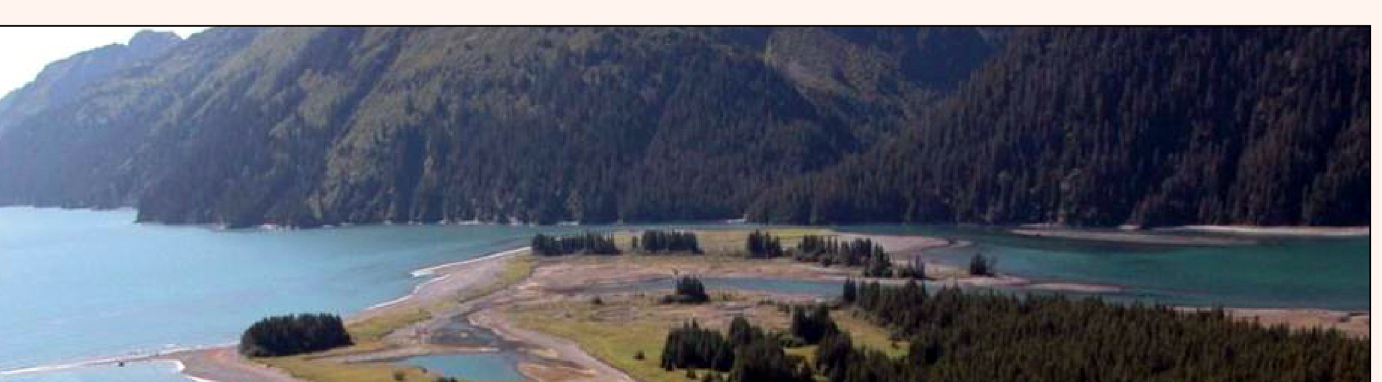
Kenai Fjords National Park
Landcover Classification

National Park Service
U.S. Department of the Interior



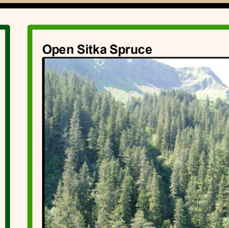
PROJECT DESCRIPTION
This project was undertaken by the Alaska National Park Service Inventory and Monitoring Program in cooperation with the Alaska Natural Heritage Program (AKNHP), University of Alaska Anchorage. The goal of the NPS Inventory and Monitoring Program is to provide reliable and consistent information for assessing status and trends in the condition of National Park ecosystems. It conducts landcover mapping and classification under the inventory portion of the program 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, AKNHP and the Alaska Region Inventory Program have developed a digital landcover map based on aerial photography and field checked by vegetation survey. We mapped 54 landcover classes for the Park using 1:40,000 and 1:36,000 color infrared aerial photographs taken in 2003 and 2004, respectively. The three levels of classification—ecological system, landcover class and plant association—provided through this project are important for addressing management and monitoring goals. The Kenai Fjords National Park 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. Fine-scale vegetation structural information provided by the accompanying Natural Resource Technical Report NPS/KEFJ/NRTR—2008/136 can also enhance ecological analyses for evaluating passerine bird habitat distribution.

Closed Sitka Spruce


Classification: The tree canopy cover is 60% or more, and Sitka spruce contributes 75% or more to the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: Closed Sitka Spruce Forest (I.A.1.a).

Environment: It is common on slopes, alluvial fans, floodplains and moraines. It occurs from sea level to tree line, patch size is small to large, and the sites are mesic but sometimes with wet inclusions. It is common covering 5.8% of the Park's vegetated land.

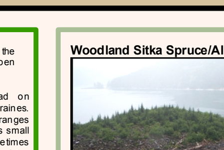
Vegetation: *Picea sitchensis* typically dominates the tree layer. *Tsuga mertensiana* and *Populus balsamifera* ssp. *trichocarpa* may be present with low cover. *Alnus viridis* ssp. *sinuata*, *Oplopanax horridus* and *Vaccinium* species are common shrub species.

Open Sitka Spruce


Classification: The tree canopy cover is 25-59%, and Sitka spruce contributes 75% or more to the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open Sitka spruce forest (I.A.2.a.)

Environment: This class is widespread on slopes, alluvial fans, floodplains and moraines. The slope is level to steep, the elevation ranges from sea level to tree line, the patch size is small to large, and the sites are mesic, but sometimes with small wet inclusions. It covers 5.8% of the Park's vegetated land.

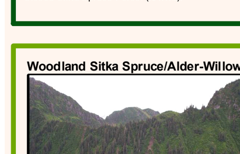
Vegetation: *Picea sitchensis* typically dominates the tree layer. *Tsuga mertensiana* and *Populus balsamifera ssp. trichocarpa* may be present with low cover. Alnus *viridis ssp. sinuata*, *Oplopanax horridus* and *Vaccinium* species are common shrub species.

Woodland Sitka Spruce/Alder


Classification: Tree cover is 10-24%, Sitka spruce contributes 75% or more to the total tree cover, and alder cover is >25%. The class is comparable to the Viereck et al. (1992) hierarchical level III: needleleaf woodland (I.A.3).

Environment: This class is widespread on slopes, alluvial fans, floodplains and moraines. The slope is level to steep, the elevation ranges from sea level to tree line, the patch size is small to large, and the sites are mesic. It is common covering 3.3% of the Park's vegetated land.

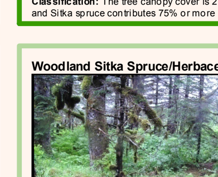
Vegetation: *Picea sitchensis* dominates the tree layer, and *Alnus viridis* ssp. *sinuata*, dominates the understory.

Woodland Sitka Spruce/Alder-Willow


Classification: Tree cover is 10-24%, Sitka spruce contributes 75% or more to the total tree cover, and alder and willow cover is >25% each contributing >25% to the total shrub cover. The class is comparable to the Viereck et al. (1992) level III: needleleaf woodland (I.A.3).

Environment: This class occurs on slopes, alluvial fans, floodplains and moraines. The slope is level to steep, the elevation ranges from sea level to tree line, the patch size is small to large, and the sites are mesic. It is uncommon covering 1.1% of the Park's vegetated land.

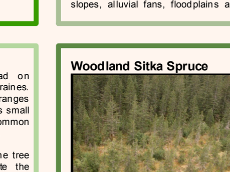
Vegetation: *Picea sitchensis* dominates the tree layer, and *Alnus viridis* ssp. *sinuata* and *Salix barclayi* co-dominate the understory.

Woodland Sitka Spruce/Herbaceous


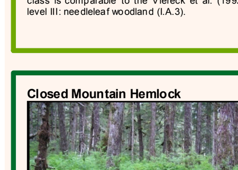
Classification: Tree cover is 10-24%, Sitka spruce contributes 75% or more to the total tree cover, alder and willow cover is <25% and herbaceous cover is >25%. The class is comparable to the Viereck et al. (1992) hierarchical level III: needleleaf woodland (I.A.3).

