USGS-NPS VEGETATION MAPPING PROGRAM

Classification of the Vegetation of Isle Royale National Park

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INTRODUCTION

The U.S. Geological Survey and National Park Service formed a partnership in 1994 to map National Parks in the United States using The Nature Conservancy's U.S. National Vegetation Classification, a standard for reporting vegetation information among federal agencies (FGDC 1997, Grossman *et al.* 1998). The goal of the projects are, among others, to provide baseline ecological data to the resource managers in the park, to put this data in a regional and national context, and to provide opportunities for future inventory, monitoring, and research activities. Each park has a vegetation team that follows standardized field sampling and vegetation classification standards to document the various vegetation types found in a given park, and conduct accuracy assessments of the aerial photo interpretations provided by the mapping team (Grossman *et al.* 1994). The final products consist of a vegetation map, descriptions of each vegetation type, a key to each type, and all related metadata files (original field forms, plot data, accuracy assessment points). This report presents the work conducted at Isle Royale National Park in northern Michigan between 1996 and 1999.

BACKGROUND

The vegetation classification used in this report, the U.S. National Vegetation Classification (USNVC), has been developed by The Nature Conservancy, in partnership with the network of Natural Heritage Programs. Additional support has come from federal agencies and the Ecological Society of America. A first edition of the classification has recently been released that provides a thorough introduction to the classification, its structure, and the list of vegetation units found across the United States, as of April 1997 (Grossman *et al.* 1998, Anderson *et al.* 1998). Refinements to the classification occur in the process of application, leading to ongoing proposed revisions that are reviewed both locally and nationally.

Not all vegetation types are equally mappable at a certain scale. Coordination between the aerial photo team and the ground team is needed to resolve the best way to map the types, whether directly at the association level, at higher classification levels, such as the alliance or formation, or as a mosaic or complex. Thus not all types described in this report are necessarily mapped directly.

STUDY AREA

Isle Royale National Park, in the northwestern portion of Lake Superior, is an archipelago of islands with a northeast/southwest orientation. The archipelago includes one large island (Isle Royale) about 45 miles long and 9 miles wide, and this large island is surrounded by about 400 small islands. The park is located about 60 miles northwest of Michigan's Keweenaw Peninsula, about 22 miles east of Grand Portage, Minnesota, and about 35 miles southeast of Thunder Bay, Ontario. The total size of the park (land and water) is 571,790 acres or 893 square miles, of which 133,782 acres (23.4%, 209 square miles) is land, and the rest is open water of Lake Superior and inland lakes and ponds. The park boundaries extend about 4.5 miles out into Lake Superior from the archipelago.

Isle Royale National Park was authorized on March 3, 1931; it was formally established in 1940, and officially dedicated in 1946. Most of the park's land area (98%) was designated as a Wilderness area in October 1976, and later additions increased the total Wilderness to 99% of the park. The park was designated an International Biosphere Reserve in 1980.

The climate is mid-continental, with a mean annual temperature of 3.4 ^{o}C, extremes of 32 and -34^{o}C and a mean annual precipitation of 77 cm per yr. (Hansen *et al.* 1973). The landscape is rugged terrain, consisting of Precambrian basalts, sandstones, and conglomerates (conglomerates outcrop mainly in the southwest portion of the island). Due to the steep SE dip of the interbedded layers of igneous and sedimentary rocks that form the Lake Superior basin, the bedrock layers form a series of parallel ridges and valleys oriented southwest to northeast. The southeastern slopes of these ridges have a moderate slope, and the northwestern slopes are often very steep hogbacks.

Prolonged erosion and glacial scouring during the Pleistocene have produced the current surficial geology features, which include sandy loam tills, lacustrine, and localized outwash deposits of sand and gravel. Much of the island is covered by thin soils. These were formed from till, talus, and other glacial deposits. Successive stages of post-glacial lake levels are marked by ancient beaches and wave-cut terraces on the rocky coastal ridges (Hansen *et al.* 1973).

The topography of the area is a complex pattern of low ridges and valleys, with a maximum relief of 244 m (792 ft) at Mount Desor (Hansen *et al.* 1973), but more typically is 20 to 40 m. All of Isle Royale National Park falls in one ecological land unit at the subsection level, the Isle Royale subsection (212Ib of Keys *et al.* 1995).

The park has a long history of human use, beginning with prehistoric copper mining by Native Americans, with charcoal evidence in aboriginal mining pits near McCargoe Cove yielding a radiocarbon age of about 1,500 B.C. (Huber 1983). Archaeological studies have indicated that Native American activity peaked during the period from A.D. 800 to 1600, possibly including copper mining as late as 1500. During the 1800's small Ojibway groups remained on the island hunting, fishing, and tapping sugar maples, and a few still worked the mines (Shelton 1997).

During the 1800's and early 1900's European immigrants came to Isle Royale for commercial fishing, copper mining, and logging, and later for recreation at several tourist resorts and private cottages. The first European immigrant settlements were built as fishing stations by the Northwest Fur Company in the late 1830's. Immigrant copper mining was active in the 1840's through the early 1890's. Both Native American and European immigrant mining operations probably used fires to clear land for prospecting (Shelton 1997, Cole *et al.* 1997). Most of the logging on the island was done to support mining and for firewood. Two commercial lumber operations were established, one at Windigo in the 1890's and a second at Siskiwit Bay in the 1930's. Both ended with major losses to the lumber companies. At Windigo, white cedar and pine were cut along Washington Creek, and the logs were floated into Washington Harbor, where they were held by boom chains. But a big storm caused the creek to flood and break the log barrier, and the harvest was lost to Lake Superior. At Siskiwit Bay a paper company was logging spruce and fir from its holdings in the swamps at the head of the Bay; in July 1936 a fire started near a lumber camp joined two other fires, and eventually burned about 20% of the island (Shelton 1997). Almost the entire large island, and many of the smaller islands were disturbed by logging, mining operations, or fires prior to park establishment in 1940.

Prior to settlement and logging, which began around 1843 and ended in 1940, (cutting much of the park forests in the process), the vegetation consisted of hardwood forests (sugar maple, yellow birch) at the southwest end of the island, and boreal mixed and conifer forests at the northeast end (Cole *et al.* 1997). Periodic fires both before and after settlement favored the aspen-birch forests, as well as the fire-dependent pines on ridges. Windstorms, spruce-budworm disease, herbivory by moose, and beaver

activity are other disturbance factors acting in the park (Hansen *et al.* 1973, Cole *et al.* 1997). The impact of browsing by large populations of moose is significantly changing current successional patterns and altering future forest composition (Cole *et al.* 1997).

METHODS

Planning

In general, the field methods used for developing the classification and conducting the accuracy assessment followed the methodology outlined by the USGS-NPS Vegetation Mapping Program (Grossman *et al.* 1994). An overview of the entire methodology is presented as it was applied at Isle Royale.

Isle Royale is a large-sized park (100-2500 km^2) based on land area (541 km^2 land area, and 2313 km^2 including open water); however, environmentally it is not all that complex, the entire unit falling in one ecological subsection (Isle Royale 212Ib of Keys et al 1995). Thus, although a gradsect sampling approach is recommended based on the park's size, it was not used at Isle Royale. Plots and accuracy assessment points were distributed as equitably as possibly throughout the park, as long as they were reasonably accessible from trails or from lakeshore areas accessible by motorboat or canoe. Access to some areas of the park was difficult because there are large tracts with no trails and no easy access from the shore. The more remote areas were sampled by bushwacking off trail, but there are fewer samples from the more remote portions of the park (e.g. Siskiwit Swamp to Lily Lake and Red Oak Ridge, and Minong Ridge midway between Windigo and North Desor Campground).

A preliminary list of vegetation associations and alliances from Faber-Langendoen *et al.* (1996, Midwest portion of USNVC) was generated for the park in January of 1997. A total of 67 community types were listed. In addition recent publications on vegetation types in northwestern Ontario were consulted (Sims *et al.* 1989, Harris *et al.* 1996).

Reconnaissance and Verification

The classification was developed based on observations during a reconnaissance trip in fall of 1996 by combined teams of aerial photo interpreters and ecologists. This reconnaissance trip clarified both the nature of the classification units and their aerial photo signatures. A minimum mapping unit of 0.5 ha guided decisions about how to treat various units as complexes or mosaics. Based on the reconnaissance trip, the aerial photo team attempted to identify all of the different aerial photo signatures that might correspond to the vegetation types. By the spring of 1997, mapping protocols were sufficiently stabilized to permit the aerial photo team to begin delineating polygons throughout the park. The full set of airphoto overlays for the park were delivered to the field team in mid-July 1997, and they were then used to locate polygons for plot sampling.

Plot sampling

Plot sampling was limited to an average of 3 plots per type. More samples were allocated to less well understood types and fewer to better understood associations. The plots were to be equitably spread across the park as much as possible, within access constraints described above. A total of 187 plots were sampled as part of this project in 1997.

The size of most plots was 20 x 20 m; there were 3 10 x 10 m plots used for cliff communities. Plots were placed subjectively so as to be most representative of the stand of vegetation. The

vegetation was visually divided into strata, and height and cover abundance of each strata were estimated. All the species of each stratum were listed (including mosses and lichens) and percent cover estimated using the cover scale provided by TNC (see example in Grossman *et al.* 1998). Additional species within the vegetation unit or polygon that occurred outside of sampled plots (generally within 2 m of the plot border) were listed separately. Species that were not identifiable in the field were collected for later identification. In addition to floristic information, the following environmental information was recorded on field forms: surficial geology, hydrologic (flooding) regime, soil drainage regime, soil texture, slope, aspect, topographic position, and evidence of disturbance. Universal Transverse Mercator (UTM) coordinates of each plot were recorded using a GPS unit, along with other locational information. The vegetation profile in cross-section was usually sketched by hand to represent the location and setting of the plot. A provisional vegetation type was assigned to the plot. All but 6 plots were permanently marked with 2 ft long angle iron stakes; the exceptions were mainly aquatic habitats with water deeper than the height of the installed stake. Plot sampling was conducted by Will MacKinnon, Carol Reschke, Mark Romanski, and Sherry Martine from June 4, 1997 to September 23, 1997.

Accuracy Assessment

Following the plot sampling, the plot data were analyzed, and the classification refined. Ecologists and air photo interpreters met in late April 1998 to review the refined classification and refine photosignatures to match the revised classification. The final product was a list of 52 associations.

Once polygon photosignatures were reviewed and updated by the aerial photo interpretation team, an accuracy assessment was conducted. The number of polygons visited per type depended on how common the type was, from 24 polygons for widespread types to 2 for rare types. Points were stratified to be equitably distributed across the island. The target number of polygons to be sampled for each community was split into two groups, one for a team working the northeast half of the park (east team), and one for the team working the southwest half of the park (west team).

The surveyors on the east team were Janet Marr and Lynn Repola, with occasional assistance from Mark Romanski. The west team consisted of Carol Reschke and Jon Kazmierski, with occasional assistance from Emmet Judziewicz and Alicia Giatas. Park Service staff including natural resource management staff, rangers, and maintenance staff frequently provided boat rides to and from shoreline access points. From there all access was either on foot or by canoe and portage. Some field work was completed in day trips from base camps at Davidson Island (east end) or Windigo Ranger Station (west end), and the rest was completed during two to seven day backpacking and/or canoe trips.

Field teams were sent out with a preliminary vegetation key and a set of aerial photos and overlays on which vegetation polygons had completely delineated. Team members selected polygons for sampling, and used maps and GPS units to locate polygons. Teams recorded locational information, briefly described the vegetation, noting canopy structure, dominant species by strata, and environmental features, including topographic position, slope, and aspect. Adjacent vegetation types were often noted. Rationale for the classification type chosen and comments on problems with the classification were also recorded. A total of 551 accuracy assessment points were surveyed in 1998, and almost all of these were in different polygons than the 187 plots sampled in 1997.

Data Analysis

Isle Royale plot data (187 plots) and accuracy assessment data (551 AAP's) were entered into the PLOTS database developed by The Nature Conservancy (TNC 1997). Species were assigned standardized codes and names based on the PLANTS database developed by National Resources Conservation Service (NRCS) in cooperation with the Biota of North America Program (BONAP). For the vegetation analysis, the plot data were analyzed by PC-ORD Multivariate Analysis package (McCune and Mefford 1997). The data were analyzed in a series of runs, partitioning the data into successively smaller sets based on groupings determined in the larger data sets, until sufficient resolution was achieved. Multivariate analyses were done using UPGMA or group average cluster analysis (Lance and Williams 1967; Wishart 1978, 1969), Bray-Curtis ordination (Beals 1984, McCune and Beals 1993), Nonmetric multidimensional scaling or NMS ordination (Mather 1976) starting with the axis coordinates from the Bray-Curtis ordination, and Detrended Correspondence Analysis or DCA (Hill and Gauch 1980). These were then reviewed and assessed for perceived environmental gradients (e.g. moisture gradients, geology, soil texture and depth, etc.).

These groups were compared with the USNVC (Faber-Langendoen *et al.* 1996, Grossman *et al.* 1998), as well as to northwestern Ontario types (Sims *et al.* 1989, Harris *et al.* 1996). Care was taken not to over-emphasize local variations found at Isle Royale compared to more extensive information compiled at the state or regional level. Nevertheless, several types in the USNVC were revised based on these analyses. Plot summaries were produced for each type using species composition data and environmental data from both plot and accuracy assessment point data sets.

