carex aquatilis* var. *dives* type with a similar species composition on the Copper River Delta. Mackenzie and Moran (2004) described a *Myrica gale – Carex aquatilis* var*. dives* site association on seasonally flooded lowland sites in British Columbia.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
93	0	49	0	76	42	41

Average relative percent ground cover by category.

Basal Veg.	Moss / Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
11	17	48	0	4	19	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Myrica gale	49	10-80	100
Carex aquatilis	31	5-60	89
Comarum palustre	21	5-70	78
Calamagrostis canadensis	10	3-30	78

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Myrica gale	37	0.000

***Myrica gale - Salix barclayi / Primula egaliksensis* Shrubland**
Sweetgale - Barclay Willow / Greenland Primrose Shrubland
MYGA - SABA3 / PREG Shrubland

Number of plots: 5

Type Concept

This plant association has an open low shrub layer dominated by *Myrica gale*, often mixed with a tall shrub layer of *Salix barclayi*. The herbaceous layer is scattered and relatively species poor. *Primula egaliksensis* and *Argentina egedii* are common and are strong indicator species for this plant association. A scattered moss layer may include *Amblystegium serpens* and *Philonotis fontana.* On some sites a large portion of the ground cover may be bare soil.

Geographic Distribution

Located on recently active glacier outwash areas in the Taku River Valley. Sites are located within the Juneau Ranger District.

Environmental Setting

Occurs on glaciofluvial outwash deposits at the terminus of glaciers in flat, low-elevation floodplains. Landform class is Flood Plains (53) in the Valley Floors association (Brock et al. 1996). Soils are somewhat poorly drained to poorly drained, sandy Typic Cryaquepts and Typic Cryaquents. Average pH of the surface soil is 6.5. Observed water table depth averages 75 cm, but it can vary from 30 cm to over 100 cm and is most likely influenced by water levels of nearby streams. The soil surface usually lacks an organic matter layer; however, occasional thin layers of organic materials such as twigs and leaves in the soil profile suggest periodic flooding occurs on some sites.

Vegetation Dynamics

This plant association is probably a mid-seral type on glacial outwash areas that follows the transition from bare soil to herbaceous communities. This plant association may also represent a transition from evergreen to deciduous shrubland, or vice versa. Some sites may succeed to *Populus balsamifera* or *Picea sitchensis* forests, which often occur adjacent to these sites on older outwash deposits.

Comparison to Other Types

Viereck et al. (1992) lists several *Myrica gale*-dominated shrub communities in the Open Low Sweetgale-Graminoid Bog (II.C.2.j). These communities occupy wet lowland sites where standing water usually is present. A low shrub layer of *Myrica gale* is dominant, with an herb layer dominated by graminoids and with only a few forbs. Shephard (1995) described four *Myrica gale*-dominated shrub communities on the Yakutat Foreland, including a *Myrica gale / Equisetum variegatum* community type that occurs on outburst floodplains. *Myrica gale* is the dominant shrub, with *Salix barclayi* and *S. commutata* present in small amounts. *Equisetum variegatum* is the dominant herb, and *Rhytidiadelphus squarrosus* is common in the sparse moss layer. DeVelice et al. (1999) identified seven shrub communities on the Chugach National Forest that are dominated by *Myrica gale,* including a *Myrica gale - Salix barclayi* type with *Comarum palustre, Calamagrostis canadensis,* and *Equisetum arvense* as common to abundant herbaceous species. Boggs (2000) described five shrub communities on the Copper River Delta that are dominated by *Myrica gale*, including a *Myrica gale / Equisetum variegatum* type in which *Salix barclayi* is a common associate.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
96	0	33	0	74	58	48

Average relative percent ground cover by category.

Basal Veg.	Moss / Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
8	16	64	5	7	0	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Myrica gale	64	5-80	100
Salix barclayi	32	10-60	80
Equisetum arvense	7	1-20	80
Salix sitchensis	7	3-20	60
Argentina egedii	3	1-10	60
Primula egaliksensis	tr	0.1-1	60

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Primula egaliksensis	58	0.001
Myrica gale	44	0.000

***Alnus viridis - Rubus spectabilis / Athyrium filix-femina* Shrubland**
Sitka Alder - Salmonberry / Lady Fern Shrubland
ALVI5 - RUSP / ATFI Shrubland

Number of plots: 5

Type Concept

This plant association has a tall, closed shrub canopy dominated by *Alnus viridis,* a low shrub layer dominated by *Rubus spectabilis,* and an herbaceous layer dominated by *Athyrium filix-femina.* Other associated species include *Streptopus amplexifolius, Oplopanax horridus,* and *Veratrum viride.* Bryophytes and lichens including *Dicranum tauricum* and *Lobaria linita* may be sparsely distributed, usually on the lower trunks of alders.

Geographic Distribution

Occurs on alluvial flats and levees along river and slough channels on the Stikine and Taku River floodplains and in the Stikine River Delta. Sites are located within the Juneau and Wrangell Ranger Districts.

Environmental Setting

Occurs on alluvial deposits on river and slough levees and along lakeshores. Landform class is Flood Plains (53) in the Valley Floors association (Brock et al. 1996). Occurs on a variety of moderately well-drained to somewhat poorly drained, sandy to coarse-silty soils, including Typic Cryaquepts, Aquic Dystroquepts, Typic Cryaquents, and Typic Cryorthents. Average pH of the surface soil is 4.9. Average observed water table is 83 cm, but redoxymorphic features may occur in the upper soil profile, indicating a seasonally fluctuating water table or flooding . Organic matter depth averages 4 cm.

Vegetation Dynamics

On well-drained sites this plant association is early successional and may eventually be replaced by Sitka spruce forest. However, this process may take several decades as the dense canopy of alder can inhibit spruce seedling germination or growth. This plant association may persist on more poorly drained sites.

Comparison to Other Types

Viereck et al. (1992) described a Closed Tall Alder Shrub (II.B.1.b) type that occurs on a variety of well-drained sites such as floodplains and stream banks, including a *Alnus viridis - Rubus spectabilis* shrub community. Shephard (1995) described an *Alnus viridis - Rubus spectabilis* community type that occurs on a variety of sites including floodplains. DeVelice et al. (1999) described several *Alnus viridis* - dominated shrublands on the Chugach National Forest, including an *Alnus viridis - Rubus spectabilis* community and an *Alnus viridis - Rubus spectabilis / Athyrium filix-femina* community. Boggs (2000) described an *Alnus viridis - Rubus spectabilis* community that occurs on various well-drained sites on the Copper River Delta.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
98	0	98	0	30	30	1

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
9	4	81	6	0	0	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Alnus viridis	76	40-100	100
Rubus spectabilis	50	10-80	100
Athyrium filix-femina	24	10-40	100
Streptopus amplexifolius	4	1-10	80

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Rubus spectabilis	59	0.000
Streptopus amplexifolius	52	0.000
Alnus viridis	50	0.000
Athyrium filix-femina	43	0.000

***Alnus rubra* / *Calamagrostis canadensis* Shrubland**
Red Alder / Bluejoint Shrubland
ALRU / CACA4 Shrubland

Number of plots: 6

Type Concept

This plant association usually has an open shrub layer consisting of *Alnus rubra* in shrub form with multiple stems and usually < 5 m tall when mature (see Hultén 1968), along with smaller amounts of *Rubus spectabilis, Salix barclayi, S. sitchensis,* and *Sambucus racemosa*. *Calamagrostis canadensis* is usually a dominant component of the herb layer, which also contains a diverse and variable mix of forbs and graminoids with low individual cover, including *Argentina egedii, Equisetum arvense, Angelica genuflexa, Galium trifidum, Lycopus uniflorus,Trientalis europaea,* and *Carex lyngbyei.* Some sites may form a vegetation complex containing both shrub and herbaceous layers on well-drained microsites and only an herbaceous layer on poorly drained microsites.

Geographic Distribution

Occurs on alluvial and glaciofluvial flats and along river and slough channels in the Stikine and Taku River Valleys and Stikine River Delta subsections. Sites are located within the Juneau and Wrangell Ranger Districts.

Environmental Setting

Occurs on organic soils over loamy floodplain alluvium, deltaic deposits above the maximum extent of high tide, and glaciofluvial deposits near the terminus of tidal glaciers. Landform class is Flood Plains (53) in the Valley Floors association and Uplifted Estuaries and Tidal Flats (76) in the Coastal landform association (Brock et al. 1996). Soils are moderately well-drained to very poorly drained, sandy to loamy Typic Cryaquents, Typic Cryaquepts, Typic Cryopsamments, and Terric Cryohemists. Average pH of the surface soil is 6.6. Average observed water table is 45 cm, but redoxymorphic features may occur in the soil profile, indicating a seasonally fluctuating water table or flooding. Organic matter depth averages 4 cm.

Vegetation Dynamics

This plant association succeeeds pioneer herbaceous communities on alluvial floodplains and non-brackish sites on river deltas, and it may persist on poorly drained sites. If changes in hydrologic conditions improve drainage, *Alnus rubra* may grow in height and lose its shrub characteristics, transitioning the community from shrubland to closed-canopy forest.

Comparison to Other Types

Del Moral and Watson (1978) described *Alnus rubra* “thickets” above the maximum high tide line bordering brackish marshes on Sergief Island in the Stikine River Delta. *Carex lyngbyei, C. macrochaeta, Calamagrostis nutkaensis,* and *Comarum palustre* are common herbaceous associates. Viereck et al. (1992) described a Closed Red Alder Forest (I.B.1.a), based on del Moral and Watson’s *Alnus rubra* community, that occurs on moist, well-drained sites along creek bottoms and river terraces in southeast Alaska. Mackenzie and Moran (2004) reported an *Alnus rubra – Rubus spectabilis – Equisetum arvense* site association that occurs on frequently flooded low benches adjacent to river courses in the Coast Mountains of British Columbia.

This plant association differs from the above communities in that is has an open canopy of *Alnus rubra* in shrub form.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
84	1	30	0	78	28	64

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
9	8	63	3	16	1	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Calamagrostis canadensis	32	10-70	83
Alnus rubra	29	1-90	50

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Lycopus uniflorus	27	0.013

***Alnus rubra / Comarum palustre / Sphagnum angustifolium* Shrubland**
Red Alder / Marsh Cinquefoil / Sphagnum Moss Shrubland
ALRU / COPA28 / SPAN11 Shrubland

Number of plots: 6

Type Concept

This plant association usually has an open shrub layer consisting of *Alnus rubra* in shrub form with multiple stems and usually < 15 m tall when mature (see Hultén 1968), along with occasional willows such as *Salix barclayi* and *S. pseudomonticola*. Some microsites may lack a shrub layer. *Comarum palustre* is the dominant component of the herb layer, which is also characterized by the presence of orchids including *Platanthera dilatata* and *P. stricta.* A substantial moss ground cover is dominated by *Sphagnum angustifolium* and *Sphagnum squarrosum.* Some sites may form a vegetation complex consisting of both shrub and herbaceous layers on well-drained microsites and only an herbaceous layer on poorly drained microsites.

Geographic Distribution

Occurs on alluvial and glaciofluvial flats and along river and slough channels in the Stikine and Taku River Valleys and the Stikine River Delta. Sites are located within the Juneau and Wrangell Ranger Districts.

Environmental Setting

Occurs on organic soils on alluvial flats and near lakeshores in river floodplains. Landform class is Flood Plains (53) in the Valley Floors association (Brock et al. 1996). Soils are very poorly drained Typic Cryohemists and Typic and Sphagnic Cryofibrists. Average pH of the surface soil is 5.2. Average observed water table depth is 16 cm, but it may be near the surface for long periods in the growing season due to seasonal flooding. Organic matter depth averages 41 cm.

Vegetation Dynamics

The successional status of this plant association is unclear. It may represent the transition of filled-in ponds or lakes from bog vegetation communities to shrublands. If changing hydrologic conditions result in better drainage, *Alnus rubra* may grow in height and lose its shrub characteristics, transitioning the community from shrubland to closed-canopy forest. This plant association also may be seral to encroaching peatlands (Keith Boggs pers. comm.).

Comparison to Other Types

Del Moral and Watson (1978) described *Alnus rubra* "thickets" above the maximum high tide line at the transition from brackish marshes on Sergief Island in the Stikine River Delta. *Carex lyngbyei, C. macrochaeta, Calamagrostis nutkaensis,* and *Comarum palustre* are common herbaceous associates. Viereck et al. (1992) described a Closed Red Alder Forest (I.B.1.a), based on del Moral and Watson's *Alnus rubra* community, that occurs on moist, well-drained sites along creek bottoms and river terraces in southeast Alaska.

This plant association differs from the above in usually having an open canopy of *A. rubra* in shrub form and a substantial layer of sphagnum moss. Additional inventory is needed to more accurately classify this plant association both by physiognomy and species composition.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
91	0	27	3	84	68	42

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
7	51	33	1	0	8	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Comarum palustre	42	10-80	100
Sphagnum angustifolium	30	30-80	50
Alnus rubra	24	10-70	67
Carex aquatilis	23	10-80	83
Menyanthes trifoliata	15	10-50	67
Sphagnum squarrosum	9	1-40	50
Calamagrostis canadensis	8	0.1-20	100
Equisetum palustre	7	1-20	83
Eriophorum russeolum	5	1-30	50
Salix barclayi	4	0.1-20	50
Rubus arcticus	3	1-10	50
Platanthera dilatata	1	0.1-2	83

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Platanthera stricta	44	0.001
Platanthera dilatata	33	0.001
Alnus rubra	32	0.004
Comarum palustre	27	0.000

Salix barclayi Shrubland
Barclay Willow Shrubland
SABA3 Shrubland

Number of plots: 11

Type Concept

This is a shrubland community dominated by *Salix barclayi* with occasional occurrences of other shrubs including *Alnus viridis, Salix sitchensis, Viburnum edule,* and *Rubus spectabilis*. A diverse and variable mix of mesophytic and hydrophytic species occupies the herbaceous layer. Common species include *Calamagrostis canadensis, Equisetum arvense,* and *Carex aquatilis*. A scattered moss layer of *Rhytidiadelphus squarrosus* is usually present. Some sites may support a shrubland-meadow matrix, with some areas containing an herbaceous layer but no shrub layer.

Geographic Distribution

Occurs along river and slough channels, lakeshores, and on outwash areas at the terminus of tidewater glaciers in the Stikine and Taku River Valleys and Stikine River Delta. Sites are located within the Juneau and Wrangell Ranger Districts.

Environmental Setting

Occurs on alluvial floodplains and glaciofluvial or deltaic deposits. Landform class is Flood Plains (53) in the Valley Floors association and Uplifted Estuaries and Tidal Flats (76) in the Coastal landform association (Brock et al. 1996). Soils are moderately well-drained to very poorly drained, sandy, coarse-loamy, or coarse-silty soils. The majority of sites are on Typic and Histic Cryaquepts and Typic and Aquic Dystrocrepts, Typic Cryaquents, and Fluvaquentic Cryohemists. Average pH of the surface soil is 6.0. Average water table depth is 66 cm, but can vary from 0 cm to over 100 cm depending on flood conditions and site drainage. Organic matter depth averages 6 cm.

Vegetation Dynamics

The successional status of this plant association is unclear. It may be a mid-seral type in the transition from herbaceous marsh communities on river floodplains and glacier outwash areas. Well-drained sites may eventually succeed to black cottonwood or Sitka spruce-western hemlock forests.

Comparison to Other Types

Del Moral and Watson (1978) described a *Salix barclayi* shrub community type that occurs along sloughs and channels of well-drained sites on Sergief Island in the Stikine River Delta. *Salix barclayi* and *S. sitchensis* are the common shrub species, and associates include *Equisetum arvense, Populus balsamifera, Lathyrus maritima,* and *Leymus mollis*. They also identified an herbaceous type dominated by *Calamagrostis nutkaensis* with a heterogenous mix of other forbs and graminoids, recognizing it both as a distinct community and as the herbaceous layer of the *Salix barclayi* type. Viereck et al. (1992) described an Open Tall Willow Shrub (II.B.2.a) type that occurs on floodplains and recent outwash deposits. This type includes the *Salix barclayi - Salix glauca / Calamagrostis canadensis* community that occurs in the Knik Arm area near Anchorage (Ritchie et al. 1981, cited in Viereck et al. 1992). On the Yakutat Forelands, Shephard (1995) described a *Salix barclayi* - Mixed Herb shrub community type with a diverse herbaceous layer. DeVelice et al. (1999) described for the Chugach National Forest a *Salix barclayi / Calamagrostis canadensis* community type, with the herb layer dominated by *C. canadensis,* and a *Salix barclayi* / Mixed Herb type, with the herb layer dominated by *Equisetum arvense*. Boggs (2000) described five *Salix barclayi*-dominated community types, including a *Salix barclayi /* Mixed Herb shrub type with an herbaceous layer dominated by *Equisetum arvense,* with *Calamagrostis canadensis, Comarum palustre*, and/or *Angelica genuflexa* often as codominants. Mackenzie and Moran (2004) described a *Salix barclayi – Carex aquatilis – Aulacomnium palustre* type that occurs at subalpine elevations in the interior and boreal mountains of British Columbia.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
95	0	49	0	75	55	38

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
8	17	67	2	0	6	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Salix barclayi	25	10-50	73
Carex aquatilis	15	1-50	55
Rhytidiadelphus squarrosus	13	3-70	64
Alnus viridis	12	5-50	55
Equisetum arvense	10	1-70	64
Calamagrostis canadensis	8	1-30	73

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
N/A		

Salix sitchensis Shrubland
Sitka Willow Shrubland
SASI2 Shrubland

Number of plots: 8

Type Concept

This is a closed canopy shrubland dominated by *Salix sitchensis* in the tall shrub layer, with *Cornus sericea* a characteristic associate. *Rubus spectabilis* is often present as a low shrub layer. The herbaceous layer is somewhat sparse, with common forbs including *Athyrium filix-femina, Equisetum arvense, Lysichiton americanus,* and *Streptopus amplexifolius.* A sparse moss layer may be present, with *Plagiomnium insigne* a characteristic species.

Geographic Distribution

Occurs within the Stikine and Taku River Valleys. Sites are located within the Juneau and Wrangell Ranger Districts.

Environmental Setting

Occurs on alluvial, glaciofluvial, and eolian deposits. Landform class is Flood Plains (53) in the Valley Floors association (Brock et al. 1996). Soils are moderately well-drained to very poorly drained, silty to coarse-silty Typic and Fluvaquentic Cryaquepts, Typic Cryaquents, and Typic Cryofluvents. It can also occur on well-drained Typic Cryopsamments formed from eolian dune deposits. Average pH of the surface soil is 6.0. Average observed water table is 65 cm, but can be at or near the surface at some sites and deeper than 100 cm at other sites, depending on soil drainage and seasonal fluctuations. Soil organic matter depth averages 1 cm.

Vegetation Dynamics

This plant association is an early colonizer of river bars, stream levees, and dunes. Shephard (1995) suggested that *Salix sitchensis* shrublands are seral to mixed alder-willow shrub types, which eventually develop into late-seral Sitka spruce forest.

Comparison to Other Types

This plant association classifies as Closed Tall Willow Shrub (II.B.1.a) according to Viereck et al. (1992), although sites on dunes may classify as Closed Low Willow Shrub (II.C.1.b). There are apparently no communities listed under these types that are analogous to this plant association. Shephard (1995) described a *Salix sitchensis* community type that is found on fine to coarse sand in active floodplains of the Yakutat Forelands. DeVelice et al (1999) also described a *Salix sitchensis* community type that occurs on floodplains, flat lowlands, outwash plains, and high relief hills of the Chugach National Forest. Likewise, Boggs (2000) described a *Salix sitchensis* type on the Copper River Delta that occurs on a wide range of moderately well-drained sites including river and stream levees, lake shorelines, and abandoned river channels. Mackenzie and Moran (2004) reported a *Salix sitchensis – Cornus sericea – Equisetum* site association that occurs primarily on sandy, well-drained but seasonally saturated levees or bars in the active floodplains of sluggish, low-gradient streams of interior and coastal British Columbia.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
94	6	80	0	54	44	12

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
8	2	69	5	15	1	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Salix sitchensis	48	10-70	100
Cornus sericea	20	3-60	75
Rubus spectabilis	14	1-50	63
Lysichiton americanus	12	2-70	50
Athyrium filix-femina	11	5-20	88
Equisetum arvense	9	1-40	88
Osmorhiza berteroi	2	0.1-10	50
Streptopus amplexifolius	1	0.1-5	63
Plagiomnium insigne	1	0.1-5	50

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Cornus sericea	51	0.000
Plagiomnium insigne	40	0.002
Osmorhiza berteroi	34	0.005
Salix sitchensis	29	0.000
Salix lucida	27	0.007

Salix interior Shrubland
Sandbar Willow Shrubland
SAIN3 Shrubland

Number of plots: 8

Type Concept

This is an open canopy low shrub community dominated by *Salix interior.* Other willows such as *Salix pseudomonticola* and *S. alaxensis* may be present on some sites. The ground cover consists mostly of bare soil with little or no organic matter accumulation. The sparse herbaceous layer is dominated by horsetails including *Equisetum hyemale*, *E. arvense,* and *E. variegatum.* Graminoids such as *Leymus mollis* and *Juncus arcticus* occur in small amounts on some sites.

Note: Herbarium specimens of sandbar willow that have been collected in Alaska were usually identified as *Salix exigua* ssp. *interior* (University of Alaska 2009). However according to the NRCS PLANTS database (2009) this subspecies is a synonym for *Salix interior.*

Geographic Distribution

Occurs only in the Stikine River Valley. Sites are located within the Wrangell Ranger District.

Environmental Setting

Occurs on active dunes with slopes to 15 percent located along the main river channel. Soils are well-drained, sandy Typic and Oxyaquic Cryopsamments, Typic and Oxyaquic Cryorthents, and Typic Cryaquepts. Average pH of the surface soil is 7.4. Observed water table depth averages 81 cm but can range anywhere from 0 cm to greater than 100 cm, depending on river flood conditions and the elevation of the site in relation to normal flood stage. Ground cover is mostly bare soil and contains little or no organic matter.