Environment: This class is widespread on slopes, alluvial fans, floodplains and moraines. The slope is level to steep, the elevation ranges from sea level to tree line, the patch size is small to large, and the sites are mesic. It is uncommon covering 0.6% of the Park's vegetated land.

Vegetation: *Picea sitchensis* dominates the tree layer, and herbaceous species dominate the understory including *Athyrium filix-femina*, *Chamerion angustifolium* ssp. *angustifolium*, *Achillea millefolium* var. *borealis*, *Calamagrostis canadensis*, *Equisetum arvense*, *Geranium erianthum*, *Heracleum maximum*, *Sanguisorba canadensis* and *Senecio triangularis*.

Woodland Sitka Spruce


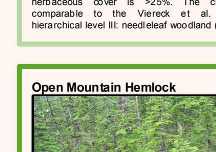
Classification: This landcover class includes polygons we could not identify as one of the finer scale Sitka spruce woodland classes (i.e. Sitka spruce woodland/alder, Sitka spruce woodland/alder-willow and Sitka spruce woodland/herbaceous). Tree cover is 10-24%, and Sitka spruce contributes 75% or more to the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level III: needleleaf woodland (I.A.3). It is rare covering 0.4% of the Park's vegetated land.

Closed Mountain Hemlock


Classification: Tree cover is 60% or more, and mountain hemlock contributes 75% or more to the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed mountain hemlock forest (IA.1.f.).

Environment: This class is common on slopes and moraines. It is less common on steep slopes. It extends from sea level to tree line, its patch size is small to large, and the sites are mesic, sometimes with wet inclusions. It covers 1.5% of the Park's vegetated land.

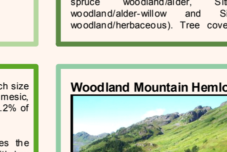
Vegetation: *Tsuga mertensiana* dominates the tree layer. Sitka spruce may be present with low cover. The shrub layer includes tall shrubs such as *Vaccinium* species and *Oplopanax horridus*. A variety of other understory species occur such as *Harrimanella stelleriana*, *Elliottia pyroliflorus*, *Lysichiton americanus* and *Nephrophyllidium crista-galli*.

Open Mountain Hemlock


Classification: Tree canopy cover is 25-59%, and mountain hemlock contributes 75% or more to the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open mountain hemlock (I.A.2.c).

Environment: This class is common on slopes and moraines and uncommon on steep slopes. It extends from sea level to tree line, its patch size is small to large, and the sites are mesic, sometimes with wet inclusions. It covers 1.2% of the Park's vegetated land.

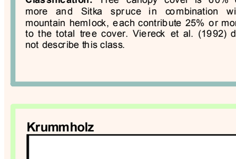
Vegetation: *Tsuga mertensiana* dominates the tree layer. Sitka spruce may be present with low cover. The shrub layer includes tall shrubs such as *Vaccinium* species and *Oplopanax horridus*. A variety of other understory species occur such as *Harrimanella stelleriana*, *Elliottia pyroliflorus*, *Lysichiton americanus* and *Nephrophyllidium crista-galli*.

Woodland Mountain Hemlock


Classification: Tree canopy cover is 10-24%, and mountain hemlock contributes 75% or more to the total tree cover. Viereck et al. (1992) did not describe this class.

Environment: This class is common at higher elevations on the outer fjordlands, moraines and slopes. It occurs on flat to moderate slopes, from sea level to tree line, patch size is small to large, and the sites are typically mesic. It covers 1.7% of the Park's vegetated land.

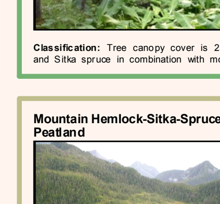
Vegetation: *Tsuga mertensiana* dominates the tree layer. Understory species include *Harrimanella stelleriana*, *Nephrophyllidium crista-galli*, *Vaccinium ovalifolium* and *V. uliginosum*.

Closed Sitka Spruce-Mountain Hemlock


Classification: Tree canopy cover is 60% or more and Sitka spruce in combination with mountain hemlock, each contribute 25% or more to the total tree cover. Viereck et al. (1992) did not describe this class.

Environment: This class is common on the outer fjordlands, moraines and slopes. Slopes are flat to moderate, it occurs from sea level to tree line, patch size is small to large, and the sites are typically mesic often with wet inclusions. It covers 2.5% of the Park's vegetated land.

Vegetation: *Picea sitchensis* dominates the tree layer in combination with *Tsuga mertensiana*. The shrub layer includes *Oplopanax horridus*, *Rubus spectabilis* and *Vaccinium* species. Other understory species include *Lysichiton americanus*, *Nephrophyllidium crista-galli*, and *Dryopteris expansa*.

Open Sitka Spruce-Mountain Hemlock


Classification: Tree canopy cover is 25-59%, and Sitka spruce in combination with mountain hemlock, each contribute 25% or more to the total tree cover. Viereck et al. (1992) did not describe this class.

Environment: This class is common on the outer fjordlands, moraines and slopes. Slopes are flat to moderate, it occurs from sea level to tree line, patch size is small to large, and the sites are typically mesic often with wet inclusions. It covers 1.0% of the Park's vegetated land.

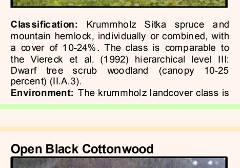
Vegetation: *Picea sitchensis* dominates the tree layer in combination with *Tsuga mertensiana*. The shrub layer includes *Oplopanax horridus*, *Rubus spectabilis* and *Vaccinium* species.

Woodland Sitka Spruce-Mountain Hemlock


Classification: Tree canopy cover is 10-24%, and Sitka spruce in combination with mountain hemlock, each contribute 25% or more to the total tree cover. Viereck et al. (1992) did not describe this class.

Environment: This class is common on the outer fjordlands, moraines and slopes. Slopes are flat to moderate, it occurs from sea level to tree line, patch size is small to large, and the sites are typically mesic often with wet inclusions. It covers 0.6% of the Park's vegetated land.

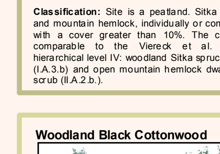
Vegetation: *Picea sitchensis* dominates the tree layer in combination with *Tsuga mertensiana*. Understory species includes *Cornus suecica*, *Vaccinium* species, *Lysichiton americanus*, and *Nephrophyllidium crista-galli*.

Krummholz


Classification: Krummholz Sitka spruce and mountain hemlock, individually or combined, with a cover of 10-24%. The class is comparable to the Viereck et al. (1992) hierarchical level III: Dwarf tree scrub woodland (canopy 10-25 percent) (II.A.3).

Environment: The krummholz landcover class is uncommon and typically occurs in the subalpine on older landscapes, and occurs occasionally on windswept knobs at lower elevations. Patch size is small and, consequently, we could rarely map it. Sites are typically mesic, and flat to steep on mountain ridges, knolls and slopes. It covers 0.1% of the Park's vegetated land.

