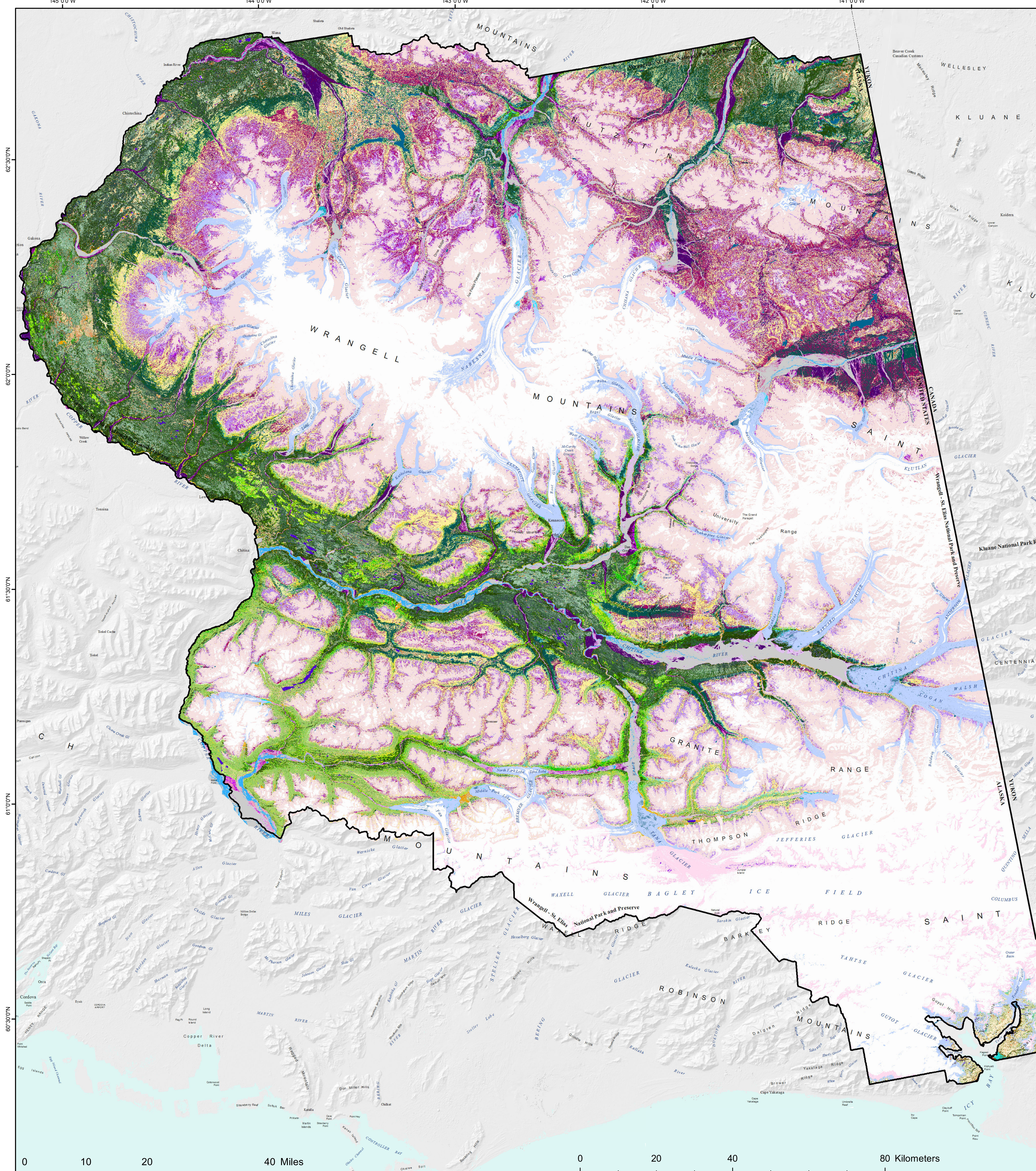
Wrangell-St.Elias National Park and Preserve

Landcover Classification

National Park Service
U.S. Department of the Interior

PROJECT DESCRIPTION

The Wrangell-St. Elias National Park and Preserve Landcover Mapping Project was undertaken by the National Park Service (NPS) Alaska Region Inventory and Monitoring Program in cooperation with Geographic Resource Solutions and ABR, Inc. The goal of the NPS Inventory and Monitoring Program is to provide reliable and consistent information for assessing status and trends in the condition of National Park ecosystems. The Inventory portion of the Program conducts landcover mapping and classification to provide basic information useful for making resource management decisions, and to collect data that can be aggregated on a service-wide level for designing monitoring programs. To this end, the Inventory Program has developed a digital landcover map based on satellite imagery and field checked by vegetation survey. Map classes were calculated for each signature based on the vegetation attributes in the spectral database and a rule set that followed Viereck,et.al (1992) class breaks and naming conventions. The calculated map classes were intended to correspond to the important ecological types encountered in the study area. The two levels of classification— ecological system and landcover class —provided through this project are important for addressing management and monitoring goals. These classifications can be used to understand habitat availability, provide baseline information about natural resources in the park, and for conducting coarse-scale analyses including regional ecological planning. For example, the classification and maps provided by this project can help wildlife biologists evaluate forage availability for bear and moose and visualize the distribution of wetlands, and rare habitats and species. Products and documentation for this project can be found online through the National Park Service Integrated Resource Management Applications portal at https://irma.nps.gov/DataStore/Reference/Profile/2170670.



The landcover classification identified on this map describes existing vegetation classes. It is based primarily on life form (tree, shrub or herbaceous), vegetation stature and to a lesser extent, genera and species information. It follows, with modifications, The Alaska Vegetation Classification (Viereck et al. 1992) system at levels II through IV. The landcover class descriptions include geographic distribution, site characteristics such as elevation and landform, and the dominant species that occur within the landcover class.

For more information contact the
Alaska Inventory Program
National Park Service
240 West 5th Avenue
Anchorage, Alaska 99501