RESULTS

Community types

A total of 52 community types were described in the course of the survey. An additional 5 variants were recognized because they contained structural or floristic patterns somewhat different from other stands in the type. A total of 187 plots were collected to describe these types more carefully and to verify their compositional characteristics. The vegetation survey turned up at least one new plant species for the park and the eastern United States, *Prosartes (Disporum) trachycarpa* (Judziewicz *et al.* 1997).

Ordination of all 187 plots and 400 taxa revealed three large groups, upland forests and woodlands, upland open bedrock vegetation, and wetlands. The wetlands were separable into two subgroups, the open shrub/herb dominated group and the more forested swamps. Within the upland open bedrock group, individual types could be distinguished fairly well within the overall dataset. These types show a pattern from very open bedrock types, such as the Great Lakes basalt (conglomerate) bedrock lakeshore (#51) or the Great Lakes basalt/diabase cliff (#52), that share little in common with more forested types, to those that overlap in composition with these forests, such as the Boreal rocky shrubland (#29), the Spruce-fir basalt bedrock glade (#62), and particularly the Canada yew mixed shrubland (#35). Somewhat surprisingly, the more open herbaceous wetland group, such as the Northern Water Lily aquatic wetland (#50) appear clustered near types in the open bedrock group, such as the bedrock lakeshore (#51). This may reflect the somewhat lower diversity found in both types, as well as the compression of the diversity of types into 2 axes. The third axis clearly separates the two groups.

Within the wetlands group, the forested swamp types showed discernable clusters on the overall ordination. The drier forested swamps, such as the White cedar-black ash swamp (#18) and the Black ash-mixed hardwood swamp (#26) were more similar to upland types than were the more saturated and peaty swamps, such as the white cedar-(mixed conifer)/alder swamp (#7), the Black spruce/labrador tea poor swamp (#25) and the Northern tamarack rich swamp (#65).

The more shrub and herbaceous dominated wetland subgroup was ordinated separately from the swamp subgroup to further clarify patterns of those types. The first axis orders the stands from more open water types, such as the Water horsetail-spikerush marsh (#47), through emergent marsh and meadow types, such as the Midwest mixed emergent deep marsh (#46) and the Bluejoint eastern meadow (#40), to fen and swamp peatland types, such as the Boreal calcareous seepage fen (#44) and the Sweet gale shrub fen (#37). The Black spruce/labrador tea poor swamp type (#25), included for comparative purposes, clearly separates from these shrub/herb types, but is most similar to the Northern sedge poor fen (#25), the White cedar/sweet gale scrub fen (#60), and an outlier stand of the Northern sedge wet meadow type (#41).

Forested uplands were also ordinated separately from the complete dataset. The primary axis separates dry, woodland types, such as the Boreal pine rocky woodland (#63) and Spruce-fir basalt bedrock glade (#62) from more mesic forest types, such as the Maple-yellow birch northern hardwoods forest (#9) and the White cedar-yellow birch forest (#16). The second axis separates the more island-influenced and cooler microclimate types (e.g. Mountain ash-mountain maple forest, #13; Balsam fir/Canada yew-devil's club forest, #2, which is a variant of the spruce-fir/feathermoss forest, #1; Balsam fir/Canada-yew woodland, #22, a variant of the Canada yew mixed shrubland, #35) from deeper soil, warmer spruce-fir-aspen (#23) and aspen-birch types (#8, 54.2, 54.6). Dominating the central portions of the ordination is the more closed spruce-fir-aspen forest type (#55) as well as the more open spruce-fir-aspen open forest (#23). The latter type, thought to be induced primarily by heavy moose grazing, appears to separate somewhat from the former, but compositional similarity is still quite high.

Ecological Groups

The types can be organized from an ecological perspective using ecological groups (Table 2). These groups bring together types that share ecological processes. The 14 ecological groups present at Isle Royale include 4 wetland groups and 10 upland groups. The Lake Superior shorelines add interesting and unusual features to this boreal system.

Linkage of Mapping Units to Classification Units

Results of the linkage between mapping units and classification units are still under review, and will be discussed in the mapping report.

DISCUSSION

Field survey methods were somewhat hampered by the logistic difficulties of moving around the island; nevertheless a very comprehensive survey of the vegetation of Isle Royale was feasible because of the linkage of classification and mapping. The mapping effort encouraged sampling of vegetation in a fairly systematic way across the island for two reasons. First, the distribution of each vegetation type across the entire park could be determined from aerial photo interpretation, and plots and accuracy assessment points could be spread accordingly. Second, any vegetation stand that had

distinct vegetational signatures was recorded by the aerial photo team and subsequently visited by the ground team, thereby ensuring that all variability visible on the photos was assessed.

Some types were very difficult to resolve. The open forest or woodland phase (#23) of the spruce-fir-aspen type (#55) contained some structural and floristic differences from the more closed or forested phase. Ultimately the decision was made to keep these as one type, and allow the two phases to remain as separate mapping units. This should lead to more stable vegetation typing, as a more open stand may close over in a relatively short period of time, depending on moose grazing pressures.

Wetland types were often small and difficult to distinguish on aerial photos. Mapping them required the use of map units called complexes or mosaics, particularly in the herbaceous wetland group. It was possible to recognize many of the forested swamp types.

New and unusual types recorded on the island include the White cedar-sweet gale scrub fen (#60), the Boreal calcareous seepage fen (#44), and the Sweet gale shrub fen (#37). The Twig rush wet meadow (#48) is also unusual. The Lake Superior Shoreline contains a number of high quality occurrences of bedrock types, including the Great Lakes basalt (conglomerate) bedrock lakeshore (#51) and the Great Lakes basalt/diabase cobble-gravel lakeshore (#33, 39). The cold climate of Isle Royale is reflected in the species-poor and more boreal spruce-fir/feathermoss forest type (#1), which is not found in the U.S. south of Isle Royale, nor immediately north on the somewhat warmer north shore of Lake Superior. Several island types or variants, such as those found on Passage Island, including the Canada yew mixed shrubland (#35), its variant, the Balsam fir/Canada yew woodland (#22), and the Balsam fir/Canada yew-devil's club forest (#2), a variant of the Spruce-fir/feathermoss type (#1), require more extensive investigation throughout the Lake Superior islands to assess their relative distinctiveness from their main types.

At least 6 new types were described as a result of the survey work on the Island. These are as follows: the Canada yew mixed shrubland (#35) and its variant, the Balsam fir/Canada yew woodland (#22), Yellow birch-(spruce) forest (#74), White spruce rocky woodland (#19, which bears some resemblance to Boreal pine rocky woodland, #63), the Great Lakes boreal talus woodland (#28), the Thimbleberry shrubland (#32), and the White cedar-sweet gale scrub fen (#60). Other types, as mentioned above, such as the Common juniper rocky krummholz (#31), have important variants found on the island, such as described by the White cedar-balsam fir/leatherleaf/black crowberry krummholz type (#34) found in association with the Common juniper rocky krummholz (#31)near the open rocky shorelines. See also Judziewicz (1997) for more information on the vegetation of Passage Island.

A number of types are currently ranked globally rare (G1-G3). These include the White cedar - yellow birch forest (G2Q) and the Boreal calcareous seepage fen (G2Q), both of which have uncertain ranks because of range-wide vegetation classification issues. Other types may well be rare, based on a preliminary review of their ranks. These include the Balsam fir-Canada yew woodland, the Common juniper rocky krummholz, the Great Lakes basalt/diabase cliff, and the Great Lakes basalt (conglomerate) bedrock lakeshore. The bedrock shorelines have been described elsewhere in Michigan by Reschke (1985) and Albert *et al.* (1994, 1995, 1997). Further review of the rarity of these types is needed, especially by ecological specialists in Ontario.

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Table 1. List of community types (plant associations) for Isle Royale. The Community Number is used throughout as the project number for the type. The Community Common Name is the global common name for the type, except where an asterisk occurs, which indicates the name is that of a variant of the main type (the type itself is indicated by the global code given in the last column), or a +, which indicates that the type is an alliance, complex or mosaic. The Physiognomic Type identifies the structural category that the type fits into at the subclass level of the USNVC (Grossman *et al.* 1998). The Upland/Wetland category indicates whether the type falls into the wetland category as defined by Cowardin *et al.*(1985). The Global Rank refers to the level of rarity of the type, ranging from G1 (very rare) to G5 (very common) (See Grossman *et al.* 1998 for more details). GW indicates a weedy, or exotic type, and a 'Q' after the rank means the type is taxonomically questionable, which may affect the rank. Global ranks for many types found at Isle Royale had not been determined, as indicated by a G? The last column provides the Global Elcode, a unique identifier for each plant association in the USNVC. Global ranks and codes are not applied to variants, alliances, complexes and mosaics.

Community Number	Community Common Name	Physiognomic Type	Upland/ Wetland	Global rank	Global code
01	Spruce - fir / feathermoss forest	Evergreen forest	Upland	G?	2509
02	Balsam fir / Canada yew - devil's club forest*	Evergreen forest	Upland	-	2509 variant
03	White pine - aspen - birch forest	Mixed evergreen – deciduous forest	Upland	G4?	2479
04	White cedar - boreal conifer mesic forest	Evergreen forest	Upland	G4	2449
05	Black spruce / feathermoss forest	Evergreen forest	Upland	G5	2447
06	Jack pine - black spruce / feathermoss forest	Evergreen forest	Upland	G5	2448
07	White cedar - (mixed conifer) / alder swamp	Evergreen forest	Wetland	G4	2456
08	Aspen - birch - red maple forest	Deciduous forest	Upland	G5	2467
09	Maple - yellow birch - northern hardwoods forest	Deciduous forest	Upland	G3G4	2457
10	Red oak - sugar maple forest	Deciduous forest	Upland	G?	2461
12	Great Lakes boreal cliff forest	Deciduous forest	Upland	G?	5251
13	Mountain ash - mountain maple forest	Deciduous forest	Upland	G?	5253
14	Aspen - balsam poplar lowland forest	Deciduous forest	Upland	G5	5036
16	White cedar - yellow birch forest	Mixed evergreen – deciduous forest	Upland	G2Q	2450
18	White cedar - black ash swamp	Mixed evergreen – deciduous forest	Wetland	G?	5165
19	White spruce woodland	Evergreen woodland	Upland	G?	5196
22	Balsam fir / Canada yew woodland*	Evergreen woodland	Upland	-	5254 variant

23	Spruce - fir – aspen open forest*	Mixed evergreen – deciduous woodland (sometimes deciduous)	Upland	-	2475 variant
25	Black spruce / Labrador tea poor swamp	Evergreen woodland	Wetland	G5	2454
26	Black ash – mixed hardwood swamp	Deciduous woodland or forest	Wetland	G4	2105
27	Red maple – ash - birch swamp forest	Deciduous woodland	Wetland	G4	2071
28	Great Lakes boreal talus woodland	Mixed evergreen – deciduous woodland	Upland	G?	5252
29	Boreal rocky shrubland	Deciduous shrubland	Upland	G?	5197
31	Common juniper rocky krummholz	Evergreen dwarf-shrubland or shrubland	Upland	G3G4	5065
32	Thimbleberry shrubland	Deciduous shrubland	Upland	G?	5248
33	Great Lakes basalt/diabase cobble-gravel lakeshore, shrub zone*	Deciduous dwarf-shrubland (zone in sparse veg. type)	Upland	-	5250 variant
34	White cedar – balsam fir / leatherleaf / black crowberry krummholz*	Evergreen shrubland	Upland	-	5065 variant
35	Canada yew mixed shrubland	Mixed evergreen - deciduous shrubland	Upland	G?	5254
36	Speckled alder swamp	Deciduous shrubland	Wetland	G5?	2381
37	Sweet gale shrub fen	Deciduous dwarf-shrubland	Wetland	G?	5141
38	Poverty grass barrens	Perennial graminoid vegetation	Upland	G?	5157
39	Great Lakes basalt/diabase cobble-gravel lakeshore	Boulder, cobble, gravel, or talus sparse vegetation	Upland	G?	5250
40	Bluejoint eastern meadow	Perennial graminoid vegetation	Wetland	G?	5174
41	Northern sedge wet meadow	Perennial graminoid vegetation	Wetland	G4G5Q	2257
42	Northern poor fen	Perennial graminoid vegetation	Wetland	G3G4	2265
44	Boreal calcareous seepage fen	Perennial graminoid vegetation	Wetland	G2Q	2496
45	Great Lakes shoreline bulrush – cattail marsh	Perennial graminoid vegetation	Wetland	G4?	5112
46	Midwest mixed emergent deep marsh	Perennial graminoid vegetation	Wetland	G4G5	2229
47	Water horsetail - spikerush marsh	Perennial graminoid vegetation	Wetland	G4	5258
48	Twig rush wet meadow	Perennial graminoid vegetation	Wetland	G3G5	5103
49	Midwest pondweed submerged aquatic wetland	Hydromorphic rooted vegetation	Wetland	G5Q	2282
50	Northern water lily aquatic wetland	Hydromorphic rooted vegetation	Wetland	G5	2562