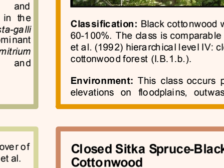
Vegetation: *Tsuga mertensiana* and *Picea sitchensis* have a krummholz lifeform. Tree height is typically less than 2 m with some trees extending to 3 m. Understory species include *Phyllodoce aleutica*, *Rubus pedatus*, *Rubus spectabilis*, *Vaccinium uliginosum* and *Nephrophyllidium crista-galli*.

Mountain Hemlock-Sitka-Spruce Peatland


Classification: Site is a peatland. Sitka spruce and mountain hemlock, individually or combined, with a cover greater than 10%. The class is comparable to the Viereck et al. (1992) hierarchical level IV: woodland Sitka spruce—bog (I.A.3.b) and open mountain hemlock dwarf tree scrub (II.A.2.b.).

Environment: This is a minor though widespread class in the Park and Prince William Sound. It is mosaiced with forests or wetlands that dominate the slopes of the older landscapes. The patch size is small to moderate, it occurs from low to mid elevations, the slope ranges up to 32°, and the sites are wet, often with an organic layer. It covers 0.8% of the Park's vegetated land.

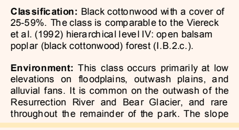
Vegetation: *Tsuga mertensiana* dominates the overstory and is generally of a dwarf stature (0.6 to 3.7 meters tall). *Picea sitchensis* can be common. The stands are uneven-aged. The dominant shrubs are *Empetrum nigrum*, *Elliottia pyroliflorus*, *Loiseleuria procumbens* and *Vaccinium uliginosum*. Common species in the undergrowth include *Nephrophyllidium crista-galli* and *Trichophorum caespitosum*. The dominant mosses are *Hylocomium splendens*, *Racomitrium lanuginosum*, *Rhytidiadelphus loreus* and *Sphagnum*.

Closed Black Cottonwood


Classification: Black cottonwood with a cover of 60-100%. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed black cottonwood forest (I.B.1.b.).

Environment: This class occurs primarily at low elevations on floodplains, outwash plains, and alluvial fans. It is common on the outwash of the Resurrection River and Bear Glacier, and rare throughout the remainder of the park. The slope is level, patch size is small to large, and the sites are mesic although high riverflows will inundate floodplain and outwash sites. It covers 0.2% of the Park's vegetated land.

Vegetation: *Populus balsamifera* ssp. *trichocarpa* dominates this class with cover greater than 60%. *Picea sitchensis* seedlings through mature trees may be common. Tall shrubs commonly dominate the understory including *Alnus viridis* ssp. *sinuata* and *Oplopanax horridus*. Other understory species include *Calamagrostis canadensis*, *Chamerion angustifolium* ssp. *angustifolium*, *Galium triflorum*, *Gymnocarpium dryopteris* and *Orthilia secunda*.

Open Black Cottonwood


Classification: Black cottonwood with a cover of 25-59%. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open balsam poplar (black cottonwood) forest (I.B.2.c.).

Environment: This class occurs primarily at low elevations on floodplains, outwash plains, and alluvial fans. It is common on the outwash of the Resurrection River and Bear Glacier, and rare throughout the remainder of the park. The slope is level, patch size is small to large, and the sites are mesic although high riverflows will inundate floodplain and outwash sites. It covers 0.2% of the Park's vegetated land.

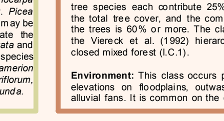
Vegetation: *Populus balsamifera* ssp. *trichocarpa* dominates this class with 25-59% cover. *Picea sitchensis* seedlings through mature trees may be common. Tall shrubs commonly dominate the understory including *Alnus viridis* ssp. *sinuata* and *Oplopanax horridus*. Other understory species include *Calamagrostis canadensis*, *Chamerion angustifolium* ssp. *angustifolium*, *Galium triflorum*, *Gymnocarpium dryopteris* and *Orthilia secunda*.

Woodland Black Cottonwood


Classification: Black cottonwood with a cover of 10-24%. The class falls within the Viereck et al. (1992) level III: broadleaf woodland (I.B.3).

Environment: This class occurs primarily at low elevations on floodplains, outwash plains, and alluvial fans. It is common on the outwash of the Resurrection River and Bear Glacier, and rare throughout the remainder of the park. The slope is level, patch size is small to large, and the sites are mesic although high riverflows will inundate floodplain and outwash sites. It covers 0.2% of the Park's vegetated land.

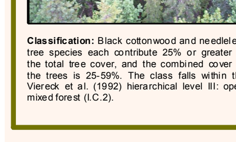
Vegetation: *Populus balsamifera* ssp. *trichocarpa* dominates this class with 10-24% cover. *Picea sitchensis* seedlings through mature trees may be common. Tall shrubs commonly dominate the understory including *Alnus viridis* ssp. *sinuata* and *Oplopanax horridus*. Other understory species include *Calamagrostis canadensis*, *Chamerion angustifolium* ssp. *angustifolium*, *Galium triflorum*, *Gymnocarpium dryopteris* and *Orthilia secunda*.

Closed Sitka Spruce-Black Cottonwood


Classification: Black cottonwood and needleleaf tree species each contribute 25% or greater to the total tree cover, and the combined cover of the trees is 60% or more. The class falls within the Viereck et al. (1992) hierarchical level III: closed mixed forest (I.C.1).

Environment: This class occurs primarily at low elevations on floodplains, outwash plains, and alluvial fans. It is common on the outwash of the Resurrection River and Bear Glacier, and rare throughout the remainder of the park. The slope is level, patch size is small to large, and the sites are mesic although high riverflows will inundate floodplain and outwash sites. It covers 0.05% of the Park's vegetated land.

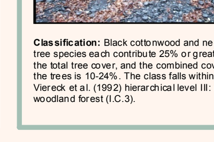
Vegetation: *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* codominate this class with cover greater than 60%. Understory species likely include *Alnus viridis* ssp. *sinuata*, *Oplopanax horridus* and *Calamagrostis canadensis*.

Open Sitka Spruce-Black Cottonwood


Classification: Black cottonwood and needleleaf tree species each contribute 25% or greater to the total tree cover, and the combined cover of the trees is 25-59%. The class falls within the Viereck et al. (1992) hierarchical level III: open mixed forest (I.C.2).

Environment: This class occurs primarily at low elevations on floodplains, outwash plains, and alluvial fans. It is common on the outwash of the Resurrection River and Bear Glacier, and rare throughout the remainder of the park. The slope is level, patch size is small to large, and the sites are mesic although high riverflows will inundate floodplain and outwash sites. It covers 0.2% of the Park's vegetated land.

Vegetation: *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* codominate this class with 25-59% cover. Understory species likely include *Alnus viridis* ssp. *sinuata*, *Oplopanax horridus* and *Calamagrostis canadensis*.

Woodland Sitka Spruce-Black Cottonwood


Classification: Black cottonwood and needleleaf tree species each contribute 25% or greater to the total tree cover, and the combined cover of the trees is 10-24%. The class falls within the Viereck et al. (1992) hierarchical level III: mixed woodland forest (I.C.3).