Ecotype	% map	Ecotype	% map
Boreal Alpine Barrens	21.4%	Boreal Riverine Sandy Willow Shrub	0.2%
Boreal Alpine Dryas Dwarf Shrub	4.0%	Boreal Riverine Loamy Willow Shrub	0.2%
Boreal Alpine Ericaceous Dwarf Shrub	0.5%	Boreal Riverine Low Silverberry Shrub	0.0%
Boreal Alpine Tussock Meadow	0.7%	Boreal Riverine Dryas Dwarf Shrub	0.3%
Boreal Alpine Sedge-Dwarf Willow Meadow	4.1%	Boreal Riverine Circumalkaline Barrens	1.8%
Boreal Glaciated Poplar Forest	0.0%	Maritime Alpine Barrens	1.8%
Boreal Glaciated Willow Shrub	0.0%	Maritime Alpine Cassiope Dwarf Shrub	0.0%
Boreal Glaciated Dryas Dwarf Shrub	0.1%	Maritime Glaciated Barrens	2.8%
Boreal Glaciated Barrens	3.7%	Maritime Glaciated Tall Alder-Willow Shrub	0.3%
Boreal Subalpine Spruce Woodland	2.8%	Maritime Subalpine Low Blueberry Shrub	0.0%
Boreal Subalpine Poplar Forest	0.8%	Maritime Subalpine Lupine Meadow	0.0%
Boreal Subalpine Willow and Birch Shrub	7.1%	Maritime Upland Sitka Spruce Forest	0.0%
Boreal Subalpine Forb Meadow	0.1%	Maritime Upland Tall Alder Shrub	0.1%
Boreal Upland White Spruce Forest	2.9%	Maritime Lowland Sitka Spruce Forest	0.1%
Boreal Upland Birch Forest	0.4%	Maritime Lowland Cottonwood-Spruce Forest	0.1%
Boreal Upland Aspen Forest	0.4%	Maritime Lowland Cottonwood Forest	0.3%
Boreal Upland Spruce-Birch Forest	1.5%	Maritime Lowland Tall Alder-Willow Shrub	0.3%
Boreal Upland Tall Alder Shrub	1.9%	Maritime Lowland Forb-Willow Meadow	0.1%
Boreal Upland Tall Willow Shrub	0.0%	Maritime Lowland Sedge-Blueberry Bog	0.0%
Boreal Upland Sagebrush Meadow	0.0%	Maritime Lowland Menyanthes Bog	0.0%
Boreal Upland Forb Meadow	0.0%	Maritime Riverine Cottonwood-Spruce Forest	0.0%
Boreal Lowland White Spruce Forest	2.6%	Maritime Riverine Cottonwood Forest	0.0%
Boreal Lowland Black Spruce Forest	1.4%	Maritime Riverine Tall Alder-Willow Shrub	0.0%
Boreal Lowland Black Spruce Bog	1.2%	Maritime Riverine Tall Willow Shrub	0.0%
Boreal Lowland Tall Willow Shrub	0.3%	Maritime Riverine Horsetail Meadow	0.0%
Boreal Lowland Low Birch-Willow Shrub	0.8%	Maritime Riverine Barrens	0.1%
Boreal Lowland Tussock-Shrub Bog	0.3%	Maritime Coastal Angelica Meadow	0.0%
Boreal Lowland Sedge-Shrub Fen	0.2%	Maritime Coastal Elymus Meadow	0.0%
Boreal Lowland Barrens	0.2%	Maritime Coastal Barrens	0.0%
Boreal Lacustrine Pondlily	0.0%	Alpine Lake	0.1%
Boreal Riverine White Spruce Forest	0.9%	Glacial Lake	0.2%
Boreal Riverine Spruce-Poplar Forest	0.2%	Glacial River	0.3%
Boreal Riverine Gravelly Poplar Forest	0.1%	Lowland Lake	0.1%
Boreal Riverine Loamy Poplar Forest	0.0%	Nearshore Water	8.5%
Boreal Riverine Tall Alder Shrub	0.1%	Snow/Glacier	28.4%

Wrangell-St. Elias NP&Pr boundary
Alaska, USA / Yukon Territories, Canada boundary



Boreal Alpine Barrens

Plant Association: *Racomitrium* sp. – *Carex microchaeta* Total cover of vascular species is less than 30%, yet this ecotype is diverse in forb and lichen species. It has the 5th highest total species count and the 11th highest number of species per plot of all ecotypes. Trees and shrubs taller than 20 cm are absent. Nonvascular species have greater total cover than vascular species, and plots with the vegetation class Dry Bryophyte are included in this ecotype. Common species include *Salix arctica, Salix polaris, Saxifraga bronchialis, Saxifraga oppositifolia, Poa arctica* and *Carex microchaeta.*

Geomorphology: This ecotype is widespread throughout the park at high elevations. Vascular plants are sparse. Soils are blocky or rubbly, and parent material consists of hillside colluvium, talus or older moraine.

Boreal Alpine Dryas Dwarf Shrub

Plant Association: *Dryas octopetala-Hierochlöe alpine - Saussurea viscida* Evergreen dwarf shrubs, particularly *Dryas* spp., characterize this diverse, species-rich class. This ecotype has the second highest number of species per plot and the third highest overall species count; many rare species, such as *Oxytropis huddelsonii*, occur here. Trees and tall shrubs are absent. Most species have less than 2% cover. Dominant species include *Dryas octopetala, Salix arctica, Hierochlöe alpina, Silene acaulis Saussurea viscid* and *Flavocetraria cucullata*. This ecotype is similar to Boreal Alpine Ericaceous Dwarf Shrub in species composition and diversity, but *Dryas* is more prevalent than ericaceous species.

Geomorphology: This ecotype commonly occurs at high elevations on slopes and crests. Blocky and rubbly soils overlain by thin organic horizons are most common, though soil texture is variable.

Boreal Alpine Ericaceous Dwarf Shrub

Geomorphology: This ecotype is widespread and occurs on upper slopes, especially in nivation hollows and other high elevation areas where snowmelt is late. Underlying terrain units include upland loess, hillside colluvium, kame and solifluction deposits, and older and younger moraine. Soil textures are loamy, blocky or rubbly, and occur under a thin organic horizon. Sites are moist, well-drained and mostly circumneutral (alkaline or acidic chemistry occurs infrequently). Depth to permafrost is variable.

Plant Association: *Cassiope tetragona-Pedicularis capitata Empetrum nigrum-Artemisia arctica Cassiope,* dwarf *Vaccinium,* and *mixed ericaceous* vegetation classes are included in this ecotype. Additional common species are *Salix arctica, Anemone narcissiflora* and *Festuca altaica.* Nonvascular species have reduced cover relative to vascular species. Similar to all boreal alpine ecotypes, rare and notable species frequently occur here.

Boreal Alpine Tussock Meadow

These meadows are poorly to somewhat poorly drained, moist to wet, and circumneutral.

Plant Association: *Eriophorum vaginatum-Salix pulchra-Polygonum bistorta.* This ecotype is characterized by the tussock-forming sedge *Eriophorum vaginatum.* Dwarf shrubs, typically *Cassiope tetragona, Ledum decumbens, Vaccinium vitis-idaea* and *Salix reticulata,* are present and can be co-dominant. Trees are absent or <1% cover. Common species are *Salix pulchra, Polygonum bistorta, Polygonum viviparum* and *Flavocetraria cucullata.* This is the least diverse boreal alpine ecotype. It has only 87 documented species, whereas the remainder of the boreal alpine ecotypes each have >100 species.

Geomorphology: These tussock-dominated meadows are located on plateaus or slopes comprised of hillside colluvium above 1200 m elevation. Permafrost occurs within 0.5 m of the surface. Soils have well developed organic horizons overlying loams or blocky material.

Boreal Alpine Sedge-Dwarf Willow Meadow

Geomorphology: This ecotype hosts a diverse array of plant species. Located at high elevations on plateaus and concave or planar slopes, terrain includes hillside colluvium, older and younger moraine, solifluction deposits, upland loess deposits, and alluvial fan abandoned deposits. Due to this variety, dominant soil textures can be rocky, loamy or organic. Sites are moist or wet and drainage is variable. Permafrost usually is present and soils range from circumneutral to acidic.

Plant Association: *Carex bigelowii-Salix reticulata Salix polaris-Artemisia arctica* This ecotype has the highest documented number of species per plot and the second highest species diversity overall. Except for trees, every life form is well represented in this ecotype. Associated species include *Salix planifolia pulchra, Dryas* spp., *Polygonum viviparum,* and *Petasites frigidus.* Rare species that occur here include *Claytonia bostockii* and *Aphragmus eschscholtzianus.*

Boreal Glaciated Willow Shrub

Geomorphology: Boreal Glaciated Willow Shrub consists of early successional willow communities located on young moraine. Surfaces are uneven, and sloped or flat. Soils are comprised of blocky or rubbly material with thin organic horizons. These sites are somewhat excessive to excessively well-drained, dry, and are alkaline to circumneutral.

Plant Association: *Salix alaxensis-Salix niphoclada-Arctostaphylos rubra* Willows occur in open to closed stands in this ecotype. The understory is open with moss, bare soil, and litter comprising the groundcover. Trees are present as seedlings. Common species are *Salix alaxensis, Salix niphoclada, Arctostaphylos rubra, Shepherdia canadensis, Salix glauca, Dryas drummondii, Populus balsamifera* and *Ceratodon purpureus.* This ecotype is not species rich, with a median number of species per plot and a low total count.