51	Great Lakes basalt (conglomerate) bedrock lakeshore	Lichen vegetation	Upland	G?	5215
52	Great Lakes basalt/diabase cliff	Consolidated rock sparse vegetation	Upland	G?	5191
53	Paper birch / bush honeysuckle - fir forest	Deciduous forest	Upland	G4?	2463
54	Aspen – birch alliance+	Deciduous forest	Upland	-	Alliance
54a	Aspen – birch / boreal conifer forest	Deciduous forest	Upland	G5	2466
54b	Aspen - birch / sugar maple - mixed hardwoods forest	Deciduous forest	Upland	G5	2468
55	Spruce - fir - aspen forest	Mixed evergreen – deciduous forest	Upland	G5	2475
56	Spruce – fir and sugar maple – yellow birch mosaic+	Mosaic forest: evergreen/deciduous	Upland	-	Mosaic
58	Sedge meadow complex	Perennial graminoid vegetation	Wetland	-	Complex
59	Sedge / Sphagnum meadow complex+	Perennial graminoid vegetation	Wetland	-	Complex
60	White cedar - sweet gale scrub fen	Mixed evergreen - deciduous shrubland	Wetland	G?	5193
62	Spruce – fir basalt bedrock glade	Evergreen woodland	Upland	G?	5214
63	Boreal pine rocky woodland	Mixed evergreen - deciduous woodland	Upland	G?	2483
65	Northern tamarack rich swamp	Deciduous (needle-leaved) forest	Wetland	G4	2471
66	Black spruce / alder rich swamp	Evergreen forest/woodland	Wetland	G5	2452
67	Leatherleaf - sweet gale shore fen	Mixed evergreen - deciduous dwarf-shrubland	Wetland	G?	5228
70	Leatherleaf bog	Evergreen dwarf-shrubland	Wetland	G5	2498
72	Timothy - (bluejoint) seminatural meadow	Perennial graminoid vegetation	Upland	GW	5249
74	Yellow birch - (spruce) forest	Deciduous forest	Upland	G?	5245

Table 2. List of community types for Isle Royale based on ecological groups. The Community Number is used throughout as the project number for the type. The Community Common Name is the global common name for the type, except where an asterisk occurs, which indicates the name is that of a variant of the main type (the type itself is indicated by the global code given in the last column). The ecological groups are modified slightly from Faber-Langendoen (1999).

Community Number	Ecological Group Name Community Common Name	Global code
	Northern Shrub/Graminoid Fens and Bogs	
44	Boreal calcareous seepage fen	2496
70	Leatherleaf bog	2498
67	Leatherleaf - sweet gale shore fen	5228
42	Northern poor fen	2265
37	Sweet gale shrub fen	5141
60	White cedar - sweet gale scrub fen	5193
	Rooted/Floating Aquatic Marshes	
49	Midwest pondweed submerged aquatic wetland	2282
50	Northern water lily aquatic wetland	2562
	Wet Meadows/Marshes	
40	Bluejoint eastern meadow	5174
45	Great Lakes shoreline bulrush – cattail marsh	5112
46	Midwest mixed emergent deep marsh	2229
41	Northern sedge wet meadow	2257
48	Twig rush wet meadow	5103
47	Water horsetail - spikerush marsh	5258
	Northern Conifer and Hardwood Forest and Shrub Swamps	
26	Black ash – mixed hardwood swamp	2105
66	Black spruce / alder rich swamp	2452
25	Black spruce / Labrador tea poor swamp	2454
65	Northern tamarack rich swamp	2471
27	Red maple – ash – birch swamp forest	2071
36	Speckled alder swamp	2381
07	White cedar - (mixed conifer) / alder swamp	2456
18	White cedar – black ash swamp	5165
	Great Lakes Rocky Shores	
39	Great Lakes basalt/diabase cobble-gravel lakeshore	5250
33	Great Lakes basalt/diabase cobble-gravel lakeshore, shrub zone*	5250 variant
51	Great Lakes basalt (conglomerate) bedrock lakeshore	5215
	Rock Barrens	
29	Boreal rocky shrubland	5197
31	Common juniper rocky krummholz	5065
38	Poverty grass barrens	5157
62	Spruce – fir basalt bedrock glade	5214
34	White cedar – balsam fir / leatherleaf / black crowberry krummholz*	5065 variant
	Cliffs and Talus	
52	Great Lakes basalt/diabase cliff	5191
12	Great Lakes boreal cliff forest	5251
28	Great Lakes boreal talus woodland	5252
	Northern Dry Conifer-(Hardwood) Forests and Woodlands	
63	Boreal pine rocky woodland	2483
06	Jack pine - black spruce / feathermoss forest	2448
03	White pine - aspen - birch forest	2479
	Northern Mesic Conifer-(Hardwood) Forests	
04	White cedar - boreal conifer mesic forest	2449
16	White cedar - yellow birch forest	2450

	Northern Spruce – Fir –(Hardwood) Forests	
02	Balsam fir / Canada yew – devil's club forest*	2509 variant
22	Balsam fir / Canada yew woodland*	5254 variant
05	Black spruce / feathermoss forest	2447
01	Spruce - fir / feathermoss forest	2509
55	Spruce - fir – aspen forest	2475
23	Spruce - fir – aspen open forest*	2475 variant
19	White spruce woodland	5196
	Boreal Hardwood Forests and Woodlands	
14	Aspen – balsam poplar lowland forest	5036
08	Aspen – birch – red maple forest	2467
54a	Aspen – birch / boreal conifer forest	2466
54b	Aspen – birch / sugar maple – mixed hardwoods forest	2468
53	Paper birch / bush honeysuckle – fir forest	2463
	Northern Hardwood Forests and Woodlands	
09	Maple – yellow birch - northern hardwoods forest	2457
13	Mountain ash - mountain maple forest	5253
10	Red oak – sugar maple forest	2461
74	Yellow birch - (spruce) forest	5245
	Northern Shrublands	
35	Canada yew mixed shrubland	5254
32	Thimbleberry shrubland	5248
	Semi-natural Meadows	
72	Timothy - (bluejoint) seminatural meadow	5249

CLASSIFICATION OF ISLE ROYALE NATIONAL PARK

I. Forest
I.A Evergreen Forest
I.A.8 Temperate or subpolar needle-leaved evergreen forest
I.A.8.N.c Conical-crowned temperate or subpolar needle-leaved evergreen forest
PICEA MARIANA FOREST ALLIANCE
Picea mariana / Pleurozium schreberi Forest
Pinus banksiana – Picea mariana / Vaccinium spp. / Pleurozium schreberi Forest

THUJA OCCIDENTALIS FOREST ALLIANCE
Thuja occidentalis /Abies balsamea – Acer spicatum Forest

PICEA GLAUCA - ABIES BALSAMEA FOREST ALLIANCE
Picea glauca – Abies balsamea / Pleurozium schreberi Forest

I.A.8.N.g Saturated temperate or subpolar needle-leaved evergreen forest
PICEA MARIANA SATURATED FOREST ALLIANCE
Picea mariana / Alnus incana / Sphagnum spp. Forest
Picea mariana / Ledum groenlandicum / Sphagnum spp. Forest

THUJA OCCIDENTALIS SATURATED FOREST ALLIANCE
Thuja occidentalis - (Picea mariana, Abies balsamea) / Alnus incana Forest

I.B Deciduous forest
I.B.2 Cold-deciduous forest
I.B.2.N.a Lowland or submontane cold-deciduous forest
QUERCUS RUBRA – ACER SACCHARUM – (QUERCUS ALBA) FOREST ALLIANCE
Quercus rubra - Acer saccharum Forest

ACER SACCHARUM – BETUAL ALLEGHANIENSIS - (FAGUS GRANDIFOLIA) FOREST ALLIANCE
Acer saccharum - Betula alleghaniensis - (Tilia americana) Forest
Betula alleghaniensis - (Acer saccharum, Picea glauca) Forest

I.B.2.N.b Montane or boreal cold-deciduous forest
BETULA PAPYRIFERA FOREST ALLIANCE
Betula papyrifera / Diervilla lonicera - (Abies balsamea) Forest

POPULUS TREMULOIDES – BETULA PAPYRIFERA FOREST ALLIANCE
Populus tremuloides - Betula papyrifera / (Abies balsamea, Picea glauca) Forest
Populus tremuloides - Betula papyrifera - (Acer rubrum, Populus grandidentata) Forest
Populus tremuloides - Betula papyrifera / Acer saccharum - Mixed Hardwoods Forest

I.B.2.N.d Temporarily flooded cold-deciduous forest
POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE
Populus tremuloides - Populus balsamifera - Mixed Hardwoods Lowland Forest

I.B.2.N.g Saturated cold-deciduous forest
FRAXINUS NIGRA – ACER RUBRUM SATURATED FOREST ALLIANCE
Fraxinus nigra - Mixed Hardwoods-Conifers / Cornus sericea / Carex spp. Forest
Acer rubrum - Fraxinus spp. - Betula papyrifera / Cornus canadensis Forest

LARIX LARICINA SATURATED FOREST ALLIANCE
Larix laricina / Alnus incana Forest

I.C Mixed evergreen-deciduous forest
I.C.3 Mixed needle-leaved evergreen – cold-deciduous forest
I.C.3.N.a Mixed needle-leaved evergreen – cold-deciduous forest
THUJA OCCIDENTALIS – BETULA ALLEGHANIENSIS FOREST ALLIANCE
Thuja occidentalis - Betula alleghaniensis Forest

PINUS STROBUS – (PINUS RESINOSA) – POPULUS TREMULOIDES FOREST ALLIANCE
Pinus strobus - Populus tremuloides / Corylus cornuta Forest

PICEA GLAUCA – ABIES BALSAMEA – POPULUS SPP. FOREST ALLIANCE
Picea glauca - Abies balsamea - Populus tremuloides / Mixed Herbs Forest

I.C.3.N.d Saturated mixed needle-leaved evergreen – cold-deciduous forest
THUJA OCCIDENTALIS – ACER RUBRUM SATURATED FOREST ALLIANCE
Thuja occidentalis - Fraxinus nigra Forest

II Woodland
II.A Evergreen woodland
II.A.4 Temperate or subpolar needle-leaved evergreen woodland
II.A.4.N.b Conical-crowned temperate or subpolar needle-leaved evergeen woodland
PINUS (BANKSIANA, RESINOSA) WOODLAND ALLIANCE
Pinus banksiana - (Picea mariana, Pinus strobus) / Vaccinium spp. Rocky Woodland

PICEA GLAUCA WOODLAND ALLIANCE
Picea glauca - (Betula papyrifera) / Danthonia spicata Woodland
Picea glauca - Abies balsamea Basalt (Conglomerate) Woodland

II.C Mixed evergreen – deciduous woodland
II.C.3 Mixed needle-leaved evergreen – cold-deciduous woodland
II.C.3.N.a Mixed needle-leaved evergreen – cold-deciduous woodland
PICEA GLAUCA – BETULA PAPYRIFERA WOODLAND ALLIANCE
Betula papyrifera - Picea glauca / Acer spicatum - Alnus viridis / Polypodium vulgare Talus Woodland [Provisional]

III Shrubland
III.A Evergreen shrubland
III.A.3 Needle-leaved evergreen shrubland
III.A.3.N.a Needle-leaved evergreen shrubland
JUNIPERUS COMMUNIS SHRUBLAND ALLIANCE
Juniperus communis - (Quercus rubra) / Juniperus horizontalis - Arctostaphylos uva-ursi Shrubland

III.B Deciduous shrubland
III.B.2 Cold-deciduous shrubland
III.B.2.N.a Temperate cold-deciduous shrubland
ACER SPICATUM SHRUBLAND ALLIANCE
Acer spicatum - Thuja occidentalis - Betula papyrifera / Taxus canadensis cliff forested scrub [Provisional]
Sorbus decora - Acer spicatum / Dryopteris carthusiana Forested Scrub [Provisional]

CORYLUS CONRUTA – AMELANCHIER SPP. SHRUBLAND ALLIANCE
Corylus cornuta - Amelanchier spp. - Prunus virginiana Rocky Shrubland

III.B.2.N.b Subalpine or subpolar cold-deciduous shrubland
RUBUS PARVIFLORUS SHRUBLAND ALLIANCE
Rubus parviflorus Shrubland

III.B.2.N.e Seasonally flooded cold-deciduous shrubland
ALNUS INCANA SEASONALLY FLOODED SHRUBLAND ALLIANCE
Alnus incana Swamp Shrubland [Provisional]

III.B.2.N.g Saturated cold-deciduous shrubland
PENTAPHYLLOIDES FLORIBUNDA - MYRICA GALE - (CAREX LASIOCARPA) SATURATED SHRUBLAND ALLIANCE
Myrica gale Fen Shrubland
Thuja occidentalis - (Myrica gale) / Eriophorum alpinum / Drepanocladus spp. Shrubland

III.C Mixed evergreen – deciduous shrubland
III.C.2 Mixed evergreen – cold-deciduous shrubland
III.C.2.N.a Mixed evergreen – cold-deciduous shrubland
TAXUS CANADENSIS – MIXED DECIDUOUS SHRUBLAND ALLIANCE
Taxus canadensis - Viburnum edule - Cornus sericea - Alnus viride - Oplopanax horridus Shrubland [Provisional]

