Glacier Bay National Park and Preserve

Landcover Classification

National Park Service
U.S. Department of the Interior

PROJECT DESCRIPTION

This project was undertaken by the National Park Service Inventory and Monitoring Program in cooperation with the Alaska Natural Heritage Program. 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, the Inventory Program has developed a digital landcover map based on satelite 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. The Glacier Bay National Park and Preserve 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 can also enhance ecological analyses for evaluating passerine bird habitat distribution. Full documentation and products for this project can be found on the Natural Resource Information Portal at https://irma.nps.gov/DataStore/Reference/Profile/2170666.

Closed Sitka Spruce Forest



Classification: Tree canopy cover is 60% or more, and Sitka spruce and shore pine, individually or combined, contribute 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).

Distribution and landform: This class is widespread except for upper Glacier Bay and the Alsek River Canyon. It is common on older terraces of floodplains and outwash plains, uplifted marine deposits, dominates uplifted beach ridges along the outer coast, and occurs on sideslopes and moraines. It covers 8.7% (35,683 ha) of the Park's vegetated land and the following map gives its distribution.

Vegetation: *Picea sitchensis* typically dominates the tree layer. *Tsuga* species and *Populus balsamifera* ssp. *trichocarpa* may be present with low cover. Sitka spruce reach 18 m or more in height. *Alnus viridis* ssp. *sinuata* and *Oplopanax horridus* are common shrub species. This class is interspersed with a wide variety of map classes because of its wide ecological amplitude. *Pinus contorta* var. *contorta* occurs as a codominant with spruce and sometimes Sitka spruce and black cottonwood primarily in the Gustavus region. On most of these sites, pine is declining as the spruce mature or the sites become drier (Streveler 2003).

Open Low Shrub Peatland

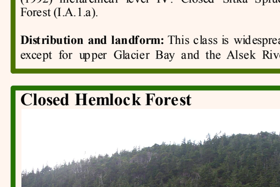


Classification: Total cover of low shrubs is 25-74% and the site is a peatland. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open ericaceous shrub bog (II.C.2.e), open low willow graminoid shrub bog (II.C.2.i), and open sweetgale graminoid bog (II.C.2.j).

Distribution and landform: This class is uncommon but occurs on most peatlands throughout the Park. We did not map it in the Alsek River Canyon or in upper Glacier Bay, but it is common on Excursion Ridge and the Dundas River valley. It occurs on outer coast piedmonts, uplifted marine deposits, old outwash plains, mountain benches and within forest openings. Small ponds and pools are common. It covers 0.8% (3,091 ha) of the Park's vegetated land.

Vegetation: These peatlands are characterized by either a closed cover of *Vaccinium uliginosum* or a sparse cover of *Myrica gale*. Species richness is high and includes *Alnus viridis* ssp. *sinuata*, *Calamagrostis canadensis*, *Carex lyngbyei*, *C. pauciflora*, *C. pluriflora*, *C. sitchensis*, *C. viridula* ssp. *viridula*, *Cicuta douglasii*, *Drosera rotundifolia*, ***Eriophorum angustifolium*** **ssp.** ***scabriusculum***, *Kalmia microphylla*, *Menziesia ferruginea*, *Rubus arcticus*, *Sanguisorba canadensis*, *S. officinalis* and *Trichophorum caespitosum*. *Sphagnum* cover ranges up to 70%. This class is typically interspersed with classes that dominate peatlands such as Wet Herbaceous, Hemlock-Sitka Spruce Woodland Peatland, and Shore Pine Woodland Peatland.

Closed Hemlock Forest

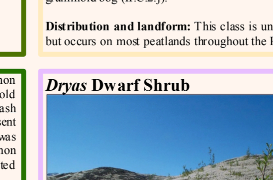


Classification: Tree cover is 60% or more, and western hemlock, mountain hemlock and Alaska cedar, individually or combined, contribute 75% or more to the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed western hemlock forest (I.A.1.b), closed western hemlock-Alaska cedar (I.A1.e) and closed mountain hemlock forest (IA.1.f.).

Distribution and landform: This type is common and matrix forming on the outer coast piedmonts, old uplifted beach ridges and old or inactive outwash plains. It is less common on steep sideslopes, absent from Glacier Bay except near the outer coast, and was not mapped in the Alsek River Canyon. It is common covering 3.2% (13,003 ha) of the Park's vegetated land. The following map gives its distribution.

Vegetation: *Tsuga heterophylla* and/ or *Tsuga mertensiana* dominate the tree layer. *Chamaecyparis nootkatensis* may also be present or co-dominate. Sitka spruce may be present with low cover. Hemlock height ranges to 18 m. The shrub layer includes tall shrubs such as *Vaccinium* species and *Oplopanax horridus*. A variety of other understory species occur such as *Cassiope* species, *Dryopteris expansa*, *Elliottia pyroliflorus*, *Lysichiton americanus* and *Menziesia ferruginea*. This class is typically interspersed with the Closed Sitka Spruce, Open Sitka Spruce, Open Hemlock, Closed Sitka Spruce-Hemlock and Open Hemlock-Sitka Spruce classes plus classes that occur in peatlands.

Dryas Dwarf Shrub

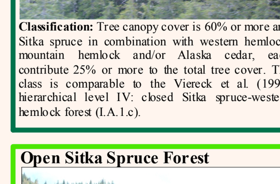


Classification: Dwarf shrub cover is 25% or greater, and *Dryas drummondii* contributes greater than 60% to the total shrub cover. Viereck et al. (1992) did not describe this class.

Distribution and landform: This is an uncommon landcover class in Glacier Bay NPPr. It occurs as large patches from low to mid elevations primarily in the recently deglaciated portions of upper Glacier Bay. It also occurs as small patches on recently disturbed sites on fans, colluvial slopes, floodplains and outwash. Soils are dry and characterized by a thin layer of organic matter such as litter and roots (<2 cm thick) over sand, gravel and/or cobbles. It covers 0.2% (995 ha) of the Park's vegetated land.

Vegetation: *Dryas drummondii* is the dominant species, and species diversity is low. Young *Populus balsamifera* ssp. *trichocarpa* (ranging in height to 8 m) and Sitka spruce (to 2 m) may also occur. Other species include *Chamerion latifolium*, *Equisetum variegatum* var. *alaskanum*, *Salix alaxensis*, *S. barclayi*, *S. sitchensis* and *Shepherdia canadensis*.

Closed Sitka Spruce-Hemlock Forest

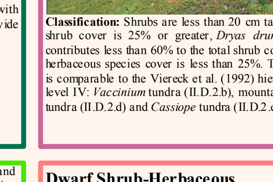


Classification: Tree canopy cover is 60% or more and Sitka spruce in combination with western hemlock, mountain hemlock and/or Alaska cedar, each contribute 25% or more to the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed Sitka spruce-western hemlock forest (I.A.1.c).

Distribution and landform: This type is common on the outer coast piedmonts, old uplifted beach ridges, old and inactive outwash plains, uplifted marine deposits, moraines and sideslopes. It was not mapped in the Alsek River Canyon or in upper Glacier Bay. It covers 9.4% (38,503 ha) of the Park's vegetated land. The following map gives its distribution.

Vegetation: *Picea sitchensis* dominates the tree layer in combination with *Tsuga heterophylla*, *Tsuga mertensiana* or *Chamaecyparis nootkatensis*. Tree height may exceed 42 m. The shrub layer includes tall shrubs such as *Alnus* species, *Oplopanax horridus* and *Vaccinium* species. This class is interspersed with a wide variety of map classes because of its wide ecological amplitude.