Vegetation Dynamics

According to Mackenzie and Moran (2004), *Salix exigua,* which is morphologically similar to *S. interior,* is a colonial species in British Columbia that occurs on sandbars of larger river systems with prolonged flooding, strong currents, and sediment movement. A black cottonwood forest may eventually replace this shrubland type as substrates, through continued deposition, rise above the normal flood level.

Comparison to Other Types

This plant association classifies as Open Low Wilow Shrub (II.C.2.g) according to Viereck et al. (1992). However, no current classification of plant communities in Alaska includes a *Salix interior*-dominated shrubland. Mackenzie and Moran (2004) described a *Salix exigua* community that is locally common in the interior of British Columbia on sandbars along very large river systems. *Salix exigua,* which is morphologically similar to *S. interior*, is the dominant shrub, and *Equisetum hyemale* is common in the very sparse understory.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
56	4	44	0	22	14	9

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
2	11	3	0	84	0	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Salix interior	38	20-60	100
Equisetum hyemale	10	3-50	50
Equisetum arvense	2	0.1-5	88

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Salix interior	92	0.000
Equisetum hyemale	50	0.001
Salix pseudomonticola	28	0.007

***(Salix barclayi - Salix sitchensis - Salix alaxensis) / Equisetum variegatum* Shrubland**
(Barclay Willow - Sitka Willow - Feltleaf Willow) / Shrubland
(SABA3 - SASI2 - SAAL) / EQVA Shrubland

Number of plots: 6

Type Concept

This is an open tall shrub plant association with no clear dominant shrub species. *Salix barcalyi, S. sitchensis,* and *S. alaxensis* are common associates. Characteristic herbaceous species in the somewhat sparse understory include *Equisetum variegatum, E. palustre,* and *Carex aquatilis. Pohlia nutans* and *Drepanocladus aduncus* are characteristic species in the scattered moss ground cover. Much of the remaining ground surface is bare soil.

Geographic Distribution

Located in the Taku and Stikine River valleys. Sites are located within the Juneau and Wrangell Ranger Districts.

Environmental Setting

This plant association primarily occurs on glaciofluvial outwash near the terminus of glaciers, but it can also occur on alluvial river bar deposits. Landform class is Flood Plains (53) in the Valley Floors association (Brock et al. 1996). Soils include a variety of coarse-loamy to sandy, poorly drained to very poorly drained Typic Cryaquents and Typic Cryaquepts. Average pH of the surface soil is 7.8. The observed water table depth is 27 cm but ranges from 3 cm to 56 cm, depending on seasonal and microsite hydrologic conditions. Organic matter in the surface soil is usually absent.

Vegetation Dynamics

This plant association typically replaces seral herb or nonvascular communities on recently deposited material, as willow becomes more dominant. Barring disturbance by flooding or erosion, the shrubland may be eventually replaced by black cottonwood or Sitka spruce-western hemlock forest.

Comparison to Other Types

Viereck et al. (1992) described an Open Tall Willow Shrub (II.B.2.a) several *Salix*-dominated communities, including several dominated by *Salix barclayi* or *S. alaxensis.* Some of these types are characterized by an understory dominated by *Equisetum* spp. DeVelice (1999) described a *Salix alaxensis* community type that is common on floodplains and beaches of the Chugach National Forest. *Salix sitchensis, S. barclayi,* and *S. commutata* are also usually well represented. Boggs (2000) described a similar community that is limited to linear dunes on the Copper River Delta.

Additional inventory is needed to more accurately describe the species composition of this plant association, particularly in the shrub layer.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
75	0	49	0	49	46	5

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
7	25	23	0	44	1	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Equisetum variegatum	33	5-80	67
Salix barclayi	18	1-30	100
Salix sitchensis	16	3-30	83
Salix alaxensis	13	10-30	67
Equisetum palustre	10	10-30	50
Pohlia nutans	9	5-30	50
Carex aquatilis	4	1-20	50

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Equisetum variegatum	48	0.001
Salix alaxensis	32	0.001

***(Salix sitchensis - Alnus viridis) / Chamerion latifolium / Racomitrium canescens* Shrubland**
Sitka Willow - Sitka Alder / Dwarf Fireweed / Rock Moss Shrubland
(SASI - ALVI5) / CHLA / RACA11 Shrubland

Number of plots: 11

Type Concept

This is an open tall shrub association with no clear dominant shrub species; *Salix sitchensis* and *Alnus viridis* are the most common shrubs, and *S. barclayi,* and *S. alaxensis* are common associates. Characteristic species in the somewhat sparse herbaceous layer include *Chamerion latifolium, Phleum alpinum,* and *Boschniakia rossica.* An extensive nonvascular ground cover is dominated by *Racomitrium canescens*, and *Stereocaulon tomentosum* is a characteristic lichen.

Geographic Distribution

Located in the Taku River Valley, including the lower Sittakanay River, a tributary of the Taku near the Canadian border. Sites are located within the Juneau Ranger District.

Environmental Setting

Occurs on glaciofluvial deposits near the terminus of glaciers and along fast-flowing, glacier-fed stream channels. Landform class is Flood Plains (53) in the Valley Floors association (Brock et al. 1996). Soils include a variety of sandy to sandy-skeletal, well-drained to excessively drained Entisols, including Typic Cryorthents, Typic Cryopsamments, Typic and Oxyaquic Cryofluvents, and Typic Cryaquents. Soils usually contain a large component of gravel and cobbles. Average pH of the surface soil is 6.7. The observed water table depth is usually greater than 100 cm. Organic matter depth averages 1 cm.

Vegetation Dynamics

This plant association typically replaces seral herb or nonvascular communities on recently deposited material as willow or alder invades and becomes dominant. Barring disturbance by flooding or erosion, the shrubland will be eventually replaced by black cottonwood or Sitka spruce-western hemlock forest.

Comparison to Other Types

Viereck et al. (1992) recognized an Open Tall Willow Shrub (II.B.2.a) vegetation type containing several *Salix*-dominated communities, including a *Salix alaxensis / Racomitrium canescens* community (Viereck 1970). Scattered spruce and poplar trees may be present in these communities but with less than 10 percent cover, and one of the associated herbaceous species is *Chamerion latifolium*. DeVelice et al. (1999) described a *Salix alaxensis* community type that is common on floodplains and beaches of the Chugach National Forest. *Salix sitchensis, S. barclayi,* and *S. commutata* are also usually well represented. Boggs (2000) described a similar community that is limited to linear dunes on the Copper River Delta.

The nonvascular ground cover that fills the interstices of the open shrub canopy bears a resemblance to the Dry Bryophyte (III.C.1.b) community type of Viereck et al. (1992), which includes those dominated by *Racomitrium* spp. This plant association is also compositionally similar to the *Racomitrium canescens* Nonvascular Vegetation type of this classification, except that herbaceous and shrub species are less common in the nonvascular type.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
57	5	34	0	25	20	5

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
5	39	28	1	5	0	9	13	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Racomitrium canescens	29	5-100	82
Salix sitchensis	14	1-40	91
Alnus viridis	12	0.1-50	82
Chamerion latifolium	8	0.1-30	91
Salix alaxensis	6	1-20	64
Populus balsamifera	4	0.1-20	64
Picea sitchensis	1	0.1-5	82

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Chamerion latifolium	85	0.000
Boschniakia rossica	36	0.002
Phleum alpinum	36	0.003
Racomitrium canescens	31	0.000
Picea sitchensis	26	0.001

***Menyanthes trifoliata* Herbaceous Vegetation**
Buckbean Herbaceous Vegetation
METR3 Herbaceous Vegetation

Number of plots: 8

Type Concept

This plant association is a wet forb meadow that occurs on permanently or semipermanently flooded sites such as shallow ponds and sloughs, either anchored in substrate or as floating mats. It is dominated by *Menyanthes trifoliata,* with *Comarum palustre* a common associate. Other forbs such as *Equisetum fluviatile* and *E. palustre* are common, and a few sedges such as *Carex aquatilis, C. chordorhiza,* and *Eriophorum russeolum* may be present. A bryophyte layer dominated by *Sphagnum angustifolium, S. squarrosum,* and *S. magellanicum* is present on some sites.

Geographic Distribution

Occurs on alluvial flats and along river and slough channels in the Stikine and Taku River floodplains. Sites are located within the Juneau and Wrangell Ranger Districts.

Environmental Setting

Occurs on alluvial deposits, often with a deep, overlying organic layer, on river valley floodplains. Landform class is Flood Plains in the Valley Floors association (Brock et al. 1996). Soils are very poorly drained and permanently or semipermanently flooded with standing water. This plant association can occur on coarse-silty mineral soils including Histic Cryaquepts and Typic Cryaquents, and on organic soils including Typic and Terric Cryohemists and Typic Cryofibrists. Average pH of the surface soil is 5.8. Average observed water table is 13 cm, but sites are often covered with standing water for long periods due to seasonal flooding. Organic matter depth averages 60 cm but can range from 20 cm to over 100 cm.

Vegetation Dynamics

This plant association is often a colonizer of open water around pond edges, replacing aquatic or fresh herb marsh communities. As the herb root mat at pond edges thickens, shrubs such as *Myrica gale* or *Salix* spp. can invade. In bog pools, sphagnum mosses may eventually develop a deep layer of peat. As the peat mat thickens, the emergent forb community can be replaced by sedge bog or sedge-moss bog communities.

Comparison to Other Types

Viereck et al. (1992) listed several plant community types dominated by *Menyanthes trifoliata,* including two *Menyanthes trifoliata - Comarum palustre* communities (Griggs 1936, Tande 1983), under the Subarctic Lowland Herb Bog Meadow type (III.B.3.c). They also described a Fresh Herb Marsh (III.B.3.a) that is similar in site characteristics, except that bog meadows occur on sites with shallow or no standing water and have a peat substrate, and marshes occur in deeper water with mineral or well-decomposed organic substrate. *Equisetum fluviatile* is usually the dominant species in herb marshes. Shephard (1995) described a *Menyanthes trifoliata - Comarum palustre* community type for the Yakutat Forelands that occurs on wet floodplains, old stream channels, and shallow ponds. *Cicuta douglasii, Equisetum fluviatile,* and *Carex limosa* are often mixed with the two dominants, and common mosses include *Calliergon giganteum, Sphagnum squarrosum, and S. riparium.* DeVelice et al. (1999) and Boggs (2000) reported a *Menyanthes trifoliata* type and a *Comarum palustre* type on the Chugach National Forest and Copper River Delta, respectively. *Menyanthes trifoliata, Comarum palustre,* and *Equisetum fluviatile* are common species in both communities.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
86	0	0	0	87	73	33

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
5	26	15	0	0	54	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Menyanthes trifoliata	53	30-70	100
Comarum palustre	28	10-40	88
Carex aquatilis	12	1-80	63
Eriophorum russeolum	7	0.1-30	50
Equisetum fluviatile	5	1-10	75
Equisetum palustre	3	1-10	50
Carex chordorrhiza	2	0.1-10	50

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Menyanthes trifoliata	47	0.000

***Castilleja miniata - Plantago macrocarpa - Achillea millefolium* Herbaceous Vegetation**
Indian Paintbrush - Seashore Plantain - Yarrow Herbaceous Vegetation
CAMI12 - PLMA - ACMI2 Herbaceous Vegetation

Number of plots: 6

Type Concept

This plant association contains a diverse assemblage of hydrophytic and mesophytic forbs and graminoids, with no clear dominant or codominant species. *Argentina egedii* and/or *Lupinus nootkatensis* may be common on some sites. However, several species including *Castilleja miniata, Plantago macrocarpa, Triglochin maritima, Achillea millefolium,* and *Lathyrus palustris* occur on almost all sites and are good indicator species for this plant association.

Geographic Distribution

This plant association occurs primarily on the extensive upper tidal flats of the Stikine River Delta, although it may also occur on the lower Stikine River valley floodplain. Sites are located on the Wrangell Ranger District.

Environmental Setting

This plant association is found primarily on alluvium, loess, mudflats, and uplifted tidal flats of the Stikine River Delta. It occurs on recent deposits of low-velocity loamy or silty glaciofluvial material. Landform class is Uplifted Estuaries and Tidal Flats (76) in the Coastal landform association (Brock et al. 1996). Soils include a variety of somewhat poorly drained to poorly drained, coarse-silty to coarse-loamy soils, including Typic and Fluvaquentic Cryaquepts, Typic and Fluvaquentic Cryaquents, and Aquic Cryorthents. Average pH of the surface soil is 7.3. Average observed water table depth is 75 cm. Organic matter depth averages 7 cm.

Vegetation Dynamics

This plant association occurs in the broad, extensive flats of the Stikine River Delta, usually between alder or willow shrublands and intertidal marshes. These sites may exhibit weakly brackish conditions due to irregular tidal inundation. The successional status of mixed herb meadows is unclear and is probably dependent on local site characteristics. This plant association normally occurs on the highest portions of tidal flats. As these flats continue to accrete or uplift, tidal flooding becomes less common. The eventual dilution of salinity and increased soil drainage may allow sites to be invaded by shrubs and eventually trees.

Comparison to Other Types

This plant association is difficult to compare to most regional classifications due to the high diversity of species combined with lack of dominants. It classifies as a Mixed Herb (III.B.2.a) vegetation type of Viereck et al. (1992), but it does not appear to fit any of the Level V community descriptions listed under that type. Stone (1993) described a Coastal Forb Meadow type for coastal marshes near Juneau with visual dominants that are similar to indicator species for this plant association. On the Yakutat Forelands, Shepherd (1995) recognized a *Calamagrostis canadensis - Argentina egedii* community type that occurs on current and uplifted tidal flats. Although *Calamagrostis* is dominant, many of the common forbs and grasses are similar to the indicator species for this plant association. Mackenzie and Moran (2004) described a *Deschampsia beringensis - Symphyotrichum subspicatus* site association that is one of the most floristically diverse and widespread ecosystems in estuaries of coastal British Columbia. Although *Deschampsia beringensis* and *Symphyotrichum subspicatum* are dominant species, many other species that are often prominent, including *Achillea millefolium, Conioselinum gmelinii, Hordeum brachyantherum, Plantago macrocarpa, Argentina egedii,* and *Triglochin maritima,* are also indicator species for this plant association.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
97	0	0	0	97	77	41

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
10	26	62	0	2	0	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Argentina egedii	18	10-30	83
Lupinus nootkatensis	13	3-30	67
Plantago macrocarpa	11	3-20	100
Triglochin maritima	11	2-30	100
Deschampsia cespitosa	11	1-40	83
Carex lyngbyei	9	0.1-40	67
Festuca rubra	8	1-30	83
Achillea millefolium	7	3-20	100
Castilleja miniata	6	2-10	100
Dodecatheon pulchellum	5	2-10	83
Angelica lucida	5	0.1-30	50
Hierochloe odorata	4	0.1-20	67
Glaux maritima	4	1-10	67
Hordeum brachyantherum	4	1-20	50
Iris setosa	3	3-10	50
Lathyrus palustris	2	1-3	100
Parnassia palustris	2	0.1-5	83
Trientalis europaea	2	2-30	67
Poa arctica	2	1-10	50
Conioselinum gmelinii	1	0.1-1	67
Poa eminens	1	1-1	50
Fritillaria camschatcensis	0.1	0.1-0.1	50

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Castilleja miniata	87	0.000
Plantago macrocarpa	70	0.000
Achillea millefolium	53	0.000
Dodecatheon pulchellum	49	0.000
Parnassia palustris	45	0.000
Poa arctica	45	0.002
Conioselinum gmelinii	44	0.001
Hierochloe odorata	38	0.002
Triglochin maritima	30	0.000
Angelica lucida	30	0.005
Hordeum brachyantherum	29	0.007
Lathyrus palustris	27	0.006
Lupinus nootkatensis	26	0.004

***Fritillaria camschatcensis - Thalictrum sparsiflorum - Iris setosa* Herbaceous Vegetation**
Northern Riceroot - Calthaleaf Avens - Beachhead Iris Herbaceous Vegetation
FRCA5 - GECA6 - IRSE Herbaceous Vegetation

Number of plots: 15

Type Concept

This plant association supports a diverse herbaceous layer consisting mostly of mesophytic forbs, but there are usually no clear dominant or codominant species. Several species are good indicators, including *Fritillaria camschatcensis, Thalictrum sparsiflorum,* and *Iris setosa.* Other common forbs include *Rubus arcticus*, *Galium trifidum*, and *Angelica genuflexa.* Various graminoids that may be present include *Calamagrostis canadensis*, *Leymus mollis*, and *Hierochloe odorata.* Some sites may be intermixed with a low evergreen shrub layer of *Myrica gale.* A diverse moss layer can also be present and includes such species as *Rhytidiadelphus squarrosus, Sphagnum squarrosum, Brachythecium* spp., *Racomitrium lanuginosum,* and *Aulacomnium palustre.*

Geographic Distribution

Occurs mainly in the Taku River Valley, but can also occur on loess deposits on the Stikine River Valley and Delta. Sites are located on the Juneau and Wrangell Ranger Districts

Environmental Setting

Occurs on alluvial flats of major river valley flooplains and sandy to silty glaciofluvial deposits at the terminus of glaciers. Some sites on the Stikine River Delta occur on loess deposits. Landform class is Flood Plains in the Valley Floors association (Brock et al. 1996). This plant association can occur on a variety of well-drained to very poorly drained, fine-silty to sandy-skeletal soils, including Typic Cryaquepts, Typic Cryaquents, Aquic Cryofluvents, Typic and Oxyaquic Cryorthents, and Oxyaquic Cryopsamments. Average pH of the surface soil is 6.4. Average observed water table depth is 85 cm, but ranges from 16 cm to over 100 cm. Organic matter depth averages 2 cm. Soils are usually moist but not saturated during the growing season.

Vegetation Dynamics

The successional status of mixed herb meadows is unclear and is probably dependent on site characteristics. Viereck et al. (1992) proposed that mixed herb communities may tend to develop into shrub or forest types, or occasionally bogs in forested areas of Alaska. Shephard (1995) suggested that a mixed forb community may persist on nutrient-rich, well-drained soils, because the robust growth of forbs and occasionally high water table prevents invasion by shrubs and trees.

Comparison to Other Types

Viereck et al. (1992) described a Mixed Herb type (III.B.2.a) that includes several communities with a variety of dominant and characteristic forbs, including some with *Fritillaria camschatcensis* and *Iris setosa*. They occur in small patches on deep, loamy, fairly well-drained soils on streambanks, stabilized dunes, old beach ridges, and sheltered subalpine slopes. Shephard (1995) described a Mesic Forb community type for the Yakutat Forelands found on nutrient-rich, well-drained hill slopes. *Solidago canadensis, Heracleum maximum,* and *Epilobium angustifolium* are dominant species. DeVelice et al. (1999) and Boggs (2000) described several herbaceous forb community types, but none appear to have species assemblages that are analogous to this plant association. However, Boggs reported an unsampled *Iris setosa* community type on the Copper River Delta.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
88	1	20	0	78	64	23

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
8	21	64	1	5	1	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Iris setosa	18	2-60	87
Myrica gale	15	2-70	53
Calamagrostis canadensis	13	0.1-80	60
Angelica genuflexa	12	1-40	87
Rubus arcticus	12	0.1-30	80
Sanguisorba canadensis	5	0.1-20	73
Achillea millefolium	4	1-20	53
Fritillaria camschatcensis	3	1-10	73
Galium trifidum	2	0.1-10	93
Epilobium ciliatum	1	0.1-5	53
Trientalis europaea	1	0.1-5	53

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Fritillaria camschatcensis	56	0.000
Thalictrum sparsiflorum	47	0.001
Iris setosa	40	0.000
Geum calthifolium	37	0.003
Castilleja unalaschcensis	33	0.003
Chamerion angustifolium	33	0.006

Carex lyngbyei Herbaceous Vegetation
Lyngbye's Sedge Herbaceous Vegetation
CALY3 Herbaceous Vegetation

Number of plots: 8

Type Concept

This plant association is species-poor and is characterized by an almost continuous cover of *Carex lyngbyei*. These sedges may be quite robust, with heights up to 1.5 m. A few halophytic herbs such as *Ruppia maritima, Caltha palustris,* and *Eleocharis palustris* may also be present in small amounts. A sparse cover of mosses such as *Campylium stellatum* may be present.

Geographic Distribution

This plant association occurs primarily in the extensive intertidal flats of the Stikine River Delta, but it is also found on a few sites near the mouth of the Taku River as it enters Taku Inlet. Sites are located on the Wrangell and Juneau Ranger Districts.

Environmental Setting

This plant association is found primarily in brackish water intertidal flats that are often dissected by drainage channels and sloughs. Landform class is Estuaries in the Coastal landform association (Brock et al. 1996). Sites are subject to diurnal tidal flooding and sometimes complete inundation, as evidenced by watermarks on vegetation. Soils are derived from recent deposits of loamy or silty alluvium, and most are classified as very poorly drained, coarse-silty to coarse-loamy Typic Cryaquents. A loamy Terric Cryohemist was reported from one sample site. Average pH of the surface soil is 7.5, reflecting the saline inputs from brackish tidal water. Average observed water table is 27 cm but fluxuates regularly due to diurnal tide cycles. Organic matter depth averages 7 cm, but much of the ground surface consists of bare soil or standing water.

Vegetation Dynamics

This plant association is highly influenced by tidal inundation. The frequent flooding by brackish water and the continual erosion and deposition of sediments inhibits establishment of tree and shrub species. However, isostatic uplift can raise these flats above the high-tide level, allowing them to dry out and providing suitable conditions for mixed herbaceous meadows, shrublands, and eventually forest vegetation (Boggs and Shephard 1999).