IV Dwarf-shrubland
IV.A Evergreen dwarf-shrubland
IV.A.1 Needle-leaved or microphyllous evergreen dwarf-shrubland
IV.A.1.N.g Saturated needle-leaved or microphyllous evergreen dwarf-shrubland
CHAMAEDAPHNE CALYCULATA SATURATED DWARF-SHRUBLAND ALLIANCE
Chamaedaphne calyculata - Ledum groenlandicum - Kalmia polifolia Bog Dwarf-shrubland
Chamaedaphne calyculata - Myrica gale / Carex lasiocarpa Dwarf-shrubland

V Herbaceous vegetation
V.A Perennial graminoid vegetation
V.A.5 Temperate or subpolar grassland
V.A.5.N.a Tall sod temperate grassland
PHLEUM PRATENSE HERBACEOUS ALLIANCE
Phleum pratense - (Calamagrostis canadensis) Seminatural Herbaceous Vegetation

V.A.5.N.c Medium-tall sod temperate or subpolar grassland
DANTHONIA SPICATA HERBACEOUS ALLIANCE
Danthonia spicata - Poa compressa Granite Herbaceous Vegetation

V.A.5.N.k Seasonally flooded temperate or subpolar grassland
CALAMAGROSTIS CANADENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE
Calamagrostis canadensis Eastern Herbaceous Vegetation [Provisional]

CAREX (ROSTRATA, UTRICULATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE
Carex rostrata - Carex lacustris - (Carex vesicaria) Herbaceous Vegetation

CLADIUM MARISCOIDES SEASONALLY FLOODED HERBACEOUS ALLIANCE
Cladium mariscoides - Carex cryptolepis - Rhynchospora alba - Juncus canadensis Herbaceous Vegetation

V.A.5.N.l Semipermanently flooded temperate or subpolar grassland
TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCIRPUS SPP.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE
Typha spp. - Scirpus spp. - Mixed Herbs Great Lakes Shore Herbaceous Vegetation
Typha spp. - Scirpus acutus - Mixed Herbs Midwest Herbaceous Vegetation

V.A.5.N.m Saturated temperate or subpolar grassland
CAREX OLIGOSPERMA - CAREX LASIOCARPA SATURATED HERBACEOUS ALLIANCE
Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation

CAREX LASIOCARPA SATURATED HERBACEOUS ALLIANCE

Carex lasiocarpa - Scirpus cespitosus - Rhynchospora capillacea / Andromeda glaucophylla Herbaceous Vegetation

V.B Perennial forb vegetation
V.B.2 Temperate or subpolar perennial forb vegetation
V.B.2.N.e Semipermanently flooded temperate perennial forb vegetation
EQUISETUM FLUVIATILE SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE
Equisetum fluviatile - (Eleocharis smallii) Herbaceous Vegetation

V.C Hydromorphic rooted vegetation
V.C.2 Temperate or subpoloar hydromorphic rooted vegetation
V.C.2.N.a Permanently flooded temperate or subpolar hydromorphic rooted vegetatiton
POTAMOGETON SPP. - CERATOPHYLLUM SPP. - ELODEA SPP. PERMANENTLY FLOODED HERBACEOUS ALLIANCE
Potamogeton spp. - Ceratophyllum spp. Midwest Herbaceous Vegetation

NUPHAR LUTEA - NYMPHAEA ODORATA PERMANENTLY FLOODED HERBACEOUS ALLIANCE
Nymphaea odorata - Nuphar lutea (ssp. pumila, variegata) Herbaceous Vegetation

VII Sparse vegetation
VII.A Consolidated rock sparse vegetation
VII.A.1 Sparsely vegetated cliffs
VII.A.1.N.a Cliffs with sparse vascular vegetation
OPEN BLUFF/CLIFF SPARSE VEGETATION
Basalt/Diabase Great Lakes Cliff Sparse Vegetation

VII.A.2 Sparsely vegetated pavement
VII.A.2.N.a Pavement with sparse vascular vegetation
OPEN PAVEMENT SPARSE VEGETATION
Great Lakes Basalt (Conglomerate) Bedrock Lakeshore Sparse Vegetation

VII.B Boulder, gravel, cobble, or talus sparse vegetation
VII.B.2 Sparsely vegetated rock flats
VII.B.2.N.b Cobble/gravel beaches and shores
COBBLE/GRALVE SHORE SPARSE VEGETATION
Basalt/Diabase Cobble-Gravel Great Lakes Shore Sparse Vegetation

KEY TO VEGETATION ASSOCIATIONS OF ISLE ROYALE NP

1a. Mature trees (over 5 m tall, over 10 cm dbh) have at least 25% cover
FORESTS and WOODLANDS . . . 2 (or see p. 8)

2a. Tree canopy is > 50% evergreen and < 25% deciduous (consider proportions of actual canopy cover)
EVERGREEN FORESTS and WOODLANDS . . . 3 (or see p. 4)

3a. The most abundant trees are white spruce (*Picea glauca*) and/or balsam fir (*Abies balsamea*) . 4 (or see p. 2)

4a. The most abundant trees are white spruce (*Picea glauca*) . . . 5

5a. Forests: canopy has at least 60% cover of trees (over 5 m tall, over 10 cm dbh); canopy is dominated by white spruce or a mixture of white spruce and balsam fir; feathermosses such as *Pleurozium schreberi* and *Hylocomium splendens* are common in groundlayer; tree branches are often draped with beard lichens such as *Usnea* spp.; sites are on low slopes near Lake Superior, or on cool, mid-elevation slopes of ridges.
Spruce – fir / feathermoss forest (01)
[if this community occurs in a mosaic with sugar maple – yellow birch – northern hardwoods forest (9), and individual patches of each are usually < 0.5 ha, then use map unit **(56): Spruce – fir and sugar maple – yellow birch mosaic**

5b. Woodlands: canopy has from 25% to 60% cover of trees (over 5 m tall, over 10 cm dbh) . . . 6

6a. Less than 5% of ground surface is exposed bedrock; white spruce *(Picea glauca*) is the most abundant tree (10 to 60% cover), paper birch (*Betula papyrifera*) and aspen (*Populus tremuloides*) are the next most abundant trees (each with 1 to 5% cover); common shrubs are saplings or browsed scrub of white spruce, balsam fir (*Abies balsamea*), mountain ash (*Sorbus decora*), as well as speckled alder (*Alnus incana*), thimbleberry (*Rubus parviflorus*), red-berried elder (*Sambucus racemosa*) and skunk currant (*Ribes glandulosum*); sites range from level beach flats or ridges to steep slopes.
White spruce rocky woodland (19)

6b. Usually 5 to 30% of ground surface is exposed bedrock; white spruce *(Picea glauca*) is the most abundant tree (20 to 50% cover); other characteristic trees, usually with less than 25% cover include balsam fir (*Abies balsamea*), paper birch (*Betula papyrifera*), mountain ash (*Sorbus decora*) , and white cedar (*Thuja occidentalis*); common shrubs include common juniper *(Juniperus communis*), shadbush (*Amelanchier* spp.), and *Lonicera dioica;* sites are well-drained rocky ridges.
Spruce-fir basalt bedrock glade (62)

4b. The most abundant trees are balsam fir (*Abies balsamea*) . . . 7

7a. Forests: canopy has at least 60% cover of trees (over 5 m tall, over 10 cm dbh) . . . 8

8a. Canopy is dominated by a mixture of white spruce and balsam fir; feathermosses such as *Pleurozium schreberi* and *Hylocomium splendens* are common in groundlayer; tree branches are often draped with beard lichens such as *Usnea* spp.; sites are on low slopes near Lake Superior, or on cool, mid-elevation slopes of ridges.
Spruce – fir / feathermoss forest (01)

8b. Balsam fir (*Abies balsamea)* is the single most abundant canopy tree, Canada yew (*Taxus canadensis)* and devil's-club (*Oplopanax horridus)* are common understory shrubs; the most abundant herbs are *Clintonia borealis, Dryopteris expansa, Linnaea borealis, Maianthemum canadense*, and *Mitella nuda*; the feathermoss *Pleurozium schreberi* is abundant in the groundlayer; community is restricted to the northernmost portions of the park, mainly on Passage Island.
Balsam fir / Canada yew - devil's club forest (02) - phase of Spruce – fir / feathermoss forest

7b. Woodlands: canopy has from 25% to 60% cover of trees (over 5 m tall, over 10 cm dbh); balsam fir (*Abies balsamea*) is the single most abundant tree (25 to 50% cover); shrub layer is a dense thicket: Canada yew (*Taxus canadensis*) is the most abundant shrub (over 75% cover), with devil's-club (*Oplopanax horridus*), mountain alder (*Alnus viridis*), mountain ash (*Sorbus decora*), and squashberry (*Viburnum edule*) mixed in; only known from ridges on Passage Island; may also occur in other areas in the northern end of Isle Royale.

Balsam fir / Canada yew woodland (22)

3b. The most abundant trees are pines (*Pinus* spp.), white cedar (*Thuja occidentalis*), or black spruce (*Picea mariana*) . . . 9

9a. The most abundant trees are white cedar (*Thuja occidentalis*) . . . 10

10a. Upland sites, with well-drained soils; white cedar (*Thuja occidentalis*) is the most abundant canopy tree; balsam fir (*Abies balsamea*) and paper birch (*Betula papyrifera*) are common associates; the most common shrubs are thimbleberry (*Rubus parviflorus;* 25 to 50% cover), dwarf raspberry (*Rubus pubescens*), and bush honeysuckle (*Diervilla lonicera*); the most abundant herbs are *Aralia nudicaulis*, *Lycopodium annotinum*, *Streptopus roseus*, and *Cornus canadensis*.

White cedar – boreal conifer mesic forest (04)

10b. Wetland sites, with poorly-drained soils; white cedar (*Thuja occidentalis*) is the most abundant canopy tree (average 30% cover), tamarack (*Larix laricina*) and black spruce (*Picea mariana*) may also be common; speckled alder (*Alnus incana)* is the most abundant tall shrub (average 26% cover), *Rhamnus alnifolius* is another characteristic shrub; the most abundant herbs are *Symplocarpus foetidus, Calamagrostis canadensis*, and *Carex stricta.* (Note: this community has a variable physiognomy, it can occur as either a forest or a woodland, with canopy cover ranging from 25 to 90% cover).

White cedar - (mixed conifer) / alder swamp (07)

9b. The most abundant trees are pines(*Pinus* spp.) or black spruce (*Picea mariana*) . . . 11

11a. The most abundant trees are white pine (*Pinus strobus*) or red pine (*P. resinosa*) . . . 12

12a. Forests: canopy has at least 60% cover of trees (over 5 m tall, over 10 cm dbh); white pine (*Pinus strobus*) is the most abundant canopy tree, with 25 to 75% cover, mixed with smaller numbers of aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and balsam fir (*Abies balsamea*); the most abundant shrub is thimbleberry (*Rubus parviflorus*) with 5 to 25% cover; other characteristic shrubs are *Diervilla lonicera* and *Amelanchier* spp.; the most abundant herbs are *Aster macrophyllus* and *Aralia nudicaulis.*

White pine – aspen - birch – forest (03)

12b. Woodlands: canopy has from 25% to 60% cover of trees (over 5 m tall, over 10 cm dbh); sites are rocky summits, usually on south or southeast-facing upper slopes of ridges (occasionally on northeast-facing slopes); the most abundant trees are white pine (*Pinus strobus*) or red pine (*P. resinosa*); characteristic shrubs are common juniper (*Juniperus communis*), bush honeysuckle (*Diervilla lonicera*), blueberries (*Vaccinium angustifolium, V. myrtilloides*), and bearberry (*Arctostaphylos uva-ursi*).

Boreal pine rocky woodland (63)

11b. The most abundant trees are jack pine (*Pinus banksiana*) or black spruce (*Picea mariana*) . . .

13a. Upland sites, with well-drained soils . . . 14

14a. Forests: canopy has at least 60% cover of trees (over 5 m tall, over 10 cm dbh); with black spruce or jack pine . . . 15

15a. Black spruce (*Picea mariana*) is the most abundant canopy tree forming nearly pure stands, jack pine (*Pinus banksiana*) is rare or absent; the feathermoss *Pleurozium schreberi* is common in the groundlayer (average 38% cover); characteristic herbs are *Aster macrophyllus* and *Cornus canadensis.* This community occurs on gentle, east-facing slopes of ridges, usually at elevations of about 630 to 790 feet, on well-drained to rapidly-drained.

Black spruce / feathermoss forest (05)

15b. Canopy is a mixture of black spruce (*Picea mariana*) and jack pine (*Pinus banksiana*); the most abundant shrubs are blueberry (*Vaccinium angustifolium*), thimbleberry (*Rubus parviflorus*), Canada honeysuckle (*Lonicera canadensis*), and bearberry (*Arctostaphylos uva-ursi*); the most abundant herbs are *Aster macrophyllus* and *Maianthemum canadense*; the feathermoss *Pleurozium schreberi* is common in the groundlayer (average 18% cover).