Ericaceous Dwarf Shrub



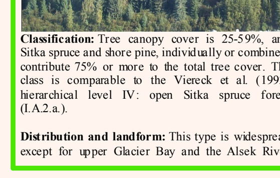
Classification: Shrubs are less than 20 cm tall, dwarf shrub cover is 25% or greater, *Dryas drummondii* contributes less than 60% to the total shrub cover, and herbaceous species cover is less than 25%. The class is comparable to the Viereck et al. (1992) hierarchical level IV: *Vaccinium* tundra (II.D.2.b), mountain-heath tundra (II.D.2.d) and *Cassiope* tundra (II.D.2.e).

Distribution and landform: The Ericaceous Dwarf Shrub class is common in the alpine throughout the Park. It also occurs as small patches on low elevation wind-swept knobs such as Cape Spencer. It covers 2.9% (11,727 ha) of the Park's vegetated land.

Vegetation: Typically, *Cassiope mertensiana*, *Empetrum nigrum*, *Harrimanella stellariana*, *Luetkea pectinata*, *Phyllodoce aleutican* and *Vaccinium* species dominate or codominate the sites. Herbaceous species are often present with low cover and include *Geum macrophyllum* var. *macrophyllum*, *Hieracium triste*, *Loiseleuria procumbens*, *Lupinus nootkatensis*, *Nephrophyllidium crista-galli*, *Saxifraga nelsoniana* ssp. *pacifica*, and *Vahlodea atropurpurea*. This class is commonly found near or adjacent to Hemlock Dwarf Tree Scrub, Low Willow, Dwarf Shrub-Herbaceous, Wet Herbaceous and Mesic Herbaceous classes.

Mosaics: This class commonly forms mosaics with the Rock-Bare Ground class.

Open Sitka Spruce Forest

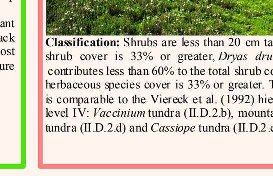


Classification: Tree canopy cover is 25-59%, and Sitka spruce and shore pine, individually or combined, contribute 75% or more to the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open Sitka spruce forest (I.A2.a.).

Distribution and landform: This type is widespread except for upper Glacier Bay and the Alsek River Canyon. It is common on older floodplains and outwash plains terraces, uplifted marine deposits, uplifted beach ridges along the outer coast, and mid seral sideslopes and moraines. It covers 6.9% (28,467 ha) of the Park's vegetated land.

Vegetation: *Picea sitchensis* typically dominates the tree layer. *Tsuga* species and *Populus balsamifera* ssp. *trichocarpa* may be present with low cover. *Alnus viridis* ssp. *sinuata*, *Oplopanax horridus* and *Vaccinium* species are common shrub species. This class is interspersed with a wide variety of map classes because of its wide ecological amplitude. *Pinus contorta* var. *contorta* occurs as a codominant with spruce and sometimes spruce and black cottonwood primarily in the Gustavus region. On most of these sites, pine is declining as the spruce mature and the sites become drier (Streveler 2003).

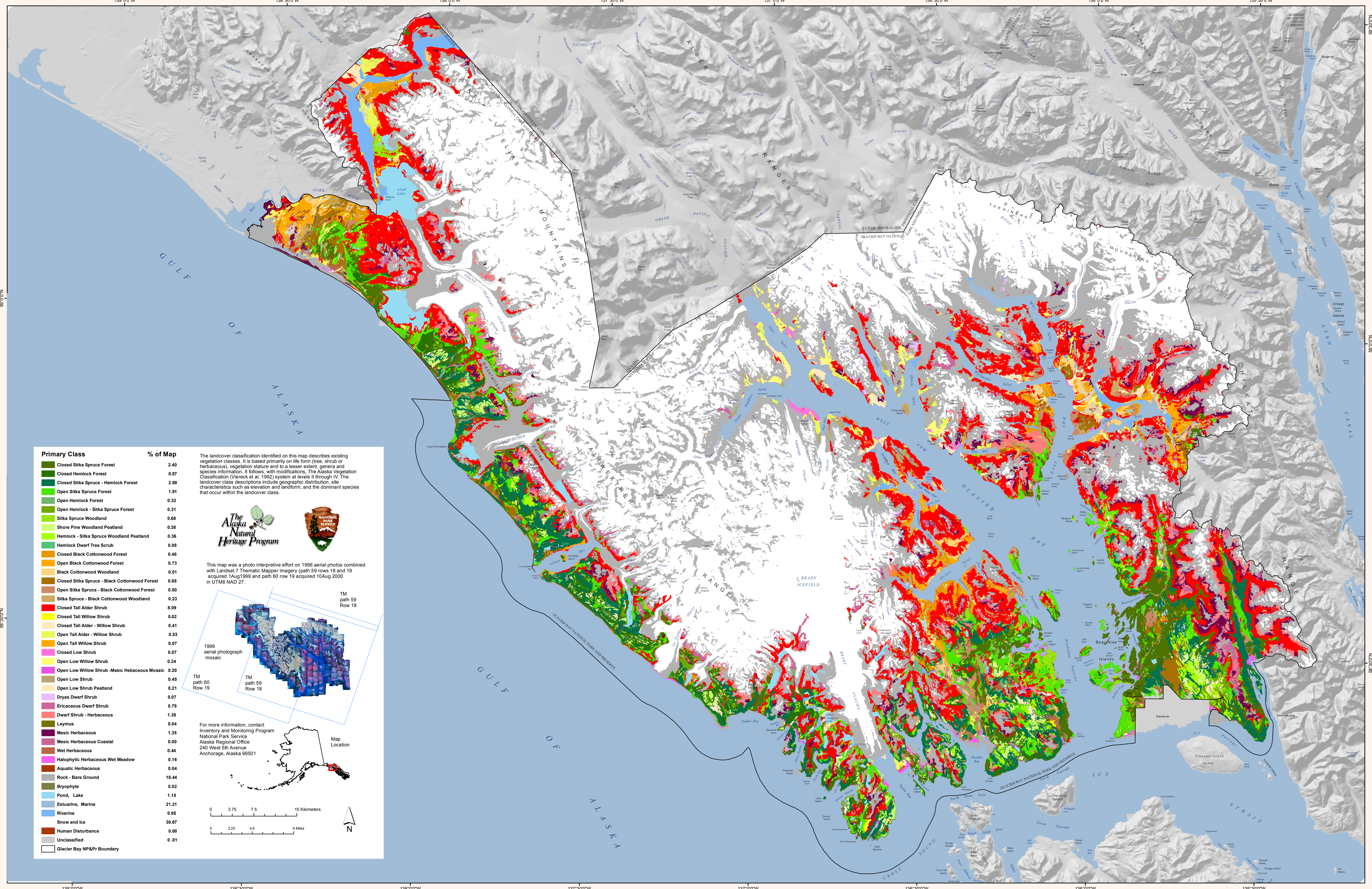
Dwarf Shrub-Herbaceous



Classification: Shrubs are less than 20 cm tall, dwarf shrub cover is 33% or greater, *Dryas drummondii* contributes less than 60% to the total shrub cover, and herbaceous species cover is 33% or greater. The class is comparable to the Viereck et al. (1992) hierarchical level IV: *Vaccinium* tundra (II.D.2.b), mountain-heath tundra (II.D.2.d) and *Cassiope* tundra (II.D.2.e).

Distribution and landform: The Dwarf Shrub-Herbaceous class is common in the alpine throughout the Park. It may also occur as small patches on low elevation wind-swept knobs such as Cape Spencer. It covers 5.0% (20,491 ha) of the Park's vegetated land.