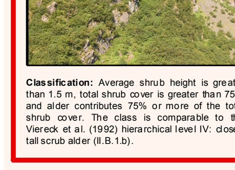
Environment: This class occurs primarily at low elevations on floodplains, outwash plains, and alluvial fans. It is common on the outwash of the Resurrection River and Bear Glacier, and rare throughout the remainder of the park. The slope is level, patch size is small to large, and the sites are mesic although high riverflows will inundate floodplain and outwash sites. It covers 0.1% of the Park's vegetated land.

Vegetation: *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* codominate this class with 10-24% cover. Understory species likely include *Alnus viridis* ssp. *sinuata*, *Oplopanax horridus* and *Calamagrostis canadensis*.

Closed Alder/Mesic Herbaceous Mosaic


Classification: This class is a mosaic of the closed tall alder landcover class, closed low alder landcover class and mesic herbaceous landcover class. Each landcover class contributes 25% or more to the total cover.

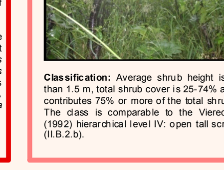
Environment: It is a common and widespread class on recently deposited glacial till slopes, active colluvial slopes, avalanche chutes, stabilized talus, and young moraines. See the respective landcover classes for more detailed descriptions. It covers 13.8% of the Park's vegetated land.

Closed Tall Alder


Classification: Average shrub height is greater than 1.5 m, total shrub cover is greater than 75% and alder contributes 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed tall scrub alder (II.B.1.b).

Environment: This is a common and widespread landcover class. It occurs on early seral floodplain and outwash deposits, recently deposited glacial till slopes, active colluvial slopes, avalanche chutes, stabilized talus, on pockets of glacial till interspersed with rocky outcroppings, young moraines, and the edge of peatlands and toeslopes. Sites are flat to steep from sea level to alpine, patch size is small to matrix forming, and the sites are typically mesic. It covers 12.1% of the Park's vegetated land.

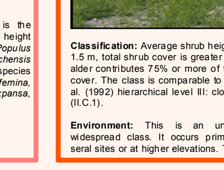
Vegetation: *Alnus viridis* ssp. *sinuata* is the dominant species within this class. Its height ranges to over 4 m. Scattered young *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* are often characteristic. Understory species dominance includes *Athyrium filix-femina*, *Calamagrostis canadensis*, *Dryopteris expansa* and *Oplopanax horridus*.

Open Tall Alder


Classification: Average shrub height is greater than 1.5 m, total shrub cover is 25-74% and alder contributes 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open tall scrub alder (II.B.2.b).

Environment: This is an uncommon but widespread class. It occurs on early seral floodplain and outwash deposits, recently deposited glacial till slopes, active colluvial slopes, avalanche chutes, stabilized talus, on pockets of glacial till interspersed with rocky outcroppings, and young moraines. Sites are flat to steep from sea level to alpine, patch size is small to large, and the sites are typically mesic. It covers 0.7% of the Park's vegetated land.The adjacent map gives its distribution.

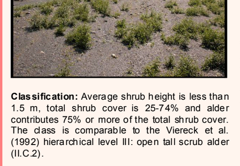
Vegetation: *Alnus viridis* ssp. *sinuata* is the dominant species within this class. Its height ranges to over 4 m. Scattered young *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* are often characteristic. Understory species dominance includes *Athyrium filix-femina*, *Calamagrostis canadensis*, *Dryopteris expansa*, *Luetkea pectinata* and *Oplopanax horridus*.

Closed Low Alder


Classification: Average shrub height is less than 1.5 m, total shrub cover is greater than 75% and alder contributes 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level III: closed low scrub (II.C.1).

Environment: This is an uncommon yet widespread class. It occurs primarily on early seral sites or at higher elevations. The early seral sites include floodplain and outwash deposits, recently deposited glacial till slopes, active colluvial slopes, avalanche chutes, and young moraines. Sites are flat to steep from sea level to alpine, patch size is small to large, and the sites are typically mesic. It covers 0.5% of the Park's vegetated land.

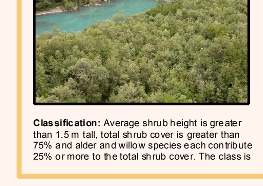
Vegetation: *Alnus viridis* ssp. *sinuata* is the dominant species within this class. Scattered young *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* are often characteristic. Understory species dominance includes *Athyrium filix-femina*, *Calamagrostis canadensis*, *Dryopteris expansa* and *Oplopanax horridus*.

Open Low Alder


Classification: Average shrub height is less than 1.5 m, total shrub cover is 25-74% and alder contributes 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level III: open tall scrub alder (II.C.2).

Environment: This is an uncommon but widespread class. It occurs primarily on early seral sites or at higher elevations. The early seral sites include floodplain and outwash deposits, recently deposited glacial till slopes, active colluvial slopes, avalanche chutes, and young moraines. Sites are flat to steep from sea level to alpine, patch size is small to large, and the sites are typically mesic. It covers 2.1% of the Park's vegetated land.

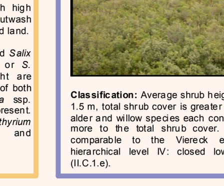
Vegetation: *Alnus viridis* ssp. *sinuata* is the dominant species within this class. Scattered young *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* are often characteristic. Understory species dominance includes *Athyrium filix-femina*, *Calamagrostis canadensis*, *Dryopteris expansa*, *Luetkea pectinata* and *Oplopanax horridus*.

Closed Tall Alder-Willow


Classification: Average shrub height is greater than 1.5 m tall, total shrub cover is greater than 75% and alder and willow species each contribute 25% or more to the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed tall alder-willow scrub (II.B.1.d).

Environment: The closed tall alder-willow class is common at mid to low elevations on outwash plains, floodplains, and recently deglaciated slopes. The sites are often early seral. The slope ranges from flat to steep, patch size is small to large, and the sites are mesic although high riverflows may inundate floodplain and outwash sites. It covers 0.6% of the Park's vegetated land.