Jack pine - black spruce / feathermoss forest (06)

14b. Woodlands: canopy has from 25% to 60% cover of trees (over 5 m tall, over 10 cm dbh); sites are rocky summits, usually on south or southeast-facing upper slopes of ridges (occasionally on northeast-facing slopes); the most abundant trees are jack pine (*Pinus banksiana*); characteristic shrubs are common juniper (*Juniperus communis*), bush honeysuckle (*Diervilla lonicera*), blueberries (*Vaccinium angustifolium, V. myrtilloides*), and bearberry (*Arctostaphylos uva-ursi*).

Boreal pine rocky woodland (63)

13b. Wetland sites, with poorly-drained soils; black spruce (*Picea mariana*) is the most abundant tree . . . 16

16a. Black spruce and white spruce (*Picea mariana, P. glauca*) are the most abundant trees, each with 5 to 25% cover; speckled alder (*Alnus incana*) is the most abundant tall shrub (20 to 40% cover), and there is a dense herbaceous cover (70 to 80% cover) with sedges, grasses, and herbs; the most abundant mosses are S*phagnum* spp. and *Calliergon* spp. with 5 to 25% cover.

Black spruce / alder rich swamp (66)

16b. Black spruce (*Picea mariana,* average 20% cover) and tamarack (*Larix laricina,* average 4% cover) are the most abundant trees; leatherleaf (*Chamaedaphne calyculata,* average 50% cover) and Labrador tea (*Ledum groenlandicum,* average 10% cover) are the most abundant shrubs; average cover of *Sphagnum* spp. is 80%

Black spruce / labrador tea poor swamp (25)

2b. Tree canopy is ≤ 50% evergreen (consider proportions of actual canopy cover)
MIXED or DECIDUOUS FORESTS and WOODLANDS . . . 17

17a. Tree canopy is 25 - 50% deciduous and 25 - 50 % evergreen (consider proportions of the actual canopy cover) **MIXED EVERGREEN - DECIDUOUS FORESTS and WOODLANDS** . . . 18 (or see p. 5)

18a. Upland sites, with well-drained soils . . . 19 (or see p. 5)

19a. Canopy dominants are a mix of pines (*Pinus* spp.) and hardwoods (especially *Populus* spp. or *Betula* spp.) . . . 20

20a. Forests: canopy has at least 60% cover of trees (over 5 m tall, over 10 cm dbh); white pine (*Pinus strobus*) is mixed with aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and balsam fir (*Abies balsamea*); the most abundant shrub is thimbleberry (*Rubus parviflorus*) with 5 to 25% cover; other characteristic shrubs are *Diervilla lonicera* and *Amelanchier* spp.; the most abundant herbs are *Aster macrophyllus* and *Aralia nudicaulis.*

White pine – aspen - birch – forest (03)

20b. Woodlands: canopy has from 25% to 60% cover of trees (over 5 m tall, over 10 cm dbh); sites are rocky summits, usually on south or southeast-facing upper slopes of ridges (occasionally on northeast-facing slopes); the most abundant trees are white pine, red pine, or jack pine (*Pinus strobus, P. resinosa, P. banksiana*) mixed with aspen (*Populus tremuloides*) or paper birch (*Betula papyrifera*); characteristic shrubs are common juniper (*Juniperus communis*), bush honeysuckle (*Diervilla lonicera*), blueberries (*Vaccinium angustifolium, V. myrtilloides*), and bearberry (*Arctostaphylos uva-ursi*).

Boreal pine rocky woodland (63)

19b. Canopy dominants are a mix of white spruce (*Picea glauca*), white cedar (*Thuja occidentalis*) or balsam fir (*Abies balsamea*) and hardwoods (especially *Populus* spp. or *Betula* spp.) . . . 21

21a. Forests: canopy has at least 60% cover of trees (over 5 m tall, over 10 cm dbh) . . . 22

22a. White cedar (*Thuja occidentalis*) has 25 to 60% cover, and is codominant with yellow birch (*Betula alleghaniensis*, 15 to 60% cover), paper birch (*Betula papyrifera*, 5 to 25% cover), and white spruce (*Picea glauca*, 5 to 25% cover)*;* common shrubs are thimbleberry (*Rubus parviflorus*) and saplings of canopy trees; *Cornus canadensis* is the most abundant herb (average cover 37%), other common herbs are *Athyrium filix-femina, Phegopteris connectilis*, and *Symplocarpus foetidus.*

White cedar - yellow birch forest (16)

22b. Canopy has less than 25% cover of white cedar (*Thuja occidentalis*); the most abundant canopy trees are white spruce (*Picea glauca*, 5 to 50% cover), aspen (*Populus tremuloides*, 5 to 25% cover), paper birch (*Betula papyrifera*, 5 to 25% cover), balsam fir (*Abies balsamea*, 1 to 5% cover), and white cedar (*Thuja occidentalis*, 1 to 5% cover), thimbleberry (*Rubus parviflorus*) is a common shrub (5 to 25% cover); *Aralia nudicaulis* and *Aster macrophyllus* are the most abundant herbs.

Spruce – fir – aspen forest (55) –closed forest phase

21b. Woodlands: canopy has from 25% to 60% cover of trees (> 5 m tall, > 10 cm dbh) . . . 23

23a. Site is on a gentle to moderate slope, trees are a mix of aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), and mountain ash (*Sorbus decora*); each of these trees usually have about 5 to 25% cover, but occasionally one species will have up to 50% cover; thimbleberry (*Rubus parviflorus ,* 0 to 75% cover) is the most abundant shrub, bush honeysuckle (*Diervilla lonicera*) and Canada honeysuckle (*Lonicera canadensis*) are also common, as well as saplings or browsed scrub of balsam fir or white spruce; many sites with this type are recovering from past disturbance, and standing dead snags of *Betula* and *Populus* are common; *Aralia nudicaulis* and *Aster macrophyllus* are the most abundant herbs.

Spruce – fir – aspen forest (23) –open forest phase

23b. Site is on a steep to very steep, NW-facing talus slope; the most abundant trees are paper birch (*Betula papyrifera*) and white spruce (*Picea glauca*); the most abundant tall shrubs are mountain maple (*Acer spicatum*) and mountain alder (*Alnus viridis*), and the most abundant low shrubs are Canada yew (*Taxus canadensis*) and dwarf raspberry (*Rubus pubescens*); the most abundant herbs are *Polypodium virginianum* and *Dryopteris expansa*; mosses such as *Pleurozium schreberi* are common in the groundlayer.

Great Lakes boreal talus woodland (28)

18b. Wetland sites, with poorly-drained soils . . . 24

24a. Tamarack (*Larix laricina*) and black spruce (*Picea mariana*) are the most abundant canopy trees; canopy is fairly open (usually about 30% cover of trees over 5 m tall); cover of tall shrubs (over 2 m tall) is about 50% cover, including stunted forms of black spruce and tamarack, as well as speckled alder (*Alnus incana*) and swamp birch (*Betula pumila*); the most abundant short shrubs (under 2 m tall) are leatherleaf (*Chamaedaphne calyculata*) and Labrador tea (*Ledum groenlandicum*); *Sphagnum* spp. are common in the groundcover.

Northern tamarack rich swamp (65)

24b. White cedar (*Thuja occidentalis*) and/or black ash (*Fraxinus nigra*) are the most abundant canopy trees, each typically with 25 to 50% cover), yellow birch (*Betula alleghaniensis*) is a common tree, usually with less than 20%cover; total canopy cover varies from 40 to 100% cover; the most abundant tall shrubs are speckled alder (*Alnus incana*) and saplings of canopy trees; dwarf raspberry (*Rubus pubescens*), and skunk cabbage (*Symplocarpus foetidus*) are common in the groundlayer.

White cedar - black ash swamp (18)

17b. Tree canopy is > 50% deciduous and < 25% evergreen (consider proportions of the actual canopy cover) **DECIDUOUS FORESTS and WOODLANDS** . . . 25

25a. Tree canopy consists primarily of needle-leaved deciduous trees; open canopy woodlands with about 20 to 30% cover of tamarack (*Larix laricina*); evergreen trees such as white cedar (*Thuja occidentalis*), black spruce (*Picea mariana*), and white pine (*Pinus strobus*) may be present, generally with less than 10% cover.
Northern tamarack rich swamp (65)

25b. Tree canopy primarily consists of broad-leaved deciduous trees . . . 26

26a. Forests and woodlands with early-successional tree species dominant, such as poplars (*Populus* spp.), paper birch (*Betula papyrifera*), or red maple (*Acer rubrum*) . . . 27 (or see p. 7)

27a. Red maple (*Acer rubrum*) is dominant or mixed with aspen (*Populus tremuloides*) and paper birch (*Betula papyrifera*) or black ash (*Fraxinus nigra*) . . . 28

28a. Sites are uplands with well-drained soils; canopy has no black ash (*Fraxinus nigra*); red maple (*Acer rubrum*), aspen (*Populus tremuloides*), and paper birch (*Betula papyrifera*) are the most abundant canopy trees; canopy cover varies from 40 to 90% cover; beaked hazelnut (*Corylus cornuta*) is usually the most abundant shrub; characteristic herbs are *Aster macrophyllus, Aralia nudicaulis*, and *Pteridium aquilinum.*
Aspen - birch - red maple forest (08)

28b. Sites are wetlands with poorly-drained soils; red maple (*Acer rubrum*) is the most abundant tree (ca 60% cover); shrublayer has about 20% cover, the most abundant shrub is *Alnus viridis*; the most abundant herbs are *Calamagrostis canadensis* and *Carex rostrata*; site is a poorly drained wetland at relatively high elevation (ca 1000 ft) near top of Greenstone Ridge, on SE side of ridge in a shallow depression with muck soils.
Red maple – ash - birch swamp forest (27)

27b. Red maple (*Acer rubrum*) is absent, or has less than 10% cover; canopy dominants are aspen (*Populus tremuloides*) and/or paper birch (*Betula papyrifera*) . . . 29

29a. Forests with paper birch (*Betula papyrifera*) the single dominant canopy tree, often occurring in pure stands; there is less than 10% cover aspen (*Populus tremuloides*).
Paper birch / bush honeysuckle - fir forest (53)

29b. Forests or woodlands with poplars (*Populus* spp.) either dominant, or mixed with paper birch (*Betula papyrifera*) . . . 30

30a. Balsam poplar (*Populus balsamifera*) and aspen (*Populus tremuloides*) are codominant in the canopy; speckled alder (*Alnus incana*), thimbleberry (*Rubus parviflorus*) are the most abundant understory shrubs (over 50% cover) and *Lonicera hirsuta* is another common understory shrub (average 37% cover); the most abundant herbs are *Aster macrophyllus, Clintonia borealis,* and *Heracleum maximum;* on moist sites.
Aspen - balsam poplar lowland forest (14)

30b. Aspen (*Populus tremuloides*) codominant with paper birch (*Betula papyrifera*) and possibly other species in the canopy . . . 31

31a. Understory with saplings or browsed scrub of balsam fir (Abies balsamea) and/or white spruce (Picea glauca) common (over 10% cover); and less than 10% cover of sugar maple (Acer saccharum) seedlings and saplings . . . 31 (or see p. 7)

32a. Forests: canopy has at least 60% cover of trees (over 5 m tall, over 10 cm dbh); shrublayer consists primarily of balsam fir (*Abies balsamea*) or white spruce (*Picea glauca*) saplings or browsed scrub.

Aspen - birch / boreal conifer forest (54a)

32b. Woodlands: canopy has from 25% to 60% cover of trees (over 5 m tall, over 10 cm dbh); trees are a mix of aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), and mountain ash (*Sorbus decora*); each of these trees usually have about 5 to 25% cover, but occasionally one species will have up to 50% cover; thimbleberry (*Rubus parviflorus ,* 0 to 75% cover) is the most abundant shrub, bush honeysuckle (*Diervilla lonicera*) and Canada honeysuckle (*Lonicera canadensis*) are also common, as well as saplings or browsed scrub of balsam fir or white spruce; many sites with this type are recovering from past disturbance, and standing dead snags of *Betula* and *Populus* are common; *Aralia nudicaulis* and *Aster macrophyllus* are the most abundant herbs.

Spruce – fir – aspen forest (23) - open forest phase

31b. Understory with over 10% cover of sugar maple (*Acer saccharum*) seedlings and saplings, and less than 10% cover balsam fir (*Abies balsamea*) or white spruce (*Picea glauca*) saplings or browsed scrub.

Aspen - birch / sugar maple - mixed hardwoods forest (54b)

26b. Forests and woodlands with mid- to late-successional tree species dominant, such as sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), red oak (*Quercus rubra*), black ash (*Fraxinus nigra*), mountain maple (*Acer spicatum*), or mountain ash (*Sorbus decora*) . . . 33

33a. Site is a poorly-drained wetland with muck soils; black ash (*Fraxinus nigra*) is the most abundant tree (average 37% cover); speckled alder (*Alnus incana*) is abundant in the shrublayer (average 62% cover) and can grow to small tree size; the most abundant herbs are *Osmunda claytoniana, Athyrium filix-femina , Symplocarpus foetidus*, and *Thalictrum dasycarpum.*

Black ash - mixed hardwood swamp (26)

33b. Site is a well-drained upland; black ash (*Fraxinus nigra*) is rare or absent . . . 34

34a. Sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*) or red oak (*Quercus rubra*) are the most abundant canopy trees . . . 35 (or see p. 8)

35a. Sugar maple (*Acer saccharum*) is either dominant, or codominant with yellow birch (*Betula alleghaniensis*) or red oak (*Quercus rubra*) . . . 36

36a. Canopy dominants are sugar maple (*Acer saccharum*) and yellow birch (*Betula alleghaniensis),* and their combined cover is over 50%; other tree species present may include white cedar (*Thuja occidentalis*), white pine (*Pinus strobus*), and white spruce (*Picea glauca),* each with less than 50% cover; beaked hazelnut (*Corylus cornuta*) has less than 50% cover in the understory (typical is less than 30%); the most abundant herbs are *Lycopodium annotinum, L. dendroideum*, and sugar maple seedlings.