Comparison to Other Types

The most extensive vegetation type described by del Moral and Watson (1978) on Sergief Island in the Stikine River Delta was a *Carex lyngbyei* community, which generally occurs on brackish-water intertidal flats. Several communities dominated by *Carex lyngbyei* are listed by Viereck et al. (1992) as part of the Subarctic Lowland Sedge Wet Meadow (III.3.A.f) and Halophytic Sedge Wet Meadow (III.A.3.i) classes. Shephard (1995) described a *Carex lyngbyei* community type for the Yakutat Forelands that occurs on current tidal flats and occasionally on uplifted tidal and glacial outwash flats. The vegetative cover is a single layer of *Carex lyngbyei* and a sparse assortment of other herbs, and bryophytes are uncommon. DeVelice et al. (1999) described a *Carex lyngbyei* type with low species richness that occurs on raised tidal flats and floodplains. Boggs (2000) reported a *Carex lyngbyei* community that occurs as a minor type on nontidal sites with permanent to semipermanent standing water. Most occurrences are probably remnants of intertidal marshes that were uplifted by earthquakes or isostatic rebound. Mackenzie and Moran (2004) described a *Carex lyngbyei*-dominated type that has low species diversity and occurs on tidal flats and channel margins with strong fluctuations of brackish water, active sedimentation, and diurnal flooding.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
96	0	0	0	96	3	96

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
8	2	37	1	25	27	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Carex lyngbyei	94	80-100	100

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Carex lyngbyei	29	0.000

***Carex lyngbyei - Deschampsia cespitosa* Herbaceous Vegetation**
Lyngbye's Sedge - Tufted Hairgrass Herbaceous Vegetation
CALY3 - DECE Herbaceous Vegetation

Number of plots: 18

Type Concept

This plant association is dominated by *Carex lyngbyei* along with other graminoid herbs including *Deschampsia cespitosa* and *Eleocharis palustris.* Characteristic forbs include *Glaux maritima, Triglochin maritima, Ranunculus cymbalaria,* and *Argentina egedii.*

Geographic Distribution

Occurs primarily in the extensive intertidal flats of the Stikine River Delta, although it is found on a few sites near the mouth of the Taku River as it enters Taku Inlet. Sites are located on the Wrangell and Juneau Ranger Districts.

Environmental Setting

This plant association is found primarily on brackish water intertidal flats of the Stikine River Delta. It occurs on recent deposits of low-velocity loamy or silty alluvial material, which is often overlaid by, or in alternating layers with, embedded sedge peat. Landform class is Estuaries in the Coastal landform association (Brock et al. 1996). Sites are subject to periodic tidal inundation of varying frequency, depending on elevation. Soils are poorly to very poorly drained Typic and Histic Cryaquents, Terric Cryohemists, Typic Cryaquepts, and Terric Cryosaprists. Mineral soil texture is predominately loamy, coarse-loamy, and coarse-silty. Average pH of the surface soil is 7.2. Average observed water table depth was 36 cm but can be highly variable due to flooding or tidal cycles. Organic matter depth averages 14 cm but can range from 0 cm to 40 cm.

Vegetation Dynamics

This plant association is highly influenced by tidal inundation. The frequent flooding by brackish water and the continual erosion and deposition of sediments inhibits establishment of tree and shrub species. However, isostatic uplift can raise these flats above the high-tide level, allowing them to dry out and providing suitable conditions for tree and shrub establishment (Boggs and Shephard 1999).

Comparison to Other Types

Del Moral and Watson (1978) described a *Carex lyngbyei*-dominated community on Sergief Island in the Stikine River Delta and observed that it was the most extensive in community in the brackish marshes of the study area. Veireck et al. (1992) lists several *Carex lyngbyei*-dominated communities, including a *Carex lyngbyei - Deschampsia beringensis* type, as part of the Subarctic Lowland Sedge Wet Meadow (III.3.A.f) and Halophytic Sedge Wet Meadow (III.A.3.i) vegetation classes that occur in the coastal areas of Alaska. Shephard (1995) described a *Carex lyngbyei* community type on the Yakutat Forelands that is dominated by *Carex lyngbyei* and includes a variable mix of other herbaceous species such as *Deschampsia cespitosa*. For the Chugach National Forest, DeVelice et al. (1999) described three community types dominated by *Carex lyngbyei*: *a Carex lyngbyei* type, a *Carex lyngbyei - Ranunculus cymbalaria* type, and a *Carex lyngbyei* / Mixed Herb type, in all of which *Deschampsia cespitosa* may be common. Boggs (2000) described a *Carex lyngbyei* type and a *Carex lyngbyei* / Mixed Herb type in the marshes of the Copper River Delta, both of which can contain *Deschampsia cespitosa*. Mackenzie and Moran (2004) described a *Carex lyngbyei* type dominated by *C. lyngbyei* and mixed with scattered *Deschampsia cespitosa, Argentina egedii, Glaux maritima,* and *Triglochin maritima*.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
90	0	0	0	90	41	72

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
9	9	63	0	10	9	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Carex lyngbyei	44	0.1-80	100
Deschampsia cespitosa	31	0.1-60	100
Argentina egedii	24	5-40	100
Eleocharis palustris	22	0.1-50	93
Triglochin maritima	17	3-30	100
Glaux maritima	8	0.1-30	100
Campylium stellatum	8	2-20	67
Festuca rubra	2	0.1-10	60
Poa eminens	1	0.1-5	67
Ranunculus cymbalaria	1	0.1-3	67
Lathyrus palustris	1	0.1-5	60
Parnassia palustris	1	0.1-5	53
Stellaria humifusa	tr	0.1-2	53

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Ranunculus cymbalaria	60	0.000
Glaux maritima	51	0.000
Campylium stellatum	47	0.000
Deschampsia cespitosa	44	0.000
Triglochin maritima	40	0.000
Poa eminens	39	0.001
Plantago maritima	39	0.001
Argentina egedii	36	0.000
Stellaria humifusa	35	0.002
Carex mackenziei	28	0.010
Eleocharis palustris	26	0.000

Carex aquatilis Herbaceous Vegetation
Water Sedge Herbaceous Vegetation
CAAQ Herbaceous Vegetation

Number of plots: 21

Type Concept

This plant association is characterized by a dense graminoid layer dominated by *Carex aquatilis*, usually with greater than 70 percent cover. Sitka sedge (*Carex aquatilis* var. *dives)* is usually the dominant sedge variety. Several other hydrophytic graminoids and forbs can occur but usually have low cover. *Comarum palustre* and *Equisetum palustre* are two frequently occuring forbs. This plant association often occurs intermixed with stands of shrubs such as *Salix barclayi, S. sitchensis, Myrica gale,* and *Alnus viridis.* Moss cover is low, and sedge litter or water dominate the ground cover.

Geographic Distribution

Occurs on alluvial and glaciofluvial flats and along river and slough channels in the Stikine and Taku River floodplains. Sites are located within the Juneau and Wrangell Ranger Districts.

Environmental Setting

Occurs on alluvial and glaciofluvial deposits in flat, low-elevation floodplains. Landform class is Flood Plains in the Valley Floors association (Brock et al. 1996). Soils are poorly to very poorly drained Typic Cryaquents, Histic and Typic Cryaquepts, Terric and Typic Cryohemists, and Typic Cryorthents. Average pH of the surface soil is 6.4. Average observed water table is 36 cm, but sites are often covered with standing freshwater for long periods due to seasonal flooding. Organic matter depth averages 22 cm but can range from 0 cm to over 100 cm. The surface layer often consists of a thick network of sedge roots. The soil profile may contain alternating organic and mineral horizons as a result of periodic flood events.

Vegetation Dynamics

This plant association develops on early successional sites such as ponds and alluvial basins adjacent to streams. It colonizes pond edges and replaces fresh sedge marshes as accumulating sediment raises the soil level or drainage lowers the water level. Over time, thick sedge peat organic layer can develop, often alternating with layers of fresh sediment deposits from seasonal flood events. If hydrologic conditions remain stable, this plant association can persist. If a site becomes drier, it can succeed to willow or alder shrublands. Alternatively, if the input of nutrients is reduced, the site may succeed to a sedge-sphagnum bog.

Comparison to Other Types

Viereck et al. (1992) listed several plant communities dominated by water sedge (*Carex aquatilis)* or Sitka sedge (*C. aquatilis* var*. dives,* formerly *Carex sitchensis*) under Subarctic Lowland Sedge Wet Meadows (III.A.3.f), which are commonly found in wet areas on floodplains, margins of ponds, lakes, and sloughs and in upland depressions. Shephard (1995) reported a *Carex aquatilis* var*. dives / Equisetum fluviatile* community type for the Yakutat Forelands. It occurs on areas with standing water, and *Carex aquatilis* var*. dives* is dominant, with *Equisetum fluviatile* and *Comarum palustre* often present. DeVelice et al. (1999) described *Carex aquatilis* and *C. aquatilis* var*. dives* community types on the Chugach National Forest. The *Carex aquatilis* var*. dives* community type of Boggs (2000) is a major type on the outwash plains and uplifted marshes of the Copper River Delta. Sites have semipermanent to permanent standing water from groundwater seepage or river flooding. Mackenzie and Moran (2004) described a *Carex aquatilis* var*. dives – Sphagnum* type that occurs occur in wet drainage channels or hollows along the British Columbia coast. It differs from this plant association in having a substantial moss cover. They also describe a *Carex aquatilis – Carex utriculata* fen type that is commonly found in palustrine basins and contains low moss cover, but *C. aquatilis* and *C. utriculata* are codominant.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
92	0	15	0	89	25	78

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
9	8	56	1	9	17	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Carex aquatilis	71	10-100	100
Comarum palustre	12	1-60	57

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Carex aquatilis	27	0.000

***Carex aquatilis / Sphagnum angustifolium* Herbaceous Vegetation**
Water Sedge / Sphagnum Moss Herbaceous Vegetation
CAAQ / SPAN11 Herbaceous Vegetation

Number of plots: 7

Type Concept

This plant association is an herbaceous bog dominated by *Carex aquatilis,* along with smaller amounts of *C. pluriflora, Eriophorum angustifolium,* and *Trichophorum cespitosum*. Sitka sedge (*Carex aquatilis* var. *dives)* is often the dominant sedge variety. Forbs include *Menyanthes trifoliata* and *Drosera rotundifolia,* which occur in small depressions and pools, and *Vaccinium oxycoccus* and *Cornus canadensis* which are commonly found on mounds of sphagnum moss. The ground cover contains a substantial sphagnum moss component, with *Sphagnum angustifolium* and *S. magellanicum* the most common species. A sparse dwarf shrub layer consisting of *Kalmia polifolia, Empetrum nigrum,* and *Ledum groenlandicum* is usually present. Scattered trees and shrubs may also occur, including *Pinus contorta, Vaccinium ovalifolium,* and *Menziesia ferruginea.*

Geographic Distribution

Occurs on extensive flats in the Stikine River floodplain, commonly on flats along sloughs, away from the current main river channel. Sites are located within the Wrangell Ranger Distict.

Environmental Setting

Occurs on older, fine-textured alluvial floodplain deposits upon which layers of sphagnum peat have built up over time, resulting in bogs on deep organic soils. Landform class is Floodplains in the Valley Floor Association (Brock et al. 1996). Soils are very poorly drained, acidic Sphagnic Cryofibrists, Typic Cryohemists, and Typic Sphagnofibrists. Average pH of the surface soil is 4.2. Average observed water table depth is 14 cm, but may be at or above the soil surface for extended periods during seasonal flooding, during which sites may be covered with standing freshwater for extended periods. Organic matter depth averages 41 cm. The soil profile may contain alternating organic and mineral horizons as a result of past flood events. Sphagnum moss usually dominates the ground cover.

Vegetation Dynamics

This plant association is probably a mid-successional type that replaces early pioneer aquatic vegetation in former floodplain lakes or depressions. It may transition to an ombrotrophic bog as the peat layer deepens, soil acidity increases, and available plant nutrients are reduced. This plant association may also succeed to shrubland or even forest if hydrological changes create drier, less acidic conditions.

Comparison to Other Types

Viereck et al. (1992) describes a Subarctic Lowland Sedge-Moss Bog Meadow vegetation type (III.A.3.k) that occurs on raised bogs, slope bogs, and early stages of flat bogs in southeast Alaska. The ground cover is dominated by mosses, mainly of *Sphagnum* spp. Sedges including *Carex aquatilis* and *C. pluriflora* are the dominant herbs and grow out of a matrix of sphagnum mosses. Dwarf shrubs such as *Andromeda polifolia* are present but have low cover, and widely scattered stunted trees may be present. Shephard (1995) describes a *Carex aquatilis* var. *dives - Vaccinium oxycoccos* community type for the Yakutat Forelands, in which *C. aquatilis* var*. dives, C. pluriflora,* and *Eriophorum angustifolium* are the dominant graminoids. *Vaccinium oxycoccos* and *Drosera rotundifolia* are common forbs, and *Menyanthes trifoliata* occurs in small pools. The extensive moss layer is composed of several *Sphagnum* species. DeVelice et al. (1999) reported a *Carex aquatilis* var. *dives* community as a major type on the Copper River Delta that occurs on floodplains, outwash plains, and raised tidal flats. Bogg's (2000) *Carex aquatilis* var. *dives / Sphagnum* community type is a bog type that occurs on distal outwash plains, floodplains, and uplifted marshes on the Copper River Delta. *Carex aquatilis* var. *dives, Eriophorum russeolum, Menyanthes trifoliata,* and *Equisetum palustre* are often codominant, and *Sphagnum* spp. blankets the ground. Mackenzie and Moran (2004) describe a *Carex aquatilis* var*. dives – Sphagnum* type that occurs occur in wet drainage channels or hollows along the British Columbia coast.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
71	10	9	4	64	26	47

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
5	74	7	0	0	14	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Sphagnum angustifolium	34	20-60	86
Carex aquatilis	26	5-60	100
Carex pluriflora	13	2-40	71
Menyanthes trifoliata	8	1-30	71
Kalmia polifolia	6	0.1-30	86
Vaccinium oxycoccos	6	1-10	86
Eriophorum angustifolium	5	3-10	86
Drosera rotundifolia	2	0.1-10	71
Cornus canadensis	2	0.1-10	71

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Cornus canadensis	64	0.000
Kalmia polifolia	51	0.000
Vaccinium oxycoccos	44	0.000
Vaccinium ovalifolium	30	0.005
Sphagnum magellanicum	26	0.008
Drosera rotundifolia	25	0.005

***Eriophorum angustifolium* Herbaceous Vegetation**
Tall Cottongrass Herbaceous Vegetation
ERAN6 Herbaceous Vegetation

Number of plots: 11

Type Concept

This is a wet herbaceous meadow dominated by *Eriophorum angustifolium* and other sedges of the genus *Carex,* including *C. aquatilis*, *C. livida, C. pluriflora,* and *C. stylosa*. A variety of forbs can occur, but they usually have limited cover. *Gentiana douglasiana* occurs consistently and is an important indicator of this plant association. Ericaceous dwarf shrubs including *Vaccinium uliginosum, Kalmia polifolia,* and *Andromeda polifolia* also commonly occur in small amounts. A substantial moss/liverwort ground cover is usually present, with characteristic species including *Sphagnum papillosum* and *Lophozia badensis.* Shallow ponds may occupy portions of the site. An occurrence of *Piperia unalascensis*, an Alaska Region sensitive species, was recorded on one of the sample plots for this plant association.

Geographic Distribution

Occurs in the Stikine River valley floodplain. It is commonly found on flats along sloughs, away from the main river channel. Sites are located within the Wrangell Ranger Distict.

Environmental Setting

Occurs on organic soils over older alluvial floodplain deposits. Landform class is Floodplains in the Valley Floor association (Brock et al. 1996). Soils are poorly to very poorly drained Terric Cryohemists and Terric Cryosaprists. Sites are nutrient-poor and acidic, with an average surface soil pH of 5.1. Average observed water table is 30 cm, but it may be at or close to the surface most of the growing season, and standing water sometimes persists on the site long periods due to snowmelt or seasonal flooding. Organic matter depth averages 28 cm.

Vegetation Dynamics

This plant association develops on older, mostly flat outwash and floodplain deposits or former ponds and lakes that have gradually filled with sediment. It may be a late-seral community that will persist as long as the hydrologic regime remains relatively stable.

Comparison to Other Types

The Subarctic Lowland Sedge Wet Meadow (III.A.3.f) of Viereck et al. (1992) is common in very wet areas on floodplains, margins of ponds, lakes, and sloughs and in depressions in upland areas. Shephard's (1995) *Carex livida - Trichophorum cespitosum* community type on the Yakutat Forelands is similar in species composition, except that *C. livida, T. cespitosum,* and *Eriophorum angustifolium* codominate the herbaceous layer. *Gentiana douglasiana* is a commonly occuring forb, and *Sphagnum papillosum* is a common moss. DeVelice et al. (1999) described an *Eriophorum angustifolium - Trichophorum cespitosum* type for the Chugach National Forest, in which *Gentiana douglasiana* and *Vaccinium uliginosum* are often present. Boggs (2002) identified an *Eriophorum angustifolium* type for the Copper River Delta, which has a dominant cover of *E. angustifolium*. Mackenzie and Moran (2004) described several *Eriophorum angustifolium*-dominated meadow types, but they occur at montane and subalpine elevations.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
82	1	0	7	75	10	67

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
8	30	42	0	2	18	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Eriophorum angustifolium	32	2-90	100
Carex aquatilis	13	2-80	64
Vaccinium uliginosum	3	1-10	82
Sanguisorba menziesii	2	2-5	64
Kalmia polifolia	2	0.1-5	55
Gentiana douglasiana	0.1	0.1-1	100

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Gentiana douglasiana	93	0.000
Eriophorum angustifolium	59	0.000
Triantha glutinosa	45	0.002
Sphagnum papillosum	45	0.002
Vaccinium uliginosum	43	0.001
Andromeda polifolia	28	0.009
Carex livida	26	0.012

***Eriophorum russeolum / Sphagnum angustifolium* Herbaceous Vegetation**
Red Cottongrass / Sphagnum Herbaceous Vegetation
ERRU / SPAN11 Herbaceous Vegetation

Number of plots: 11

Type Concept

This plant association is characterized by species that are tolerant of permanent saturation. *Eriophorum russeolum, Carex aquatilis, C. chordorhiza,* and *C. pluriflora* are common sedge species, and *Menyanthes trifoliata, Comarum palustre,* and *Drosera rotundifolia* are common forbs. The ground cover is dominated by *Sphagnum angustifolium,* which often forms continuous lawns, along with *S. capillifolium* and other sphagnum mosses. Some sites may have considerable standing water during the growing season.

Geographic Distribution

Occurs primarily on the alluvial flats of the Stikine River Valley and Delta, but it is also found on similar sites on the lower Taku River. Sites are located on the Wrangell and Juneau Ranger Districts.

Environmental Setting

Occurs on deep sphagnum peat overlying floodplain alluvial and glaciofluvial sediments. Landform class is Flood Plains in the Valley Floors association (Brock et al. 1996). Soils are very poorly drained Sphagnic and Typic Cryofibrists, Typic Sphagnofibrists, Typic Cryohemists, and Histic Cryaquepts. Average pH of the surface soil is 4.8. Average observed water table depth is 9 cm, but many sites are fully saturated during the growing season. Soil organic horizon depth exceeds 100 cm on most sites. Sphagnum moss dominates the ground cover and often forms continuous lawns.

Vegetation Dynamics

This plant association occurs where water regimes are relatively stable. It can also be found on floating peat mats that colonize the margins of shallow lakes, replacing aquatic vegetation. Accumulation of organic matter combined with invasion of sphagnum mosses can gradually fill in depressions until it becomes a bog, which may persist for long periods. However, changes in hydrology or increases in surface elevation through continued peat accumulation may reduce water saturation enough to allow the site to succeed to shrubland or forest.

Comparison to Other Types

Viereck et al. (1992) described a Subarctic Lowland Sedge-Moss Bog Meadow (III.A.3.k), which occurs on peat soils, raised bogs, slope bogs, and early stages of flat bogs in southeastern Alaska. Several communities listed under this type contain or are dominated by some combination of *Eriophorum russeolum* and other sedges, with an extensive moss cover of various species of *Sphagnum.* Shephard (1995) reported a *Carex aquatilis* var. *dives / Vaccinium oxycoccos* community type that classifies as Subarctic Lowland Sedge-Moss Bog Meadow. *Eriophorum angustifolium* is common and *E. russeolum* is usually a minor component. DeVelice et al. (1999) listed an *Eriophorum russeolum*-dominated community as an undersampled type that occurs on the Chugach National Forest. Likewise, an *Eriophorum russeolum*-dominated community type is described by Boggs (2000) as an incidental type on the Copper River Delta that occurs on root mats and poorly drained uplifted marshes. Mackenzie and Moran (2004) describe a *Scheuchzeria palustris* - *Sphagnum* wetland type for British Columbia that occurs on similar landscapes and in which *Sphagnum angustifolium* and *Eriophorum chamissonis* (closely related to *E. russeolum)* are characteristic species.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
68	0	0	2	66	15	52

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
4	79	11	0	0	6	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Sphagnum angustifolium	79	40-100	100
Eriophorum russeolum	25	0.1-80	91
Carex aquatilis	17	5-50	64
Menyanthes trifoliata	6	0.1-30	64
Comarum palustre	5	1-30	55
Drosera rotundifolia	2	1-10	55

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Sphagnum angustifolium	37	0.000
Eriophorum russeolum	34	0.001

***Calamagrostis canadensis - Carex pluriflora* Herbaceous Vegetation**
Bluejoint - Manyflower Sedge Herbaceous Vegetation
CACA4 - CAPL6 Herbaceous Vegetation

Number of plots: 17

Type Concept

This herbaceous meadow is dominated by *Calamagrostis canadensis* and *Carex pluriflora* intermixed with a variable and often diverse assortment of other graminoids and forbs, including *Trientalis europaea, Galium trifidum,* and *Epilobium ciliatum.* The presence of *Epilobium palustre* is a strong indicator of this plant association, and *Peltigera membranacea* is a characteristic lichen in the ground cover.

Geographic Distribution

Occurs primarily on the upper edges of tidal flats in the Stikine River Delta, although it may also occur on the lower Stikine River floodplain. Sites are located on the Wrangell Ranger District.

Environmental Setting

This plant association is found primarily on former deltaic mud flats and uplifted tidal flats of the Stikine River Delta and at the mouth of the Stikine River. It occurs on recent deposits of loamy or silty glaciofluvial material. Landform class is Uplifted Estuaries and Tidal Flats (76) in the Coastal landform association (Brock et al. 1996). Soils include a wide variety of poorly drained to very poorly drained, coarse-loamy to coarse-silty mineral soils or sediment-laden organic soils. It occurs most commonly on Terric Cryohemists but may also be found on Typic Cryaquepts, Sphagnic Cryofibrists, Typic Cryosaprists, and Typic Cryaquents. Average pH of the surface soil is 5.8. Soil organic matter depth averages 31 cm. Average observed water table is 18 cm but ranges from 0 to 46 cm. Soils may be saturated throughout the growing season.