Boreal Glaciated Dryas Shrub

Geomorphology: This ecotype occurs on slopes on stabilized young moraine and is characterized by dwarf evergreen shrubs and an uneven blocky surface. Leaf litter (mostly *Dryas*) and bare soil cover approximately half the ground surface. Soils consist of blocky or bouldery material overlain by thin organic horizons. Sites are somewhat excessively to excessively drained, dry, and basic to circumneutral.

Plant Association: *Dryas drummondii-Shepherdia canadensis-Salix alaxensis. Dryas drummondii* forms extensive mats and is the most abundant species. Graminoids are absent, and nonvascular species are found in very low numbers. Tree seedlings may be present in trace amounts. This ecotype is not diverse; it has the second lowest species count of boreal ecotypes (4th overall), and has few species per plot.

Boreal Glaciated Barrens

Geomorphology: Boreal Glaciated Barrens occurs on young moraine at the terminuses of receding glaciers. The surface is dynamic and unstable. Soils are underlain by glacial ice and are poorly developed. The dominant soil texture is blocky and organic material is absent. Soil chemistry is alkaline. Drainage is excessive unless ice is close to the surface; soils typically are dry. Vegetative cover is <5% and plant litter and water are absent.

Plant Association: *Dryas drummondii-Shepherdia canadensis-Salix alaxensis.* This ecotype is early successional and is sparsely vegetated by ruderal colonizers such as *Epilobium latifolium.* Trees are absent, and all other life forms can be present with low total cover. The relatively high diversity of this ecotype probably reflects the variety of species available from local seed sources.

Boreal Subalpine Spruce Woodland

Geomorphology: These woodland stands form the treeline zone on mountain slopes, and occur on hillside colluvium or loess deposits. Soils are moist to dry, and well to excessively drained with rubbly or loamy textures. Soil chemistry is circumneutral to acidic. These woodlands are common throughout the mountainous regions of the park.

Plant Association: *Picea glauca-Vaccinium uliginosum* Although evergreen trees characterize these sites, deciduous shrubs have the greatest total cover. All life forms are present except deciduous trees. Dominant species include *Picea glauca, Vaccinium uliginosum, Empetrum nigrum, Vaccinium vitis-idaea, Salix glauca, Festuca altaica* and *Hylocomium splendens.* While this ecotype has a high species count per plot, the overall species count is moderate, and species composition is consistent among sites.

Boreal Subalpine Poplar Forest

Geomorphology: These forests occur on colluvium or loess deposits and have limited distribution on subalpine hillsides in the park. Soil texture is loamy, sandy or rubbly. Site conditions co-vary with soil textures; moist and well drained conditions are most common, although dry, excessively drained soils occur on rubbly sites. Soil chemistry is variable.

Plant Association: *Populus balsamifera-Festuca altaica* Stands typically are open forests of mature balsam poplar, but dwarfed stands and woodlands also occur. Deciduous shrubs, forbs and grasses typically are present, while the occurrence of other life forms is variable among sites. Nonvascular species usually are present but with little cover. Some litter alone usually is present. Common species include *Festuca altaica, Rosa acicularis, Mertensia paniculata* and *Epilobium angustifolium.*

Boreal Subalpine Willow and Birch Shrub

Geomorphology: This common and widespread ecotype occurs on hillside colluvium, older moraine, retransported deposits, margins of high elevation thaw basins, loess deposits, inactive alluvial fan deposits, and lacustrine deposits.

Plant Association: *Betula nana-Salix pulchra-Festuca altaica* Deciduous shrubs characterize this ecotype but dominant species vary. This results in several low shrub vegetation classes being combined into the same ecotype. Species composition among plots is similar, but relative abundances of individual species are quite variable. Forbs are always present and overall species diversity is high. This ecotype is frequently are species rich, containing plants that occur in both physiographic regions. Dominant species include *Betula nana, Salix lanata* ssp. *richardsonii, Vaccinium uliginosum, Vaccinium vitis-idaea, Epilobium angustifolium* and *Festuca altaica.*

Boreal Subalpine Forb Meadow

Geomorphology: These productive, forb-rich meadows occur on mountain slopes comprised of hillside colluvium, solifluction, loess, abandoned alluvial fan deposits, and younger and older moraines. Permafrost is absent or >1 m below the surface. These meadows also can be found on higher elevation upland deposits and upland as well as subalpine species are common.

Plant Association: *Artemisia arctica - Festuca altaica-Valeriana capitata* Forbs and grasses are the most common life forms in this ecotype. Deciduous shrubs are present, but total shrub cover is < 25%. Evergreen shrub and sedge cover is variable. An uncommon species that occurs in this ecotype is *Carex spectabilis.* Common species include *Artemisia arctica, Festuca altaica, Valeriana capitata, Mertensia paniculata, Aconitum delphinifolium, Epilobium angustifolium* and *Petasites frigidus.*

Boreal Upland White Spruce Forest

Geomorphology: These upland forests occur on older moraine, upland loess or hillside colluvium throughout the park. Soils predominantly are loams overlain by well developed organic horizons. Blocky-textured soils also occur. These sites are moderately well to well drained, moist, and mostly circumneutral.

Plant Association: *Picea glauca-Rosa acicularis* Needleleaf trees typically have 10-60% cover. All life forms are present except deciduous trees and graminoids. Nonvascular species represent a substantial proportion of total cover. This is a late successional community and has the highest numer of species per plot and highest total species count of all upland ecotypes. Overall, Upland White Spruce Forest has the 9th highest species count. Common species include *Picea glauca, Rosa acicularis, Arctostaphylos rubra, Geocaulon lividum, Hylocomium splendens,* and *Cladonia* spp.

Boreal Upland Birch Forest

Geomorphology: These mature birch forests are located on well-drained slopes of hillside colluvium, older moraine, upland loess, or eolian inactive sand deposits. Although distribution is patchy, this ecotype is widespread throughout the boreal section of the park. Sites are moist and have circumneutral to acidic chemistry. Soils primarily are loamy, rubbly or sandy textured, with well developed surface organic horizons.

Plant Association: *Betula papyrifera-Ledum groenlandicum* Paper birch stands have open to closed canopies with an understory dominated by shrubs and grasses. Nonvascular cover is variable, and sedges often are absent. Spruce trees are present in all plots but have low total cover. This ecotype has a moderate number of species per plot and a low diversity overall. Common species include *Ledum groenlandicum, Picea glauca, Alnus crispa, Rosa acicularis,* and *Calamagrostis canadensis.*

Boreal Upland Aspen Forest

Geomorphology: This ecotype is comprised of aspen forests on hillside colluvium, older moraine, upland loess, and talus bluffs. The ground is sloped, sites are well to excessively drained, and moist to dry. The dominant soil texture is loam, rubble or gravel, and an organic horizon typically is present. Site chemistry is circumneutral to alkaline, although acidic soils occur. These stands are prone to disturbance by fire.

Plant Association: *Populus tremuloides-Picea glauca-Rosa acicularis* Quaking aspen occurs in open to closed stands; spruce trees are present but comprise <25% of total tree cover. Nonvascular cover is low or absent. Forbs and both evergreen and deciduous shrubs form the understory. This ecotype has a high number of species per plot, but overall is not diverse. Common species include *Populus tremuloides, Picea glauca, Rosa acicularis Arctostaphylos uva-ursi, Geocaulon lividum,* and *Pyrola secunda.*

Boreal Upland Spruce-Birch Forest

Geomorphology: These mid- to late successional forests occur on slopes of older moraine or hillside colluvium. Soils are predominantly blocky, rubbly or loamy, resulting in drainage classes of well to somewhat poorly drained. Sites are moist to wet with acidic or circumneutral chemistry. Permafrost is absent or deeper than 1 m.