Maple - yellow birch - northern hardwoods forest (09)
[if this community occurs in a mosaic with white spruce – balsam fir / feathermoss forest (1), and individual patches of each are usually less that 0.5 ha in area, then use map unit **(56): Spruce – fir and sugar maple – yellow birch mosaic**].

36b. Red oak (*Quercus rubra*) is codominant with sugar maple (*Acer saccharum*); other tree species present at less than 10% cover include red maple (*Acer rubrum*), white cedar (*Thuja occidentalis*), white spruce (*Picea glauca*), mountain ash (*Sorbus decora*), and white pine (*Pinus strobus*)*;* the most abundant shrubs are common juniper (*Juniperus communis*) and shadbush (*Amelanchier* spp.); the most abundant herbs are *Aralia nudicaulis*, *Calystegia spithamea*, and *Elymus* sp.; characteristic nonvascular plants are the moss *Leucobryum glaucum*, and reindeer lichens (*Cladina* spp.)

Red oak - sugar maple forest (10)

35b. Yellow birch (*Betula alleghaniensis*) is the most abundant canopy tree; sugar maple (*Acer saccharum*) is absent or has less than 10% cover; white spruce (*Picea glauca*) is a common associate (5 to 25% cover).

Yellow birch - (spruce) forest (74)

34b. Mountain ash (*Sorbus decora*) or mountain maple (*Acer spicatum*) are the most abundant canopy trees . . . 37

37a. Site is on a very steep talus slope or cliff, typically facing NW; mountain maple (*Acer spicatum*) is dominant in the canopy, with over 50% cover; other tree species present include white cedar (*Thuja occidentalis*), paper birch (*Betula papyrifera*), and white spruce (*Picea glauca*); Canada yew (*Taxus canadensis*) and thimbleberry (*Rubus parviflorus*) are common shrubs; the most abundant herbs are *Gymnocarpium dryopteris* and *Mitella nuda*.

Great Lakes boreal cliff forest (12)

37b. Site is on gentle to moderate slopes at low elevations (under 650 feet) at the northern end of the island (plots were sampled on Smithwick Island); mountain ash (*Sorbus decora*) is the most abundant canopy tree, mountain maple (*Acer spicatum*) may be codominant, other less common trees include balsam fir (*Abies balsamea*), white spruce (*Picea glauca*), and paper birch (*Betula papyrifera*); devil's-club (*Oplopanax horridus*) may be a common understory shrub (but is absent in some places); *Dryopteris carthusiana* is the most abundant herb, (average 50% cover), other common herbs are *Gymnocarpium dryopteris* and *Maianthemum canadense.*

Mountain ash - mountain maple forest (13)

1b. Mature trees (over 5 m tall, over 10 cm dbh) have less than 25% cover; most woody plants are shrubs, or saplings < 10 cm dbh, or stunted trees (less than 5 m tall) . . . 38

38a. There is more than 25% cover of shrubs **SHRUBLANDS** . . . 39 (or see p. 10)

39a. Site is a well-drained upland . . .40 (or see p. 9)

40a. Thimbleberry (*Rubus parviflorus*) is the most abundant shrub (over 25% cover); other common woody plants are balsam fir (*Abies balsamea,* sapling or shrub size) and dwarf raspberry (*Rubus pubescens*); the most abundant herbs are *Aralia nudicaulis*, *Streptopus roseus, Aster macrophyllus, Clintonia borealis, Galium triflorum, Gymnocarpium dryopteris*, and *Linnaea borealis*; this shrubland is a successional type following disturbance, for example, following fire or clearing of types 53, 54, or 23.

Thimbleberry shrubland (32)

40b. Thimbleberry (*Rubus parviflorus*) is not the most abundant shrub . . . 41

41a. The most abundant shrubs are beaked hazelnut (*Corylus cornuta*), hawthorn (*Crataegus douglasii*), shadbush (*Amelanchier* spp.), or saplings and browsed scrub of pin cherry (*Prunus pensylvanica*), white spruce (*Picea glauca*) or mountain ash (*Sorbus decora*); shrubland has variable physiognomy, with 25 to 80% cover of shrubs; often a sparse tree layer is present with 5 to 20% cover, the most common trees are white spruce, aspen (*Populus tremuloides*), and mountain ash; site is usually high on a ridge.

Boreal rocky shrubland (29)

41b. The most abundant shrubs are junipers (Juniperus spp.), wild rose (Rosa acicularis), Canada yew (Taxus canadensis), squashberry (Viburnum edule), red-osier dogwood (Cornus sericea), or stunted, scrub forms of white cedar (Thuja occidentalis) or balsam fir (Abies balsamea); site is usually on low ridges, slopes, or shores . . . 42

42a. The most abundant shrubs are common juniper (*Juniperus communis*, average 33% cover) and creeping juniper (*J. horizontalis*, average 21% cover); other characteristic shrubs are mountain alder (*Alnus viridis*) and bearberry (*Arctostaphylos uva-ursi*); the most abundant herb is *Sibbaldiopsis tridentata* (= *Potentilla tridentata*); *Cladina* spp. (reindeer lichens), crustose lichens, and the feathermoss *Pleurozium schreberi* are common; sites are on low, often steep, S- or SE-facing rocky ridges near the Lake Superior shore.

Common juniper rocky krummholz (31)

42b. Junipers (*Juniperus* spp.) are not the most abundant shrubs . . . 43

43a. The most abundant shrubs are wild rose (*Rosa acicularis*), raspberry (*Rubus idaeus*), bush honeysuckle (*Diervilla lonicera*), ninebark (*Physocarpus opulifolius*), gooseberry (*Ribes oxyacanthoides*), speckled alder (*Alnus incana*), or mountain ash (*Sorbus decora*); cover of shrubs varies from 20 to 60%; there may be scattered trees including white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), white cedar (*Thuja occidentalis*), and paper birch (*Betula papyrifera*); the most common herbs are *Cornus canadensis, Calamagrostis canadensis, Equisetum hyemale*, and *Lathyrus palustris*; site is on a cobble or gravel shore of Lake Superior.

Great Lakes basalt/diabase cobble-gravel lakeshore (shrub zone) (33)

43b. The most abundant shrubs are stunted, scrub forms of white cedar (*Thuja occidentalis*) and balsam fir (*Abies balsamea*), or Canada yew (*Taxus canadensis*), squashberry (*Viburnum edule*), red-osier dogwood (*Cornus sericea*), mountain alder (*Alnus viridis*), or devil's-club (*Oplopanax horridus*) . . . 44

44a. Stunted, scrub forms of white cedar (*Thuja occidentalis*) and balsam fir (*Abies balsamea*) are the most abundant tall shrubs (2 to 5 m tall); *Chamaedaphne calyculata* and *Empetrum nigrum* are the most abundant shrubs under 1 m tall; the most abundant herbs are *Sibbaldiopsis tridentata* (= *Potentilla tridentata*) and *Eriophorum alpinum (= Scirpus hudsonianus)*; sites are at upper, inland edge of bedrock lakeshore; a rare community restricted in the park to Passage Island.

White cedar - balsam fir / leatherleaf / black crowberry krummholz (34) -phase of Common juniper rocky krummholz

44b. The most abundant shrubs are Canada yew (*Taxus canadensis*), squashberry (*Viburnum edule*), red-osier dogwood (*Cornus sericea*), mountain alder (*Alnus viridis*), or devil's-club (*Oplopanax horridus*), these collectively form a dense, nearly impenetrable thicket (usually over 80% cover shrubs), other common shrubs are bush honeysuckle (*Diervilla lonicera*) and mountain ash (*Sorbus decora*); the most abundant herbs are *Dryopteris expansa, Lycopodium annotinum*, and *Clintonia borealis*; a rare community restricted in the park to Passage Island.

Canada yew - squashberry - red osier - mountain alder - devil's club shrubland (35) - phase of Balsam fir / Canada yew woodland

39b. Site is a poorly-drained wetland with peat or muck soils . . . 45

45a. The most abundant shrub is speckled alder (*Alnus incana*, average 60% cover); other characteristic woody plants include red-osier dogwood (*Cornus sericea*) and balsam fir (*Abies balsamea*); the most abundant herb is *Calamagrostis canadensis* (average 40% cover), other characteristic herbs are *Caltha palustris, Impatiens capensis*, and *Equisetum fluviatile*; mosses may be common in the groundcover, especially S*phagnum* spp. (average 7% cover).

Speckled alder swamp (36)

45b. The most abundant shrubs are sweet gale (*Myrica gale*), leatherleaf (*Chamaedaphne calyculata*), or stunted, scrub forms of white cedar (*Thuja occidentalis*) . . . 46

46a. The most abundant shrubs are either sweet gale (*Myrica gale*, 25 to 60% cover), or a mixture of sweet gale and leatherleaf (*Chamaedaphne calyculata*), each with less than 50% cover . . . 47

47a. Sweet gale (*Myrica gale*) is the most abundant shrub (25 to 60% cover), other characteristic shrubs (each with less than 5% cover) are leatherleaf (*Chamaedaphne calyculata*), bog

rosemary (*Andromeda polifolia* var. *glaucophylla*), swamp birch (*Betula pumila*), cranberry (*Vaccinium oxycoccos*), and stunted, scrub forms of tamarack (*Larix laricina*); the most abundant herbs are *Osmunda regalis, Carex lasiocarpa*, and *Rhynchospora alba; Sphagnum* spp. are common in the groundlayer (average 7% cover).

Sweet gale shrub fen (37)

47b. Sweet gale (*Myrica gale*, 25 to 50% cover) is codominant with leatherleaf (*Chamaedaphne calyculata*, 5 to 50% cover); site is along the Lake Superior shore in areas subject to lake level fluctuations.

Leatherleaf - sweet gale shore fen (67)

46b. The most abundant shrubs are either leatherleaf (*Chamaedaphne calyculata*), or stunted, scrub forms of tamarack (*Larix laricina*), white cedar (*Thuja occidentalis*), and black spruce (*Picea mariana*); there is less than 25% cover of sweet gale (*Myrica gale*) . . . 48

48a. The most abundant shrubs are leatherleaf (*Chamaedaphne calyculata*, 25 to 50% cover) and Labrador tea (*Ledum groenlandicum*, 5 to 25% cover).

Leatherleaf bog (70)

48b. The shrub layer is a diverse mix with 30 to 80% cover of shrubs; the most abundant tall shrubs (2 to 5 m tall) are stunted, scrub forms of tamarack (*Larix laricina*), white cedar (*Thuja occidentalis*), and black spruce (*Picea mariana*); characteristic short shrubs (under 2 m tall) include smaller scrub forms of white cedar and tamarack, alder buckthorn (*Rhamnus alnifolia*), leatherleaf (*Chamaedaphne calyculata*), sweet gale (*Myrica gale*), bog rosemary (*Andromeda polifolia* var. *glaucophylla*), swamp birch (*Betula pumila*), shrubby cinquefoil (*Pentaphylloides floribunda*), creeping juniper *(Juniperus horizontalis*), Labrador tea (*Ledum groenlandicum*), and cranberry (*Vaccinium oxycoccos*).

White cedar - sweet gale scrub fen (60)

38b. There is less than 25% cover of shrubs . . . 49

49a. There is more than 25% cover of herbs **HERBACEOUS VEGETATION** . . . 50 (or see p. 13)

50a. Site is a well-drained upland . . . 51

51a. Site is a well-drained rocky ridge; poverty grass (*Danthonia spicata*) is the dominant herb (average 46% cover), other characteristic herbs are *Poa* spp., *Agrostis hyemalis*, *Trifolium aureum*, and *Geum allepicum*; *Cladina* spp. (reindeer lichens) are common (average 10% cover).

Poverty grass barrens (38)

51b. Site is a low slope, flat, or lakeshore . . . 52

52a. Site is a low slope or flat area, often near the Lake Superior shore; site has a history of disturbance (e.g. formerly a residential area, pasture, etc.); the most abundant herbs are timothy (*Phleum pratense*) and bluejoint (*Calamagrostis canadensis*).

Timothy - (bluejoint) seminatural meadow (72)

52b. Sites are sparsely vegetated cobble or gravel shores of Lake Superior; the most abundant herbs are grasses, mostly wheatgrass (*Elymus trachycaulus*, average 29% cover); other characteristic herbs are beach pea (*Lathyrus palustris*) and *Oenothera biennis*; characteristic shrubs are raspberry (*Rubus idaeus*), red-osier dogwood (*Cornus sericea*), and mountain alder (*Alnus viridis*), each with ≤ 5% cover; this community occurs as a mix of sparse grassland with over 25% cover, and sparsely vegetated areas with less than 25% cover; these sites are regularly disturbed by wave action and winter ice scour.