Vegetation Dynamics

Wet graminoid meadows may develop from wet sedge meadows or herb marshes as soil develops and flood duration decreases. In turn, they can eventually can be invaded by shrubs and become scrub communities as soil drainage improves. However, if drainage remains poor, the accumulation of organic matter combined with invasion of sphagnum mosses can gradually convert these sites into acidic bogs.

Comparison to Other Types

Del Moral and Watson (1978) described a *Calamagrostis nutkaensis* community type that occurs in high marsh on Sergief Island in the Stikine River Delta. It has a heterogenous mix of graminoids and forbs and is usually dominated by *Calamagrostis nutkaensis* but can also occur intermixed with *Salix barclayi* and *S. sitchensis* shrubland (no occurrences of *Calamagrostis nutkaensis* were recorded in this study, possibly due to differences in taxonomic criteria). Viereck et al. (1992) listed several communities dominated by *Calamagrostis canadensis* under the Bluejoint-Herb type (III.A.2.b). They also listed the *Carex pluriflora - Calamagrostis* spp*. / Sphagnum* spp. type of Thomas (1957) under Subarctic Sedge-Moss Bog Meadow (III.A.3.k), which may be more similar to this plant association since *Calamagrostis* is codominant with a substantial sedge and bryophyte component. Shephard's (1995) *Calamagrostis canadensis* community on the Yakutat Forelands has a somewhat similar species composition, although it generally occurs on Typic Cryaquents. His *Calamagrostis canadensis / Argentina egedii* community type, which also occurs on Typic Cryaquents, has many of the species that occur in this plant association, although often with different average cover and/or frequency. DeVelice et al. (1999) described a *Calamagrostis canadensis* community type in which *C. canadensis* is generally the dominant herbaceous species, while some sites may have a variable but well-represented mesophytic species component. It occurs on estuaries and raised tidal flats but also on some slopes, hills, and mountains to 2000 feet elevation. Boggs (2000) reported a *Calamagrostis canadensis* community type which occurs on highly variable sites in the Copper River Delta including uplifted marshes, outwash plains, spits, and coastal dunes. He also described a *Calamagrostis canadensis / Comarum palustre* community type that occurs on terraces, levees, lake edges of outwash plains, and uplifted marshes on semipermanently saturated soils. *Calamagrostis canadensis* is dominant, and *Comarum palustre, Carex aquatilis* var*. dives, C. lyngbyei,* and *Equisetum palustre* are often common associates.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
88	0	0	1	88	33	71

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
8	48	42	0	0	2	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Calamagrostis canadensis	28	2-70	88
Carex pluriflora	27	3-60	88
Rhytidiadelphus loreus	12	2-40	53
Eriophorum russeolum	8	0.1-30	59
Argentina egedii	4	0.1-30	53
Trientalis europaea	3	1-10	100
Galium trifidum	3	0.1-20	94
Epilobium ciliatum	3	0.1-25	65
Epilobium palustre	2	0.1-10	82

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Epilobium palustre	44	0.000
Peltigera membranacea	41	0.001
Rhytidiadelphus loreus	38	0.001
Stellaria borealis	32	0.007
Trientalis europaea	27	0.000
Galium trifidum	27	0.000
Carex pluriflora	27	0.001
Epilobium ciliatum	25	0.005

Eleocharis palustris Herbaceous Vegetation
Common Spike-Rush Herbaceous Vegetation
ELPA Herbaceous Vegetation

Number of plots: 4

Type Concept

This plant association is a low-diversity plant community of the lower tidal zone that is dominated by *Eleocharis palustris,* with *Carex lyngbyei* as a common associate*. Ruppia maritima* is a characteristic forb and is strongly associated with this community.

Geographic Distribution

Occurs primarily in the extensive intertidal flats of the Stikine River Delta, but is also found on a few sites near the mouth of the Taku River as it enters Taku Inlet. Sites are located on the Wrangell and Juneau Ranger Districts.

Environmental Setting

This plant association is found primarily on recent deposits of alluvial and glaciofluvial material of lower intertidal flats. Landform class is Estuaries in the Coastal landform association (Brock et al. 1996). Sites are subject to diurnal tidal flooding and often complete inundation. Soils are very poorly drained, coarse-loamy, Typic and Fluvaquentic Cryaquepts. Average pH of the surface soil is 8, reflecting the saline inputs from brackish or salt water. All sites are subject to active tidal inundation, with accompanying erosion and sediment deposition. Little or no organic matter accumulates, and much of the ground cover is bare soil.

Vegetation Dynamics

This plant association is considered to be an early-seral vegetation type. Because of the dynamic nature of active tidal flats, both sediment erosion and deposition can occur relatively quickly. With continued sediment accumulation and/or geologic uplift, this plant association will usually migrate seaward, following the lower tidal zone as it is replaced on its former sites by marsh communities dominated by *Carex lyngbyei.*

Comparison to Other Types

On Sergief Island in the Stikine River Delta, del Moral and Watson (1978) described a sparsely vegetated, *Eleocharis palustris*-dominated community typical of lower intertidal marshes where tidal action is strongest and salinity is greatest. Viereck et al. (1992) listed the *Eleocharis palustris* community as part of the Halophytic Sedge Wet Meadow (III.A.3.i) type. Some communities in the Fresh Sedge Marsh (lll.A.3.d) type are dominated by *Eleocharis palustris*, but they occur in localized freshwater sites that are not susceptible to tidal flooding. Shephard (1995) described an *Eleocharis palustris* community on the Yakutat Forelands that only occurs on sandy uplifted tidal flats or the higher reaches of current tidal flats where freshwater is backed up by tidal water. DeVelice (1999) and Boggs (2000) described an *Eleocharis palustris* community type which is a minor but widespread type on the floodplains, raised beaches, estuaries, and outwash plains of the Copper River Delta. The *Eleocharis palustris* site association described by Mackenzie and Moran (2004) for British Columbia occurs in semipermanently to permanently flooded freshwater marshes and in brackish tidal reaches of large coastal rivers and estuaries. Species diversity is low, with *Eleocharis palustris* the dominant species, accompanied by *Carex lyngbyei* in some estuarine sites. Their *Eleocharis palustris - Carex lyngbyei* site association is a minor type that occurs in locations with prolonged tidal flooding but low salinity, such as protected inlets or mouths of major river systems. They also describe a *Ruppia maritima* type that occurs on tidal flats with muddy substrates, most commonly below the limit of emergent vascular plants in the middle intertidal zone.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
75	0	0	0	75	13	74

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
4	0	5	0	84	7	0	0	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Eleocharis palustris	56	5-90	100
Carex lyngbyei	27	2-95	75
Ruppia maritima	13	0.1-25	100

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Ruppia maritima	79	0.000
Eleocharis palustris	46	0.000

***Racomitrium canescens* Nonvascular Vegetation**
Rock Moss Nonvascular Vegetation
RACA11 Nonvascular Vegetation

Number of plots: 6

Type Concept

This plant association occurs on recently deposited coarse outwash deposits near the terminus of glaciers. Vascular plant cover tends to be sparse, although *Salix sitchensis* and seedlings of *Picea sitchensis* and *Populus balsamifera* are usually present in small amounts. *Orthilia secunda* is a characteristic forb indicator species. The ground cover is dominated by an almost continuous layer of rock moss (*Racomitrium canescens*) mixed with reindeer lichen (*Cladina* spp.) and cup lichen (*Cladonia* spp.).

Geographic Distribution

Occurs on recent glacier outwash areas in the Taku River Valley. The largest occurrences are located at Grizzly Bar near the terminus of Taku Glacier. Locations are within the Juneau Ranger Distict.

Environmental Setting

Occurs on recent glaciofluvial sand, gravel, and cobble outwash deposits near the terminus of glaciers. The landform class is Flood Plains in the Valley Floors association (Brock et al. 1996). Soils are well-drained, sandy or gravelly Typic Cryopsamments and Typic Cryorthents. A layer of live mosses and lichens averaging 3 cm deep covers most of the mineral soil surface. Average pH of the surface soil is 5.0. The water table depth is usually 100 cm or more.

Vegetation Dynamics

This plant association is an early successional community and a colonizer of recent glaciofluvial deposits. The extensive ground cover of mosses and lichens may inhibit the establishment of herbaceous, shrub, and tree species, allowing it to persist for some time. Over time these sites, if undisturbed by glacial advance or future outwash events, may succeed to a willow or alder dominated shrubland and eventually to black cottonwood or Sitka spruce-western hemlock forest.

Comparison to Other Types

This plant association resembles the Dry Bryophyte (III.C.1.b.) community of Viereck et al. (1992). These communities are dominated by bryophytes, especially mosses such as *Racomitrium* spp., *Grimmia apocarpum*, and *Andreaea rupestris*, and lichens may also be common. This community is considered fairly rare and has been reported primarily from the Aleutian Islands (Shacklette 1969). The Aleutian sites are described as sparsely vegetated with moss mounds and much exposed substrate. Meidinger and Pojar (1991) described a general Bryoid community in British Columbia dominated by mosses, liverworts, or lichens. It occurs in environments too harsh for vascular plants, including raised sphagnum bogs, alpine lichen tundra, and rock outcrops partially covered by lichens and mosses such as *Racomitrium* spp., *Polytrichum* spp., and *Dicranum* spp.

Vegetation Data

Average absolute percent cover of vascular plants by life form.

All Veg	Trees	Shrubs	Dwarf Shrubs	Herbs-All	Herbs-Forb	Herbs-Graminoid
21	7	12	0	2	2	0

Average relative percent ground cover by category.

Basal Veg.	Moss/ Lichen	Litter	Wood	Bare Soil	Water	Gravel	Cobble	Stone	Boulder
1	89	7	0	0	0	2	1	0	0

Average percent canopy cover, canopy cover range, and constancy of species with constancy ≥ 50.

Species	Average Cover	Range	Constancy
Racomitrium canescens	37	20-60	100
Salix sitchensis	9	1-20	100
Cladina rangiferina	9	1-20	100
Cladonia squamosa	8	5-10	100
Cladina portentosa	7	10-20	50
Cladonia crispata	5	5-20	50
Populus balsamifera	4	1-8	83
Cladina mitis	3	5-10	50
Dicranum howellii	3	5-10	50
Picea sitchensis	2	1-5	83
Ptilidium ciliare	2	2-5	67
Stereocaulon tomentosum	2	2-10	50
Cladonia bellidiflora	2	3-5	50
Cladonia uncialis	2	0.1-5	50
Orthilia secunda	1	0.1-3	100
Cetraria ericetorum	1	0.1-5	67
Cladonia cornuta	1	1-3	50
Lupinus nootkatensis	1	0.1-5	50
Polytrichum strictum	1	0.1-5	50
Tsuga mertensiana	tr	0.1-1	50
Cladonia chlorophaea	tr	0.1-1	50
Chamerion latifolium	tr	0.1-0.1	50
Umbilicaria hyperborea	tr	0.1-0.1	50

Indicator species with indicator value > 25 and $p < 0.05$.

Species	Indicator Value	p-value
Cladina rangiferina	100	0.000
Cladonia squamosa	96	0.000
Orthilia secunda	93	0.000
Cetraria ericetorum	67	0.000
Ptilidium ciliare	67	0.000
Racomitrium canescens	52	0.000
Cladina mitis	43	0.001
Cladina portentosa	40	0.001
Picea sitchensis	37	0.001
Populus balsamifera	32	0.002
Stereocaulon tomentosum	25	0.017

LITERATURE CITED

Austin, M., and P. Heyligers. 1991. New approach to vegetation survey design: gradsect sampling. *In:* Margules, C., and M. Austin, eds. Nature conservation: cost-effective biological surveys and data analysis. Commonwealth Scientific and Industrial Research Organization Melbourne, Australia.

Boggs, K. 2000. Classification of community types, successional sequences, and landscapes of the Copper River Delta, Alaska. General Technical Report PNW-GTR-469, USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

Boggs, K., S. Klein, L. Flagstad, T. Boucher, J. Grunblatt, and B. Koltun. 2008a. Landcover classes, ecosystems and plant associations of Kenai Fjords National Park. Natural Resource Technical Report NPS/KEFJ/NRTR—2008/136. National Park Service, Fort Collins, Colorado.

Boggs, K., S. Klein, J. Grunblatt, G. Streveler and B. Koltun. 2008b. Landcover classes and plant associations of Glacier Bay National Park and Preserve. Natural Resource Technical Report NPS/GLBA/NRTR-2008/093. National Park Service, Fort Collins, Colorado.

Boggs, K., and M. Shephard. 1999. Response of marine deltaic surfaces to major earthquake uplifts in southcental Alaska. Wetlands 19(1):13-27.

Brock, T., R. West, and S. Paustian. 1996. Landforms of the Alaska Region classification guide. Unpublished report, USDA Forest Service - Alaska Region, Juneau, AK.

Brohman, R., and L. Bryant, eds. 2005. Existing vegetation classification and mapping technical guide. General Technical Report WO–67. USDA Forest Service, Ecosystem Management Coordination Staff, Washington, DC.

Cleland, D., P. Avers, W. McNab, M. Jensen, R. Bailey, T. King, and W. Russell. 1997. National Hierarchical Framework of Ecological Units. *In:* Boyce, M. , and A. Haney, eds. Ecosystem Management Applications for Sustainable Forest and Wildlife Resources. Yale University Press, New Haven, CT.

Conn, J., K. Beattie, M. Shephard, M. Carlson, I. Lapina, M. Hebert, R. Gronquist, R. Densmore, and M. Rasy. 2008. Alaska *Melilotus* invasions: distribution, origin and susceptibility of plant communities. Arctic and Alpine Research 40:298–308.

Del Moral, R., and A. Watson. 1978. Vegetation on the Stikine Flats, Southeast Alaska. Northwest Science 52(2):137-150.

DeMeo, T., J. Martin, and R. West. 1992. Forest Plant Association Management Guide: Ketchikan Area, Tongass National Forest. R10-MB-210, USDA Forest Service - Alaska Region, Juneau, AK.

DeVelice, R., C. Hubbard, K. Boggs, S. Boudreau, M. Potkin, T. Boucher, and C. Wertheim. 1999. Plant community types of the Chugach National Forest. R10-TP-76, USDA Forest Service - Alaska Region, Anchorage, AK.

Dufrene, M., and P. Legendre. 1997. Species assemblages and indicator species: the need for a flexible asymmetrical approach. Ecological Monographs 67:345-366.

Federal Geographic Data Committee (FGDC), Vegetation Subcommittee. 1997. Vegetation classification standard. FGDC-STD-005, U.S.Geological Survey, Reston, VA.

Gillison, A., and K. Brewer. 1985. The use of gradient directed transects or gradsects in natural resource surveys. Journal of Environmental Management 20:103-127.

Griggs, R. 1936. The vegetation of the Katmai District. Ecology. 17(3):380-417.

Gabriel, H., and S. Talbot. 1984. Glossary of landscape and vegetation ecology for Alaska. Technical Report 10, USDI Bureau of Land Management, Anchorage, AK.

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

Hennon, P., D. D'Amore, D. Wittwer, A. Johnson, P. Schaberg, G. Hawley, C. Beier, S. Sink, and G. Juday. 2006. Climate warming, reduced snow, and freezing injury could explain the demise of yellow-cedar in southeast Alaska, USA. World Resource Review 18: 427-450.

Hultén, E. 1968. Flora of Alaska and neighboring territories: a manual of the vascular plants. Stanford University Press, Stanford, CA.

Jennings, M., D. Faber-Langendoen, O. Loucks, R. Peet, and D. Roberts. 2009. Standards for associations and alliances of the U.S. National Vegetation Classification. Ecological Monographs, 79(2):173–199.

Kelly, B., T. Ainsworth, D. Boyce Jr., E. Hood, P. Murphy, and J. Powell. 2007. Climate change: predicted impacts on Juneau. Scientific Panel on Climate Change report to Mayor Bruce Botelho and the City and Borough of Juneau Assembly, Juneau, AK.

Larsen, C., R. Motyka, J. Freymueller, K. Echelmeyer, and E. Ivins. 2004. Rapid uplift of southern Alaska caused by recent ice loss. Geophysical Journal International 158:1118-1133.

Mackenzie, W., and J. Moran. 2004. Wetlands of British Columbia: a guide to identification. British Columbia Ministry of Forests, Victoria, BC.

Martin, J., S. Trull, W. Brady, R. West and J. Downs. 1995. Forest plant association management guide, Chatham Area, Tongass National Forest. Technical Publication R10-TP-57, USDA Forest Service - Alaska Region, Juneau, AK.

McCune, B., J. Grace, and D. Urban. 2002. Analysis of ecological communities. MJM Software Design, Gleneden Beach, OR.

McCune, B., and M. Medford. 2006. PC-ORD: Multivariate Analysis of Ecological Data, Version 5. MJM Software, Gleneden Beach, OR.

Meidinger, D., and J. Pojar (eds.). 1991. Ecosystems of British Columbia. Special Report Series No. 6, British Columbia Ministry of Forests, Victoria, BC.

Mueller-Dombois, D., and H. Ellenberg. 1974. Aims and methods of vegetation ecology. John Wiley & Sons, New York, NY.

Neal, E. 2007. Hydrology and glacier-lake outburst floods (1987–2004) and water quality (1998–2003) of the Taku River near Juneau, Alaska. Scientific Investigations Report 2007–5027, U.S. Geological Survey, Reston, VA.

Nowacki, G., M. Shepard, P. Krosse, W. Pawuk, G. Fisher, J. Baichtal, D. Brew, E. Kissinger, and T. Brock. 2001. Ecological subsections of southeast Alaska and neighboring areas of Canada. Technical Publication R10-TP-75, USDA Forest Service, Alaska Region, Juneau, AK.

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

Pawuk, W., and E. Kissinger. 1989. Preliminary forest plant associations for the Stikine Area, Tongass National Forest. Technical Publication R10-TP-72, USDA Forest Service, Alaska Region, Juneau, AK.

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

Scenarios Network for Alaska Planning (SNAP). 2010. Alaska regional climate projections (http://www.snap.uaf.edu/files/Regional_Climate_Projections_Jan%2010.pdf). University of Alaska, Fairbanks, AK.

Shacklette, H., L. Durrell, J. Erdman, J. Keith, W. Klein, H. Krog, H. Persson, H. Skuja, and W. Weber. 1969. Vegetation of Amchitka Island, Aleutian islands, Alaska Geological Survey Professional Paper 648. Washington, DC: U.S. Government Printing Office.

Shephard, M. 1995. Plant community ecology and classification of the Yakutat Foreland, Alaska. R10-TP-56, USDA Forest Service, Alaska Region, Sitka, AK.

Sparks, L., R. del Moral, A. Watson, and A. Kruckeberg. 1977. The distribution of vascular plant species on Sergief Island, southeast Alaska. Syesis 10:1-9.

Stone, C. 1993. Vegetation of coastal marshes near Juneau, Alaska. Northwest Science. 67(4): 215-231

Stephens, F., and R. Billings. 1967. Plant communities of a tide-influence meadow on Chichagof Island, Alaska. Northwest Science 41(4):178-183.

Tande, G. 1983. Vegetation. *In:* Rothe, T., S. Lanigan, P. Martin, and G. Tande. Natural resource inventory of Elmendorf Air Force Base, Alaska: part I. Anchorage, AK: U.S. Department of the Interior, Fish and Wildlife Service, Region 7, Special Studies: 14-85.

Thomas, J. 1957. The vascular flora of Middleton Island, Alaska. Contributions from the Dudley Herbarium 5(2): 39-56

USDA Forest Service. 2003. Tongass land management plan revision supplemental environmental impact statement: roadless area evaluation for Wilderness recommendations. USDA Forest Service, Tongass National Forest, Ketchikan, AK.

USDA Natural Resources Conservation Service. 2009. The PLANTS Database (http://plants.usda.gov, 17 February 2009). National Plant Data Center, Baton Rouge, LA.

University of Alaska. 2009. ARCTOS Database (http://arctos.database.museum/SpecimenSearch.cfm). Museum of the North, University of Alaska, Fairbanks, AK.

Viereck, L. 1970. Forest succession and soil development adjacent to the Chena River in interior Alaska. Arctic and Alpine Research 2(l): 1-26.

Viereck, L., C. Dyrness, A. Batten, and K. Wenzlick 1992. The Alaska vegetation classification. General Technical Report PNW-GTR-286, USDA Forest Service, Pacific Northwest Research Station, Portland, OR.

APPENDIX A – PLANT ASSOCIATION NOMENCLATURE

To ensure consistency in naming the plant associations in this classification, the following criteria were developed based on nomenclatural standards outlined in Jennings et al. (2009).

1. Include the dominant species in each layer with absolute cover > 50%. If no species meet this criteria then include up to three most dominant species in each layer with absolute cover > 25%. If no species meet this criteria then include up to three species with relative cover > 25% for that layer. If there is a tie between dominance values, use the species with the highest constancy value first.

2. If a layer does not have species that meet the above criteria, then include the species with the highest Indicator Value (IV) > 50. If there is a tie between IV's, use the species with the highest constancy value first. For the uppermost layer, up to three species with the highest IV > 25 can be used if no other species meets the above dominance/indicator criteria and the stratum otherwise meets physiognomic class criteria for that layer (e.g., total shrub cover > 25% for shrubland).

3. Species occurring in the uppermost layer are listed first, followed successively by those in lower strata. Layers in descending order are: Tree, Shrub, Herb, Nonvascular, Floating Aquatic, Submerged Aquatic.

4. Species in the same layer are separated by a hyphen (-), and those of different layers are separated by a slash (/).

5. Species should be listed in order of decreasing dominance and/or indicator value with a maximum of three species listed per layer. Include at least one species from the uppermost layer of the type.

6. Limit the total number of the dominant/indicator species in the plant association name to five.

7. Species that fail to meet the above dominance or indicator criteria (example: a shrub-dominated type, but no dominant/indicator shrub species) may be included if their presence would add significantly to the descriptive ability of the plant association name. However, these species must be used sparingly, and must be enclosed in parentheses to indicate further sampling and analysis is needed to evaluate their status in the plant association classification.