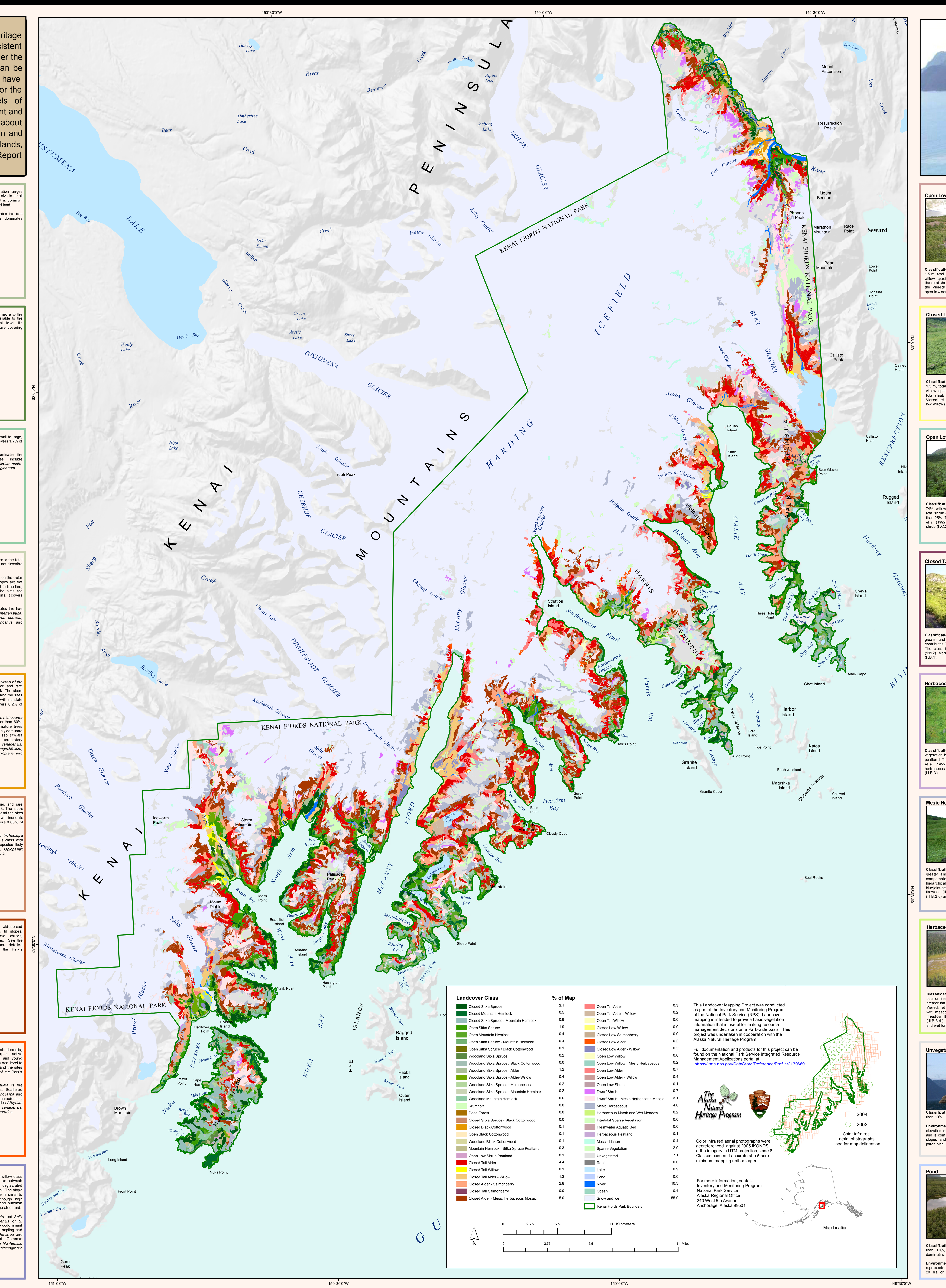
Vegetation: *Alnus viridis* ssp. *sinuata* and *Salix* species (*Salix sitchensis*, *S. alaxensis* or *S. barclayi*) greater than 1.5 m in height are codominant in the overstory. A scattering of both sapling and large *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* may be present. Common understory species include *Athyrium filix-femina*, *Equisetum arvense* and *Calamagrostis canadensis*.

Closed Low Alder-Willow


Classification: Average shrub height is less than 1.5 m, total shrub cover is greater than 75% and alder and willow species each contribute 25% or more to the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed low alder-willow (II.C.1.e).

Environment: The closed low alder-willow class is common at mid to low elevations on outwash plains, floodplains, and recently deglaciated slopes. The sites are often early seral. The slope ranges from flat to steep, patch size is small to large, and the sites are mesic although high riverflows may inundate floodplain and outwash sites. It covers 0.9% of the Park's vegetated land.

Vegetation: *Alnus viridis* ssp. *sinuata* and *Salix* species (*Salix sitchensis*, *S. alaxensis* or *S. barclayi*) less than 1.5 m in height are codominant in the overstory. A scattering of both sapling and large *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* may be present. Common understory species include *Athyrium filix-femina*, *Equisetum arvense* and *Calamagrostis canadensis*.



Landcover Class	% of Map
Closed Sitka Spruce	2.1
Closed Mountain Hemlock	0.5
Closed Sitka Spruce - Mountain Hemlock	0.9
Open Sitka Spruce	1.9
Open Mountain Hemlock	0.4
Open Sitka Spruce - Mountain Hemlock	0.4
Open Sitka Spruce / Black Cottonwood	0.1
Woodland Sitka Spruce	0.2
Woodland Sitka Spruce / Black Cottonwood	0.0
Woodland Sitka Spruce - Alder	1.2
Woodland Sitka Spruce - Alder-Willow	0.4
Woodland Sitka Spruce - Herbaceous	0.2
Woodland Sitka Spruce - Mountain Hemlock	0.2
Woodland Mountain Hemlock	0.6
Krumholz	0.0
Dead Forest	0.0
Closed Sitka Spruce - Black Cottonwood	0.0
Closed Black Cottonwood	0.1
Open Black Cottonwood	0.1
Woodland Black Cottonwood	0.1
Mountain Hemlock - Sitka Spruce Peatland	0.3
Open Low Shrub Peatland	0.1
Closed Tall Alder	4.4
Closed Tall Willow	0.1
Closed Tall Alder - Willow	1.2
Closed Alder - Salmonberry	2.8
Closed Tall Salmonberry	0.0
Closed Alder - Mesic Herbaceous Mosaic	5.0
Open Tall Alder	0.3
Open Tall Alder - Willow	0.2
Open Tall Willow	0.0
Closed Low Willow	0.0
Closed Low Salmonberry	0.0
Closed Low Alder	0.2
Closed Low Alder - Willow	0.3
Open Low Willow	0.0
Open Low Willow - Mesic Herbaceous	0.2
Open Low Alder	0.7
Open Low Alder - Willow	0.4
Open Low Shrub	0.1
Dwarf Shrub	0.7
Dwarf Shrub - Mesic Herbaceous Mosaic	3.1
Mesic Herbaceous	4.0
Herbaceous Marsh and Wet Meadow	0.2
Intertidal Sparse Vegetation	0.0
Freshwater Aquatic Bed	0.0
Herbaceous Peatland	0.1
Moss - Lichen	0.4
Sparse Vegetation	2.0
Unvegetated	7.1
Road	0.0
Lake	0.9
Pond	0.0
River	10.3
Ocean	0.4
Snow and Ice	55.0
Kenai Fjords Park Boundary	

This Landcover Mapping Project was conducted as part of the Inventory and Monitoring Program of the National Park Service (NPS). Landcover mapping is intended to provide basic vegetation information that is useful for making resource management decisions on a Park-wide basis. This project was undertaken in cooperation with the Alaska Natural Heritage Program.

Full documentation and products for this project can be found on the National Park Service Integrated Resource Management Applications portal at https://irma.nps.gov/DataStore/Reference/Profile/2170669.