Plant Association: *Betula papyrifera-Picea glauca-Ribes triste* All life forms except sedges and lichens are present. Deciduous shrubs and forbs characterize the understory, while moss frequently occurs in thick patches. Grasses are present but have little cover. This ecotype has a moderate number of species per plot and a low overall species diversity. Common species include *Vaccinium vitis-idaea, Mertensia paniculata, Calamagrostis Canadensis,* and *Hylocomium splendens.*

Boreal Upland Tall Alder Shrub

Geomorphology: This ecotype consists of tall alder shrubs in patchy or continuous closed thickets on mountain slopes below the subalpine zone. Hillside deposits are upland loess or colluvium with variable surficial textures including organic, loamy, sandy or blocky. These sites are moist, well or moderately well drained, and have acidic or circumneutral chemistry.

Plant Association: *Alnus crispa-Ribes triste-Calamagrostis Canadensis* Tall alder with mixed deciduous shrubs and forbs characterize this ecotype. Common species include *Alnus crispa, Ribes triste, Calamagrostis canadensis, Epilobium angustifolium* and *Mertensia paniculata.* Of upland ecotypes, this class has the second lowest species count per plot but the third highest diversity; of all ecotypes it ranks 17th in total species count.

Boreal Upland Tall Willow Shrub

This ecotype consists of tall willow shrubs in patchy or continuous closed thickets on mountain slopes below the subalpine zone but was not described in detail in the Natural Resource Technical Report. **Common species** include *Salix alaxensis, Salix glauca, Salix arbuscaloides*, mixed deciduous shrubs and forbs including *Shepherdia canadensis, Rosa acicularis* and *Potentilla fruticosa.* Graminoids include *Calamagrostis sp.* and *Festuca sp.*

RARE ECOTYPE

Boreal Upland Sagebrush Meadow

Geomorphology: These meadows are restricted to steep, excessively drained slopes, usually bluffs. Terrain includes hillside colluvium, upland glaciolacustrine deposits (pro-glacial Lake Ahtna), and talus bluffs.

Plant Association: *Artemisia frigida-Calamagrostis purpurescens- Linum perenne* Sagebrush (*Artemisia frigida*) gives this ecotype its characteristic blue tint and strong odor. Deciduous shrubs, forbs and grasses are the most prevalent life forms. Plant species in this ecotype have deep root systems and can withstand disturbance created by solifluction. This community type is stable and persistent, but is not species rich. Despite this, several rare species occur here, including *Juniperus horizontalis, Oxytropis campestris* ssp. *variens* (syn. *Oxytropis tananensis*, and *Agropyron yukonense* (syn. *Elymus calderi*). This ecotype is a relict of pro-glacial steppe; there are no similar ecotypes within the park.

Boreal Lowland White Spruce Forest

Geomorphology: These late successional forests are located on flat or sloped surfaces throughout the park. They occur on a variety of surficial geomorphic types including older moraine, hillside colluvium, alluvial fans and abandoned deposits on floodplains and glaciofluvial outwash. Dominant soil textures include sands, loams, gravels and organic material. Permafrost usually is within 0.5 m of the surface.

Plant Association: *Picea glauca-Vaccinium uliginosum*, White spruce characterizes this ecotype and stand densities vary from woodland to closed canopies. Typical understory species are *Vaccinium uliginosum, Ledum groenlandicum, Vaccinium vitis-idaea, Arctostaphylos rubra,* and *Hylocomium splendens.* Mosses have high cover. This ecotype has a high number of species per plot and is the second most diverse lowland ecotype.

Maritime Upland Tall Alder

Plant Association: *Alnus sinuata-Rubus spectabilis-Sambucus racemosa.* This ecotype is early to mid-successional and is not species-rich. A high density of alder creates a closed or nearly closed canopy. Trees, evergreen shrubs and graminoids have trace cover or are absent. Complete data are not available for nonvascular species, but cover values for both mosses and lichens probably are low. Common vascular species are *Alnus sinuata, Oplopanax horridus, Rubus spectabilis, Heracleum lanatum* and *Athyrium filix-femina.*

Geomorphology: This ecotype occurs on steep slopes on hillside colluvium below the subalpine zone in the St. Elias Mountains and on younger moraines on the Malaspina Forelands. Soils are blocky and well drained.

Maritime Riverine Horsetail Meadow

Geomorphology: These productive communities occur on braided or meander active overbank deposits in riverine corridors. Surface forms include interfluves, river banks, and flood basins. Bare ground and surface water are common features. Soils are loams or silts and organic horizons are thin or absent. Buried organic horizons may be present as a result of flooding and sedimentation.

Plant Association: *Equisetum arvense-Eriophorum angustifolium* Forbs characterize this ecotype, while trees and shrubs are absent or have minimal cover. Graminoids or rushes are present but have low total cover. Mosses frequently are found but lichens are absent. Dominant species include *Equisetum arvense, Equisetum variegatum, Eriophorum angustifolium,* and the mosses *Rhytidiadelphus squarrosus, Sanionia uncinata* and *Drepanocladus* sp.

Maritime Lowland Sitka Spruce Forest

Geomorphology: These spruce forests occur on flat, abandoned floodplains at low elevations in the Malaspina Forelands. This is a late successional ecotype and is limited in distribution. Soils are acidic, well drained, and consist of gravels overlain by organic horizons. Soil stratigraphy data are incomplete because only one comprehensive plot was sampled in this ecotype.

Plant Association: *Picea sitchensis - Vaccinium ovalifolium* Tree canopy is either open or closed. The dominant species is *Picea sitchensis.* Associated species include *Oplopanax horridus, Vaccinium ovalifolium, Rubus pedatus, Carex macrochaeta,* and feather mosses. Information on cover of nonvascular plants is incomplete. Most likely, lichens and evergreen shrubs are absent.

Maritime Riverine Barrens

Geomorphology: This ecotype occurs on barren channel deposits in riverine corridors on the Malaspina Forelands at low elevations. Channels are braided and are both active and inactive. Soils are gravelly or bouldery with little to no surface organics. These sites are well to extremely well drained, moist to dry, and have basic chemistry. Frequent disturbance from water movement or flood events prevents vegetation from becoming established and maintains this ecotype.

Plant Association: *Racomitrium* spp.-*Epilobium latifolium* Although total vegetative cover is variable, mosses are dominant, particularly *Racomitrium* spp. Vascular cover typically is <15%. Among vascular species, *Epilobium latifolium, Lupinus nootkatensis,* and *Alnus sinuata* are most common. Tree seedlings and forbs are present in limited quantities. Sedges are absent and trace amounts of grasses are present.

Maritime Lowland Cottonwood-Spruce Forest

Geomorphology: This ecotype occurs in lowlands on inactive and abandoned glaciofluvial outwash cover deposits of the Malaspina Forelands. The surface generally is flat. Soils are gravelly with thin organic layers.

These sites are well to moderately well drained, moist, and acidic to circumneutral.

Plant Association: *Populus trichocarpa-Alnus sinuate - Picea sitchensis* Common species are *Populus trichocarpa, Picea sitchensis, Alnus sinuata, Oplopanax horridus, Rubus spectabilis,* and *Hylocomium splendens.* Tree canopy cover is open, and the understory canopy varies from densely closed to open. Evergreen shrubs and lichens are absent and graminoids are present in trace amounts. This ecotype is not species-rich.