Vegetation: Typically, *Cassiope mertensiana*, *Empetrum nigrum*, *Harrimanella stellariana*, *Luetkea pectinata*, *Phyllodoce aleuticum* and *Vaccinium* species dominate or codominate the dwarf shrub layer. Herbaceous species are present with greater than 33% cover and include *Geum macrophyllum* var. *macrophyllum*, *Chamerion angustifolium* ssp. *angustifolium*, *Chamerion latifolium*, *Hieracium triste*, *Loiseleuria procumbens*, *Lupinus nootkatensis*, *Nephrophyllidium crista-galli*, *Pedicularis oderii*, *Poa alpina*, *Saxifraga nelsoniana* ssp. *pacifica*, and *Vahlodea atropurpurea*. This class is commonly found near the Ericaceous Dwarf Shrub and Mesic Herbaceous classes.



Primary Class	% of Map
Closed Sitka Spruce Forest	2.40
Closed Hemlock Forest	0.87
Closed Sitka Spruce - Hemlock Forest	2.59
Open Sitka Spruce Forest	1.91
Open Hemlock Forest	0.32
Open Hemlock - Sitka Spruce Forest	0.31
Sitka Spruce Woodland	0.68
Shore Pine Woodland Peatland	0.38
Hemlock - Sitka Spruce Woodland Peatland	0.36
Hemlock Dwarf Tree Scrub	0.08
Closed Black Cottonwood Forest	0.46
Open Black Cottonwood Forest	0.73
Black Cottonwood Woodland	0.51
Closed Sitka Spruce - Black Cottonwood Forest	0.68
Open Sitka Spruce - Black Cottonwood Forest	0.50
Sitka Spruce - Black Cottonwood Woodland	0.23
Closed Tall Alder Shrub	8.09
Closed Tall Willow Shrub	0.02
Closed Tall Alder - Willow Shrub	0.41
Open Tall Alder - Willow Shrub	0.53
Open Tall Willow Shrub	0.07
Closed Low Shrub	0.07
Open Low Willow Shrub	0.24
Open Low Willow Shrub -Mesic Hebaceous Mosaic	0.20
Open Low Shrub	0.45
Open Low Shrub Peatland	0.21
Dryas Dwarf Shrub	0.07
Ericaceous Dwarf Shrub	0.79
Dwarf Shrub - Herbaceous	1.38
Leymus	0.04
Mesic Herbaceous	1.35
Mesic Herbaceous Coastal	0.00
Wet Herbaceous	0.44
Halophytic Herbaceous Wet Meadow	0.16
Aquatic Herbaceous	0.04
Rock - Bare Ground	18.44
Bryophyte	0.02
Pond, Lake	1.15
Estuarine, Marine	21.21
Riverine	0.95
Snow and Ice	30.67
Human Disturbance	0.00
Unclassified	0 .01
Glacier Bay NP&Pr Boundary	

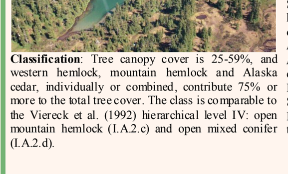
The landcover classification identified on this map describes existing vegetation classes. It is based primarily on life form (tree, shrub or herbaceous), vegetation stature and to a lesser extent, genera and species information. It follows, with modifications, The Alaska Vegetation Classification (Viereck 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.

The Alaska Natural Heritage Program

This map was a photo interpretive effort on 1996 aerial photos combined with Landsat 7 Thematic Mapper imagery (path 59 rows 18 and 19 acquired 1Aug1999 and path 60 row 19 acquired 10Aug 2000 in UTM8 NAD 27.

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

Open Hemlock Forest

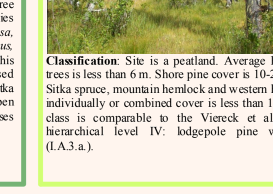


Classification: Tree canopy cover is 25-59%, and western hemlock, mountain hemlock and Alaska cedar, individually or combined, contribute 75% or more to the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open mountain hemlock (I.A.2.c) and open mixed conifer (I.A.2.d).

Distribution and landform: This type is common on the outer coast piedmonts, old inactive outwash plains and sideslopes. It was not mapped in the Alsek River Canyon or in upper or middle Glacier Bay. It covers 1.1% (4,713 ha) of the Park's vegetated land. The following map gives its distribution.

Vegetation: *Tsuga heterophylla* and/ or *Tsuga mertensiana* dominate the tree layer. *Chamaecyparis nootkatensis* may also be present or co-dominate. Sitka spruce may be present with low cover. Tree height ranges to 37 m. A variety of understory species occur, such as *Cassiope* species, *Dryopteris expansa*, *Elliottia pyroliflorus*, *Lysichiton americanus*, *Menziesia ferruginea* and *Vaccinium* species. This class is typically interspersed with the Closed Hemlock, Closed Sitka Spruce, Open Sitka Spruce, Closed Sitka Spruce-Hemlock and Open Hemlock-Sitka Spruce landcover classes and classes that occur in peatlands.

Shore Pine Woodland Peatland

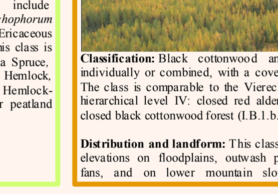


Classification: Site is a peatland. Average height of trees is less than 6 m. Shore pine cover is 10-24%, and Sitka spruce, mountain hemlock and western hemlock, individually or combined cover is less than 10%. The class is comparable to the Viereck et al. (1992) hierarchical level IV: lodgepole pine woodland (I.A.3.a.).

Distribution and landform: This class occurs primarily on low to mid elevation headlands, piedmonts and ancient inactive outwash deposits. Sites are usually flat, poorly drained peatlands. Small ponds and pools are common. It was not mapped in the Alsek River Canyon or in upper Glacier Bay. It covers 1.4% (5,649 ha) of the Park's vegetated land.

Vegetation: These peatlands support scattered dwarf *Pinus contorta* var. *contorta* (often less than 2 m height). Understory species include *Nephrophyllidium crista- galli*, *Trichophorum caespitosum*, *Empetrum nigrum* and other Ericaceous shrubs. *Sphagnum* species are prevalent. This class is typically interspersed with the Closed Sitka Spruce, Open Sitka Spruce, Closed Hemlock, Open Hemlock, Closed Sitka Spruce-Hemlock and Open Hemlock-Sitka Spruce landcover classes and other peatland classes.

Closed Black Cottonwood Forest

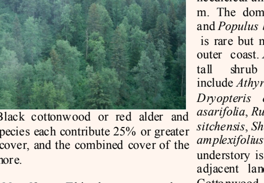


Classification: Black cottonwood and red alder, individually or combined, with a cover of 60-100%. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed red alder (I.B.1.a) and closed black cottonwood forest (I.B.1.b.).

Distribution and landform: This class occurs at low elevations on floodplains, outwash plains, alluvial fans, and on lower mountain slopes including colluvial, glacial till and morainal deposits. It is common on the outwash of the Alsek River and along the slopes of mid to upper Glacier Bay such as Giekie Inlet. This class is uncommon on the outer coast. It covers 1.7% (6,885 ha) of the Park's vegetated land.

Vegetation: *Populus balsamifera* ssp. *trichocarpa* dominates this class with cover greater than 60%. Tree height is generally 18 m or greater although less in young stands. *Picea sitchensis* seedlings through mature trees are common. *Alnus rubra* is rare but may dominate in riparian areas on the outer coast. Tall shrubs commonly dominate the understory including *Alnus viridis* ssp. *sinuata* and *Oplopanax horridus*. Other understory species include *Athyrium filix-femina*, *Circaea alpina*, *Osmorhiza berteroi*, *Pyrola asarifolia*, *Rubus spectabilis*, *Salix alaxensis*, *S. barclayi* and *Shepherdia canadensis*.