The Alaska Natural Heritage Program

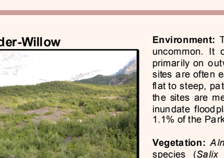
Color infra red aerial photographs were georeferenced against 2005 IKONOS ortho imagery in UTM projection, zone 8. Classes assumed accurate at a 5 acre minimum mapping unit or larger.

2004
2003
Color infra red aerial photographs used for map delineation

For more information, contact
Inventory and Monitoring Program
National Park Service
Alaska Regional Office
240 West 5th Avenue
Anchorage, Alaska 99501

Map location

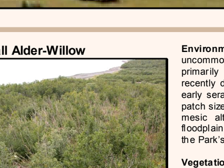
0 2.75 5.5 11 Kilometers
0 2.75 5.5 11 Miles
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Open Low Alder-Willow


Classification: Average shrub height is less than 1.5 m, total shrub cover is 25-74% and alder and willow species each contribute 25% or more to the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level III: open low scrub (II.C.2).

Environment: The open low alder-willow class is uncommon. It occurs at mid to low elevations primarily on outwash plains and floodplains. The sites are often early seral. The slope ranges from flat to steep, patch size is small to moderate, and the sites are mesic although high riverflows may inundate floodplain and outwash sites. It covers 1.1% of the Park's vegetated land.

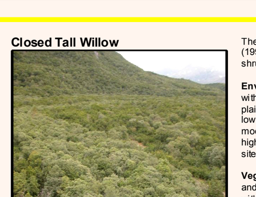
Vegetation: *Alnus viridis* ssp. *sinuata* and *Salix* species (*Salix sitchensis*, *S. alaxensis* or *S. barclayi)* less than 1.5 m in height are codominant in the overstory. A scattering of both sapling and large *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* may be present. Common understory species include *Athyrium filix-femina*, *Equisetum arvense* and *Calamagrostis canadensis*.

Open Tall Alder-Willow


Classification: Average shrub height is greater than 1.5 m, total shrub cover is 25-74% and alder and willow species each contribute 25% or more to the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level III: open tall scrub (II.B.2).

Environment: The open tall alder-willow class is uncommon. It occurs at mid to low elevations primarily on outwash plains, floodplains and recently deglaciated slopes. The sites are often early seral. The slope ranges from flat to steep, patch size is small to moderate, and the sites are mesic although high riverflows may inundate floodplain and outwash sites. It covers 1.1% of the Park's vegetated land.

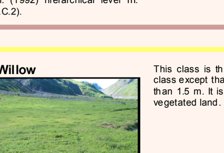
Vegetation: *Alnus viridis* ssp. *sinuata* and *Salix* species (*Salix sitchensis*, *S. alaxensis* or *S. barclayi)* greater than 1.5 m in height are codominant in the overstory. A scattering of both sapling and large *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* may be present. Common understory species include *Athyrium filix-femina*, *Equisetum arvense* and *Calamagrostis Canadensis*.

Closed Tall Willow


Classification: Total shrub cover is 75% or greater and willow greater than 1.5 m tall contributes 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed tall willow shrub (II.B.1.a).

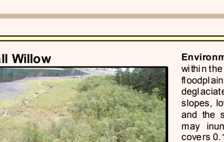
Environment: The closed tall willow class is rare within the Park. It occurs on alluvial fans, outwash plains and floodplains. Sites are relatively level, at low to mid elevations, patch size is small to moderate, and the sites are mesic to wet, with high riverflows inundating floodplain and outwash sites. It covers 0.3% of the Park's vegetated land.

Vegetation: Willows (*Salix barclayi*, *S. sitchensis* and *S. alaxensis*) are the dominant shrub species with heights averaging 1.5 m or greater. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* saplings may also have a minor presence. Other common species include *Calamagrostis canadensis*, *Alnus viridis* ssp. *sinuata* and *Equisetum arvense*.

Closed Low Willow


Classification: Average shrub height is less than 1.5 m, total shrub cover is greater than 75% and willow species contributes 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open low willow (II.C.1.b).

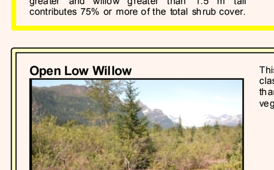
This class is the same as the closed tall willow class except that the average shrub height is less than 1.5 m. It is rare covering 0.1% of the Park's vegetated land.

Open Tall Willow


Classification: Total shrub cover is 25-74% and willows greater than 1.5 m tall contribute 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open tall willow shrub (II.B.2.a).

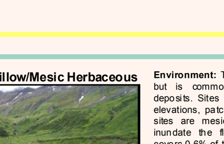
Environment: The open tall willow class is rare within the Park. It typically occurs on outwash and floodplain deposits and rarely on recently deglaciated slopes. It occurs on level to moderate slopes, low to mid elevations, patch size is small, and the sites are mesic although high riverflows may inundate floodplain and outwash sites. It covers 0.1% of the Park's vegetated land.

Vegetation: Willows (*Salix barclayi*, *S. sitchensis* and *S. alaxensis*) are the dominant shrub species with heights averaging 1.5 m or greater. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* saplings may also have a minor presence. Other common species include *Calamagrostis canadensis*, *Alnus viridis* ssp. *sinuata* and *Equisetum arvense*. The understory and openings between shrubs are highly variable, from bare ground to herbaceous species.

Open Low Willow


Classification: Total cover of low shrubs is 25-74%, and willow cover contributes 75% or more to the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open low willow shrub (II.C.2.g.).

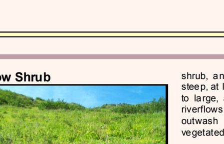
This class is the same as the open tall willow class except that the average shrub height is less than 1.5 m. It is rare covering 0.1% of the Park's vegetated land.

Open Low Willow/Mesic Herbaceous


Classification: Total cover of low shrubs is 25-74%, willow cover contributes 75% or more to the total shrub cover and herbaceous cover is greater than 25%. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open low willow shrub (II.C.2.g.).

Environment: This class is rare within the Park but is common on outwash and floodplain deposits. Sites are typically level, at low to mid elevations, patch size is small to large, and the sites are mesic although high riverflows may inundate the floodplain and outwash sites. It covers 0.6% of the Park's vegetated land.

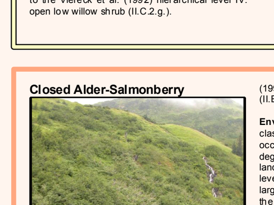
Vegetation: Willows (*Salix barclayi*, *S. sitchensis* and *S. alaxensis*) are the dominant shrub species with heights averaging less than 1.5 m. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* saplings may also have a minor presence. The understory supports *Calamagrostis canadensis*, *Equisetum arvense* and other herbaceous species.

Open Low Shrub


Classification: Total cover of low shrubs is 25-74%. The class is comparable to the Viereck et al. (1992) hierarchical level III: open low scrub (II.C.2).