8. Nomenclature for vascular plant species used in type names must follow the current version of the NRCS PLANTS database. Species sub-categories, i.e. subspecies and variety, are allowed. Use genera-only names sparingly; for example, if distinguishing between species is difficult or if several dominant or indicator species of the same genus meeting the above criteria occur in the type.

9. Include at the end of the plant association name the FGDC physiognomic class in which the plant association is placed. The word "Vegetation" follows "Herbaceous" and "Nonvascular" for types in those classes.

APPENDIX B – NATIONAL VEGETATION CLASSIFICATION HEIRARCHY

Note: This hierarchy was developed according to the Federal Geographic Data Committee (FGDC) National Vegetation Classification Standard of 1997. The Formation level was omitted for brevity. The FGDC standard was revised in 2008, but descriptions of types in each hierarchical level are incomplete at this time.

Vegetated Division

Shrub Dominated Order

Shrubland Class

Deciduous Shrubland Subclass

Alnus rubra Seasonally Flooded Shrubland Alliance*
Alnus rubra / Calamagrostis canadensis Shrubland*
(Alnus rubra) / Comarum palustre / Sphagnum angustifolium Shrubland*

Alnus viridis ssp. sinuata Seasonally Flooded Shrubland Alliance
Alnus viridis - Rubus spectabilis / Athyrium filix-femina Shrubland*

Salix barclayi Seasonally Flooded Shrubland Alliance*
Salix barclayi Shrubland*
(Salix barclayi - Salix sitchensis - Salix alaxensis) / Chamerion latifolium / Racomitrium canescens Shrubland*

Salix sitchensis Seasonally Flooded Shrubland Alliance
Salix sitchensis Shrubland

Salix (exigua, interior) Temporarily Flooded Shrubland Alliance
Salix interior Shrubland

Evergreen Shrubland Subclass

Myrica gale Seasonally Flooded Shrubland Alliance
Myrica gale / Carex aquatilis Shrubland*
Myrica gale - Salix barclayi / Primula egaliksensis Shrubland*

Herb Dominated Order

Herbaceous Vegetation Class

Perennial Forb Vegetation Subclass

Menyanthes trifoliata Flooded Herbaceous Alliance*
Menyanthes trifoliata Herbaceous Vegetation*

Plantago macrocarpa - Castilleja miniata - Lathyrus palustris Herbaceous Alliance*

Plantago macrocarpa - Castilleja miniata - Lathyrus palustris Herbaceous Vegetation*

Fritillaria camschatcensis - Geum calthifolium - Iris setosa Herbaceous Alliance*

Fritillaria camschatcensis - Geum calthifolium - Iris setosa Herbaceous Vegetation*

Perennial Graminoid Vegetation Subclass

Carex lyngbyei Tidal Herbaceous Alliance

Carex lyngbyei Herbaceous Vegetation

Carex lyngbyei - Deschampsia cespitosa Herbaceous Vegetation*

Carex aquatilis Seasonally Flooded Herbaceous Alliance

Carex aquatilis Herbaceous Vegetation

Carex aquatilis Saturated Herbaceous Alliance

Carex aquatilis / Sphagnum angustifolium Herbaceous Vegetation*

Eriophorum spp. Saturated Herbaceous Alliance

Eriophorum angustifolium Herbaceous Vegetation*

Eriophorum russeolum / Sphagnum angustifolium Herbaceous Vegetation*

Calamagrostis canadensis Seasonally Flooded Herbaceous Alliance

Calamagrostis canadensis - Carex pluriflora Herbaceous Vegetation

Eleocharis palustris Tidal Herbaceous Alliance*

Eleocharis palustris Herbaceous Vegetation*

Nonvascular Dominated Order

Nonvascular Vegetation Class

Bryophyte Vegetation Subclass

Racomitrium canescens Nonvascular Alliance*

Racomitrium canescens Nonvascular Vegetation*

* Not currently listed in the National Vegetation Classification (NatureServe 2009).

APPENDIX C – SYNTHESIS TABLES

The following tables list average cover and constancy values for all species encountered within plant assocations. Plant associations are organized according to broad structrural groups (Shrubland, Graminoid, and Forb/Nonvascular). See Table 3 in the Results section for definitions of plant association short names. Cover (Cov.) is the average absolute percent cover of a species across all plots sampled for a plant association. The designation “tr” denotes less than 1% average absolute cover. Constancy (Con.) is the percentage of sample plots on which the species occurs across all plots sampled for a plant association.

SHRUBLAND PLANT ASSOCIATIONS	**SABA3 11 plots**		**SASI2 8 plots**		**SAIN3 8 plots**		**(SABA3-SASI2-SAAL)/ EQVA 6 plots**		**(SASI-ALVI5)/ CHLA/ RACA11 11 plots**	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
TREES										
Picea sitchensis	-	-	-	-	-	-	-	-	1	82
Populus balsamifera	-	-	-	-	4	38	tr	17	4	64
SHRUBS										
Acer glabrum	-	-	-	-	-	-	-	-	tr	9
Alnus rubra	-	-	1	13	-	-	tr	17	-	-
Alnus viridis	12	55	-	-	-	-	-	-	12	82
Amelanchier alnifolia	-	-	-	-	-	-	-	-	-	-
Cornus sericea	1	18	20	75	-	-	-	-	tr	18
Malus fusca	-	-	1	13	-	-	-	-	-	-
Myrica gale	-	-	-	-	-	-	1	17	-	-
Oplopanax horridus	-	-	1	13	-	-	-	-	-	-
Rubus spectabilis	3	27	14	63	-	-	-	-	-	-
Salix alaxensis	-	-	1	13	3	38	13	67	6	64
Salix barclayi	25	73	6	38	-	-	18	100	3	27
Salix interior	-	-	-	-	38	100	2	17	-	-
Salix lucida	-	-	11	38	-	-	3	17	-	-
Salix pseudomonticola	-	-	-	-	4	38	-	-	-	-
Salix sitchensis	9	36	48	100	1	25	16	83	14	91
Sambucus racemosa	-	-	2	25	-	-	-	-	-	-
Vaccinium oxycoccos	-	-	-	-	-	-	-	-	-	-
Viburnum edule	1	36	2	38	-	-	-	-	-	-
DWARF SHRUBS										
Kalmia polifolia	-	-	-	-	-	-	-	-	-	-
Vaccinium ovalifolium	-	-	-	-	-	-	-	-	-	-
Vaccinium uliginosum	-	-	-	-	-	-	-	-	-	-
FORBS										
Achillea millefolium	tr	9	-	-	-	-	-	-	tr	27
Angelica genuflexa	7	45	tr	13	-	-	-	-	-	-
Aquilegia formosa	-	-	-	-	-	-	-	-	tr	18

SHRUBLAND PLANT ASSOCIATIONS	SABA3 11 plots		SASI2 8 plots		SAIN3 8 plots		(SABA3-SASI2-SAAL)/EQVA 6 plots		(SASI-ALVI5)/CHLA/RACA11 11 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
FORBS (cont.)										
Argentina egedii	1	9	-	-	-	-	-	-	-	-
Aruncus dioicus	tr	9	-	-	-	-	-	-	1	9
Athyrium filix-femina	2	45	11	88	-	-	-	-	-	-
Boschniakia rossica	-	-	-	-	-	-	-	-	tr	36
Caltha leptosepala	tr	18	-	-	-	-	-	-	-	-
Caltha palustris	tr	9	1	13	-	-	-	-	-	-
Canadanthus modestus	tr	9	-	-	-	-	-	-	-	-
Castilleja miniata	-	-	-	-	-	-	-	-	-	-
Chamerion latifolium	-	-	-	-	-	-	-	-	8	91
Chrysanthemum arcticum	-	-	-	-	-	-	-	-	-	-
Cicuta douglasii	tr	18	-	-	tr	13	-	-	-	-
Circaea alpina	-	-	tr	13	-	-	-	-	-	-
Comarum palustre	5	36	-	-	-	-	-	-	-	-
Conioselinum gmelinii	tr	9	-	-	-	-	-	-	-	-
Dodecatheon pulchellum	tr	9	-	-	-	-	-	-	-	-
Drosera rotundifolia	-	-	-	-	-	-	-	-	-	-
Dryas drummondii	-	-	-	-	-	-	-	-	1	27
Dryopteris expansa	-	-	-	-	-	-	-	-	-	-
Epilobium anagallidifolium	tr	9	-	-	-	-	-	-	-	-
Epilobium ciliatum	tr	9	-	-	-	-	-	-	-	-
Epilobium palustre	tr	18	-	-	-	-	-	-	-	-
Equisetum arvense	10	64	9	88	2	88	tr	33	-	-
Equisetum fluviatile	tr	9	6	13	-	-	-	-	-	-
Equisetum hyemale	-	-	-	-	10	50	-	-	-	-
Equisetum palustre	1	27	-	-	-	-	10	50	-	-
Equisetum variegatum	-	-	-	-	2	38	33	67	-	-
Erigeron peregrinus	3	9	-	-	tr	13	tr	17	-	-
Fritillaria camschatcensis	tr	18	tr	13	-	-	-	-	-	-
Galium trifidum	1	45	tr	25	-	-	-	-	-	-
Galium triflorum	-	-	tr	25	-	-	-	-	tr	9
Geum calthifolium	tr	9	-	-	-	-	-	-	-	-
Geum macrophyllum	tr	9	tr	13	-	-	-	-	-	-
Gymnocarpium dryopteris	-	-	-	-	-	-	-	-	tr	9
Heracleum maximum	tr	18	1	38	-	-	-	-	-	-
Heuchera glabra	-	-	-	-	-	-	-	-	tr	9
Hippuris montana	tr	9	-	-	-	-	-	-	-	-
Impatiens noli-tangere	-	-	-	-	-	-	-	-	-	-
Iris setosa	4	9	-	-	-	-	-	-	-	-
Lathyrus japonicus	-	-	-	-	-	-	-	-	5	9
Lathyrus palustris	tr	9	-	-	-	-	-	-	-	-
Leptarrhena pyrolifolia	tr	9	-	-	-	-	-	-	-	-

SHRUBLAND PLANT ASSOCIATIONS	SABA3 11 plots		SASI2 8 plots		SAIN3 8 plots		(SABA3-SASI2-SAAL)/EQVA 6 plots		(SASI-ALVI5)/CHLA/RACA11 11 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
FORBS (cont.)										
Listera caurina	-	-	tr	13	-	-	-	-	-	-
Lupinus nootkatensis	1	27	-	-	-	-	-	-	6	36
Lycopus uniflorus	-	-	-	-	-	-	-	-	-	-
Lysichiton americanus	8	27	12	50	-	-	-	-	-	-
Lysimachia thyrsiflora	tr	9	-	-	-	-	-	-	-	-
Maianthemum dilatatum	-	-	tr	13	-	-	-	-	-	-
Melilotus officinalis	-	-	-	-	tr	13	-	-	-	-
Menyanthes trifoliata	-	-	-	-	-	-	-	-	-	-
Mitella pentandra	-	-	tr	13	-	-	-	-	-	-
Oenanthe sarmentosa	-	-	1	13	-	-	-	-	-	-
Orthilia secunda	-	-	-	-	-	-	-	-	tr	18
Osmorhiza berteroi	-	-	2	50	-	-	-	-	-	-
Parnassia palustris	-	-	-	-	-	-	tr	17	-	-
Pedicularis parviflora	-	-	-	-	-	-	-	-	-	-
Petasites frigidus	tr	9	-	-	-	-	-	-	-	-
Plantago maritima	tr	9	-	-	-	-	-	-	-	-
Platanthera dilatata	tr	27	-	-	-	-	tr	17	-	-
Platanthera stricta	-	-	-	-	-	-	-	-	-	-
Polygonum viviparum	1	18	-	-	-	-	-	-	-	-
Prenanthes alata	1	9	-	-	-	-	-	-	-	-
Primula egaliksensis	-	-	-	-	-	-	-	-	-	-
Ranunculus macounii	-	-	-	-	tr	13	-	-	-	-
Rubus arcticus	7	27	-	-	-	-	-	-	-	-
Rumex aquaticus	-	-	-	-	-	-	-	-	-	-
Ruppia maritima	-	-	-	-	-	-	-	-	-	-
Sanguisorba canadensis	2	27	-	-	-	-	-	-	-	-
Sanguisorba menziesii	3	27	-	-	-	-	-	-	-	-
Scheuchzeria palustris	-	-	-	-	-	-	-	-	-	-
Senecio triangularis	tr	18	-	-	-	-	-	-	-	-
Solidago canadensis	-	-	-	-	-	-	-	-	-	-
Spiranthes romanzoffiana	-	-	-	-	-	-	-	-	-	-
Stellaria calycantha	tr	9	-	-	-	-	-	-	-	-
Stellaria crispa	-	-	-	-	-	-	-	-	tr	9
Stellaria longipes	-	-	-	-	-	-	-	-	tr	9
Streptopus amplexifolius	tr	9	1	63	-	-	-	-	-	-
Streptopus lanceolatus	-	-	1	13	-	-	-	-	-	-
Symphyotrichum subspicatum	5	36	-	-	-	-	-	-	-	-
Tellima grandiflora	-	-	3	13	-	-	-	-	-	-
Tiarella trifoliata	-	-	-	-	-	-	-	-	-	-
Trientalis europaea	1	27	-	-	-	-	-	-	-	-
Triglochin maritima	tr	9	-	-	-	-	-	-	-	-

SHRUBLAND PLANT ASSOCIATIONS	SABA3 11 plots		SASI2 8 plots		SAIN3 8 plots		(SABA3-SASI2-SAAL)/EQVA 6 plots		(SASI-ALVI5)/CHLA/RACA11 11 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
FORBS (cont.)										
Urtica dioica	-	-	tr	25	-	-	-	-	-	-
Veratrum viride	tr	27	tr	25	-	-	-	-	-	-
Viola epipsila	tr	9	-	-	-	-	-	-	-	-
Viola palustris	4	45	1	38	-	-	-	-	-	-
GRAMINOIDS										
Agrostis aequivalvis	tr	9	-	-	-	-	-	-	-	-
Agrostis mertensii	-	-	-	-	-	-	-	-	tr	9
Arctagrostis latifolia	-	-	-	-	-	-	-	-	tr	9
Calamagrostis canadensis	8	73	1	25	tr	25	-	-	1	36
Calamagrostis stricta	-	-	-	-	tr	13	-	-	-	-
Carex aquatilis	15	55	5	25	-	-	4	50	-	-
Carex bicolor	-	-	-	-	-	-	tr	33	-	-
Carex canescens	tr	27	-	-	-	-	-	-	-	-
Carex chordorrhiza	-	-	-	-	-	-	-	-	tr	9
Carex garberi	-	-	-	-	-	-	tr	17	-	-
Carex laeviculmis	3	9	-	-	-	-	-	-	-	-
Carex lenticularis	tr	9	-	-	tr	13	-	-	-	-
Carex limosa	-	-	-	-	-	-	-	-	-	-
Carex livida	-	-	-	-	-	-	-	-	-	-
Carex lyngbyei	1	9	-	-	1	13	-	-	-	-
Carex mertensii	-	-	-	-	-	-	-	-	tr	9
Carex pluriflora	1	9	-	-	-	-	-	-	-	-
Carex saxatilis	tr	9	-	-	-	-	-	-	-	-
Carex viridula	-	-	-	-	tr	13	-	-	-	-
Deschampsia cespitosa	2	18	-	-	tr	25	tr	17	-	-
Eleocharis palustris	-	-	-	-	-	-	-	-	-	-
Elymus alaskanus	-	-	-	-	tr	13	-	-	-	-
Elymus glaucus	-	-	-	-	-	-	-	-	tr	9
Eriophorum angustifolium	3	9	-	-	-	-	-	-	-	-
Eriophorum russeolum	tr	9	-	-	-	-	1	33	-	-
Festuca brachyphylla	-	-	-	-	-	-	-	-	tr	9
Festuca rubra	tr	9	-	-	-	-	-	-	tr	18
Juncus alpinoarticulatus	-	-	-	-	-	-	-	-	-	-
Juncus arcticus	1	9	-	-	1	25	tr	17	-	-
Juncus drummondii	tr	9	-	-	-	-	-	-	-	-
Juncus filiformis	tr	9	-	-	-	-	-	-	tr	9
Leymus mollis	-	-	-	-	6	38	-	-	tr	9
Phleum alpinum	-	-	-	-	-	-	-	-	tr	36
Poa alpina	-	-	-	-	-	-	-	-	tr	9
Poa arctica	-	-	-	-	-	-	-	-	tr	9

SHRUBLAND PLANT ASSOCIATIONS	SABA3 11 plots		SASI2 8 plots		SAIN3 8 plots		(SABA3-SASI2-SAAL)/EQVA 6 plots		(SASI-ALVI5)/CHLA/RACA11 11 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
GRAMINOIDS (cont.)										
Poa eminens	tr	9	-	-	-	-	-	-	tr	9
Poa palustris	-	-	-	-	-	-	-	-	tr	18
Poa pratensis	-	-	-	-	-	-	-	-	1	18
Puccinellia tenella	-	-	-	-	-	-	-	-	-	-
Pyrola asarifolia	tr	18	-	-	-	-	-	-	-	-
Scirpus microcarpus	7	18	1	13	-	-	-	-	-	-
Trisetum spicatum	-	-	-	-	-	-	-	-	tr	9
Vahlodea atropurpurea	-	-	-	-	-	-	-	-	tr	9
BRYOPHYTES										
Amblystegium serpens	-	-	-	-	-	-	-	-	-	-
Aulacomnium palustre	-	-	-	-	-	-	-	-	-	-
Brachythecium frigidum	-	-	-	-	-	-	-	-	-	-
Brachythecium reflexum	tr	9	-	-	-	-	-	-	-	-
Brachythecium salebrosum	-	-	tr	25	-	-	-	-	-	-
Calliergon giganteum	-	-	-	-	-	-	-	-	-	-
Campylium polygamum	-	-	-	-	-	-	tr	17	-	-
Ceratodon purpureus	-	-	-	-	-	-	-	-	tr	9
Dicranella rufescens	-	-	-	-	-	-	-	-	5	9
Dicranum tauricum	-	-	-	-	-	-	-	-	-	-
Drepanocladus aduncus	-	-	tr	13	-	-	5	33	-	-
Hygroamblystegium tenax	-	-	-	-	-	-	-	-	-	-
Hypnum lindbergii	-	-	-	-	11	13	-	-	-	-
Hypnum pratense	-	-	-	-	-	-	-	-	-	-
Marchantia polymorpha	-	-	-	-	-	-	-	-	tr	9
Philonotis fontana	-	-	-	-	-	-	7	17	-	-
Plagiomnium insigne	-	-	1	50	-	-	-	-	-	-
Plagiomnium venustum	tr	9	-	-	-	-	-	-	-	-
Pleuroziopsis ruthenica	-	-	-	-	-	-	-	-	-	-
Pohlia nutans	-	-	-	-	-	-	9	50	-	-
Pohlia wahlenbergii	-	-	-	-	-	-	5	17	-	-
Polytrichum commune	1	18	-	-	-	-	-	-	-	-
Ptilium crista-castrensis	tr	9	-	-	-	-	-	-	tr	9
Racomitrium canescens	-	-	-	-	-	-	-	-	29	82
Rhytidiadelphus loreus	-	-	-	-	-	-	-	-	tr	9
Rhytidiadelphus squarrosus	13	64	-	-	-	-	-	-	-	-
Sanionia uncinata	tr	9	1	13	-	-	-	-	tr	9
Scapania paludicola	tr	9	-	-	-	-	-	-	-	-
Sphagnum angustifolium	tr	9	-	-	-	-	-	-	-	-

SHRUBLAND PLANT ASSOCIATIONS	SABA3 11 plots		SASI2 8 plots		SAIN3 8 plots		(SABA3-SASI2-SAAL)/ EQVA 6 plots		(SASI-ALVI5)/ CHLA/ RACA11 11 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
BRYOPHYTES (cont.)										
Sphagnum magellanicum	tr	9	-	-	-	-	-	-	-	-
Sphagnum squarrosum	tr	9	1	13	-	-	-	-	-	-
Warnstorfia exannulata	-	-	-	-	-	-	-	-	-	-
Warnstorfia fluitans	tr	9	-	-	-	-	-	-	tr	9
LICHENS										
Cladonia squamosa	-	-	-	-	-	-	-	-	tr	18
Lobaria linita	-	-	tr	13	-	-	-	-	-	-
Nephroma bellum	tr	9	-	-	-	-	-	-	-	-
Nephroma resupinatum	-	-	-	-	-	-	-	-	-	-
Stereocaulon tomentosum	-	-	-	-	-	-	-	-	6	18

SHRUBLAND PLANT ASSOCIATIONS	ALVI5-RUSP/ATFI 5 plots		ALRU/CACA4 6 plots		ALRU/COPA28/SPAN11 6 plots		MYGA/CAAQ 9 plots		MYGA-SABA3/PREG 5 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
TREES										
Picea sitchensis	-	-	1	17	-	-	-	-	-	-
Populus balsamifera	-	-	-	-	-	-	-	-	-	-
SHRUBS										
Acer glabrum	-	-	-	-	-	-	-	-	-	-
Alnus rubra	-	-	29	50	24	67	-	-	-	-
Alnus viridis	76	100	-	-	-	-	-	-	4	40
Amelanchier alnifolia	-	-	-	-	-	-	tr	11	-	-
Cornus sericea	-	-	2	17	-	-	-	-	-	-
Malus fusca	-	-	-	-	-	-	-	-	-	-
Myrica gale	-	-	-	-	-	-	49	100	64	100
Oplopanax horridus	4	40	-	-	-	-	-	-	-	-
Rubus spectabilis	50	100	-	-	-	-	-	-	-	-
Salix alaxensis	-	-	-	-	-	-	-	-	-	-
Salix barclayi	6	20	2	17	4	50	-	-	32	80
Salix interior	-	-	-	-	-	-	-	-	-	-
Salix lucida	-	-	tr	17	-	-	-	-	-	-
Salix pseudomonticola	-	-	-	-	1	17	-	-	-	-
Salix sitchensis	6	20	tr	17	-	-	-	-	7	60
Sambucus racemosa	2	40	-	-	-	-	-	-	-	-
Vaccinium oxycoccos	-	-	-	-	4	33	-	-	-	-
Viburnum edule	-	-	-	-	tr	17	-	-	-	-
DWARF SHRUBS										
Kalmia polifolia	-	-	-	-	1	17	-	-	-	-
Vaccinium ovalifolium	-	-	tr	17	-	-	-	-	-	-
Vaccinium uliginosum	-	-	-	-	2	33	-	-	-	-
FORBS										
Achillea millefolium	-	-	tr	33	-	-	-	-	-	-
Angelica genuflexa	-	-	2	50	3	33	1	11	3	40
Aquilegia formosa	-	-	-	-	-	-	-	-	-	-
Argentina egedii	-	-	4	67	-	-	-	-	3	60
Aruncus dioicus	-	-	-	-	-	-	-	-	-	-
Athyrium filix-femina	24	100	tr	33	1	17	-	-	-	-
Boschniakia rossica	-	-	-	-	-	-	-	-	-	-
Caltha leptosepala	-	-	3	33	-	-	-	-	-	-
Caltha palustris	-	-	-	-	1	17	1	33	tr	20
Canadanthus modestus	-	-	-	-	tr	17	-	-	-	-
Castilleja miniata	-	-	tr	17	-	-	-	-	-	-
Chamerion latifolium	-	-	-	-	-	-	-	-	-	-
Chrysanthemum arcticum	-	-	-	-	-	-	-	-	tr	20