Maritime Coastal Angelica Meadow

Plant Association: *Lupinus nootkatensis-Angelica lucida* Dominant plant species in these productive meadows include *Angelica lucida, Lupinus nootkatensis, Heracleum lanatum, Castilleja* spp., *Epilobium* spp., and *Fragaria chiloensis.* Evergreen shrubs are absent and deciduous shrubs are sparse. Mosses usually are present, although species diversity is low, while lichens generally are absent. Because of the rich diversity of forbs, this class has the highest species count of the coastal ecotypes.

Geomorphology: This ecotype commonly occurs along coastal beaches, primarily on gently sloping eolian sand deposits. The active dunes are modified by sand blowing off the beaches and are subject to storm surges.

Maritime Lowland Cottonwood Forest

Plant Association: *Populus trichocarpa-Alnus sinuata- Picea sitchensis* Maritime Lowland Cottonwood Forest consists of an open canopy of black cottonwood (*Populus trichocarpa*) with an understory dominated by deciduous shrubs. Common understory species are *Alnus sinuata, Oplopanax horridus, Rubus spectabilis,* and *Equisetum arvense.* Spruce trees are present but do not contribute more than 25% of total tree cover. Mosses are common and lichen cover is sparse.

Geomorphology: This ecotype occurs on flat to hilly terrain at low elevations (<100 m) in the Malaspina Forelands. It occurs in lowland areas on glacial moraine or abandoned cover deposits of glaciofluvial outwash.

Maritime Coastal Elymus Meadow

Geomorphology: This ecotype is located along the coastal section of the Malaspina Forelands. It occurs on eolian active sand deposits. Soils are sandy with no surface organic material. Drainage is somewhat excessive and soils are dry to moist. *Elymus* communities occur early in succession in these coastal areas and are subject to disturbance. The plant community composition and structure are maintained by sand displacement due to wind and periodic inundation by storm surges.

Plant Association: *Elymus mollis-Lathyrus maritimus* Dominant plants include *Elymus arenarius* ssp. *mollis, Lathyrus maritimus* ssp. *maritimus, Fragaria chiloensis, Castilleja* spp. and *Lupinus nootkatensis.* Vascular plant diversity is low because species in this community must be salt tolerant; nonvascular species are absent. Primary productivity is high due to the predominance of forbs and meadows.

Maritime Lowland Tall Alder-Willow Shrub

Geomorphology: This early successional ecotype occurs on abandoned or inactive glaciofluvial cover deposits near the coast (elevations <30 m). Large expanses of these outwash flats occur below the terminus of the Malaspina Glacier, and presumably are being revegetated since stabilization of the glacial moraine a century ago. The surface is flat and soils generally are well drained.

Plant Association: *Alnus sinuata- Salix barclayi- Athyrium filix-femina* These tall alder-willow communities typically have closed canopies, although open canopies occur. The understory canopy typically is closed. Dominant vegetation includes *Alnus sinuata, Salix scouleriana, Salix sitchensis, Rubus spectabilis,* and *Equisetum arvense.* Tree species are present with low cover, and evergreen shrubs and lichens are absent. Mosses are present, although total nonvascular cover is variable.

Maritime Coastal Barrens

Plant Association: *Elymus mollis-Lathyrus maritimus* Vegetation is sparse to non-existent. Dominant plants include *Elymus arenarius* ssp. *mollis, Lathyrus maritimus* ssp. *maritimus; Conioselinum chinense* and *Honckenya peploides.* Species diversity is low. The species present in this ecotype are colonizers that can withstand frequent scouring by wind and sand, and inundation by seawater.

Geomorphology: This ecotype occurs on active marine beaches. Soils are sands or gravels that are moist, somewhat excessively drained, and saline. Wave action and storm surges frequently scour the surface.

Maritime Lowland Forb-Willow Meadow

Plant Association: *Equisetum variegatum-Salix barclayi-Tofieldia glutinosa.* This ecotype is species-rich, with all life forms present. Cover values for individual species are not high; forbs and deciduous shrubs have the highest total vascular cover and mosses comprise a substantial portion of ground cover. Common species include *Equisetum variegatum, Equisetum palustre, Salix barclayi, Salix sitchensis, Limprichtia revolvens,* and *Campylium stellatum.* Some bare soil and surface water may be present but most nonliving cover is plant litter.

Geomorphology: This ecotype occurs on very poorly drained low-elevation flats near the coast. Geomorphic classes include fens and abandoned channel deposits. This ecotype is not prone to natural disturbance.

Alpine Lake

Geomorphology: Alpine lakes occur in substantial depressions formed in glacial moraine or by thawing of permafrost. These lakes mostly are circumneutral, although pH can vary from acidic to basic. Vegetation usually is present and there may be live cover as well as plant litter along the shoreline. Floristic classes were not developed for lake ecotypes. Plant species in alpine lakes include mosses, sedges, or aquatic forbs. Typical shoreline emergent species are *Eriophorum angustifolium, Carex aquatilis,* and *Menyanthes trifoliata. Potamogeton* species are the most common aquatics.

Boreal Lowland Black Spruce Forest

Geomorphology: This late successional ecotype is common in all lowland areas north of the Bagley Icefield. It is found on older moraine, lowland loess, and glaciolacustrine and retransported deposits. Soils are loamy, infrequently sandy or rubbly, and are covered by thin to moderate organic horizons. These forests are prone to wildfire.

Plant Association: *Picea mariana-Salix glauca-Equisetum scirpoides.* This ecotype is black spruce-dominated with substantial shrub and nonvascular components. The forest canopy is open and the understory shrub canopy includes tall, low and dwarf shrubs. Mosses and lichens form a thick carpet. Common additional species are *Empetrum nigrum, Ledum groenlandicum, Arctostaphylos rubra, Vaccinium uliginosum, Vaccinium vitis-idaea* and *Hylocomium splendens.* It has the 3rd highest species count of boreal lowland types.

Boreal Lowland Tussock-Shrub Bog

Geomorphology: This ecotype is widespread in lowland areas in the northern section of the park. Soils are circumneutral to acidic, somewhat to very poorly drained, wet or moist, and underlain by permafrost. There is a moderate to thick surface organic horizon underlain by loam or clay. At least 25% of the ground surface is covered by tussocks.

Plant Association: *Eriophorum vaginatum-Betula nana* Associated species common to plots in this ecotype are *Vaccinium vitis-idaea, Salix planifolia* ssp. *pulchra, Ledum decumbens, Vaccinium uliginosum, Sphagnum* spp., and *Hylocomium splendens.* Trees usually are present only as seedlings or in dwarfed growth forms. Grasses are present infrequently. Mosses are diverse and well represented; and lichens are present in every plot, although they have low total cover.

Boreal Riverine Spruce-Poplar Forest

Geomorphology: Mixed stands of spruce and poplar occur on braided, inactive riverine channel deposits. Soils are coarse, with a predominantly gravelly or bouldery texture, and are covered by thin but well-defined organic horizons. These mid-successional forests have alkaline to circumneutral soils that are somewhat excessively drained and dry.

Plant Association: *Populus balsamifera-Picea glauca-Oxytropis campestris* The tree canopy typically is open in this mixed-forest ecotype. All life forms can be present, but shrubs and forbs are most prevalent. Common species include *Populus balsamifera, Picea glauca, Oxytropis campestris, Shepherdia canadensis* and *Solidago multiradiata.* This ecotype has a moderate number of species per plot; species diversity of the ecotype as a whole is similar to the boreal riverine poplar ecotypes.

Boreal Riverine Sandy Willow Shrub

Geomorphology: These early successional stands occur on braided, active overbank riverine deposits, especially in the Chitina River Basin. The dominant soil texture is sand, and surface organic material is absent, although buried O horizons often exist. Soils are alkaline, moist, and well drained. The most common disturbance is sedimentation during flood events. As a result, this ecotype is the 2nd least floristically diverse of all riverine ecotypes. Bare soil and litter alone are present in all plots.