Closed Sitka Spruce Black-Cottonwood Forest

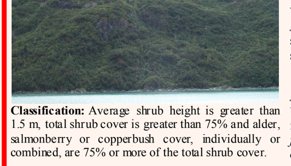


Classification: Black cottonwood or red alder and needleleaf tree species each contribute 25% or greater to the total tree cover, and the combined cover of the trees is 60% or more.

Distribution and landform: This class occurs at low elevations on floodplains, outwash plains, alluvial fans, moraines and glacial till deposits. It is uncommon but widely distributed throughout the Park and is generally absent in the upper Alsek corridor and the West Arm of Glacier Bay. It covers 2.5% (10,058 ha) of the Park's vegetated land.

Vegetation: Forest cover is greater than 60% and both needleleaf and broadleaf tree height ranges from 8-27 m. The dominant tree species are *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*. *Alnus rubra* is rare but may codominate in riparian areas on the outer coast. *Alnus viridis* ssp. *sinuata* dominates the tall shrub layer. Other understory species include *Athyrium filix-femina*, *Cornus canadensis*, *Dryopteris expansa*, *Oplopanax horridus*, *Pyrola asarifolia*, *Rubus pedatus*, *Salix barclayi*, *S. sitchensis*, *Shepherdia canadensis*, *Streptopus amplexifolius* and *Vaccinium ovalifolium*. The understory is often Depauperate. The most common adjacent landcover classes include Closed Black Cottonwood, Open Black Cottonwood, Closed Sitka Spruce and Open Sitka Spruce.

Closed Tall Alder Shrub

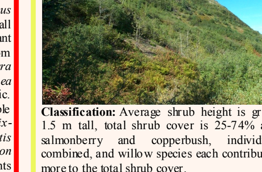


Classification: Average shrub height is greater than 1.5 m, total shrub cover is greater than 75% and alder, salmonberry or copperbush cover, individually or combined, are 75% or more of the total shrub cover.

Distribution and landform: This is the most common and widespread landcover class in the Park. It occurs on early seral floodplain and outwash deposits, recently deposited glacial till sideslopes, active colluvial sideslopes, avalanche chutes, stabilized talus, on pockets of glacial till interspersed with rocky outcroppings, young moraines, the upper coastal dune position, and the edge of peatlands and toeslopes. It covers 29% (120,567 ha) of the Park's vegetated land.

Vegetation: *Alnus viridis* ssp. *sinuata*, *Rubus spectabilis* or *Elliottia pyroliflorus* dominate the tall shrub layer. *Alnus viridis* ssp. *sinuata* is the dominant species within this map class. Its height ranges from 1.5-5m. Scattered young *Populus balsamifera* ssp. *trichocarpa* (4-12 m tall) and *Picea sitchensis* (34 m tall) are often characteristic. Understory species dominance is highly variable including: 1) *Rubus spectabilis*, 2) *Athyrium filix-femina* or *Dryopteris expansa*, 3) *Calamagrostis canadensis*, *Dryopteris expansa*, *Lysichiton americanus* and *Heracleum maximum*, 4) alpine plants including *Cassiope mertensiana*, *Empetrum nigrum*, *Harrimanella stelleriana*, *Luetkea pectinata*, *Phyllodoce aleutica* and *Vaccinium uliginosum*, and 5) young *Picea sitchensis*. Species diversity is often low.

Open Tall Alder-Willow Shrub

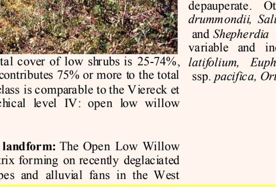


Classification: Average shrub height is greater than 1.5 m tall, total shrub cover is 25-74% and alder, salmonberry and copperbush, individually or combined, and willow species each contribute 25% or more to the total shrub cover.

Distribution and landform: The Open Tall Alder-Willow Shrub class is widely distributed within the Park. It occurs on early seral floodplain and outwash deposits (such as that of the Alsek River and Dundas River), and recently deposited glacial till on sideslopes, rocky outcrops, moraines, active colluvial sideslopes and toeslopes. It is especially common in mid to upper Glacier Bay dominating some of the sideslopes. It covers 1.9% (7,835 ha) of the Park's vegetated land.

Vegetation: *Alnus viridis* ssp. *sinuata* and *Salix* species (*Salix sitchensis* or *Salix barclayi*) greater than 1.5 m in height codominate the overstory. Sitka alder ranges in height up to 7 m tall, and willow ranges in height from 0.5-8 m. *Rubus spectabilis* and *Salix alaxensis* are common. A scattering of both sapling and large *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* may be present. Common understory species include *Athyrium filix-femina*, *Chamerion latifolium*, *Dryas drummondii*, *Equisetum arvense*. *Equisetum variegatum* var. *alaskana*, *Oplopanax horridus*, *Pyrola secunda* and *Shepherdia canadensis*.

Open Low Willow Shrub

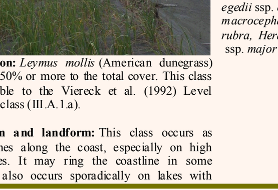


Classification: Total cover of low shrubs is 25-74%, and willow cover contributes 75% or more to the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open low willow shrub (II.C.2.g).

Distribution and landform: The Open Low Willow Shrub class is matrix forming on recently deglaciated sideslopes, toeslopes and alluvial fans in the West Arm of Glacier Bay and on the Alsek River outwash deposits. Otherwise, it is uncommon within the Park. It covers 0.9% (3,569 ha) of the Park's vegetated land.

Vegetation: Willows (*Salix barclayi*, *S. sitchensis*) are the dominant shrub species with heights averaging between 0.2 and 1.5 m tall. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* saplings may also have a minor presence. On unstable recently deglaciated sites, the willows are generally depauperate. Other shrub species include *Dryas drummondii*, *Salix alaxensis*, *S. arctica*, *S. commutate* and *Shepherdia canadensis*. Herbaceous species are variable and include *Carex pluriflora*, *Chamerion latifolium*, *Euphrasia mollis*, *Fragaria chiloensis* ssp. *pacifica*, *Orthilia secunda* and *Pyrola asarifolia*.

Leymus

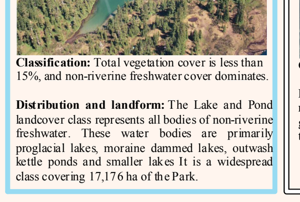


Classification: *Leymus mollis* (American dunegrass) contributes 50% or more to the total cover. This class is comparable to the Viereck et al. (1992) Level IV: *Elymus* class (III.A.1.a).

Distribution and landform: This class occurs as linear patches along the coast, especially on high beach dunes. It may ring the coastline in some regions. It also occurs sporadically on lakes with sandy shores. Soils are dry and range from silt and sand, sand to cobbles with or without a thin layer (<5 cm) of organic matter. It covers 0.1% (553 ha) of the Park's vegetated land. This class's patch size was often too small to map and, consequently, is under-represented on the digital map.

Vegetation: *Leymus mollis* may form a monoculture or codominate with other herbaceous species. These include *Achillea borealis*, *Angelica lucida*, *Argentina egedii* ssp. *egedii*, *Calamagrostis canadensis*, *Carex macrocephala*, *Deschampsia beringensis*, *Festuca rubra*, *Heracleum maximum*, *Honckenya peploides* ssp. *major* and *Lathyrus japonicus* var. *maritimus*.