Great Lakes basalt/diabase cobble-gravel lakeshore (39)

50b. Site is a poorly drained wetland or aquatic habitat . . . 53

53a. Dominant herbs are grasses (e.g. *Calamagrostis canadensis*) and sedges (e.g. *Carex* spp., *Cladium mariscoides*); soils are either saturated or permanently flooded . . . 54 (or see p. 12)

54a. *Calamagrostis canadensis* is the most abundant herb (average 43% cover), other common herbs are *Scirpus cyperinus* (average 25% cover), *Carex rostrata* (average 15% cover), *Carex lasiocarpa* (average 7% cover), *Campanula aparinoides,* and *Viola blanda*; the most abundant shrub is *Alnus incana* (average 9% cover); the most abundant mosses are *Sphagnum* spp. (average 6% cover).

Bluejoint eastern meadow (40)

54b. The most abundant herbs are sedges (e.g. *Carex* spp., *Cladium mariscoides*) . . . 55

55a. *Carex* spp. are the most abundant herbs . . . 56 (or see p. 12)

56a. Peat mosses (*Sphagnum* spp.) are absent from, or rare in the groundlayer (< 5% cover); *Carex rostrata* is the most abundant sedge (average 75% cover), *Carex stricta* is also common (average 18% cover); other characteristic herbs are *Scirpus cyperinus, Lycopus americanus* and *Sium suave; Myrica gale* is the most common shrub (< 5% cover); sites are either regularly or permanently flooded.

Northern sedge wet meadow (41)

56b. Peat mosses (*Sphagnum* spp.) are common in the groundlayer (10 to 50% cover) 57

57a. *Carex oligosperma* is the most abundant sedge (over 50% cover), other common herbs are *Calamagrostis canadensis* and *Campanula aparinoides* (each with < 25% cover); other characteristic herbs are *Drosera rotundifolia, Iris versicolor, Platanthera psycodes, Dulichium arundinaceum*, and *Comarum palustre* (= *Potentilla palustris*); the most abundant shrub is *Chamaedaphne calyculata* (< 25% cover); *Sphagnum* spp. are very common in the groundlayer (average 37% cover).

Northern poor fen (42)

57b. *Carex lasiocarpa* is the most abundant sedge (average 68% cover), *Carex rostrata* is also common (average 20% cover), other characteristic herbs are *Utricularia intermedia* and *Menyanthes trifoliata*; the most abundant shrub is *Myrica gale* (average 4% cover); *Sphagnum* spp are common in the groundlayer (average 13% cover).

Boreal calcareous seepage fen (44)

55b. *Cladium mariscoides* is the most abundant herb (average 62% cover), other common herbs are *Carex lacustris, Rhynchospora alba*, and *Utricularia intermedia* (each < 25% cover); *Myrica gale* is the most abundant shrub (<25% cover); *Sphagnum* spp. are very common in the groundlayer (average 37% cover).

Twig rush wet meadow (48)

53b. Dominant herbs are emergent, floating-leaved, or submerged aquatics (e.g. *Scirpus* spp., *Sparganium* spp., *Eleocharis smallii, Equisetum fluviatile, Potamogeton* spp., *Nuphar* spp., and *Nymphaea* spp.); site is in shallow water, the substrate is always flooded . . . 58

58a. Site is in shallow water of a bay or cove of Lake Superior, subject to fluctuating water levels from the lake's seiche; *Scirpus acutus* is the most abundant herb (average < 25% cover), associated herbs include *Sagittaria latifolia, Carex lasiocarpa*, and *Utricularia intermedia*.

Great Lakes shoreline bulrush – cattail marsh (45)

58b. Site is in shallow water of an inland lake or pond . . . 59

59a. The most abundant plants are emergent aquatic plants . . . 60

60a. *Scirpus acutus* is the most abundant emergent aquatic plant (average 22% cover); *Eleocharis smallii* is a common associate with a low cover (average < 2% cover); *Typha* spp. are very rare or absent from this community on Isle Royale, probably an effect of moose browsing.
Midwest mixed emergent deep marsh (46)

60b. *Eleocharis smallii* (average 9% cover) and *Equisetum fluviatile* (average 4% cover) are the most abundant emergent aquatic plants; *Sparganium fluctuans* is a common floating-leaved aquatic plant (average < 2% cover), and algae are the most common submerged aquatic plants.
Water horsetail – spikerush marsh (47)

59b. The most abundant plants are submerged and floating-leaved aquatic plants . . . 61

61a. The most abundant vegetation consists of submerged aquatics such as *Chara* spp., algae, *Utricularia* spp., and *Potamogeton* spp.; *Sparganium fluctuans* is a common floating leaved aquatic plant (average 10 % cover); *Eleocharis smallii* and *Equisetum fluviatile* are the most abundant emergent aquatic plants (each averaging < 5% cover).
Midwest pondweed submerged aquatic wetland (49)

61b. *Potamogeton* spp. are the most abundant herbs (average < 5% cover); *Nuphar lutea* ssp. *variegata* and *Nymphaea odorata* are the most abundant floating-leaved aquatic plants (each averages < 1 % cover).
Northern water lily aquatic wetland (50)

49b. There is less than 25% cover of herbs, and more than 25% cover of nonvascular plants
NONVASCULAR VEGETATION . . .62

62a. Site is a rugged, rocky shore of Lake Superior; exposed bedrock is basalt, sandstone, or conglomerate that has a gentle to somewhat steep slope; crustose and foliose lichens are common to abundant (average 25 - 50% cover); the most abundant herb is *Sibbaldiopsis tridentata* (= *Potentilla tridentata*, average 2% cover), other characteristic herbs of dry rocks are *Oligoneuron album* (= *Solidago ptarmicoides*), *Campanula rotundifolia, Carex umbellata*, and *Achillea millefolium*; woody plants consist of dwarf forms of tree and shrub species, mostly under 1 m tall; characteristic woody plants of dry rocks are ninebark (*Physocarpus opulifolius*), shrubby cinquefoil (*Pentaphylloides floribunda, = Potentilla fruticosa*), creeping juniper (*Juniperus horizontalis*), stunted white cedar (*Thuja occidentalis*), and bearberry (*Arctostaphylos uva-ursi*).
Great Lakes basalt (conglomerate) bedrock lakeshore (51)

62b. Site is a very steeply sloping cliff; exposed bedrock is basalt; crustose and foliose lichens and mosses are very common: characteristic lichens (average 40% cover) include *Cladonia* spp., *Xanthoparmelia* spp., *Umbilicaria deusta, Lobaria pulmonaria, Parmelia* spp., and *Rhizocarpon* spp., characteristic mosses (average 30% cover) are *Schistidium* spp. and *Pleurozium schreberi*; the most abundant herbs are *Woodsia ilvensis, Polypodium virginianum*, and *Deschampsia flexuosa*; the most abundant trees and shrubs are white pine (*Pinus strobus*, average 5% cover), white spruce (*Picea glauca*), and mountain alder (*Alnus viridis*), each with < 2% cover.
Great Lakes basalt/diabase cliff (52)

VEGETATION DESCRIPTIONS FOR ISLE ROYALE NATIONAL PARK

Picea mariana / Pleurozium schreberi Forest

COMMON NAME	Black Spruce / Feathermoss Forest
SYNONYM	Black Spruce / Feathermoss Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.c)
ALLIANCE	PICEA MARIANA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon, mostly found in the central and southwestern portions of the park.

Globally

This community is found in northeastern Minnesota, northern Michigan, northwestern Ontario, and southeastern Manitoba. It may be found in other parts of Manitoba.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occurs on gentle to moderate slopes of ridges, usually at elevations of about 630 to 790 feet, on well-drained to rapidly-drained, organic or sandy soils.

Globally

This community is found on level to gently sloping ground. Soils are typically moderately well drained, coarse loams, sands, and silts (Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Picea mariana*
Nonvascular	*Pleurozium schreberi*

Globally

Stratum	Species
Tree canopy	*Picea mariana*
Nonvascular	*Pleurozium schreberi*

CHARACTERISTIC SPECIES

Isle Royale National Park

Picea mariana, Pleurozium schreberi

Globally

Picea mariana, Pleurozium schreberi

VEGETATION DESCRIPTION

Isle Royale National Park

This black spruce/feathermoss forest is a closed canopy evergreen forest with 60 to 90% canopy cover. *Picea mariana* is the most abundant canopy tree; *Pinus banksiana* is rare or absent; the feathermoss *Pleurozium schreberi* is common in the groundlayer (average 38% cover); characteristic herbs are *Aster macrophyllus* and *Cornus canadensis.*

Globally

The canopy of this community is closed and strongly dominated by *Picea mariana* with small amounts of *Abies balsamea*, *Betula papyrifera*, *Picea glauca*, *Pinus banksiana*, and *Populus tremuloides*. The shrub and herb layer are poorly developed (Grigal and Ohmann 1975). Species that are most abundant in these layers include the shrubs *Corylus cornuta*, *Gaultheria*

procumbens, *Ledum groenlandicum*, *Rosa acicularis*, *Vaccinium angustifolium*, and *Vaccinium myrtilloides*, and the herbs *Aster macrophyllus*, *Cornus canadensis*, *Equisetum arvense*, and *Maianthemum canadense*. Feathermosses, particularly *Pleurozium schreberi*, are very abundant. Mosses may cover from 23 % (Grigal and Ohmann 1975) to over 85% (Sims *et al.* 1989) of the forest floor.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G5.

DATABASE CODE CEGL002447

MAP UNITS 05

COMMENTS

REFERENCES

Grigal. D. F. and L. F. Ohmann. 1975. Classification, description, and dynamics of upland plant communities within a Minnesota wilderness area. Ecological Monographs. 45:389-407.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Zoladeski, C. A., G. M. Wickware, R. J. Delorme, R. A. Sims, and I. G. W. Corns. 1995. Forest ecosystem classification for Manitoba: field guide. Natural Resources Canada, Canadian Forest Service, Northwest Region, Northern Forestry Center, Edmonton, Alberta. Special Report 2.

Pinus banksiana - Picea mariana / Vaccinium spp. / Pleurozium schreberi Forest

COMMON NAME	Jack Pine - Black Spruce / Blueberry species / Feathermoss Forest
SYNONYM	Jack Pine - Black Spruce / Feathermoss Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.c)
ALLIANCE	PICEA MARIANA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon; it is found primarily in the central portions of the island near the southeast-facing Lake Superior shore.

Globally

This community is found in northeastern Minnesota, northern Michigan, northwestern Ontario, and southeastern Manitoba.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies moderate to somewhat steep, southeast-facing slopes at elevations from 620 to 730 feet. Soils are sandy loams that are well-drained to rapidly drained.

Globally

This community is found on flat areas and gentle upper and lower slopes but not on ridges or valley floors (Ohmann and Ream 1971). Soils are moderately deep (60-80 cm) sands, coarse loams, or silts with boulders often present at or near the surface (Ohmann and Ream 1971, Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Pinus banksiana, Picea mariana*
Short shrub	*Vaccinium angustifolium*
Nonvascular	*Pleurozium schreberi*

Globally

Stratum	Species
Tree canopy	*Pinus banksiana, Picea mariana*
Tall shrub	*Alnus viridis, Corylus cornuta*
Short shrub	*Vaccinium angustifolium*
Nonvascular	*Pleurozium schreberi*

CHARACTERISTIC SPECIES

Isle Royale National Park

Pinus banksiana, Picea mariana, Vaccinium angustifolium, Pleurozium schreberi

Globally

Pinus banksiana, Picea mariana, Vaccinium angustifolium, Pleurozium schreberi

VEGETATION DESCRIPTION

Isle Royale National Park

This jack pine - black spruce forest type is a somewhat open canopy, evergreen forest with about 60% canopy cover. *Pinus banksiana* and *Picea mariana* are codominant in the canopy; the most abundant shrubs are *Vaccinium angustifolium, Rubus parviflorus, Lonicera canadensis*, and *Arctostaphylos uva-ursi.* The most abundant herbs are *Aster macrophyllus* and *Maianthemum canadense.* In the moss layer, the feathermoss *Pleurozium schreberi* is common (average 18% cover).

Globally
The tree canopy is usually dominated by *Pinus banksiana*, but this species may have little successful reproduction in lower strata. *Picea mariana* is of secondary importance in the canopy but often the most abundant tree species in the lower strata (Grigal and Ohmann 1975). Other trees found in this community include *Abies balsamea*, *Acer rubrum*, *Picea glauca*, and *Populus tremuloides*. Tall and low shrubs are moderately common whereas herbaceous species are infrequent. Common shrubs include both the tall shrubs *Alnus viridis*, *Amelanchier* spp., and *Corylus cornuta*, and the low shrubs *Diervilla lonicera*, *Gaultheria procumbens*, *Vaccinium angustifolium*, and *Vaccinium myrtilloides*. Herbaceous species include *Aster macrophyllus*, *Clintonia borealis*, *Cornus canadensis*, and *Maianthemum canadense*. Mosses, especially *Pleurozium schreberi*, are abundant, and Grigal and Ohmann (1975) found that *Pleurozium schreberi* had 41% ground cover in 10 stands in northeastern Minnesota, whereas all herbaceous species had 11% coverage.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G5.