Plant Association: *Salix barclayi-Salix niphoclada - Eleagnus commutate* While willows comprise the majority of deciduous shrub cover, silverberry is a typical associate. Trees are present as seedlings, and forbs always are present, while frequency of other life forms is variable. *Hedysarum alpinum, Salix glauca,* and *Oxytropis campestris* commonly occur.

Boreal Riverine Circumalkaline Barrens

Geomorphology: Widespread along braided, active or inactive riverine channel deposits, this ecotype occurs along glacial rivers throughout the park. Soils are circumneutral to alkaline, and have predominantly gravelly or bouldery soil textures. Sites have <30% cover of vascular species, are somewhat excessively to moderately well drained, and are dry or moist. Riverine processes such as flooding or channel migration maintain this ecotype, which otherwise is replaced in the successional sequence by scrub ecotypes.

Plant Association: *Epilobium latifolium-Salix alaxensis* Despite being sparsely vegetated with a low species count per plot, this ecotype has the highest total species richness of all riverine ecotypes, and the 13th highest species count overall. Forbs are the most common life form, followed by deciduous shrubs and grasses. Notable species that occur in this ecotype include *Lupinus kuschei* (G3S2), *Salix setchelliana* (G4S3) and *Puccinellia interior.*

Maritime Glaciated Tall Alder Willow Shrub

Geomorphology: This ecotype occurs on young moraine where the surface has been stable long enough to support the growth of shrubs. The ground surface has substantial microtopographic variation due to its recent deglaciation. Glacial ice is still present beneath the surface at some sites.

Plant Association: *Alnus sinuata-Sorbus scopulina* Shrubs, especially *Alnus sinuata* and *Salix sitchensis,* characterize this ecotype. Shrub canopy cover typically is closed but open canopies occur. Common understory species include *Oplopanax horridus, Streptopus amplexifolius,* and *Epilobium angustifolium.* Deciduous shrubs, forbs and nonvascular species are more common than deciduous trees, evergreen trees and graminoids. Some bare soil is present.

Maritime Lowland Sedge-Bluegberry Bog

Geomorphology: Maritime Lowland Sedge-Blueberry Bog is located at <50 m elevation on the Malaspina Forelands. This ecotype occurs in kettle basins or on glaciofluvial outwash (abandoned cover deposits). These bogs consist of very poorly to poorly drained soils that are circumneutral to acidic. Peat accumulation results in a surface organic layer =40 cm.

Plant Association: *Vaccinium uliginosum-Carex pluriflora* Shrubs and forbs characterize this ecotype and a thick layer of moss is present, mostly *Sphagnum teres.* Only species tolerant of wet soils occur in this ecotype. Trees, evergreen shrubs and lichens are absent. Dominant vascular species are *Vaccinium uliginosum, Carex pluriflora, Eriophorum russeolum, Carex lyngbyaei,* and *Polygonum viviparum.* This class is not diverse.

Glacial River

Geomorphology: Glacial Rivers are common throughout the park and originate from melting glaciers. These rivers are highly turbid, alkaline, and have peak discharge in July. Nearly all the large, mappable rivers in the park are Glacial Rivers.

Glacial Lake

Geomorphology: Glacial Lakes occur in isolated young morainal kettles and basins below the alpine zone. Aquatic vegetation is absent and water chemistry is basic. Active glacial thermokarst leads to higher turbidity and alkalinity.

Boreal Lowland Black Spruce Bog

Geomorphology: This ecotype is widespread, occurring on a variety of geomorphic types, including bogs, glaciofluvial outwash cover deposits, lowland loess, older moraine and hillside colluvium. Surface forms also are variable, including slopes, flats and basins. Despite this variability, all sites have substantial organic horizons, are somewhat poorly to poorly drained, moist to wet, and underlain by permafrost. Chemistry is circumneutral to acidic. Thaw depths typically are = 0.5 m.

Plant Association: *Picea mariana-Salix pulchra-Rubus chamaemorus* These black spruce stands are typified by species common to bogs, including *Rubus chamaemorus, Sphagnum* spp., and *Ledum decumbens.* Sites are woodlands (10-24% cover) or open forest and trees frequently are stunted. Deciduous trees are infrequent, but all other life forms are common. Total species count is high and this is the 2nd most diverse lowland ecotype.

Boreal Lowland Sedge-Shrub Fen

Geomorphology: This ecotype occurs on minerotrophic peaty soils and is taxonomically diverse, particularly in sedge and forb species. Surfaces are flat and the dominant soil texture is peat. Sites are wet, poorly to very poorly drained. The most common disturbances are thermokarst events.

Plant Association: *Carex aquatilis-Eriophorum angustifolium - Andromeda polifolia Carex aquatilis-Potentilla palustris-Salix pulchra* Two distinct floristic classes exist for this ecotype, which is co-dominated by sedge and shrub species. Two rare species that occur in the ecotype are *Carex adelostoma* and *Carex holostoma.* Of lowland ecotypes, this ecotype has the lowest number of species per plot but has the highest total species count. Total species count is the sixth highest for all ecotypes. Common species include *Carex aquatilis, Eriophorum angustifolium, Scorpidium scorpioides,* and *Andromeda polifolia.*

Boreal Riverine Gravelly Poplar Forest

Geomorphology: These poplar forest communities are located on braided, active and inactive riverine channel deposits throughout the park. Soils are alkaline to circumneutral and consist of bouldery or gravelly sediments overlain by thin organic horizons. Sites are somewhat excessively drained and dry to moist. These communities are mid-successional and eventually transition into spruce forests.

Plant Association: *Populus balsamifera-Dryas drummondii- Oxytropis campestris* Poplar trees vary from dense stands of seedlings in early succession to mature, open canopies. All life forms commonly are present except graminoids and lichens. Species richness is low. Common species include *Populus balsamifera, Dryas drummondii, Oxytropis campestris, Picea glauca, Salix alaxensis, Hedysarum mackenzii* and *Elaeagnus commutata.*

Boreal Riverine Loamy Willow Shrub

Geomorphology: These willow communities occur on active and inactive overbank riverine deposits and inactive channel deposits throughout the boreal region of the park. The dominant soil texture is loam and surface organic layers usually are present. Soils are somewhat poorly to well drained, moist, and acidic to circumneutral. These communities are early successional; vegetative structure is not complex.

Plant Association: *Salix pulchra-Calamagrostis Canadensis* Several willows occur in this ecotype but the most common species are *Salix planifolia* ssp. *pulchra, S. barclayi* and *S. arbusculoides.* Willow canopy usually is open, and deciduous shrubs, forbs, grasses and mosses are the most common life forms in the understory. Common species in addition to willows include *Calamagrostis canadensis* and *Trientalis europaea.* Of boreal riverine ecotypes, this ecotype has the highest species count per plot; and variability in species composition among plots is low.

Maritime Alpine Barrens

Geomorphology: This ecotype occurs on slopes and ridges in the alpine zone above 810 m in the St. Elias Range. Terrain includes hillslope colluvium, noncarbonated metamorphic, and sedimentary bedrock. Slopes are unstable due to frost cracking, soil creep, and landslides.

Plant Association: *Cassiope stellariana-Luetkea pectinata* Total cover of vegetation is less than 30% in this ecotype. The most common life form is dwarf shrubs, particularly evergreen shrubs. Dominant species include *Cassiope stelleriana, Luetkea pectinata,* and *Phyllodoce aleutica.* Cover of forbs, graminoids and nonvascular species generally is low, although all of these life forms usually are present to some degree. Commonly occurring species include *Carex nardina, Vaccinium uliginosum,* and *Luzula multiflora.*

Maritime Subalpine Low Blueberry Shrub

Geomorphology: These open meadows occur on steep, south-facing mountain slopes in the southern extent of the St. Elias Mountains. Terrain includes hillside colluvium and young moraine deposits. Soils consist of rubbly or blocky colluvium overlain by thin organic horizons. This terrain is fairly stable and is not prone to disturbance.