Lake and Pond



Classification: Total vegetation cover is less than 15%, and non-riverine freshwater cover dominates.

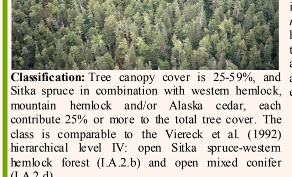
Distribution and landform: The Lake and Pond landcover class represents all bodies of non-riverine freshwater. These water bodies are primarily proglacial lakes, moraine dammed lakes, outwash kettle ponds and smaller lakes It is a widespread class covering 17,176 ha of the Park.

Snow and Ice

Classification: Snow, glacier or ice cover dominates.

Distribution and landform: The Snow and Ice class refers to areas covered with snowfields, ice fields, glaciers or late lying snow. It covers 456,898 ha of the Park. The following map gives its distribution.

Open Hemlock Sitka-Spruce Forest

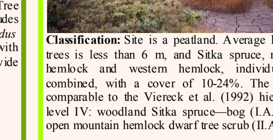


Classification: Tree canopy cover is 25-59%, and Sitka spruce in combination with western hemlock, mountain hemlock and/or Alaska cedar, each contribute 25% or more to the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open Sitka spruce-western hemlock forest (I.A.2.b) and open mixed conifer (I.A.2.d).

Distribution and landform: This class is uncommon but widespread on the outer coast piedmonts, old inactive outwash plains, uplifted marine deposits, moraines and sideslopes. It was not mapped in the Alsek River Canyon or in upper Glacier Bay. It covers 1.1% (4,597 ha) of the Park's vegetated land. The following map gives its distribution.

Vegetation: *Picea sitchensis* dominates the tree layer in combination with *Tsuga heterophylla*, *Tsuga mertensiana* or *Chamaecyparis nootkatensis*. Tree height ranges to over 42 m. The shrub layer includes tall shrubs such as *Alnus* species, *Oplopanax horridus* and *Vaccinium* species. This class is interspersed with a wide variety of map classes because of its wide ecological amplitude.

Hemlock-Sitka Spruce Woodland Peatland

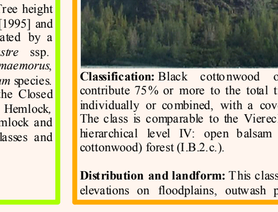


Classification: Site is a peatland. Average height of trees is less than 6 m, and Sitka spruce, mountain hemlock and western hemlock, individually or combined, with a cover of 10-24%. The class is comparable to the Viereck et al. (1992) hierarchical level IV: woodland Sitka spruce—bog (I.A.3.b) and open mountain hemlock dwarf tree scrub (II.A.2.b.).

Distribution and landform: This class occurs primarily on peatlands at mid elevations. It is uncommon throughout most of the park but common below Excursion Ridge. We did not map it in the Alsek River Canyon or in upper Glacier Bay. It occurs on uplifted marine deposits, old outwash plains, mountain benches and within forest openings. Small ponds and pools are common. It covers 1.3% (5,305 ha) of the Park's vegetated land.

Vegetation: These peatlands support scattered dwarf western hemlock and dwarf Sitka spruce. Tree height ranges from 1-5 m (according to Shephard [1995] and Boggs [2000]). The understory is dominated by a variety of species including *Ledum palustre* ssp. *decumbens*, *Empetrum nigrum*, *Rubus chamaemorus*, *Carex aquatilis* var. *dives* and *Sphagnum* species. This class is typically interspersed with the Closed Sitka Spruce, Open Sitka Spruce, Open Hemlock, Closed Hemlock, Closed Sitka Spruce-Hemlock and Open Hemlock-Sitka Spruce landcover classes and other peatland classes.

Open Black Cottonwood Forest

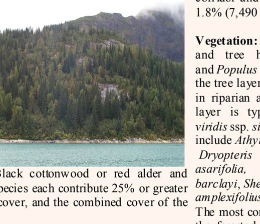


Classification: Black cottonwood or red alder contribute 75% or more to the total tree cover and, individually or combined, with a cover of 25-59%. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open balsam poplar (black cottonwood) forest (I.B.2.c.).

Distribution and landform: This class occurs at low elevations on floodplains, outwash plains, alluvial fans, and on lower mountain slopes including colluvial, glacial till and morainal deposits. It is common on the outwash of the Alsek River and along the slopes of mid to upper Glacier Bay such as Giekie Inlet. This class is uncommon on the outer coast. It covers 2.7% (10,892 ha) of the Park's vegetated land.

Vegetation: *Populus balsamifera* ssp. *trichocarpa* dominates the overstory, and *Picea sitchensis* seedlings through mature trees are common. Tree height is generally 18 m or greater although less in young stands. *Alnus rubra* is rare but may dominate in riparian areas on the outer coast. Tall shrubs commonly dominate the understory including *Alnus viridis* ssp. *sinuata* and *Oplopanax horridus*. Other understory species include *Athyrium filix-femina*, *Circaea alpina*, *Osmorhiza berteroi*, *Pyrola asarifolia*, *Rubus spectabilis*, *Salix alaxensis*, *S. barclayi* and *Shepherdia canadensis*.

Open Sitka Spruce-Black Cottonwood Forest

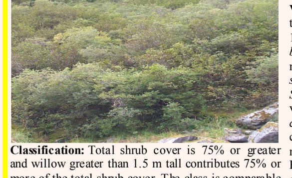


Classification: Black cottonwood or red alder and needleleaf tree species each contribute 25% or greater to the total tree cover, and the combined cover of the trees is 25-59%.

Distribution and landform: This class occurs from low to mid elevations on floodplains, outwash plains, alluvial fans, moraines, bedrock, colluvium and glacial till deposits. It is widely distributed throughout the Park but is generally absent in the upper Alsek corridor and the West Arm of Glacier Bay. It covers 1.8% (7,490 ha) of the Park's vegetated land.

Vegetation: Forest cover is between 25% and 59%, and tree height is 20-27 m. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* codominate the tree layer. *Alnus rubra* is rare but may codominate in riparian areas on the outer coast. The tall shrub layer is typically thick and dominated by *Alnus viridis* ssp. *sinuata*. Other common understory species include *Athyrium filix-femina*, *Cornus canadensis*, *Dryopteris expansa*, *Oplopanax horridus*, *Pyrola asarifolia*, *Rubus pedatus*, *Salix sitchensis*, *S. barclayi*, *Shepherdia canadensis*, *Streptopus amplexifolius* and *Vaccinium ovalifolium*.
The most common adjacent landcover classes include the forested classes Closed Black Cottonwood, Open Black Cottonwood, Closed Sitka Spruce and Open Sitka Spruce.

Closed Tall Willow Shrub

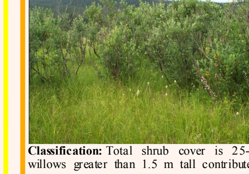


Classification: Total shrub cover is 75% or greater and willow greater than 1.5 m tall contributes 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed tall willow shrub (II.B.1.a).

Distribution and landform: The Closed Tall Willow Shrub class is uncommon within the Park. It typically occurs on mountain sideslopes, alluvial fans, active outwash plains and uplifted tidal marshes that are no longer tidal. It covers 0.1% (321 ha) of the Park's vegetated land.