Environment: This class is rare but widespread within the Park. It occurs in several systems including floodplain, recently deglaciated tall shrub, and alpine talus slope. Sites are level to steep, at low to mid elevations, patch size is small to large, and the sites are mesic although high riverflows may inundate the floodplain and outwash sites. It covers 0.2% of the Park's vegetated land.

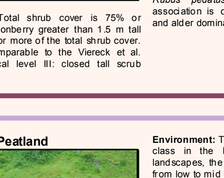
Vegetation: This class includes open low shrub polygons that could not be accurately delineated as any of the other open low shrub classes (i.e, open low alder, open low alder-willow, open low willow, and open low willow/mesic herbaceous). Consequently, it includes species that dominate those classes (*Alnus viridis* ssp. *sinuata*, *Salix barclayi*, *S. sitchensis* and *S. alaxensis* and *Rubus spectabilis*) plus additional species (*Elliottia pyroliflorus*, and *Myrica gale*).

Closed Alder-Salmonberry


Classification: Total shrub cover is 75% or greater and alder and salmonberry each contribute 25% or more to the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level III: closed tall scrub (II.B.1).

Environment: The closed alder-salmonberry class is a major class within the Park. It primarily occurs on stable talus slopes, recently deglaciated slopes, and slopes of the older landscapes. The slope is flat to steep, from sea level to above tree line, patch size is small to large, and the sites are mesic. It covers 7.6% of the Park's vegetated land.

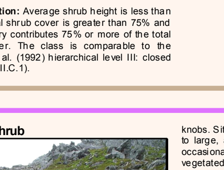
Vegetation: This class is typically a mosaic of *Rubus spectabilis* and *Alnus viridis* ssp. *sinuata* patches. Other shrubs include *Oplopanax horridus* and *Sambucus racemosa*. Herbaceous cover includes *Athyrium filix-femina*, *Calamagrostis canadensis*, *Dryopteris expansa*, *Rubus pedatus* and *Equisetum arvense*.

Closed Tall Salmonberry


Classification: Total shrub cover is 75% or greater and salmonberry greater than 1.5 m tall contributes 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level III: closed tall scrub (II.B.1).

Environment: The closed tall salmonberry class is rare within the Park. It primarily occurs on stable to semi-stable talus slopes, sometimes with avalanche debris. It is less common on recently deglaciated slopes. The slope is moderate to steep at low to mid elevations, patch size is small to large, and the sites are mesic. It covers 0.04% of the Park's vegetated land.

Vegetation: *Rubus spectabilis* dominates this class. *Oplopanax horridus*. *Alnus viridis* ssp. *sinuata* and *Sambucus racemosa* may also be common. Herbaceous cover includes *Aruncus dioicus*, *Athyrium filix-femina*, *Calamagrostis canadensis*, *Carex mertensii*, *Dryopteris expansa*, *Rubus pedatus* and *Veratrum viridis*. This association is often mosaiced with herbaceous and alder dominated associations.

Closed Low Salmonberry


Classification: Average shrub height is less than 1.5 m, total shrub cover is greater than 75% and salmonberry contributes 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level III: closed low scrub (II.C.1).

This class is the same as the closed tall salmonberry class except that the average shrub height is less than 1.5 m. It covers 0.05% of the Park's vegetated land.

Open Low Shrub Peatland

Classification: Total cover of low shrubs is 25-74% and the site is a peatland. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open ericaceous shrub bog (II.C.2.e), open low willow graminoid shrub bog (II.C.2.i), and open sweetgale graminoid shrub bog (II.C.2.j).

Environment: This is a minor though widespread class in the Park. It occurs on the older landscapes, the patch size is small to moderate, from low to mid elevations, the slope ranges up to 15°, and the sites are wet, often with an organic layer. It covers 0.3% of the Park's vegetated land.

Vegetation: The dominant species are *Empetrum nigrum*, *Vaccinium uliginosum*, *Myrica gale*, *Nephrophyllidium crista-galli* and *Sphagnum*. This class is typically mosaiced with classes that dominate peatlands including mountain hemlock-Sitka spruce peatland, and herbaceous peatland.

Herbaceous Peatland

Classification: Total cover of herbaceous vegetation is greater than 25% and the site is a peatland. The class is comparable to the Viereck et al. (1992) hierarchical level III: wet graminoid herbaceous (III.A.3) and wet forb herbaceous (III.B.3).

Environment: This is a minor though widespread class in the Park. It occurs on the older landscapes, the patch size is small to moderate, from low to mid elevations, the slope ranges from flat to steep, and the sites are wet, often with an organic layer. It covers 0.2% of the Park's vegetated land.

Vegetation: The dominant species are *Carex aquatilis*, *Carex pauciflora*, *Eriophorum angustifolium*, *Nephrophyllidium crista-galli*, and *Trichophorum caespitosum*. This class is typically mosaiced with classes that dominate peatlands including mountain hemlock-Sitka spruce peatland, and open low shrub peatland.

Dwarf Shrub

Classification: Shrubs are less than 20 cm tall, and dwarf shrub cover is 25% or greater. The class is comparable to the Viereck et al. (1992) hierarchical level II: dwarf scrub (II.D).

Environment: The dwarf shrub class is common in the alpine throughout the Park. It also occurs as small patches on low elevation wind-swept knobs. Sites are level to steep, patch size is small to large, and the hydrology is dry to mesic and occasionally wet. It covers 1.8% of the Park's vegetated land.

Vegetation: Dominant species include *Empetrum nigrum*, *Arctostaphylos alpina*, *Vaccinium uliginosum*, *Harrimanella stelleriana*, *Luetkea pectinata*, *Nephrophyllidium crista-galli* and *Phyllodoce aleutica*.

Dwarf Shrub-Mesic Herbaceous

Classification: Patches of the dwarf shrub class and the mesic herbaceous class each contribute 33% or greater to the total cover.

Environment: This class is common in the alpine throughout the Park. It also occurs as small patches on low elevation wind-swept knobs. Sites are level to steep, patch size is small to matrix forming, and the hydrology is dry to mesic and occasionally wet. It covers 8.6% of the Park's vegetated land.

Vegetation: This class is typically a mixture of herbaceous and dwarf shrub species, but can also be a mosaic of the dwarf shrub class and mesic herbaceous class. Dominant shrub species include *Empetrum nigrum*, *Arctostaphylos alpina*, *Vaccinium uliginosum*, *Harrimanella stelleriana*, *Luetkea pectinata*, and *Phyllodoce aleutica*. Herbaceous species include *Artemisia arctica*, *Athyrium filix-femina*, *Calamagrostis canadensis*, *Carex macrochaeta*, *C. microchaeta*, *C. nigricans*, *Chamerion angustifolium* ssp. *angustifolium*, *Chamerion latifolium*, *Geranium erianthum*, *Lupinus nootkatensis*, and *Nephrophyllidium crista-galli*.

Mesic Herbaceous

Classification: Herbaceous cover is 25% or greater, and the site is dry to mesic. This class is comparable to the Viereck et al. (1992) hierarchical level IV: bluejoint meadow (III.A.2.a), bluejoint-herb (III.A.2.b), mixed herbs (III.B.2.a.), fireweed (III.B.2.b), large umbel (III.B.2.c), ferns (III.B.2.d) and *Elymus* class (III.A.1.a).