Plant Association: *Vaccinium ovalifolium-Luetkia pectinata* Low, deciduous shrubs characterize this ecotype, and while closed canopies are most common, open canopies also occur. Forbs and evergreen shrubs are well represented in this ecotype, while trees are absent. Graminoids and lichens have low total cover. Dominant species include *Vaccinium ovalifolium, Luetkia pectinata, Vaccinium alaskensis, Phyllodoce aleutica, Gymnocarpium dryopteris,* and the moss *Pseudoleskea baileyi.*

Maritime Riverine Spruce Cottonwood Forest

Geomorphology: This ecotype consists of mid-successional mixed forests that occur on inactive, braided riverine overbank deposits or on glaciofluvial outwash abandoned cover deposits. Soils are sands or gravels overlain by a thin layers of organic material. Sites are located on flat surfaces, are well to moderately well drained, moist, and have acidic chemistry.

Plant Association: *Populus trichocarpa-Alnus sinuata- Picea sitchensis* Vegetation is dominated by cottonwood, with spruce comprising about one-third of total tree cover. Dominant species include *Populus trichocarpa, Picea sitchensis, Alnus sinuata, Rubus spectabilis, Streptopus amplexifolius,* and the ferns *Athyrium filix-femina* ssp. *cyclosorum,* and *Gymnocarpium dryopteris.* Graminoid cover usually is low, and lichens typically are absent.

Lowland Lake

Plant Association: No plant associations were developed for Lowland Lakes. However, two types of associations appear prevalent. One is dominated by the pondlily *Nuphar polysepalum,* while the other is dominated by the pondweed Potamogeton spp. (where pondlily is not present). The ecotype has the highest species richness of all water ecotypes. Other common species include *Hippuris vulgaris, Utricularia* spp., and *Myriophyllum* spp.

Geomorphology: Lowland lakes are common throughout the study area. This ecotype occupies both deep and shallow kettle and thermokarst depressions. Beaver ponds are also a component of this ecotype. These lakes have a circumneutral or basic pH.

Boreal Lowland Tall Willow Shrub

Geomorphology: Limited to post-disturbance (e.g. burned) areas, this uncommon ecotype occurs on lowland loess or older moraine. Surface forms include flats and slopes, and soils are moderately well to well drained, moist and circumneutral to acidic. Dominant texture is loamy but gravelly or organic textures also occur.

Plant Association: *Salix scouleriana-Salix barclayi-Rosa acicularis* Vegetation consists of willows taller than 1.5 m with an open canopy. This ecotype is not diverse; it has the lowest number of species of all boreal lowland ecotypes. The understory consists of mosses, forbs and evergreen shrubs. Common species include *Salix scouleriana, Salix barclayi, Rosa acicularis, Picea glauca* (mostly seedlings), *Vaccinium vitis-idaea, Arctostaphylos rubra, Epilobium angustifolium,* and *Hylocomium splendens.* Graminoids often are present, but deciduous trees are absent.

Boreal Lacustrine Pondlily

Geomorphology: This ecotype occurs in isolated moraine or kettle ponds of varying depths. Pond lilies are restricted to shallow margins when ponds are > 2 m deep. This ecotype is widespread throughout lowland areas in the park, particularly in the Jahathmund and Chitina Basins and on the Wrangell Forelands.

Plant Association: *Nuphar polysepalum-Sparganium angustifolium* The most common species is *Nuphar polysepalum*, although other aquatic forbs frequently occur. These include *Sparganium angustifolium, Potamogeton alpines* ssp. *tenuifolius* and *Potamogeton zosterifolius.* Aquatic sedges and mosses frequently are found in association with *Nuphar* in shallow water. We did not sample in deep water, resulting in an incomplete species list for aquatic forbs. Relative to other boreal ecotypes, Boreal Lacustrine Pondlily is low in total species, and has the 10th lowest species count per plot.

Boreal Riverine Loamy Poplar Forest

Geomorphology: These mature poplar forests occur on braided active and inactive overbank riverine deposits throughout the study area. Soils are predominantly loamy and surface organic material is present; buried O horizons within the soil matrix are a common feature. Sites are alkaline to circumneutral, well-drained and moist.

Plant Association: *Populus balsamifera-Alnus tenuifolia-Equisetum arvense* These poplar forests usually are open stands, though closed canopies occur. Deciduous shrubs and forbs are the most common life forms in the understory. Total nonvascular cover is low, and mosses or lichens may be absent. This ecotype is not diverse and has a below-average species count per plot. Common species are *Populus balsamifera, Alnus tenuifolia, Equisetum arvense, Rosa acicularis, Viburnum edule, Calamagrostis canadensis* and *Pyrola asarifolia.*

Boreal Riverine Low Silverberry Shrub

Geomorphology: This distinctive ecotype is located on river bars in the southern half of the boreal zone in WRST, particularly in the Chitina River Basin. It occurs on braided, active and inactive channel deposits and inactive overbank deposits. Soils are predominantly sands or gravels, and surface organic layers are thin to nonexistent.

Plant Association: *Eleagnus commutata-Oxytropis campestris* Silverberry (*Elaeagnus commutata*) characterizes this ecotype, which also has high diversity of grasses. Shrub canopy usually is open, and presence of nonvascular plants, grasses and evergreen species varies among plots. Trees are present as seedlings or saplings. Sedges are absent. Of boreal riverine ecotypes, this ecotype has the third highest species count per plot and substantial variability in species composition among plots. Common species are *Picea glauca, Aster sibiricus,* and *Solidago decumbens.*

Maritime Alpine Cassiope Dwarf Shrub

Geomorphology:
Maritime Alpine Cassiope Dwarf Shrub occurs on upper mountain slopes, particularly in nivation hollows, in the St. Elias Range near the coast. Terrain includes hillslope colluvium, noncarbonate metamorphic, and sedimentary bedrock. Slopes are unstable due to frost cracking, soil creep, and landslides. This ecotype is most common on north-facing slopes.

Plant Association: *Cassiope stellariana-Luetkea pectinata* Vegetation is dominated by *Cassiope stelleriana, Luetkea pectinata, Phyllodoce aleutica,* and *Fauria crista-galli.* While evergreen shrubs dominate the vegetative cover, together forbs and nonvascular species comprise one third of total live cover. Deciduous shrubs usually are present but do not contribute substantially to total vegetative cover. This ecotype has the highest species diversity of the Maritime Alpine classes.

Maritime Subalpine Lupine Meadow

Geomorphology: This forb-dominated ecotype occurs on younger moraines or hillside colluvium, on upper slopes in the subalpine zone of the St. Elias Mountains. Soils are blocky and occur with thin organic horizons. These sites are well drained, moist and acidic. They are fairly stable, although solifluction contributes to some soil instability.

Plant Association: *Lupinus nootkatensis-Valeriana sitchensis* These productive subalpine meadows are unique in the park, and flourish in the wet, maritime climate. This ecotype has high diversity of vascular species, characterized by forbs, though graminoids and mosses also are well represented. Trees are absent and shrubs have low cover. Dominant species vary among sites and may include *Fauria crista - galli, Lupinus nootkatensis, Athyrium filix - femina* ssp. *cyclosorum, Valeriana sitchensis, Epilobium angustifolium,* and *Veratrum viride* ssp. *eschscholtzii.*

Maritime Riverine Cottonwood Forest

Geomorphology: These mid- to late-successional cottonwood forests occur on braided, coarse, inactive riverine channel deposits. Surfaces are flat, and dominant soil texture varies from gravelly to bouldery. Soils are acidic, moist and somewhat excessively drained. Thin surface organic horizons are present.