Vegetation: Willows (*Salix barclayi*, *S. sitchensis*) 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 shrubs are *Alnus viridis* ssp. *sinuata*, *Rubus spectabilis*, *Sambucus racemosa* and *Shepherdia canadensis*. Herbaceous species are variable and include *Carex pluriflora* and *Fragaria chiloensis* ssp. *pacifica*. On mountain side-slopes, this class is often interspersed as small patches within a matrix of Tall Alder, Tall Alder-Willow, and Mesic Herbaceous classes. On outwash, it is often adjacent to sparsely vegetated areas, Black Cottonwood and Tall Alder classes.

Open Tall Willow Shrub

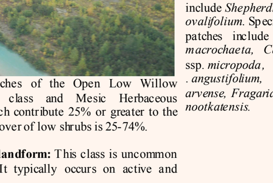


Classification: Total shrub cover is 25-74% and willows greater than 1.5 m tall contribute 75% or more of the total shrub cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: open tall willow shrub (II.B.2.a).

Distribution and landform: The Open Tall Willow Shrub class is uncommon within the Park. It typically occurs on mountain side-slopes, and inactive and active outwash-floodplain deposits. It covers 0.3% (1,068 ha) of the Park's vegetated land.

Vegetation: Willows (*Salix barclayi*, *S. sitchensis*) are the dominant shrub species with heights averaging greater than 1.5 m. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* saplings may have a minor presence. Other shrubs are *Alnus viridis* ssp. *sinuata*, *Rubus spectabilis*, *Sambucus racemosa* and *Shepherdia canadensis*.

Open Low Willow Shrub- Mesic Herbaceous

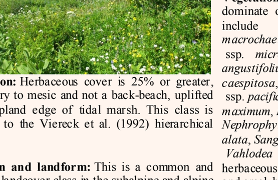


Classification: Patches of the Open Low Willow Shrub landcover class and Mesic Herbaceous landcover class each contribute 25% or greater to the total cover. Total cover of low shrubs is 25-74%.

Distribution and landform: This class is uncommon within the Park. It typically occurs on active and inactive outwash-floodplain deposits. It covers 0.7% (3,012 ha) of the Park's vegetated land.

Vegetation: This class is a mosaic of patches of the Closed Low Willow and the Mesic Herbaceous classes. Willows (*Salix barclayi*, *S. sitchensis*) are the dominant shrub species with heights averaging less than 1.5 m tall. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* saplings may also have a minor presence. Other shrub species may include *Shepherdia canadensis* and *Vaccinium ovalfolium*. Species dominating the herbaceous patches include *Calamagrostis canadensis*, *Carex macrochaeta*, *Carex pluriflora*, *Carex pyrenaica* ssp. *micropoda*, *Chamerion angustifolium* ssp *. angustifolium*, *Chamerion latifolium*, *Equisetum arvense*, *Fragaria chiloensis* ssp. *pacifica* and *Lupinus nootkatensis*.

Mesic Herbaceous

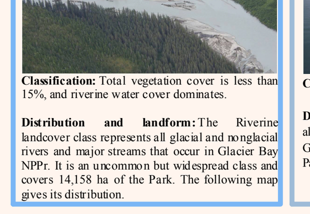


Classification: Herbaceous cover is 25% or greater, the site is dry to mesic and not a back-beach, uplifted beach or upland edge of tidal marsh. This class is comparable to the Viereck et al. (1992) hierarchical level IV.

Distribution and landform: This is a common and widespread landcover class in the subalpine and alpine of Glacier Bay NPPr. It also occurs as small to large patches on river and outwash deposits (such as Dry Bay), alluvial fans, recently deglaciated shorelines, as well as on disturbed sideslopes. The surficial geology in the subalpine and alpine includes alpine ridges, stabilized talus, glacial till on sideslopes and cirques. It covers 4.9% (20,037 ha) of the Park's vegetated land.

Vegetation: Various herbaceous species may dominate or codominate in the tallest layer. These include *Calamagrostis canadensis*, *Carex macrochaeta*, *C. nigricans*, *C. pluriflora*, *C. pyrenaica* ssp. *micropoda*, *Chamerion angustifolium* ssp. *angustifolium*, *Chamerion latifolium*, *Deschampsia caespitosa*, *Equisetum arvense*, *Fragaria chiloensis* ssp. *pacifica*, *Geranium erianthum*, *Heracleum maximum*, *Lupinus nootkatensis*, *Luzula wahlenbergii*, *Nephrophyllidium crista-galli*, *Prenanthes alata*, *Sanguisorba canadensis*, *Senecio triangularis*, *Vahlodea atropurpurea* and *Veratrum viride*. These herbaceous meadows are richer and taller in swales and creek bottoms.

Riverine



Classification: Total vegetation cover is less than 15%, and riverine water cover dominates.

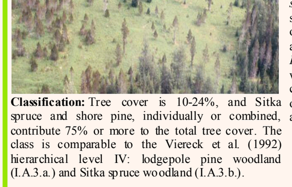
Distribution and landform: The Riverine landcover class represents all glacial and nonglacial rivers and major streams that occur in Glacier Bay NPPr. It is an uncommon but widespread class and covers 14,158 ha of the Park. The following map gives its distribution.

Estuarine and Marine

Classification: Estuarine and marine water bodies.

Distribution and landform: This class represents all estuaries and marine water bodies that occur in Glacier Bay NPPr. It covers 323,537 ha of the Park.

Sitka Spruce Woodland

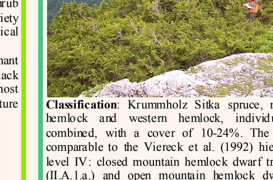


Classification: Tree cover is 10-24%, and Sitka spruce and shore pine, individually or combined, contribute 75% or more of the total tree cover. The class is comparable to the Viereck et al. (1992) hierarchical level IV: lodgepole pine woodland (I.A.3.a.) and Sitka spruce woodland (I.A.3.b.).

Distribution and landform: This type is widespread except for upper Glacier Bay. It is common on floodplains, outwash plains, uplifted marine deposits, uplifted beach ridges, sideslopes and moraines. It covers 2.5% (10,093 ha) of the Park's vegetated land. The following map gives its distribution.

Vegetation: *Picea sitchensis* dominates the tree layer. *Alnus viridis* ssp. *sinuata*, *Oplopanax horridus*, *Rubus spectabilis* and *Vaccinium* species are common shrub species. This class is interspersed with a wide variety of map classes because of its wide ecological amplitude.
Pinus contorta var. *contorta* occurs as a codominant with spruce and sometimes spruce and black cottonwood primarily in the Gustavus region. On most of these sites, pine is declining as the spruce mature and the sites become drier (Streveler 2003).

Hemlock Dwarf Tree Scrub

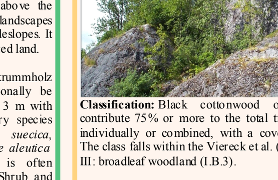


Classification: Krummholz Sitka spruce, mountain hemlock and western hemlock, individually or combined, with a cover of 10-24%. The class is comparable to the Viereck et al. (1992) hierarchical level IV: closed mountain hemlock dwarf tree scrub (II.A.1.a) and open mountain hemlock dwarf tree scrub (II.A.2.b).

Distribution and landform: The Hemlock Dwarf Tree Scrub landcover class is common 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. It did not occur in the Alsek River Canyon or in upper Glacier Bay, although it occurs sporadically in mid Glacier Bay in areas that were above the elevational extent of the neoglaciation. The landscapes are typically mountain ridges, knolls and sideslopes. It covers 0.3% (1,259 ha) of the Park's vegetated land.