SHRUBLAND PLANT ASSOCIATIONS	ALVI5-RUSP/ATFI 5 plots		ALRU/CACA4 6 plots		ALRU/COPA28/SPAN11 6 plots		MYGA/CAAQ 9 plots		MYGA-SABA3/PREG 5 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
FORBS (cont.)										
Cicuta douglasii	-	-	1	33	-	-	-	-	-	-
Circaea alpina	tr	20	1	17	-	-	-	-	-	-
Comarum palustre	-	-	3	17	42	100	21	78	-	-
Conioselinum gmelinii	-	-	-	-	-	-	-	-	-	-
Dodecatheon pulchellum	-	-	tr	17	-	-	-	-	1	40
Drosera rotundifolia	-	-	-	-	tr	17	tr	22	-	-
Dryas drummondii	-	-	-	-	-	-	-	-	-	-
Dryopteris expansa	tr	20	-	-	-	-	-	-	-	-
Epilobium anagallidifolium	-	-	-	-	-	-	-	-	-	-
Epilobium ciliatum	-	-	tr	17	tr	17	-	-	tr	20
Epilobium palustre	-	-	tr	33	tr	17	-	-	-	-
Equisetum arvense	tr	60	7	50	tr	17	1	11	7	80
Equisetum fluviatile	-	-	-	-	8	17	6	44	-	-
Equisetum hyemale	-	-	-	-	-	-	-	-	-	-
Equisetum palustre	-	-	-	-	7	83	2	44	-	-
Equisetum variegatum	-	-	-	-	-	-	-	-	2	20
Erigeron peregrinus	-	-	-	-	-	-	-	-	-	-
Fritillaria camschatcensis	-	-	-	-	-	-	-	-	-	-
Galium trifidum	-	-	1	50	tr	17	-	-	tr	20
Galium triflorum	-	-	tr	17	-	-	-	-	-	-
Geum calthifolium	-	-	-	-	-	-	-	-	-	-
Geum macrophyllum	-	-	1	17	-	-	-	-	-	-
Gymnocarpium dryopteris	-	-	-	-	-	-	-	-	-	-
Heracleum maximum	-	-	-	-	-	-	-	-	tr	20
Heuchera glabra	-	-	-	-	-	-	-	-	-	-
Hippuris montana	-	-	-	-	-	-	-	-	-	-
Impatiens noli-tangere	-	-	tr	17	-	-	-	-	-	-
Iris setosa	-	-	1	17	-	-	3	22	tr	40
Lathyrus japonicus	-	-	8	17	-	-	-	-	4	20
Lathyrus palustris	-	-	1	17	-	-	-	-	-	-
Leptarrhena pyrolifolia	-	-	-	-	-	-	-	-	-	-
Listera caurina	-	-	-	-	-	-	-	-	-	-
Lupinus nootkatensis	-	-	2	33	-	-	-	-	1	20
Lycopus uniflorus	-	-	1	33	-	-	-	-	-	-
Lysichiton americanus	-	-	3	17	-	-	-	-	-	-
Lysimachia thyrsiflora	-	-	tr	17	1	33	-	-	-	-
Maianthemum dilatatum	-	-	-	-	-	-	-	-	-	-
Melilotus officinalis	-	-	-	-	-	-	-	-	-	-
Menyanthes trifoliata	-	-	-	-	15	67	5	33	-	-
Mitella pentandra	-	-	-	-	-	-	-	-	-	-
Oenanthe sarmentosa	-	-	-	-	-	-	-	-	-	-

SHRUBLAND PLANT ASSOCIATIONS	ALVI5-RUSP/ATFI 5 plots		ALRU/CACA4 6 plots		ALRU/COPA28/SPAN11 6 plots		MYGA/CAAQ 9 plots		MYGA-SABA3/PREG 5 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
FORBS (cont.)										
Orthilia secunda	-	-	-	-	-	-	-	-	-	-
Osmorhiza berteroi	1	20	-	-	-	-	-	-	-	-
Parnassia palustris	-	-	tr	17	-	-	-	-	-	-
Pedicularis parviflora	-	-	-	-	tr	17	-	-	-	-
Petasites frigidus	-	-	-	-	-	-	-	-	-	-
Plantago maritima	-	-	-	-	-	-	-	-	-	-
Platanthera dilatata	-	-	-	-	1	83	-	-	tr	40
Platanthera stricta	-	-	-	-	tr	50	-	-	-	-
Polygonum viviparum	-	-	-	-	-	-	-	-	-	-
Prenanthes alata	-	-	-	-	-	-	-	-	-	-
Primula egaliksensis	-	-	-	-	-	-	-	-	tr	60
Ranunculus macounii	-	-	tr	17	-	-	-	-	-	-
Rubus arcticus	-	-	1	33	3	50	4	33	-	-
Rumex aquaticus	-	-	tr	17	-	-	-	-	-	-
Ruppia maritima	-	-	tr	17	-	-	-	-	-	-
Sanguisorba canadensis	-	-	tr	17	1	33	4	22	tr	20
Sanguisorba menziesii	-	-	-	-	-	-	-	-	tr	20
Scheuchzeria palustris	-	-	-	-	3	17	-	-	-	-
Senecio triangularis	-	-	-	-	-	-	-	-	-	-
Solidago canadensis	-	-	tr	17	-	-	-	-	-	-
Spiranthes romanzoffiana	-	-	-	-	tr	33	-	-	-	-
Stellaria calycantha	-	-	-	-	-	-	-	-	-	-
Stellaria crispa	-	-	-	-	-	-	-	-	-	-
Stellaria longipes	-	-	-	-	-	-	-	-	-	-
Streptopus amplexifolius	4	80	-	-	-	-	-	-	-	-
Streptopus lanceolatus	-	-	-	-	-	-	-	-	-	-
Symphyotrichum subspicatum	-	-	-	-	1	17	-	-	-	-
Tellima grandiflora	-	-	-	-	-	-	-	-	-	-
Tiarella trifoliata	-	20	-	-	-	-	-	-	-	-
Trientalis europaea	tr	20	1	50	tr	33	1	44	-	-
Triglochin maritima	-	-	1	33	-	-	-	-	-	-
Urtica dioica	-	-	-	-	-	-	-	-	-	-
Veratrum viride	2	40	-	-	-	-	-	-	-	-
Viola epipsila	-	-	-	-	-	-	-	-	-	-
Viola palustris	-	-	1	17	tr	33	-	-	-	-
GRAMINOIDS										
Agrostis aequivalvis	-	-	-	-	-	-	-	-	-	-
Agrostis mertensii	-	-	-	-	-	-	-	-	-	-
Arctagrostis latifolia	-	-	tr	17	-	-	-	-	-	-

SHRUBLAND PLANT ASSOCIATIONS	ALVI5-RUSP/ATFI 5 plots		ALRU/ CACA4 6 plots		ALRU/ COPA28/ SPAN11 6 plots		MYGA/ CAAQ 9 plots		MYGA-SABA3/ PREG 5 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
GRAMINOIDS (cont.)										
Calamagrostis canadensis	-	-	32	83	8	100	10	78	tr	20
Calamagrostis stricta	-	-	-	-	-	-	-	-	-	-
Carex aquatilis	-	-	-	-	23	83	31	89	3	40
Carex bicolor	-	-	-	-	-	-	-	-	-	-
Carex canescens	-	-	tr	17	tr	17	-	-	-	-
Carex chordorrhiza	-	-	-	-	3	17	1	22	-	-
Carex garberi	-	-	-	-	-	-	-	-	-	-
Carex laeviculmis	-	-	-	-	-	-	tr	11	-	-
Carex lenticularis	-	-	-	-	-	-	-	-	-	-
Carex limosa	-	-	-	-	-	-	tr	22	-	-
Carex livida	-	-	2	17	-	-	-	-	-	-
Carex lyngbyei	-	-	15	33	-	-	1	11	-	-
Carex mertensii	-	-	-	-	-	-	-	-	-	-
Carex pluriflora	-	-	tr	17	10	33	1	22	-	-
Carex saxatilis	-	-	-	-	-	-	-	-	-	-
Carex viridula	-	-	-	-	-	-	-	-	-	-
Deschampsia cespitosa	-	-	2	17	-	-	-	-	-	-
Eleocharis palustris	-	-	3	17	1	33	-	-	-	-
Elymus alaskanus	-	-	-	-	-	-	-	-	-	-
Elymus glaucus	-	-	tr	17	-	-	-	-	-	-
Eriophorum angustifolium	-	-	-	-	-	-	-	-	-	-
Eriophorum russeolum	-	-	-	-	5	50	2	33	-	-
Festuca brachyphylla	-	-	-	-	-	-	-	-	-	-
Festuca rubra	-	-	1	17	-	-	-	-	4	40
Juncus alpinoarticulatus	-	-	-	-	-	-	-	-	tr	20
Juncus arcticus	-	-	3	17	-	-	-	-	tr	20
Juncus drummondii	-	-	-	-	-	-	-	-	-	-
Juncus filiformis	-	-	-	-	-	-	-	-	-	-
Leymus mollis	-	-	9	33	-	-	-	-	tr	20
Phleum alpinum	-	-	-	-	-	-	-	-	-	-
Poa alpina	-	-	-	-	-	-	-	-	-	-
Poa arctica	-	-	-	-	-	-	-	-	-	-
Poa eminens	-	-	2	33	-	-	-	-	-	-
Poa palustris	-	-	9	33	-	-	-	-	-	-
Poa pratensis	-	-	-	-	-	-	-	-	-	-
Puccinellia tenella	-	-	tr	17	-	-	-	-	-	-
Pyrola asarifolia	-	-	-	-	-	-	-	-	-	-
Scirpus microcarpus	-	-	-	-	-	-	-	-	-	-
Trisetum spicatum	-	-	-	-	-	-	-	-	-	-
Vahlodea atropurpurea	-	-	-	-	-	-	-	-	-	-

SHRUBLAND PLANT ASSOCIATIONS	ALVI5-RUSP/ATFI 5 plots		ALRU/ CACA4 6 plots		ALRU/ COPA28/ SPAN11 6 plots		MYGA/ CAAQ 9 plots		MYGA-SABA3/ PREG 5 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
BRYOPHYTES										
Amblystegium serpens	-	-	-	-	-	-	-	-	6	20
Aulacomnium palustre	-	-	-	-	-	-	1	11	-	-
Brachythecium frigidum	1	20	-	-	-	-	-	-	-	-
Brachythecium reflexum	tr	20	3	33	-	-	-	-	-	-
Brachythecium salebrosum	-	-	-	-	-	-	-	-	1	20
Calliergon giganteum	-	-	tr	17	-	-	-	-	-	-
Campylium polygamum	-	-	-	-	-	-	-	-	-	-
Ceratodon purpureus	-	-	-	-	-	-	-	-	-	-
Dicranella rufescens	-	-	-	-	-	-	-	-	-	-
Dicranum tauricum	1	40	-	-	-	-	-	-	-	-
Drepanocladus aduncus	-	-	1	17	tr	17	tr	33	-	-
Hygroamblystegium tenax	1	20	-	-	-	-	-	-	-	-
Hypnum lindbergii	-	-	-	-	-	-	-	-	-	-
Hypnum pratense	-	-	tr	17	-	-	-	-	-	-
Marchantia polymorpha	-	-	-	-	-	-	-	-	-	-
Philonotis fontana	-	-	-	-	-	-	-	-	4	20
Plagiomnium insigne	-	-	-	-	-	-	-	-	-	-
Plagiomnium venustum	-	-	-	-	-	-	-	-	-	-
Pleuroziopsis ruthenica	-	-	3	17	-	-	-	-	-	-
Pohlia nutans	-	-	-	-	-	-	-	-	-	-
Pohlia wahlenbergii	-	-	-	-	-	-	-	-	tr	20
Polytrichum commune	-	-	-	-	-	-	-	-	-	-
Ptilium crista-castrensis	-	-	-	-	-	-	-	-	-	-
Racomitrium canescens	-	-	-	-	-	-	-	-	-	-
Rhytidiadelphus loreus	tr	20	tr	17	-	-	-	-	-	-
Rhytidiadelphus squarrosus	-	-	tr	17	-	-	-	-	-	-
Sanionia uncinata	-	-	-	-	-	-	-	-	tr	20
Scapania paludicola	-	-	-	-	-	-	-	-	-	-
Sphagnum angustifolium	-	-	-	-	30	50	14	22	-	-
Sphagnum magellanicum	-	-	-	-	-	-	-	-	-	-
Sphagnum squarrosum	-	-	tr	17	9	50	4	11	-	-
Warnstorfia exannulata	-	-	-	-	1	17	-	-	-	-
Warnstorfia fluitans	-	-	-	-	-	-	-	-	-	-
LICHENS										
Cladonia squamosa	-	-	-	-	-	-	-	-	-	-
Lobaria linita	1	20	-	-	-	-	-	-	-	-
Nephroma bellum	-	-	-	-	-	-	-	-	-	-
Nephroma resupinatum	1	20	-	-	-	-	-	-	-	-
Stereocaulon tomentosum	-	-	-	-	-	-	-	-	-	-

GRAMINOID PLANT ASSOCIATIONS	CACA4-CAPL6 17 plots		CAAQ 21 plots		CAAQ/ SPAN11 7 plots		ERAN6 11 plots		ERRU-SPAN11 11 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
TREES										
Picea sitchensis	tr	6	-	-	tr	14	-	-	tr	9
Pinus contorta	-	-	-	-	3	29	-	-	-	-
Tsuga heterophylla	-	-	-	-	-	-	-	-	tr	9
Tsuga mertensiana	-	-	-	-	4	29	-	-	-	-
SHRUBS										
Alnus rubra	-	-	2	5	-	-	-	-	-	-
Alnus viridis	-	-	2	5	-	-	-	-	-	-
Amelanchier alnifolia	-	-	tr	5	-	-	-	-	tr	9
Cornus sericea	-	-	tr	5	-	-	-	-	-	-
Elliottia pyroliflora	-	-	-	-	tr	14	-	-	-	-
Menziesia ferruginea	-	-	-	-	1	43	-	-	-	-
Myrica gale	-	-	1	5	-	-	-	-	tr	9
Salix alaxensis	-	-	tr	5	-	-	-	-	-	-
Salix barclayi	-	-	7	33	-	-	tr	13	tr	18
Salix sitchensis	-	-	4	19	-	-	-	-	tr	9
Sorbus sitchensis	-	-	-	-	tr	14	-	-	-	-
Vaccinium oxycoccos	tr	12	-	-	6	86	tr	25	1	27
DWARF SHRUBS										
Andromeda polifolia	-	-	-	-	-	-	tr	25	tr	18
Empetrum nigrum	-	-	-	-	1	29	-	-	-	-
Kalmia polifolia	-	-	-	-	6	86	1	38	-	-
Ledum groenlandicum	-	-	-	-	1	14	-	-	tr	9
Vaccinium ovalifolium	-	-	-	-	2	43	-	-	-	-
Vaccinium uliginosum	-	-	-	-	tr	14	3	88	-	-
FORBS										
Achillea millefolium	tr	29	-	-	-	-	-	-	-	-
Angelica genuflexa	2	35	-	-	-	-	-	-	-	-
Angelica lucida	1	18	-	-	-	-	-	-	-	-
Argentina egedii	4	53	tr	5	-	-	-	-	-	-
Athyrium filix-femina	2	12	-	-	-	-	-	-	-	-
Caltha leptosepala	-	-	-	-	tr	14	1	38	-	-
Caltha palustris	-	-	tr	14	-	-	tr	13	-	-
Castilleja miniata	tr	12	-	-	-	-	-	-	-	-
Cicuta douglasii	tr	6	tr	5	-	-	-	-	tr	9
Comarum palustre	3	35	11	57	-	-	tr	13	5	55
Cornus canadensis	-	-	-	-	2	71	-	-	-	-
Dodecatheon pulchellum	-	-	-	-	-	-	-	-	-	-
Drosera anglica	-	-	-	-	2	29	1	38	-	-
Drosera rotundifolia	tr	6	-	-	2	71	tr	25	2	55
Epilobium ciliatum	3	65	tr	10	-	-	-	-	-	-
Epilobium palustre	2	82	tr	5	-	-	-	-	-	-

GRAMINOID PLANT ASSOCIATIONS	CACA4-CAPL6 17 plots		CAAQ 21 plots		CAAQ/ SPAN11 7 plots		ERAN6 11 plots		ERRU-SPAN11 11 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
FORBS (cont.)										
Equisetum arvense	1	6	1	10	-	-	-	-	-	-
Equisetum fluviatile	-	-	8	43	-	-	-	-	1	9
Equisetum palustre	-	-	3	38	-	-	-	-	tr	9
Equisetum variegatum	1	6	-	-	-	-	-	-	-	-
Erigeron peregrinus	-	-	-	-	-	-	tr	13	-	-
Fritillaria camschatcensis	tr	24	-	-	-	-	-	-	-	-
Galium trifidum	3	94	tr	24	-	-	tr	13	-	-
Gentiana douglasiana	-	-	-	-	tr	14	tr	100	-	-
Geum macrophyllum	tr	6	-	-	-	-	-	-	-	-
Glaux maritima	tr	12	-	-	-	-	-	-	-	-
Heracleum maximum	2	12	-	-	-	-	-	-	-	-
Hippuris tetraphylla	tr	6	-	-	-	-	-	-	-	-
Iris setosa	4	29	-	-	-	-	-	-	-	-
Lathyrus palustris	tr	12	-	-	-	-	-	-	-	-
Lomatogonium rotatum	-	-	-	-	-	-	-	-	-	-
Lupinus nootkatensis	tr	12	-	-	-	-	-	-	-	-
Lycopodiella inundata	-	-	-	-	-	-	tr	13	-	-
Lycopus uniflorus	tr	12	-	-	-	-	-	-	-	-
Lysichiton americanus	-	-	1	14	1	43	-	-	tr	18
Lysimachia thyrsiflora	-	-	tr	5	-	-	-	-	tr	27
Maianthemum dilatatum	tr	12	-	-	-	-	-	-	tr	9
Menyanthes trifoliata	-	-	tr	5	8	71	1	25	6	64
Moehringia lateriflora	tr	12	-	-	-	-	-	-	-	-
Parnassia palustris	tr	6	-	-	-	-	-	-	-	-
Pedicularis parviflora	-	-	-	-	tr	29	-	-	tr	9
Piperia unalascensis	-	-	-	-	-	-	tr	13	-	-
Plantago macrocarpa	tr	6	-	-	-	-	-	-	-	-
Plantago maritima	-	-	-	-	-	-	-	-	-	-
Platanthera dilatata	tr	6	tr	5	-	-	tr	25	tr	18
Polygonum viviparum	-	-	-	-	-	-	tr	25	-	-
Primula egaliksensis	-	-	tr	5	-	-	-	-	-	-
Ranunculus cymbalaria	-	-	-	-	-	-	-	-	-	-
Rubus arcticus	3	29	tr	5	-	-	tr	38	-	-
Rubus chamaemorus	-	-	-	-	4	14	-	-	-	-
Rubus pedatus	-	-	-	-	tr	29	-	-	-	-
Rumex aquaticus	tr	41	-	-	-	-	-	-	-	-
Ruppia maritima	-	-	-	-	-	-	-	-	-	-
Sanguisorba menziesii	tr	6	-	-	1	29	2	50	1	18
Scheuchzeria palustris	-	-	-	-	tr	29	-	-	-	-
Scutellaria galericulata	1	6	-	-	-	-	-	-	-	-
Spiranthes romanzoffiana	-	-	-	-	-	-	tr	13	-	-
Stellaria borealis	tr	35	-	-	-	-	-	-	-	-
Stellaria humifusa	tr	12	-	-	-	-	-	-	-	-