Plant Association: *Populus trichocarpa-Alnus sinuata - Picea sitchensis* Maritime Riverine Cottonwood Forest has an open canopy dominated by black cottonwood. In the understory, deciduous shrubs and forbs are common. Dominant species include *Populus trichocarpa, Alnus sinuata, Oplopanax horridus, Rubus spectabilis, Dryopteris dilatata* ssp. *americana,* and *Pyrola asarifolia.* The evergreen tree *Picea sitchensis* is common in the understory. Cover of litter is high, and mosses are present, although their occurrence often is patchy.

Snow/Glaciers

Plant Association: No vegetation is present on the snow and ice surfaces.

Geomorphology: Snowfields and glaciers are abundant at high elevations throughout the park. In areas of particularly heavy snowfall along the coastal ranges, the glaciers extend down mountain valleys and occasionally into lowland areas.

Boreal Lowland Low Birch-Willow Shrub

Geomorphology: This ecotype is located in lowland areas throughout the park on lacustrine and loess deposits, older moraine, and retransported and glaciofluvial outwash abandoned cover deposits. Soils are predominantly loamy with thin to moderately thick surface organic horizons. Permafrost typically is within 1 m of the surface.

Plant Association: *Betula nana-Salix pulchra-Ledum decumbens* Deciduous shrubs characterize this ecotype, although every life form except deciduous trees may be present. Shrubs typically are <1.5 m in height. Common species are *Betula nana, Salix pulchra, Ledum decumbens, Potentilla fruticosa, Salix reticulata, Salix barclayi, Vaccinium uliginosum, Festuca altaica,* and *Hylocomium splendens.* Nonvascular species have variable cover and litter is always present. This class has the 6th highest number of species per plot, but is not diverse overall.

Boreal Riverine White Spruce Forest

Geomorphology: These mature, open, late successional forests occur on inactive overbank riverine deposits. Sites are circumneutral to acidic, moist and well drained. Although a thick layer of moss covers the forest floor, these communities are relatively young and permafrost has not developed.

Plant Association: *Picea glauca-Hedysarum alpinum* Mature white spruce trees with an open canopy characterize this ecotype. Forbs are the most common vascular life form in the understory. Mosses are conspicuous in all plots, particularly *Hylocomium splendens,* Most deciduous shrubs have low stature, although remnant tall deciduous shrubs from earlier successional stages, such as *Salix bebbiana*, are present. Common species are *Hedysarum alpinum, Rosa acicularis* and *Geocaulon lividum.* Boreal Upland White Spruce Forest also is dominated by *P. glauca*, but occurs on upland deposits and has a different species composition.

Boreal Riverine Tall Alder Shrub

Geomorphology: This early to mid-successional ecotype occurs on braided and meander active overbank deposits and on active and inactive channel deposits. Soil textures vary from loams to sands and gravels. Drainage varies from poorly to well drained, resulting in wet to moist soils. Site chemistry is either alkaline or circumneutral.

Plant Association: *Alnus tenuifolia-Calamagrostis Canadensis* Although alder stands are not typically diverse, this ecotype has the second highest total species count of all riverine ecotypes. Species composition among sites is quite variable though species count per plot is below average. The presence and proportion of life forms also varies among sites. Common species are *Alnus tenuifolia, Salix alaxensis, Calamagrostis canadensis, Rubus arcticus, Equisetum arvense* and *Artemisia tilesii.*

Boreal Riverine Dryas Dwarf Shrub

Geomorphology: This ecotype occurs on coarse, active, braided channel deposits along glacial rivers and on moderately steep headwater floodplains throughout the boreal region of the park. Slope positions include point and lateral bars, flat banks, and interfluves.

Plant Association: *Dryas drummondii-Oxytropis campestris.* This ecotype is characterized by evergreen dwarf shrubs and is not particularly species rich. Nonvascular species, deciduous species and forbs are present at all sites, while graminoids are less common with variable occurrences. Common species include *Dryas drummondii, Shepherdia canadensis, Populus balsamifera, Oxytropis campestris* and *Ceratodon purpureus.* Poplar, willow and silverberry often are present as seedlings, and these species determine the relative composition of following successional communities.

Maritime Glaciated Barrens

Geomorphology: This ecotype occurs on young moraine on terminal glaciers, and is widespread throughout the maritime zone of the park. The surface is irregular due to discontinuous thawing of the underlying ice layer. Extensive areas of barren or recently vegetated moraine occur across the forelands near the coast.

Plant Association: *Alnus sinuata-Sorbus scopulina* Plant cover is very low and species occurrence varies among sites. Deciduous shrub and forb species occur most frequently. Trees and lichens are absent. Aquatic species sometimes occur in small, poorly-drained depressions. As the surface stabilizes, this ecotype is succeeded by Maritime Glaciated Tall Alder-Willow Shrub, with which it shares species composition and some soil characteristics. Barrens have thinner surface organic horizons, more surface fragments and higher pH and EC than Maritime Glaciated Tall-Alder Willow Shrub.

Maritime Upland Sitka Spruce Forest

Geomorphology: These spruce forests occur on upper slopes on hillside colluvium, younger moraine and eolian inactive coastal sand deposits. Soils are variable, including loam, sands, and blocky material. Surface organic horizons range from thin to well developed.

Plant Association: *Picea sitchensis-Vaccinium ovalifolium* The Sitka spruce canopy usually is open, but may be closed, and low shrubs create a closed understory. Mosses and shade-tolerant forbs are well represented, while graminoids are absent and lichens are present only in trace quantities. Common species are *Picea sitchensis, Oplopanax horridus, Vaccinium ovalifolium, Rubus pedatus, Gymnocarpium dryopteris,* and *Rhytidiadelphus loreus.*

Maritime Riverine Tall Alder-Willow Shrub

Geomorphology: These early successional plant communities occur on active overbank and channel deposits in meander and braided riverine corridors. Soils are composed of interbedded sands, gravels, and boulders overlain by thin organic layers; buried O horizons also can be present. Sites are acidic, moderately to somewhat excessively drained, and moist.

Plant Association: *Alnus sinuata - Salix barclayi - Equisetum variegatum* Stands are dominated by alder with a minor, but typical component of willows, primarily *Salix barclayi, Salix scouleriana,* and *Salix sitchensis.* The canopies are open or closed. The understory is dominated by *Equisetum arvense, Rubus spectabilis,* and moss species. Forbs are common, while graminoids are scarce. This ecotype is early successional, and, in the absence of disturbance, cottonwood forest eventually becomes established on these sites.

Rare Ecotypes

Rare ecotypes were not included in mapping and analysis. These include Boreal Alpine Alkaline Barrens, Boreal Alpine Alkaline Dryas Dwarf Shrub, Boreal Subalpine Sagebrush Meadow, Maritime Coastal Brackish Barrens, Maritime Riverine Tall Willow Shrub, and Maritime Subalpine Fauria Meadow.

Notable species ranking
(see Boreal Riverine Circumalkaline Barrens)
Lupinus kuschei (G3S2),
Salix setchelliana (G4S3)

Global Ranking
G3: Either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range (21-100 occurrences). Threatened throughout its range. **G4**: Widespread and apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

State Ranking
S2: Imperiled in state because of rarity (6-20 occurrences), or because of other factors making it very vulnerable to extirpation from the state .
S3: Rare or uncommon in the state (21-100 occurrences).