Vegetation: *Tsuga mertensiana* has a krummholz lifeform and *Picea sitchensis* may occasionally be present. Tree height is typically less than 3 m with some trees extending to 7 m. Understory species include *Cassiope* species, *Cornus suecica*, *Nephrophyllidium crista-galli*, *Phyllodoce aleutica* and *Vaccinium ovalifolium*. This class is often interspersed with the Ericaceous Dwarf Shrub and Dwarf Shrub-Herbaceous landcover classes.

Black Cottonwood Woodland

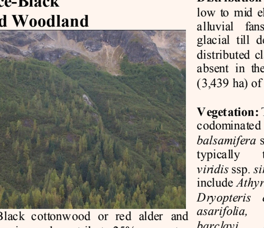


Classification: Black cottonwood or red alder contribute 75% or more to the total tree cover and, individually or combined, with a cover of 10-24%. The class falls within the Viereck et al. (1992) level III: broadleaf woodland (I.B.3).

Distribution and landform: This class occurs at low elevations on floodplains, outwash plains, alluvial fans, and on lower mountain slopes including colluvial, glacial till and morainal deposits. It is common on the outwash of the Alsek River and along the slopes of mid to upper Glacier Bay such as Adams Inlet. This class is uncommon on the outer coast. It covers 1.8% (7,573 ha) of the Park's vegetated land.

Vegetation: 10-24% cover of *Populus balsamifera* ssp. *trichocarpa* dominates the overstory. *Picea sitchensis* may also be common. Tree height is generally 18 m or greater although less in young stands. *Alnus rubra* is rare but may dominate in riparian areas on the outer coast. *Alnus viridis* ssp. *sinuata* commonly dominates the understory. Other species include *Rubus spectabilis*, *Salix barclayi* and *Shepherdia canadensis*. Adjacent landcover classes on floodplains include Closed and Open Sitka Spruce, Closed Black Cottonwood, Open Black Cottonwood, Tall Alder, Tall Willow and Mesic Herbaceous. On hills, this class most often occurs next to the Closed and Open Cottonwood, Tall Alder and Tall Alder-Willow classes.

Sitka Spruce-Black Cottonwood Woodland

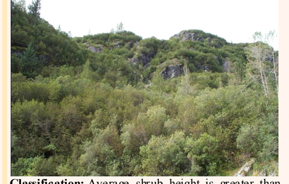


Classification: Black cottonwood or red alder and needleleaf tree species each contribute 25% or greater to the total tree cover, and the combined cover of the trees is 10-24%. The class falls within the Viereck et al. (1992) hierarchical level III: mixed woodland forest (I.C.3).

Distribution and landform: This class occurs from low to mid elevations on floodplains, outwash plains, alluvial fans, moraines, bedrock, colluvium and glacial till deposits. It is an uncommon yet widely distributed class throughout the Park but is generally absent in the upper Alsek corridor. It covers 0.8% (3,439 ha) of the Park's vegetated land.

Vegetation: Tree cover is between 10% and 24% and codominated by *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa*. The tall shrub layer is typically thick and dominated by *Alnus viridis* ssp. *sinuata*. Other understory species include *Athyrium filix- femina*, *Cornus canadensis*, *Dryopteris expansa*, *Oplopanax horridus*, *Pyrola asarifolia*, *Rubus pedatus*, *Salix sitchensis*, *S. barclayi*, *Shepherdia canadensis*, *Streptopus amplexifolius* and *Vaccinium ovalifolium*.
The most common adjacent classes are forest classes dominated by Black Cottonwood and Sitka Spruce. Other adjacent classes are Tall Alder, Tall Alder-Willow and Mesic Herbaceous.

Closed Tall Alder-Willow Shrub



Classification: Average shrub height is greater than 1.5 m tall, total shrub cover is greater than 75% and alder, salmonberry and copperbush, individually or together, and willow species each contribute 25% or more to the total shrub cover.

Distribution and landform: The Closed Tall Alder-Willow Shrub class occurs at mid to low elevations on outwash plains (such as the Alsek), low elevation slopes, and recently deglaciated sideslopes of Glacier Bay and the associated fjords. The sites are often early seral and mesic. It covers 1.5% (6,064 ha) of the Park's vegetated land.

Vegetation: *Alnus viridis* ssp. *sinuata* and *Salix* species (*Salix sitchensis* or *Salix barclayi*) greater than 1.5 m in height are codominant in the overstory. Sitka alder ranges in height from 2-7 m, and willow ranges in height from 0.5-8 m. A scattering of both sapling and large *Populus balsamifera* ssp. *trichocarpa* and *Picea sitchensis* may be present. Common understory species include *Athyrium filixfemina*, *Chamerion latifolium*, *Dryas drummondii*, *Equisetum arvense*. *Equisetum variegatum* var. *alaskana*, *Oplopanax horridus*, *Pyrola secunda*, *Rubus spectabilis*, *Salix alaxensis* and *Shepherdia canadensis*. In valley bottoms, including floodplains, it is mosaiced with Closed, Open and Woodland Black Cottonwood classes and the Closed Tall Alder class. On lower mountain sideslopes, it is mosaiced with the Tall Alder, Tall Willow and Mesic Herbaceous classes.

Closed Low Shrub

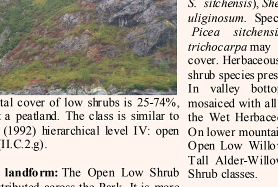


Classification: Total cover of low shrubs (0.2-1.5 m tall) is 75% or more. The class is similar to the Viereck et al. (1992) hierarchical level IV: closed low willow (II.C.1.b).

Distribution and landform: The Closed Low Shrub class is uncommon within the Park. It typically occurs on mountain side-slopes, recently deglaciated slopes, alluvial fans, and inactive outwash floodplain deposits. It covers 0.3% (1,035 ha) of the Park's vegetated land.

Vegetation: *Elliottia pyroliflorus*, *Myrica gale*, *Salix* species (*Salix barclayi* and *S. sitchensis*) and *Shepherdia canadensis* are the dominant shrub species with heights between 0.2-1.5 m. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* saplings may also have a minor presence. On recently deglaciated sites, the willows are generally depauperate. Other shrub species include *Dryas drummondii*, *Menziesia ferruginea*, *Salix alaxensis*, *S. commutata*, *Vaccinium ovalifolium* and *V. uliginosum*. Herbaceous species are variable and include *Carex pluriflora* and *Fragaria chilensis* ssp. *pacifica*.

Open Low Shrub

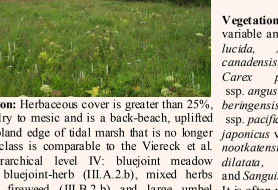


Classification: Total cover of low shrubs is 25-74%, and the site is not a peatland. The class is similar to the Viereck et al. (1992) hierarchical level IV: open low willow shrub (II.C.2.g).

Distribution and landform: The Open Low Shrub class is widely distributed across the Park. It is more common on recently deglaciated sideslopes within Glacier Bay, on mid and lower sideslopes and valley bottoms in the Dundas Bay region, and on outwash deposits such as the Alsek River outwash. It covers 1.6% (6,644 ha) of the Park's vegetated land.

Vegetation: This class is dominated shrubs 0.2-1.5 m in tall including *Elliottia pyroliflorus*, *Menziesia ferruginea*, *Myrica gale*, *Salix* species (*Salix barclayi*, *S. sitchensis*), *Shepherdia canadensis*, and *Vaccinium uliginosum*. Species dominance is highly variable. *Picea sitchensis* and *Populus balsamifera* ssp. *trichocarpa* may be present with less than 10% cover. Herbaceous species vary depending on the shrub species present.
In valley bottoms, including floodplains, it is mosaiced with all the Cottonwood Forest classes, and the Wet Herbaceous and Mesic Herbaceous classes. On lower mountain sideslopes, it is mosaiced with the Open Low Willow Shrub, Closed Tall Alder, Closed Tall Alder-Willow Shrub and Closed Tall Willow Shrub classes.