GRAMINOID PLANT ASSOCIATIONS	CACA4-CAPL6 17 plots		CAAQ 21 plots		CAAQ/ SPAN11 7 plots		ERAN6 11 plots		ERRU-SPAN11 11 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
FORBS (cont.)										
Symphyotrichum subspicatum	tr	12	-	-	-	-	1	50	-	-
Tiarella trifoliata	-	-	-	-	tr	14	-	-	-	-
Triantha glutinosa	-	-	-	-	-	-	tr	38	-	-
Trientalis europaea	3	100	tr	14	tr	43	-	-	tr	36
Triglochin maritima	1	24	tr	5	-	-	-	-	-	-
Triglochin palustris	-	-	-	-	-	-	-	-	-	-
Utricularia intermedia	-	-	-	-	-	-	tr	13	-	-
Viola palustris	3	47	tr	5	-	-	tr	38	-	-
GRAMINOIDS										
Agrostis aequivalvis	-	-	-	-	-	-	tr	13	-	-
Agrostis exarata	1	18	-	-	-	-	-	-	-	-
Agrostis scabra	tr	6	-	-	-	-	tr	13	-	-
Arctophila fulva	-	-	-	-	-	-	-	-	-	-
Calamagrostis canadensis	28	88	6	38	-	-	tr	13	tr	27
Carex aquatilis	tr	6	70	100	26	100	14	63	17	64
Carex canescens	2	35	tr	5	tr	14	-	-	1	27
Carex chordorrhiza	-	-	-	-	-	-	-	-	5	27
Carex limosa	-	-	-	-	-	-	-	-	3	27
Carex livida	-	-	-	-	-	-	10	50	-	-
Carex lyngbyei	12	35	-	-	-	-	-	-	-	-
Carex mackenziei	tr	12	tr	5	-	-	-	-	-	-
Carex pachystachya	tr	18	-	-	-	-	-	-	-	-
Carex pauciflora	-	-	-	-	1	14	-	-	-	-
Carex pluriflora	27	88	tr	5	13	71	8	38	3	45
Carex saxatilis	-	-	-	-	-	-	3	25	-	-
Carex stylosa	-	-	-	-	-	-	6	38	-	-
Carex utriculata	-	-	tr	5	-	-	-	-	-	-
Deschampsia cespitosa	2	41	tr	5	-	-	tr	25	-	-
Eleocharis palustris	tr	6	2	10	-	-	6	50	1	18
Eriophorum angustifolium	-	-	-	-	5	86	35	100	tr	9
Eriophorum russeolum	8	59	1	14	tr	29	-	-	25	91
Festuca rubra	1	29	tr	5	-	-	-	-	-	-
Hierochloe odorata	1	41	-	-	-	-	-	-	-	-
Hordeum brachyantherum	tr	12	-	-	-	-	-	-	-	-
Juncus arcticus	-	-	-	-	-	-	tr	13	-	-
Juncus ensifolius	-	-	tr	5	-	-	-	-	-	-
Juncus filiformis	-	-	1	14	-	-	-	-	-	-
Luzula multiflora	tr	6	-	-	-	-	-	-	-	-
Luzula parviflora	tr	6	-	-	-	-	-	-	-	-
Poa arctica	tr	18	-	-	-	-	-	-	-	-

GRAMINOID PLANT ASSOCIATIONS	CACA4-CAPL6 17 plots		CAAQ 21 plots		CAAQ/ SPAN11 7 plots		ERAN6 11 plots		ERRU-SPAN11 11 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
GRAMINOIDS (cont.)										
Poa eminens	tr	18	-	-	-	-	-	-	-	-
Poa palustris	1	12	-	-	-	-	-	-	-	-
Schoenoplectus tabernaemontani	-	-	-	-	-	-	-	-	-	-
Scirpus microcarpus	-	-	2	24	-	-	-	-	-	-
Sparganium hyperboreum	-	-	tr	5	-	-	-	-	-	-
Trichophorum cespitosum	-	-	-	-	9	29	tr	25	-	-
BRYOPHYTES										
Amblystegium serpens	-	-	1	5	-	-	-	-	-	-
Anomobryum filiforme	tr	6	-	-	-	-	-	-	-	-
Calliergon cordifolium	-	-	tr	5	-	-	-	-	-	-
Calliergon giganteum	2	6	-	-	-	-	-	-	-	-
Campylium stellatum	-	-	tr	5	-	-	-	-	-	-
Dicranoweisia crispula	-	-	-	-	-	-	1	13	-	-
Drepanocladus aduncus	-	-	tr	14	-	-	-	-	-	-
Lophozia badensis	-	-	-	-	-	-	13	25	-	-
Philonotis fontana	-	-	tr	5	-	-	-	-	-	-
Pleurozium schreberi	-	-	-	-	tr	14	-	-	-	-
Polytrichum commune	1	18	-	-	-	-	-	-	tr	9
Ptilium crista-castrensis	-	-	-	-	tr	14	-	-	-	-
Racomitrium canescens	-	-	-	-	-	-	-	-	-	-
Rhizomnium andrewsianum	-	-	tr	5	-	-	-	-	-	-
Rhizomnium glabrescens	-	-	tr	5	-	-	-	-	-	-
Rhytidiadelphus loreus	12	53	-	-	-	-	-	-	-	-
Rhytidiadelphus squarrosus	10	35	-	-	-	-	tr	13	tr	9
Sphagnum andersonianum	-	-	-	-	1	14	-	-	-	-
Sphagnum angustifolium	8	18	tr	5	34	86	1	25	79	100
Sphagnum capillifolium	-	-	-	-	3	14	-	-	-	-
Sphagnum fuscum	-	-	-	-	4	14	-	-	-	-
Sphagnum magellanicum	-	-	-	-	23	43	2	13	-	-
Sphagnum papillosum	-	-	-	-	-	-	13	38	-	-
Sphagnum rubellum	-	-	-	-	10	14	-	-	-	-
Sphagnum squarrosum	11	24	2	10	4	14	-	-	4	9
Warnstorfia exannulata	-	-	-	-	-	-	2	25	-	-
Warnstorfia fluitans	-	-	tr	10	-	-	-	-	-	-
LICHENS										
Alectoria sarmentosa	-	-	-	-	-	-	-	-	tr	9

GRAMINOID PLANT ASSOCIATIONS	CACA4-CAPL6 17 plots		CAAQ 21 plots		CAAQ/ SPAN11 7 plots		ERAN6 11 plots		ERRU-SPAN11 11 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
LICHENS (cont.)										
Cladina portentosa	-	-	-	-	tr	14	-	-	-	-
Lobaria linita	-	-	-	-	tr	14	-	-	-	-
Peltigera membranacea	1	41	-	-	-	-	-	-	-	-
Peltigera neopolydactyla	tr	6	-	-	-	-	-	-	-	-

GRAMINOID PLANT ASSOCIATIONS	CALY3 8 plots		CALY3-DECE 18 plots		ELPA 4 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.
TREES						
Picea sitchensis	-	-	-	-	-	-
Pinus contorta	-	-	-	-	-	-
Tsuga heterophylla	-	-	-	-	-	-
Tsuga mertensiana	-	-	-	-	-	-
SHRUBS						
Alnus rubra	-	-	-	-	-	-
Alnus viridis	-	-	-	-	-	-
Amelanchier alnifolia	-	-	-	-	-	-
Cornus sericea	-	-	-	-	-	-
Elliottia pyroliflora	-	-	-	-	-	-
Menziesia ferruginea	-	-	-	-	-	-
Myrica gale	-	-	tr	6	-	-
Salix alaxensis	-	-	-	-	tr	25
Salix barclayi	-	-	-	-	-	-
Salix sitchensis	-	-	-	-	-	-
Sorbus sitchensis	-	-	-	-	-	-
Vaccinium oxycoccos	-	-	-	-	-	-
DWARF SHRUBS						
Andromeda polifolia	-	-	-	-	-	-
Empetrum nigrum	-	-	-	-	-	-
Kalmia polifolia	-	-	-	-	-	-
Ledum groenlandicum	-	-	-	-	-	-
Vaccinium ovalifolium	-	-	-	-	-	-
Vaccinium uliginosum	-	-	-	-	-	-
FORBS						
Achillea millefolium	-	-	tr	11	-	-
Angelica genuflexa	-	-	tr	6	-	-
Angelica lucida	-	-	tr	11	-	-
Argentina egedii	-	-	24	100	-	-
Athyrium filix-femina	-	-	-	-	-	-
Caltha leptosepala	-	-	-	-	-	-
Caltha palustris	2	25	-	-	-	-
Castilleja miniata	-	-	tr	17	-	-
Cicuta douglasii	-	-	1	39	-	-
Comarum palustre	-	-	-	-	-	-
Cornus canadensis	-	-	-	-	-	-
Dodecatheon pulchellum	-	-	tr	33	-	-
Drosera anglica	-	-	-	-	-	-
Drosera rotundifolia	-	-	-	-	-	-
Epilobium ciliatum	-	-	-	-	-	-

GRAMINOID PLANT ASSOCIATIONS	CALY3 8 plots		CALY3-DECE 18 plots		ELPA 4 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.
FORBS (cont.)						
Epilobium palustre	-	-	tr	6	-	-
Equisetum arvense	-	-	-	-	tr	25
Equisetum fluviatile	-	-	-	-	-	-
Equisetum palustre	tr	13	-	-	-	-
Equisetum variegatum	-	-	-	-	-	-
Erigeron peregrinus	-	-	-	-	-	-
Fritillaria camschatcensis	-	-	-	-	-	-
Galium trifidum	-	-	tr	17	-	-
Gentiana douglasiana	-	-	-	-	-	-
Geum macrophyllum	-	-	-	-	-	-
Glaux maritima	-	-	7	89	-	-
Heracleum maximum	-	-	-	-	-	-
Hippuris tetraphylla	-	-	1	11	-	-
Iris setosa	-	-	tr	6	-	-
Lathyrus palustris	-	-	3	56	-	-
Lomatogonium rotatum	-	-	tr	11	-	-
Lupinus nootkatensis	-	-	-	-	-	-
Lycopodiella inundata	-	-	-	-	-	-
Lycopus uniflorus	-	-	-	-	-	-
Lysichiton americanus	-	-	-	-	-	-
Lysimachia thyrsiflora	-	-	-	-	-	-
Maianthemum dilatatum	-	-	-	-	-	-
Menyanthes trifoliata	-	-	-	-	-	-
Moehringia lateriflora	-	-	-	-	-	-
Parnassia palustris	-	-	1	44	-	-
Pedicularis parviflora	-	-	-	-	-	-
Piperia unalascensis	-	-	-	-	-	-
Plantago macrocarpa	-	-	1	17	-	-
Plantago maritima	-	-	2	50	-	-
Platanthera dilatata	-	-	-	-	-	-
Polygonum viviparum	-	-	-	-	-	-
Primula egaliksensis	-	-	-	-	-	-
Ranunculus cymbalaria	-	-	tr	56	-	-
Rubus arcticus	-	-	-	-	-	-
Rubus chamaemorus	-	-	-	-	-	-
Rubus pedatus	-	-	-	-	-	-
Rumex aquaticus	-	-	-	-	-	-
Ruppia maritima	1	38	tr	6	13	100
Sanguisorba menziesii	-	-	-	-	-	-
Scheuchzeria palustris	-	-	-	-	-	-
Scutellaria galericulata	-	-	-	-	-	-
Spiranthes romanzoffiana	-	-	-	-	-	-
Stellaria borealis	-	-	-	-	-	-
Stellaria humifusa	-	-	tr	44	-	-

GRAMINOID PLANT ASSOCIATIONS	CALY3 8 plots		CALY3-DECE 18 plots		ELPA 4 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.
FORBS (cont.)						
Symphyotrichum subspicatum	-	-	-	-	-	-
Tiarella trifoliata	-	-	-	-	-	-
Triantha glutinosa	-	-	-	-	-	-
Trientalis europaea	-	-	-	-	-	-
Triglochin maritima	-	-	15	94	-	-
Triglochin palustris	-	-	-	-	tr	25
Utricularia intermedia	-	-	-	-	-	-
Viola palustris	-	-	-	-	-	-
GRAMINOIDS						
Agrostis aequivalvis	-	-	-	-	-	-
Agrostis exarata	-	-	-	-	-	-
Agrostis scabra	-	-	-	-	-	-
Arctophila fulva	-	-	-	-	tr	25
Calamagrostis canadensis	-	-	1	11	-	-
Carex aquatilis	-	-	-	-	-	-
Carex canescens	-	-	2	22	-	-
Carex chordorrhiza	-	-	-	-	-	-
Carex limosa	-	-	2	6	-	-
Carex livida	-	-	-	-	-	-
Carex lyngbyei	94	100	45	94	27	75
Carex mackenziei	-	-	2	17	-	-
Carex pachystachya	-	-	tr	6	-	-
Carex pauciflora	-	-	-	-	-	-
Carex pluriflora	-	-	1	11	-	-
Carex saxatilis	-	-	-	-	-	-
Carex stylosa	-	-	-	-	-	-
Carex utriculata	-	-	-	-	-	-
Deschampsia cespitosa	-	-	26	94	-	-
Eleocharis palustris	1	13	18	78	56	100
Eriophorum angustifolium	-	-	-	-	-	-
Eriophorum russeolum	-	-	-	-	tr	25
Festuca rubra	-	-	5	61	-	-
Hierochloe odorata	-	-	-	-	-	-
Hordeum brachyantherum	-	-	2	28	-	-
Juncus arcticus	-	-	tr	6	1	25
Juncus ensifolius	-	-	-	-	-	-
Juncus filiformis	-	-	-	-	-	-
Luzula multiflora	-	-	-	-	-	-
Luzula parviflora	-	-	-	-	-	-
Poa arctica	-	-	-	-	-	-

GRAMINOID PLANT ASSOCIATIONS	CALY3 8 plots		CALY3-DECE 18 plots		ELPA 4 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.
GRAMINOIDS (cont.)						
Poa eminens	-	-	2	72	-	-
Poa palustris	-	-	-	-	-	-
Schoenoplectus tabernaemontani	-	-	2	6	-	-
Scirpus microcarpus	-	-	-	-	-	-
Sparganium hyperboreum	-	-	-	-	-	-
Trichophorum cespitosum	-	-	-	-	-	-
BRYOPHYTES						
Amblystegium serpens	-	-	-	-	-	-
Anomobryum filiforme	-	-	-	-	-	-
Calliergon cordifolium	-	-	-	-	-	-
Calliergon giganteum	-	-	-	-	-	-
Campylium stellatum	tr	13	7	56	-	-
Dicranoweisia crispula	-	-	-	-	-	-
Drepanocladus aduncus	-	-	-	-	-	-
Lophozia badensis	-	-	-	-	-	-
Philonotis fontana	-	-	-	-	-	-
Pleurozium schreberi	-	-	-	-	-	-
Polytrichum commune	-	-	-	-	-	-
Ptilium crista-castrensis	-	-	-	-	-	-
Racomitrium canescens	-	-	2	6	-	-
Rhizomnium andrewsianum	-	-	-	-	-	-
Rhizomnium glabrescens	-	-	-	-	-	-
Rhytidiadelphus loreus	-	-	-	-	-	-
Rhytidiadelphus squarrosus	-	-	-	-	-	-
Sphagnum andersonianum	-	-	-	-	-	-
Sphagnum angustifolium	-	-	-	-	-	-
Sphagnum capillifolium	-	-	-	-	-	-
Sphagnum fuscum	-	-	-	-	-	-
Sphagnum magellanicum	-	-	-	-	-	-
Sphagnum papillosum	-	-	-	-	-	-
Sphagnum rubellum	-	-	-	-	-	-
Sphagnum squarrosum	-	-	-	-	-	-
Warnstorfia exannulata	-	-	-	-	-	-
Warnstorfia fluitans	-	-	-	-	-	-
LICHENS						
Alectoria sarmentosa	-	-	-	-	-	-

GRAMINOID PLANT ASSOCIATIONS	CALY3 8 plots		CALY3-DECE 18 plots		ELPA 4 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.
LICHENS (cont.)						
Cladina portentosa	-	-	-	-	-	-
Lobaria linita	-	-	-	-	-	-
Peltigera membranacea	-	-	-	-	-	-
Peltigera neopolydactyla	-	-	-	-	-	-

FORB AND NONVASCULAR PLANT ASSOCIATIONS	METR3 8 plots		CAMI12-PLMA-ACMI2 6 plots		FRCA5-THSP-IRSE 15 plots		RACA11 6 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
TREES								
Picea sitchensis	-	-	-	-	tr	7	2	83
Populus balsamifera	-	-	-	-	-	-	4	83
Tsuga heterophylla	-	-	-	-	-	-	tr	17
Tsuga mertensiana	-	-	-	-	-	-	tr	50
SHRUBS								
Alnus viridis	-	-	-	-	-	-	2	33
Gaultheria shallon	-	-	-	-	-	-	tr	17
Myrica gale	-	-	-	-	15	53	-	-
Rubus spectabilis	-	-	-	-	1	13	-	-
Salix sitchensis	-	-	tr	17	-	-	9	100
DWARF SHRUBS								
Vaccinium ovafolium	-	-	-	-	-	-	tr	33
Vaccinium uliginosum	-	-	-	-	-	-	1	17
FORBS								
Achillea millefolium	-	-	7	100	4	53	-	-
Aconitum delphiniifolium	-	-	-	-	1	13	-	-
Actaea rubra	-	-	-	-	tr	7	-	-
Angelica genuflexa	-	-	-	-	12	87	-	-
Angelica lucida	-	-	5	50	1	27	-	-
Argentina egedii	-	-	18	83	2	47	-	-
Athyrium filix-femina	-	-	-	-	6	47	-	-
Caltha leptosepala	-	-	tr	17	-	-	-	-
Caltha palustris	tr	13	-	-	1	33	-	-
Canadanthus modestus	-	-	-	-	3	13	-	-
Castilleja miniata	-	-	6	100	tr	7	-	-
Castilleja unalaschcensis	-	-	-	-	1	33	-	-
Chamerion angustifolium	-	-	-	-	4	33	-	-
Chamerion latifolium	-	-	-	-	-	-	tr	50
Cicuta douglasii	-	-	1	17	tr	7	-	-
Comarum palustre	28	88	-	-	tr	13	-	-
Conioselinum gmelinii	-	-	1	67	tr	33	-	-
Dodecatheon pulchellum	-	-	5	83	tr	20	-	-
Epilobium ciliatum	-	-	-	-	1	53	-	-
Epilobium palustre	tr	13	tr	33	-	-	-	-
Equisetum arvense	1	25	5	17	10	33	-	-
Equisetum fluviatile	5	75	-	-	tr	7	-	-
Equisetum palustre	3	50	-	-	-	-	-	-
Fragaria chiloensis	-	-	-	-	tr	7	-	-
Fritillaria camschatcensis	-	-	tr	50	3	73	-	-
Galium trifidum	-	-	tr	33	2	93	-	-

FORB AND NONVASCULAR PLANT ASSOCIATIONS	METR3 8 plots		CAMI12-PLMA-ACMI2 6 plots		FRCA5-THSP-IRSE 15 plots		RACA11 6 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
FORBS (cont.)								
Galium triflorum	-	-	-	-	1	7	-	-
Geum calthifolium	-	-	-	-	4	47	-	-
Geum macrophyllum	-	-	-	-	1	13	-	-
Glaux maritima	-	-	4	67	-	-	-	-
Heracleum maximum	-	-	-	-	4	47	-	-
Iris setosa	-	-	3	50	18	87	-	-
Lathyrus japonicus	-	-	-	-	tr	7	-	-
Lathyrus palustris	-	-	2	100	tr	7	-	-
Lupinus nootkatensis	-	-	13	67	2	40	1	50
Lycopus uniflorus	-	-	-	-	tr	7	-	-
Mentha arvensis	-	-	-	-	tr	7	-	-
Menyanthes trifoliata	53	100	-	-	-	-	-	-
Moehringia lateriflora	-	-	-	-	tr	20	-	-
Orthilia secunda	-	-	-	-	-	-	1	100
Parnassia palustris	-	-	2	83	-	-	-	-
Pedicularis parviflora	tr	25	-	-	-	-	-	-
Plantago macrocarpa	-	-	11	100	tr	7	-	-
Plantago maritima	-	-	1	33	-	-	-	-
Platanthera dilatata	-	-	-	-	tr	13	-	-
Platanthera stricta	-	-	-	-	tr	7	-	-
Ranunculus cymbalaria	-	-	tr	17	-	-	-	-
Ranunculus pacificus	-	-	-	-	tr	13	-	-
Ranunculus uncinatus	-	-	-	-	tr	7	-	-
Rhinanthus minor	-	-	-	-	tr	7	tr	17
Rubus arcticus	-	-	-	-	12	80	-	-
Rumex aquaticus	-	-	-	-	tr	7	-	-
Sanguisorba canadensis	-	-	8	33	5	73	-	-
Solidago canadensis	-	-	-	-	1	7	-	-
Stellaria borealis	-	-	-	-	tr	7	-	-
Stellaria humifusa	-	-	-	-	tr	20	-	-
Stellaria longipes	-	-	tr	17	tr	7	-	-
Symphyotrichum subspicatum	-	-	1	33	-	-	-	-
Thalictrum sparsiflorum	-	-	-	-	2	47	-	-
Trientalis europaea	-	-	2	67	1	53	-	-
Triglochin maritima	-	-	11	100	tr	7	-	-
Veratrum viride	-	-	-	-	1	7	-	-
Viola langsdorffii	-	-	-	-	tr	7	-	-
GRAMINOIDS								
Agrostis scabra	-	-	-	-	tr	7	-	-
Calamagrostis canadensis	1	38	7	33	13	60	-	-
Carex aquatilis	12	63	-	-	-	-	-	-

FORB AND NONVASCULAR PLANT ASSOCIATIONS	METR3 8 plots		CAMI12-PLMA-ACMI2 6 plots		FRCA5-THSP-IRSE 15 plots		RACA11 6 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
GRAMINOIDS (cont.)								
Carex chordorrhiza	2	50	-	-	-	-	-	-
Carex gmelinii	-	-	tr	17	tr	13	-	-
Carex laeviculmis	-	-	-	-	tr	7	-	-
Carex limosa	9	38	-	-	-	-	-	-
Carex lyngbyei	-	-	9	67	3	20	-	-
Carex macloviana	-	-	-	-	tr	7	-	-
Carex pluriflora	8	38	3	17	-	-	-	-
Deschampsia cespitosa	-	-	11	83	tr	7	-	-
Eleocharis palustris	tr	13	1	17	-	-	-	-
Eriophorum russeolum	7	50	-	-	-	-	-	-
Festuca rubra	-	-	8	83	tr	13	-	-
Hierochloe odorata	-	-	4	67	tr	27	-	-
Hordeum brachyantherum	-	-	4	50	tr	7	-	-
Juncus arcticus	-	-	2	33	-	-	-	-
Leymus mollis	-	-	-	-	3	47	tr	17
Poa arctica	-	-	2	50	tr	7	-	-
Poa eminens	-	-	1	50	-	-	-	-
Poa palustris	-	-	1	17	tr	7	-	-
BRYOPHYTES								
Aulacomnium palustre	-	-	-	-	1	13	1	33
Brachythecium frigidum	-	-	-	-	tr	7	-	-
Brachythecium salebrosum	-	-	-	-	2	7	-	-
Bryum pseudotriquetrum	-	-	-	-	-	-	1	33
Calliergon giganteum	4	13	-	-	-	-	-	-
Campylium stellatum	-	-	2	33	-	-	-	-
Cephaloziella divaricata	-	-	-	-	-	-	2	33
Dicranum howellii	-	-	-	-	-	-	3	50
Leptodictyum humile	-	-	4	33	-	-	-	-
Lophozia badensis	-	-	-	-	-	-	4	17
Plagiomnium insigne	-	-	-	-	tr	7	-	-
Polytrichum strictum	-	-	-	-	-	-	1	50
Ptilidium ciliare	-	-	-	-	-	-	2	67
Racomitrium canescens	-	-	-	-	-	-	37	100
Racomitrium lanuginosum	-	-	-	-	1	7	1	33
Rhytidiadelphus loreus	-	-	1	17	-	-	-	-
Rhytidiadelphus squarrosus	-	-	7	17	16	47	-	-
Sphagnum angustifolium	18	38	-	-	-	-	-	-
Sphagnum magellanicum	6	13	-	-	-	-	-	-

FORB AND NONVASCULAR PLANT ASSOCIATIONS	METR3 8 plots		CAMI12-PLMA-ACMI2 6 plots		FRCA5-THSP-IRSE 15 plots		RACA11 6 plots	
Species	Cov.	Con.	Cov.	Con.	Cov.	Con.	Cov.	Con.
Sphagnum squarrosum	1	25	-	-	tr	13	-	-
Tetralophozia setiformis	-	-	-	-	-	-	tr	33
LICHENS								
Cetraria ericetorum	-	-	-	-	-	-	1	67
Cladina mitis	-	-	-	-	-	-	3	50
Cladina portentosa	-	-	-	-	-	-	7	50
Cladina rangiferina	-	-	-	-	-	-	9	100
Cladonia bellidiflora	-	-	-	-	-	-	2	50
Cladonia carneola	-	-	-	-	-	-	tr	17
Cladonia chlorophaea	-	-	-	-	-	-	tr	50
Cladonia cornuta	-	-	-	-	-	-	1	50
Cladonia crispata	-	-	-	-	-	-	5	50
Cladonia squamosa	-	-	-	-	-	-	8	100
Cladonia uncialis	-	-	-	-	-	-	2	50
Stereocaulon tomentosum	-	-	-	-	-	-	2	50
Umbilicaria hyperborea	-	-	-	-	-	-	tr	50

APPENDIX D – SPECIES LIST

The following table lists the plant species identified from plots sampled in the study area and the number of plots on which the species was observed. Plant symbols, scientific names, and common names were derived from the NRCS PLANTS database (USDA Natural Resources Conservation Service 2009).