Environment: This is a common and widespread landcover class in the subalpine and alpine. It also occurs as small to large patches on floodplain and outwash deposits, alluvial fans, recently deglaciated shorelines, disturbed slopes, and beaches. The slope ranges from flat to steep, the patch size is small to large and the sites are mesic. It covers 10.9% of the Park's vegetated land.

Vegetation: Various herbaceous species may dominate or codominate in the tallest layer. These include *Artemisia arctica*, *Athyrium filix-femina*, *Calamagrostis canadensis*, *Carex macrochaeta*, *C. microchaeta*, *C. nigricans*, *Chamerion angustifolium* ssp. *angustifolium*, *Chamerion latifolium*, *Geranium erianthum*, *Lathyrus maritimus*, *Leymus mollis*, *Lupinus nootkatensis*, and *Nephrophyllidium crista-galli*.

Intertidal Sparse Vegetation

Classification: Herbaceous cover is 10-24% and site is tidal. The class is comparable to the Viereck et al. (1992) hierarchical level IV: halophytic grass wet meadow (III.A.3.h.) and halophytic herb wet meadow (III.B.3.d.).

Environment: This is an uncommon landcover class in the Park, yet common on intertidal flats (tidal marshes) and beaches. In tidal marshes, the sites are flat and the soils are silt, sand and silt, or cobbles with sand. This class also occurs as a thin stringer on most sand and gravel beaches within the Park, occupying the beach position closest to the surf, and its distribution pattern is typically discontinuous. The beach substrate ranges from cobbles mixed with sand to silt and sand. The sites are wet and often saturated, but sand and cobble sites are typically mesic at low tide. It covers 2.1% of the Park's vegetated land.

Vegetation: These sparsely vegetated tidal mudflats are dominated by *Eleocharis palustris*, *Puccinellia nutkaensis*, *Honckenya peploides*, *Plantago maritima*, *Cochlearia sessilifolia*, *Ruppia maritima* and *Zostera marina*. *Honckenya peploides* ssp. *major* dominates the beach fronts. Additional species include *Mertensia maritima* and *Leymus mollis*. Species richness in all habitats is low.

Sparse Vegetation

Classification: Vegetation cover is 10-24% and site is not tidal.

Environment: This class includes the seaside cliff ecological system, and the sparse vegetation ridge and cliff system. It also occurs on recently deglaciated slopes, floodplains, alluvial fans, talus slopes and beaches. Sites are level to steep, patch size is small to large, and the hydrology is dry to mesic and occasionally wet. It covers 5.4% of the Park's vegetated land.

Vegetation: This class is highly variable and includes tall shrub, low shrub, dwarf shrub, and herbaceous species.

Herbaceous Marsh and Wet Meadow

Classification: Site is a marsh or wet meadow, tidal or freshwater, and the herbaceous cover is greater than 25%. The class is comparable to the Viereck et al. (1992) classes: halophytic grass wet meadow (III.A.3.h.), halophytic sedge wet meadow (III.A.3.i.), halophytic herb wet meadow (III.B.3.d.), wet graminoid herbaceous (III.A.3) and wet forb herbaceous (III.B.3).

Environment: This is an uncommon yet widespread class. It dominates tidal marshes, and is common on back-beaches, pond edges, outwash deposits, and wet depressions in alpine, subalpine and recently deglaciated terrain. Sites are wet, typically flat, range from sea level to the alpine, and the patch size is small to large. It covers 0.5% of the Park's vegetated land.

Vegetation: The dominant species include *Calamagrostis canadensis*, *Equisetum fluviatile*, *Carex aquatilis*, *Carex lyngbyei*, *Carex macrochaeta*, *Carex nigricans*, *Carex pauciflora*, *Eleocharis palustris*, *Eriophorum angustifolium*, *Nephrophyllidium crista-galli*, *Plantago maritima*, *Trichophorum alpinum* and *Trichophorum caespitosum*.

Freshwater Aquatic Bed

Classification: Herbaceous cover is greater than 25% and the vegetation is submerged, floating, or growing in permanent water. The class falls within the Viereck et al. (1992) hierarchical level III: freshwater aquatic herbaceous (III.D.1).

This landcover class is the same as the aquatic bed ecological system. It covers 0.05% of the Park's vegetated land.

Moss-Lichen

Classification: Moss and lichen cover is greater than or equal to 25%. The class falls within the Viereck et al. (1992) hierarchical level III: bryophyte (III.C.1) and lichen (III.C.2).

Environment: This is an uncommon class in the park. It occurs on mesic and dry floodplains where herbs and shrubs have not yet colonized, alpine seeps, and alpine slopes. It is common on the steep bedrock, and graminoid high alpine ecological systems. Sites are flat to steep, predominantly at high elevations, patch size is small to medium and the mesic to occasionally wet. It covers 1.1% of the Park's vegetated land.

Vegetation: Moss and lichen dominate the vegetation. In the alpine, it may occur as a mosaic within a matrix of other dwarf shrub classes.

Unvegetated

Classification: Total vegetation cover is less than 10%.

Environment: This class dominates high elevation sites and recently deglaciated slopes, and is common on floodplains, alluvial fans, talus slopes and beaches. Sites are level to steep, patch size is small to large, and the hydrology is dry to mesic and occasionally wet. It covers 6.9% of the Park's total land.

Dead Forest (Standing Dead)

Classification: Total dead tree cover is greater than 25%, and greater than 90% of the trees are dead.

Environment: This is a rare class in the Park. It typically occurs on floodplains and outwash plains. Observed tree mortality was due to several causes. Some stands drowned due to a change in river hydrology. Other forests drowned or died due to salt intrusions when stands near sea level subsided into the tidal zone during the 1964 Good Friday earthquake. In addition, some stands may have died due to insect infestations such as the spruce bark beetle. It covers 0.1% of the Park's vegetated land.

Snow and Ice

Classification: Snow, glacier or ice cover dominates.

Environment: The snow and ice class refers to areas covered with snowfields, ice fields, glaciers or late lying snow. It covers 56% of the Park's total land.

This landcover class is the same as the snow and ice ecological system.

Pond

Classification: Total vegetation cover is less than 10%, and non-riverine freshwater cover dominates.

Environment: The pond landcover class represents all bodies of non-riverine freshwater 20 ha or less in size. It is uncommon but widespread from sea level to alpine. It covers 0.1% of the Park's total land.

Lake

Classification: Total vegetation cover is less than 10%, and non-riverine freshwater cover dominates.

Environment: The lake landcover class represents all bodies of non-riverine freshwater greater than 20 ha in size. It is a widespread class primarily at lower elevations. It covers 0.9% of the Park's total land.

River

Classification: Total vegetation cover is less than 10%, and riverine water cover dominates.

Environment: The river landcover class represents all glacial and nonglacial rivers and major streams that occur in the Park. It is an uncommon but widespread class and occurs from sea level to alpine. It covers 0.3% of the Park's total land.