Mesic Herbaceous Coastal

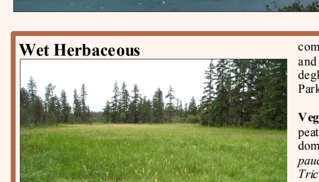


Classification: Herbaceous cover is greater than 25%, the site is dry to mesic and is a back-beach, uplifted beach or upland edge of tidal marsh that is no longer tidal. This class is comparable to the Viereck et al. (1992) hierarchical level IV: bluejoint meadow (III.A.2.a), bluejoint-herb (III.A.2.b), mixed herbs (III.B.2.a.), fireweed (III.B.2.b) and large umbel (III.B.2.c).

Distribution and landform: This is an incidental association in Glacier Bay NPPr. It occurs as small to mid size patches on uplifted tidal deposits above the high tide line and back beach dunes. The sites are level or rolling and the soils are mesic with a thin organic or litter layer over sand and silt. It covers 0.02% (63 ha) of the Park's vegetated land.

Vegetation: Species composition and dominance are variable and may include *Achillea borealis*, *Angelica lucida*, *Athyrium filix-femina*, *Calamagrostis canadensis*, *Calamagrostis neglecta*, *Carex lyngbyei*, *Carex pluriflora*, *Chamerion angustifolium* ssp. *angustifolium*, *Cicuta douglasii*, *Deschampsia beringensis*, *Festuca rubra*, *Fragaria chiloensis* ssp. *pacifica*, *Heracleum lanatum*, *Lathyrus japonicus* var. *maritimus*, *Leymus mollis*, *Lupinus nootkatensis*, *Maianthemum dilatatum*, *Platanthera dilatata*, *Rubus arcticus*, *Rubus spectabilis* and *Sanguisorba stipulata*.
It is often mosaiced with the Rock-Bare Ground class on coastal dunes.

Wet Herbaceous



Classification: Herbaceous cover is greater than 25%, and dominant vegetation is emergent; semipermanent or standing freshwater is present. The class falls within the Viereck et al. (1992) hierarchical level III: wet graminoid herbaceous (III.A.3) and wet forb herbaceous (III.B.3).

Distribution and landform: This is a common and widespread landcover class in Glacier Bay NPPr. It is common on peatlands, pond edges, outwash deposits, and wet depressions in alpine, subalpine and recently deglaciated terrain. It covers 1.6% (6,512 ha) of the Park's vegetated land.

Vegetation: Sedges and/or forbs dominate. In peatlands, *Nephrophyllidium crista-galli* is often the dominant forb and *Carex aquatilis*, *C. livida*, *C. pauciflora*, *C. sitchensis*, *Eriophorum* species and *Trichophorum caespitosum* the dominant sedges. In non-peatlands, common dominants or codominants include *Carex aquatilis* var. *dives*, *C. lyngbyei*, *C. macrochaeta*, *C. pyrenaica* ssp. *micropoda*, *C. rostrata*, *C. saxatilis*, *Comarum palustre*, *Eleocharis palustris*, *Equisetum fluviatile*, *Equisetum variegatum* var. *alaskanum*, *Juncus castaneus* ssp. *castaneus*, *Hippuris tetraphylla*, *H. vulgaris* and *Menyanthes trifoliata* and *Scirpus microcarpus*.

Halophytic Herbaceous Wet Meadow

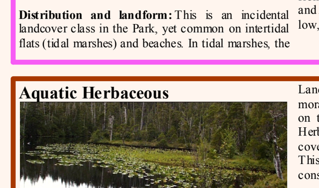


Classification: Herbaceous cover is greater than 25% and site is tidal. The class is comparable to the Viereck et al. (1992) hierarchical level IV.

Distribution and landform: This is an incidental 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. It covers 0.6% (2,450 ha) of the Park's vegetated land. This class's patch size was often too small to map and, consequently, is under-represented on the digital map.

Vegetation: Salt and brackish water tolerant species dominate this class. Tidal marshes are dominated by *Argentina egedii* ssp. *egedii*, *Carex lyngbyei*, *Deschampsia beringensis*, *Eleocharis palustris*, *Glaux maritima*, *Plantago maritima*, *Puccinellia nutkaensis*, *Ranunculus cymbalaria* and *Triglochin maritimum*. *Honckenya peploides* ssp. *major* dominates the beach fronts. Additional species include *Mertensia maritima* and *Leymus mollis*. Species richness in all habitats is low, and the cover ranges from low to high.

Aquatic Herbaceous

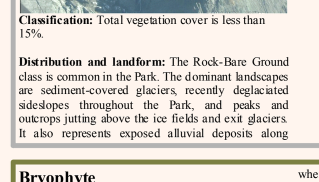


Classification: Herbaceous cover is greater than 25% and the vegetation is submerged, floating, or growing in permanent water. The class falls within the Viereck et al. (1992) hierarchical level III: freshwater aquatic herbaceous (III.D.1).

Distribution and landform: This is an uncommon yet widespread landcover class in Glacier Bay NPPr. It occurs in the shallow portions of ponds and lakes. Landforms include outwash, lateral and terminal moraines, uplifted beaches, uplifted marine deposits on the outer coast, peatlands (although the Aquatic Herbaceous class was typically too small to map). It covers 0.1% (538 ha) of the Park's vegetated land. This class's patch size was often too small to map and, consequently, is under-represented on the digital map.

Vegetation: Dominant species likely include *Hippuris tetraphylla*, *Myriophyllum spicatum*, *Nuphar lutea* ssp. *polysepala*, *Potamogeton* spp., *Ranunculus trichophyllus* and *Sparganium hyperboreum*. These species often occur as monocultures with low cover.

Rock- Bare Ground

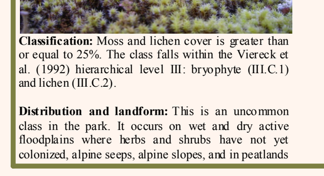


Classification: Total vegetation cover is less than 15%.

Distribution and landform: The Rock-Bare Ground class is common in the Park. The dominant landscapes are sediment-covered glaciers, recently deglaciated sideslopes throughout the Park, and peaks and outcrops jutting above the ice fields and exit glaciers. It also represents exposed alluvial deposits along rivers, especially those with wide outwash plains, and coastal dunes. It covers 274,643 ha of the Park.

Mosaics: This class is interspersed with a wide variety of map classes. It forms several major mosaics in the alpine and subalpine with the Closed Tall Alder, the Dwarf Shrub-Herbaceous, the Ericaceous Dwarf Shrub, and the Mesic Herbaceous classes. It is also mosaiced with the Mesic Herbaceous class on coastal dunes.

Bryophyte



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).

Distribution and landform: This is an uncommon class in the park. It occurs on wet and dry active floodplains where herbs and shrubs have not yet colonized, alpine seeps, alpine slopes, and in peatlands where graminoid cover is sparse and ericaceous shrubs are not dominant. It covers 0.1% (292 ha) of the Park's vegetated land.

Vegetation: Moss and lichen dominate the vegetation. In the alpine, it occurs as a mosaic within a matrix of other dwarf shrub classes. In peatlands, graminoids such as *Trichophorum caespitosum* and *Eriophorum* spp. and Ericaceous shrubs have low cover value and *Sphagnum* mosses are dominant.