Symbol	Scientific name	Common name	Count
Trees			
PISI	*Picea sitchensis*	Sitka spruce	20
PICO	*Pinus contorta*	lodgepole pine	4
POBA2	*Populus balsamifera*	balsam poplar	16
TSHE	*Tsuga heterophylla*	western hemlock	3
TSME	*Tsuga mertensiana*	mountain hemlock	5
Shrubs			
ACGL	*Acer glabrum*	Rocky Mountain maple	1
ALRU2	*Alnus rubra*	red alder	10
ALVI5	*Alnus viridis*	Sitka alder	25
AMAL2	*Amelanchier alnifolia*	Saskatoon serviceberry	3
COSE16	*Cornus sericea*	redosier dogwood	12
ELPY	*Elliottia pyroliflora*	copperbush	1
GASH	*Gaultheria shallon*	salal	1
MAFU	*Malus fusca*	Oregon crab apple	1
MEFE	*Menziesia ferruginea*	rusty menziesia	3
MYGA	*Myrica gale*	sweetgale	26
OPHO	*Oplopanax horridus*	devilsclub	3
RUSP	*Rubus spectabilis*	salmonberry	15
SAAL	*Salix alaxensis*	feltleaf willow	17
SABA3	*Salix barclayi*	Barclay's willow	39
SAIN3	*Salix interior*	sandbar willow	9
SALU	*Salix lucida*	Pacific willow	5
SAPS	*Salix pseudomonticola*	false mountain willow	4
SASI2	*Salix sitchensis*	Sitka willow	46
SARA2	*Sambucus racemosa*	red elderberry	4
SOSI2	*Sorbus sitchensis*	western mountain ash	1
VAOX	*Vaccinium oxycoccos*	small cranberry	17
VIED	*Viburnum edule*	squashberry	8
Dwarf shrubs			
ANPO	*Andromeda polifolia*	bog rosemary	6
EMNI	*Empetrum nigrum*	black crowberry	5
KAPO	*Kalmia polifolia*	bog laurel	13
LEGR	*Ledum groenlandicum*	bog Labrador tea	2
VAOV	*Vaccinium ovalifolium*	oval-leaf blueberry	6
VAUL	*Vaccinium uliginosum*	bog blueberry	13
Forbs			
ACMI2	*Achillea millefolium*	common yarrow	27

Symbol	Scientific name	Common name	Count
Forbs (cont.)			
ACDE2	*Aconitum delphiniifolium*	larkspurleaf monkshood	2
ACRU2	*Actaea rubra*	red baneberry	1
ANGE2	*Angelica genuflexa*	kneeling angelica	34
ANLU	*Angelica lucida*	seacoast angelica	12
AQFO	*Aquilegia formosa*	western columbine	2
AREG	*Argentina egedii*	Pacific silverweed	8
ARDI8	*Aruncus dioicus*	bride's feathers	2
ATFI	*Athyrium filix-femina*	common ladyfern	29
BORO	*Boschniakia rossica*	northern groundcone	4
CALE4	*Caltha leptosepala*	white marsh marigold	9
CAPA5	*Caltha palustris*	yellow marsh marigold	19
CAMO32	*Canadanthus modestus*	giant mountain aster	4
CAMI12	*Castilleja miniata*	giant red Indian paintbrush	13
CAUN4	*Castilleja unalaschcensis*	Alaska Indian paintbrush	5
CHAN9	*Chamerion angustifolium*	fireweed	5
CHLA13	*Chamerion latifolium*	dwarf fireweed	13
CHAR13	*Chrysanthemum arcticum*	arctic daisy	1
CIDO	*Cicuta douglasii*	western water hemlock	17
CIAL	*Circaea alpina*	small enchanter's nightshade	3
COPA28	*Comarum palustre*	purple marshlocks	52
COGM	*Conioselinum gmelinii*	Pacific hemlockparsley	10
COCA13	*Cornus canadensis*	bunchberry dogwood	7
DOPU	*Dodecatheon pulchellum*	darkthroat shootingstar	18
DRAN	*Drosera anglica*	English sundew	6
DRRO	*Drosera rotundifolia*	roundleaf sundew	20
DRDR	*Dryas drummondii*	Drummond's mountain-avens	3
DREX2	*Dryopteris expansa*	spreading woodfern	1
EPAN4	*Epilobium anagallidifolium*	pimpernel willowherb	1
EPCI	*Epilobium ciliatum*	fringed willowherb	25
EPPA	*Epilobium palustre*	marsh willowherb	24
EQAR	*Equisetum arvense*	field horsetail	47
EQFL	*Equisetum fluviatile*	water horsetail	25
EQHY	*Equisetum hyemale*	scouringrush horsetail	4
EQPA	*Equisetum palustre*	marsh horsetail	29
EQVA	*Equisetum variegatum*	variegated scouringrush	9
ERPE3	*Erigeron peregrinus*	subalpine fleabane	5
FRCH	*Fragaria chiloensis*	beach strawberry	1
FRCA5	*Fritillaria camschatcensis*	Kamchatka fritillary	21
GATR2	*Galium trifidum*	threepetal bedstraw	53
GATR3	*Galium triflorum*	fragrant bedstraw	5
GEDO	*Gentiana douglasiana*	swamp gentian	12
GECA6	*Geum calthifolium*	calthaleaf avens	9
GEMA4	*Geum macrophyllum*	largeleaf avens	6
GLMA	*Glaux maritima*	sea milkwort	22
GYDR	*Gymnocarpium dryopteris*	western oakfern	1
HEMA80	*Heracleum maximum*	common cowparsnip	15

Symbol	Scientific name	Common name	Count
Forbs (cont.)			
HEGL5	*Heuchera glabra*	alpine heuchera	1
HIMO2	*Hippuris montana*	mountain mare's-tail	1
HITE	*Hippuris tetraphylla*	fourleaf mare's-tail	3
IMNO	*Impatiens noli-tangere*	western touch-me-not	1
IRSE	*Iris setosa*	beachhead iris	28
LAJA	*Lathyrus japonicus*	beach pea	4
LAPA4	*Lathyrus palustris*	marsh pea	21
LEPY	*Leptarrhena pyrolifolia*	fireleaf leptarrhena	1
LICA10	*Listera caurina*	northwestern twayblade	1
LORO	*Lomatogonium rotatum*	marsh felwort	2
LUNO	*Lupinus nootkatensis*	Nootka lupine	25
LYIN2	*Lycopodiella inundata*	inundated clubmoss	2
LYUN	*Lycopus uniflorus*	northern bugleweed	5
LYAM3	*Lysichiton americanus*	American skunkcabbage	17
LYTH2	*Lysimachia thyrsiflora*	tufted loosestrife	8
MADI	*Maianthemum dilatatum*	false lily of the valley	4
MEOF	*Melilotus officinalis*	yellow sweetclover	1
MEAR4	*Mentha arvensis*	wild mint	1
METR3	*Menyanthes trifoliata*	buckbean	30
MIPE	*Mitella pentandra*	fivestamen miterwort	1
MOLA6	*Moehringia lateriflora*	bluntleaf sandwort	5
OESA	*Oenanthe sarmentosa*	water parsely	1
ORSE	*Orthilia secunda*	sidebells wintergreen	8
OSBE	*Osmorhiza berteroi*	sweetcicely	5
PAPA8	*Parnassia palustris*	marsh grass of Parnassus	16
PEPA4	*Pedicularis parviflora*	smallflower lousewort	6
PEFR5	*Petasites frigidus*	arctic sweet coltsfoot	1
PIUN3	*Piperia unalascensis*	slender-spire orchid	1
PLMA	*Plantago macrocarpa*	seashore plantain	11
PLMA3	*Plantago maritima*	goose tongue	12
PLDI3	*Platanthera dilatata*	scentbottle	20
PLST4	*Platanthera stricta*	slender bog orchid	4
POVI3	*Polygonum viviparum*	alpine bistort	4
PRAL	*Prenanthes alata*	western rattlesnakeroot	1
PREG	*Primula egaliksensis*	Greenland primrose	4
RACY	*Ranunculus cymbalaria*	alkali buttercup	11
RAMA2	*Ranunculus macounii*	Macoun's buttercup	2
RAPA	*Ranunculus pacificus*	Pacific buttercup	2
RAUN	*Ranunculus uncinatus*	woodland buttercup	1
RHMI13	*Rhinanthus minor*	little yellow rattle	2
RUAR	*Rubus arcticus*	arctic blackberry	32
RUCH	*Rubus chamaemorus*	cloudberry	2
RUPE	*Rubus pedatus*	strawberryleaf raspberry	2
RUAQ	*Rumex aquaticus*	western dock	9
RUMA5	*Ruppia maritima*	widgeongrass	9
SACA14	*Sanguisorba canadensis*	Canadian burnet	22

Symbol	Scientific name	Common name	Count
Forbs (cont.)			
SAME6	*Sanguisorba menziesii*	Menzies' burnet	16
SCPA2	*Scheuchzeria palustris*	rannoch-rush	3
SCGA	*Scutellaria galericulata*	marsh skullcap	1
SETR	*Senecio triangularis*	arrowleaf ragwort	2
SOCA6	*Solidago canadensis*	Canada goldenrod	2
SPRO	*Spiranthes romanzoffiana*	hooded lady's tresses	3
STBO3	*Stellaria borealis*	boreal starwort	7
STCA	*Stellaria calycantha*	northern starwort	1
STCR2	*Stellaria crispa*	curled starwort	1
STHU	*Stellaria humifusa*	saltmarsh starwort	13
STLO2	*Stellaria longipes*	longstalk starwort	3
STAM2	*Streptopus amplexifolius*	claspleaf twistedstalk	10
STLA16	*Streptopus lanceolatus*	twistedstalk	1
SYSU4	*Symphyotrichum subspicatum*	Douglas aster	13
TEGR2	*Tellima grandiflora*	bigflower tellima	1
THSP	*Thalictrum sparsiflorum*	fewflower meadow-rue	7
TITR	*Tiarella trifoliata*	threeleaf foamflower	3
TRGL5	*Triantha glutinosa*	sticky tofieldia	5
TREU	*Trientalis europaea*	arctic starflower	55
TRMA20	*Triglochin maritima*	seaside arrowgrass	33
TRPA28	*Triglochin palustris*	marsh arrowgrass	1
URDI	*Urtica dioica*	stinging nettle	2
UTIN2	*Utricularia intermedia*	flatleaf bladderwort	1
VEVI	*Veratrum viride*	green false hellebore	8
VIEP	*Viola epipsila*	dwarf marsh violet	1
VILA6	*Viola langsdorffii*	Aleutian violet	1
VIPA4	*Viola palustris*	marsh violet	23
Graminoids			
AGAE	*Agrostis aequivalvis*	arctic bentgrass	4
AGEX	*Agrostis exarata*	spike bentgrass	3
AGME3	*Agrostis mertensii*	northern bentgrass	1
AGSC5	*Agrostis scabra*	rough bentgrass	3
ARLA2	*Arctagrostis latifolia*	wideleaf polargrass	2
ARFU2	*Arctophila fulva*	pendantgrass	1
CACA4	*Calamagrostis canadensis*	bluejoint	78
CAST36	*Calamagrostis stricta*	slimstem reedgrass	1
CAAQ	*Carex aquatilis*	water sedge	74
CABI4	*Carex bicolor*	twocolor sedge	2
CACA11	*Carex canescens*	silvery sedge	20
CACH5	*Carex chordorrhiza*	creeping sedge	11
CAGA3	*Carex garberi*	elk sedge	1
CAGM	*Carex gmelinii*	Gmelin's sedge	3
CALA13	*Carex laeviculmis*	smoothstem sedge	3
CALE8	*Carex lenticularis*	lakeshore sedge	2
CALI7	*Carex limosa*	mud sedge	9

Symbol	Scientific name	Common name	Count
Graminoids (cont.)			
CAPA14	*Carex pachystachya*	chamisso sedge	4
CAPA19	*Carex pauciflora*	fewflower sedge	2
CAPL6	*Carex pluriflora*	manyflower sedge	41
CASA10	*Carex saxatilis*	rock sedge	3
CAST10	*Carex stylosa*	variegated sedge	3
CAUT	*Carex utriculata*	Northwest Territory sedge	1
CAVI5	*Carex viridula*	little green sedge	1
DECE	*Deschampsia cespitosa*	tufted hairgrass	39
ELPA3	*Eleocharis palustris*	common spikerush	33
ELAL5	*Elymus alaskanus*	Alaskan wheatgrass	1
ELGL	*Elymus glaucus*	blue wildrye	2
ERAN6	*Eriophorum angustifolium*	tall cottongrass	19
ERRU2	*Eriophorum russeolum*	red cottongrass	39
FEBR	*Festuca brachyphylla*	alpine fescue	1
FERU2	*Festuca rubra*	red fescue	30
HIOD	*Hierochloe odorata*	sweetgrass	15
HOBR2	*Hordeum brachyantherum*	meadow barley	11
JUAL4	*Juncus alpinoarticulatus*	northern green rush	1
JUAR2	*Juncus arcticus*	arctic rush	11
JUDR	*Juncus drummondii*	Drummond's rush	1
JUEN	*Juncus ensifolius*	swordleaf rush	1
JUFI	*Juncus filiformis*	thread rush	5
LEMO8	*Leymus mollis*	American dunegrass	15
LUMU2	*Luzula multiflora*	common woodrush	1
LUPA4	*Luzula parviflora*	smallflowered woodrush	1
PHAL2	*Phleum alpinum*	alpine timothy	4
POAL2	*Poa alpina*	alpine bluegrass	1
POAR2	*Poa arctica*	arctic bluegrass	8
POEM	*Poa eminens*	largeflower speargrass	23
POPA2	*Poa palustris*	fowl bluegrass	8
POPR	*Poa pratensis*	Kentucky bluegrass	2
PUTE	*Puccinellia tenella*	tundra alkaligrass	2
PYAS	*Pyrola asarifolia*	liverleaf wintergreen	2
SCTA2	*Schoenoplectus tabernaemontani*	softstem bulrush	1
SCMI2	*Scirpus microcarpus*	panicled bulrush	8
SPHY	*Sparganium hyperboreum*	northern bur-reed	2
TRCE3	*Trichophorum cespitosum*	tufted bulrush	6
TRSP2	*Trisetum spicatum*	spike trisetum	1
VAAT2	*Vahlodea atropurpurea*	mountain hairgrass	1
Lichens			
ALSA9	*Alectoria sarmentosa*	witch's hair lichen	1
CEER6	*Cetraria ericetorum*	cetraria lichen	4
CLMI60	*Cladina mitis*	reindeer lichen	4
CLPO4	*Cladina portentosa*	reindeer lichen	6
CLRA60	*Cladina rangiferina*	greygreen reindeer lichen	6

Symbol	Scientific name	Common name	Count
Lichens (cont.)			
CLBE4	*Cladonia bellidiflora*	cup lichen	3
CLCA10	*Cladonia carneola*	cup lichen	3
CLCH3	*Cladonia chlorophaea*	cup lichen	8
CLCO19	*Cladonia cornuta*	cup lichen	3
CLCR5	*Cladonia crispata*	cup lichen	3
CLSQ60	*Cladonia squamosa*	cup lichen	1
CLUN60	*Cladonia uncialis*	cup lichen	1
LOLI60	*Lobaria linita*	lung lichen	7
NEBE60	*Nephroma bellum*	kidney lichen	1
NERE60	*Nephroma resupinatum*	kidney lichen	5
PEME60	*Peltigera membranacea*	membraneous felt lichen	3
PENE12	*Peltigera neopolydactyla*	felt lichen	1
STTO60	*Stereocaulon tomentosum*	tomentose snow lichen	4
UMHY2	*Umbilicaria hyperborea*	navel lichen	4
Bryophytes			
AMSE3	*Amblystegium serpens*	amblystegium moss	2
ANFI4	*Anomobryum filiforme*	filiform anomobryum moss	1
AUPA70	*Aulacomnium palustre*	aulacomnium moss	5
BRFR70	*Brachythecium frigidum*	cold brachythecium moss	2
BRREP	*Brachythecium reflexum*	brachythecium moss	4
BRSA7	*Brachythecium salebrosum*	brachythecium moss	4
BRPS70	*Bryum pseudotriquetrum*	common green bryum moss	2
CACO70	*Calliergon cordifolium*	calliergon moss	1
CAGI70	*Calliergon giganteum*	giant calliergon moss	3
CAPO17	*Campylium polygamum*	campylium moss	1
CAST51	*Campylium stellatum*	star campylium moss	14
CEDI11	*Cephaloziella divaricata*	cephaloziella liverwort	2
CEPU12	*Ceratodon purpureus*	ceratodon moss	1
DIRU70	*Dicranella rufescens*	dicranella moss	1
DICR71	*Dicranoweisia crispula*	dicranoweisia moss	1
DIHO5	*Dicranum howellii*	Howell's dicranum moss	3
DITA	*Dicranum tauricum*	dicranum moss	2
DRAD2	*Drepanocladus aduncus*	drepanocladus moss	11
HYTE6	*Hygroamblystegium tenax*	hygroamblystegium moss	1
HYLI70	*Hypnum lindbergii*	Lindberg's hypnum moss	1
HYPR70	*Hypnum pratense*	hypnum moss	1
LEHU7	*Leptodictyum humile*	leptodictyum moss	2
LOBA7	*Lophozia badensis*	lophozia liverwort	3
MAPO16	*Marchantia polymorpha*	marchantia liverwort	2
PHFO6	*Philonotis fontana*	philonotis moss	3
PLIN11	*Plagiomnium insigne*	plagiomnium moss	5
PLVE	*Plagiomnium venustum*	plagiomnium moss	1
PLRU4	*Pleuroziopsis ruthenica*	pleuroziopsis moss	1
PLSC70	*Pleurozium schreberi*	Schreber's big red stem moss	1

Symbol	Scientific name	Common name	Count
Bryophytes (cont.)			
PONU70	*Pohlia nutans*	pohlia moss	3
POWA70	*Pohlia wahlenbergii*	Wahlenberg's pohlia moss	2
POCO38	*Polytrichum commune*	polytrichum moss	6
POST70	*Polytrichum strictum*	polytrichum moss	3
PTCI	*Ptilidium ciliare*	ptilidium liverwort	4
PTCR70	*Ptilium crista-castrensis*	knights plume moss	3
RACA11	*Racomitrium canescens*	racomitrium moss	18
RALA70	*Racomitrium lanuginosum*	racomitrium moss	3
RHAN70	*Rhizomnium andrewsianum*	Andrews' rhizomnium moss	1
RHGL70	*Rhizomnium glabrescens*	rhizomnium moss	1
RHLO70	*Rhytidiadelphus loreus*	goose neck moss	13
RHSQ70	*Rhytidiadelphus squarrosus*	square goose neck moss	24
SAUN8	*Sanionia uncinata*	sanionia moss	4
SCPA26	*Scapania paludicola*	scapania liverwort	2
SPAN9	*Sphagnum andersonianum*	Anderson's sphagnum	1
SPAN11	*Sphagnum angustifolium*	sphagnum	32
SPCA70	*Sphagnum capillifolium*	sphagnum	1
SPFU70	*Sphagnum fuscum*	sphagnum	1
SPMA70	*Sphagnum magellanicum*	Magellan's sphagnum	7
SPPA71	*Sphagnum papillosum*	papillose sphagnum	5
SPRU4	*Sphagnum rubellum*	sphagnum	1
SPSQ70	*Sphagnum squarrosum*	sphagnum	19
TESE7	*Tetralophozia setiformis*	tetralophozia liverwort	2
WAEX	*Warnstorfia exannulata*	warnstorfia moss	3
WAFL2	*Warnstorfia fluitans*	warnstorfia moss	4