DATABASE CODE CEGL002448

MAP UNITS 06

COMMENTS

REFERENCES
Grigal. D. F. and L. F. Ohmann. 1975. Classification, description, and dynamics of upland plant communities within a Minnesota wilderness area. Ecological Monographs 45:389-407.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Ohmann, L. F. and R. R. Ream. 1971. Wilderness ecology: virgin plant communities of the Boundary Waters Canoe Area. Res. Pap. NC-63. St. Paul, MN. U. S. Dept. of Agr., For. Service, North Central Exper. Sta. 55 pp.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Thuja occidentalis / Abies balsamea - Acer spicatum Forest

COMMON NAME	Northern White-cedar / Balsam Fir - Mountain Maple Forest
SYNONYM	White Cedar - Boreal Conifer Mesic Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.c)
ALLIANCE	THUJA OCCIDENTALIS FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon, and widely scattered throughout the park.

Globally

This community is found in northern Minnesota, northern Wisconsin, northern Michigan, and northwestern Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to steep slopes at elevations from 620 to 910 feet. Soils are usually sandy loams.

Globally

This community is found on gentle wet-mesic slopes to very steep well-drained slopes (MN NHP 1993). The predominant aspect is north to northeast. Soils are moderately deep to deep (50-100 cm), calcareous, coarse to fine textured, and often contain boulders at the surface (Ohmann and Ream 1971, Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Thuja occidentalis, Abies balsamea*

Globally

Stratum	Species
Tree canopy	*Thuja occidentalis*
Tree subcanopy	*Abies balsamea*

CHARACTERISTIC SPECIES

Isle Royale National Park

Thuja occidentalis

Globally

Thuja occidentalis, Abies balsamea, Acer spicatum, Coptis trifolia

VEGETATION DESCRIPTION

Isle Royale National Park

This white cedar mesic forest is an evergreen forest with a variable canopy cover ranging from 50 to 90% cover. *Thuja occidentalis* is the most abundant canopy tree; *Abies balsamea* and *Betula papyrifera* are common associates. Cover of short shrubs varies from 0 to 60%; the most abundant shrubs are *Rubus parviflorus* (25 to 50% cover), *Rubus pubescens* and *Diervilla lonicera*. Herbaceous cover varies from 20 to 70%; the most abundant herbs are *Aralia nudicaulis*, *Lycopodium annotinum*, *Streptopus roseus*, and *Cornus canadensis*.

Globally

The overstory is dominated by coniferous trees, with or without a substantial deciduous component. *Thuja occidentalis* is the most abundant tree and may occur in pure stands. Usually there are other canopy species, especially *Abies balsamea, Betula papyrifera, Picea glauca, Picea mariana, Populus tremuloides*, and *Pinus strobus*. There is usually an abundant shrub/sapling layer with saplings of *Thuja occidentalis* and *Abies balsamea* along with the shrubs *Acer spicatum, Corylus cornuta, Linnaea borealis, Lonicera canadensis, Rubus pubescens*, and *Sorbus decora*. The ground layer is typically diverse on mesic to wet-mesic

stands and less so on steep drier stands. Wet-mesic stands can contain a hummock and hollow topography, with a seasonally saturated hydrology. Typical species include *Aralia nudicaulis, Aster macrophyllus, Clintonia borealis, Coptis trifolia, Cornus canadensis, Dryopteris carthusiana, Galium triflorum, Maianthemum canadense, Mitella nuda*, and *Trientalis borealis*. Mosses include *Drepanocladus uncinatus, Hylocomium splendens, Plagiomnium cuspidatum, Pleurozium schreberi, Ptilium crista-castrensis*, and *Rhytidiadelphus triquestrus* and, in wetter phases of the type, *Sphagnum* spp (Ohmann and Ream 1971, Sims *et al.* 1989, Chambers *et al.* 1997).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G4.

DATABASE CODE CEGL002449

MAP UNITS 04

COMMENTS
Globally
Browsing by deer can be a serious hindrance to *Thuja occidentalis* reproduction (MN NHP 1993).

REFERENCES
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

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Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Ohmann, L. F. and R. R. Ream. 1971. Wilderness ecology: virgin plant communities of the Boundary Waters Canoe Area. Res. Pap. NC-63. St. Paul, MN.: U. S. Dept. of Agr., For. Service, North Central Exper. Sta. 55 pp.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Picea glauca - Abies balsamea / Pleurozium schreberi Forest

COMMON NAME	White Spruce - Balsam Fir / Feathermoss Forest
SYNONYM	Spruce - Fir / Feathermoss Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen forest (I.A.8.N.c)
ALLIANCE	PICEA GLAUCA - ABIES BALSAMEA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community occurs throughout the park, most often at low elevations near the Lake Superior shore.

Globally

This association is found in Manitoba, Ontario, and northern Michigan.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies upland slopes and flats, often on low slopes near Lake Superior, but also on middle slopes of ridges; elevations range from 604 to 870 feet. Soils are often sandy loam or loam.

Globally

Stands occur on fresh, well-drained upland mineral soils (Sims *et al.* 1989). In the U.S., they may be restricted to the coldest, north-facing slopes, such as those found on north slopes of islands in Lake Superior (Suzie Islands, Isle Royale).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Abies balsamea, Picea glauca*
Short shrub	*Abies balsamea, Rubus parviflorus*
Forb	*Cornus canadensis, Aralia nudicaulis*
Nonvascular	*Pleurozium schreberi*

Globally

Stratum	Species
Tree canopy	*Abies balsamea, Picea glauca*
Short shrub	*Abies balsamea, Cornus canadensis*
Forb	*Aralia nudicaulis*
Nonvascular	*Pleurozium schreberi*

CHARACTERISTIC SPECIES

Isle Royale National Park

Picea glauca, Abies balsamea, Pleurozium schreberi

Globally

Picea glauca, Abies balsamea, Pleurozium schreberi

VEGETATION DESCRIPTION

Isle Royale National Park

This spruce - fir / feathermoss forest has a variable physiognomy, ranging from open canopy evergreen woodlands to closed canopy evergreen forests. The most abundant canopy trees are either *Abies balsamea* (typically 3 to 38% cover) or *Picea glauca* (typically 15 to 38% cover). In areas heavily browsed by moose, such as at the west end near Windigo, *Abies* may be completely absent from the canopy, and only present in the shrub layer as browsed scrub (typically with 1 to 7% cover). *Betula papyrifera* is often present, with a low cover (typically 3 to 15% cover). Other trees infrequent in the canopy include *Picea mariana* and *Thuja occidentalis*. This forest community usually has 60 to 80% canopy cover, but on Isle Royale in areas with heavy moose browse, the canopy can be much more open, with as little as 30% cover. The

more open stands usually have a higher cover of short or browsed *Abies* (1 to 5 m tall). The cover of shrubs is quite variable, from few shrubs to over 50% cover. The most abundant shrubs are *Abies balsamea, Rubus parviflorus, Viburnum edule,* and at the extreme northeast end of Isle Royale NP, *Oplopanax horridus*. The most abundant herbs are *Cornus canadensis*, *Aralia nudicaulis, Aster macrophyllus, Clintonia borealis, Gymnocarpium dryopteris, Linnaea borealis,* and *Mitella nuda.* Feathermosses such as *Pleurozium schreberi* and *Hylocomium splendens* are common in the groundlayer. Tree branches are often draped with beard lichens such as *Usnea* spp.

There is an uncommon variant of this association found mostly on the northeast end of the park, the *Abies balsamea / Taxus canadensis – Oplopanax horridus* variant, which has a tree canopy with 70 to 90% cover. *Abies balsamea* is the single most abundant canopy tree. Cover of short shrubs varies from 40 to 80%. *Taxus canadensis* and *Oplopanax horridus* are the most abundant shrubs. Herbaceous cover varies from 20 to 70%. The most abundant herbs are *Clintonia borealis, Dryopteris expansa, Linnaea borealis, Maianthemum canadense*, and *Mitella nuda.* Cover of nonvascular plants varies from 30 to 80%; the feathermoss *Pleurozium schreberi* is abundant in the groundlayer.

Globally
Stands are dominated by *Picea glauca* and *Abies balsamea.* Associates can include *Picea mariana.* The shrub and herb layer are species poor or of low cover. Shrubs include *Abies balsamea, Amelanchier* spp., *Diervilla lonicera, Linnaea borealis*, and *Rubus pubescens.* Herbs include *Aralia nudicaulis, Clintonia borealis, Coptis trifolia, Cornus canadensis, Mitella nuda, Streptopus roseus, Trientalis borealis*, and *Viola renifolia.* Mosses dominate the ground layer, including extensive mats of feathermosses, such as *Pleurozium schreberi, Ptilium crista-castrensis, Hylocomium splendens*, and *Rhytidiadelphus triquetrus* (Sims *et al.* 1989).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park

CONSERVATION RANK G?.

DATABASE CODE CEGL002509

MAP UNITS 01, 02

COMMENTS

REFERENCES

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Picea mariana / Alnus incana / Sphagnum spp. Forest

COMMON NAME	Black Spruce / Speckled Alder / Peatmoss species Forest
SYNONYM	Black Spruce / Alder Rich Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Saturated temperate or subpolar needle-leaved evergreen forest (I.A.8.N.g)
ALLIANCE	PICEA MARIANA SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 1

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is rare and scattered, it was sampled at two sites: at the east end of Lake Halloran (southwest end of the park), and on Amygdaloid Island (northeast end of the park).

Globally

This community is found in northern Minnesota, northern Michigan, northwestern Ontario, and southeastern Manitoba.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions with a gentle slope facing southeast or southwest at elevations ranging from 620 to 662 feet. Soils are saturated peats.

Globally

This type occurs as part of large peatlands, in confined basins and along the upland margins of less minerotrophic peatlands (Harris *et al.* 1996). Stands occur on level, wet, poorly drained organic soils (Zoladeski 1995). The substrate is deep, fibric Sphagnum peat or shallow peat over clay. Hummock and hollow microtopography is moderately to well developed with standing water occasionally occurring in the hollows. The water regime is saturated.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Picea mariana, Picea glauca*
Tall shrub	*Alnus incana*
Graminoid	*Carex rostrata, Calamagrostis canadensis*
Nonvascular	*Sphagnum* spp., *Calliergon* sp.

Globally

Stratum	Species
Tree canopy	*Picea mariana, Picea glauca*
Tall shrub	*Alnus incana*
Graminoid	*Carex rostrata, Calamagrostis canadensis*
Nonvascular	*Sphagnum* spp., *Calliergon* sp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Picea mariana, Alnus incana

Globally

Picea mariana, Alnus incana

VEGETATION DESCRIPTION

Isle Royale National Park

The black spruce/alder rich swamp is an open canopy, evergreen, wooded wetland. The tree canopy (over 5 m tall) is sparse, with 10 to 20% cover; the same species are present in the tall shrub layer (2 to 5 m tall) with 30 to 40% cover. *Picea mariana* and *Picea glauca* are the most abundant trees, each with 5 to 25% cover. *Alnus incana* is the most abundant

tall shrub, with 20 to 40% cover; other tall shrubs include *Picea mariana*, and *Larix laricina*, each with 5 to 25% cover. Short shrub and dwarf shrub layers are very sparse, with less than 10% cover. There is 70 to 80% herbaceous cover; the most abundant herbs are *Carex rostrata, Calamagrostis canadensis, Iris versicolor, Impatiens capensis*, and *Aster puniceus*. *Sphagnum* spp. (including *Sphagnum magellanicum*) and *Calliergon* spp. are the most abundant mosses, with 5 to 25% cover. *Usnea* spp. are the most abundant lichens.

Globally

The overstory is composed almost exclusively of conifers. *Picea mariana* is the most abundant tree and may occur in pure stands. *Abies balsamea, Larix laricina*, and *Thuja occidentalis* vary from minor to codominant. There is a moderately well developed tall shrub/sapling layer, consisting of *Alnus incana* and saplings of the canopy trees. Several shrubs, many of them ericaceous, make up a low shrub layer. These include *Andromeda polifolia, Chamaedaphne calyculata, Gaultheria hispidula, Ledum groenlandicum, Linnaea borealis, Rubus pubescens*, and *Vaccinium angustifolium*. The herbaceous layer is frequently species rich, containing species such as *Calamagrostis canadensis*, *Carex leptalea*, *Carex trisperma, Clintonia borealis, Coptis trifolia, Cornus canadensis, Dryopteris cristata, Eriophorum* spp.*, Mitella nuda*, and *Trientalis borealis*. Mosses include *Dicranum flagellare, Dicranum polysetum, Pleurozium schreberi, Ptilium crista-castrensis, Sphagnum girgensohnii, Sphagnum magellanicum*, and *Sphagnum nemoreum* (Sims *et al.* 1989, Harris *et al.* 1996, Chambers *et al.* 1997).

OTHER NOTEWORTHY SPECIES

Isle Royale National Park

Information not available.

CONSERVATION RANK G5.

DATABASE CODE CEGL002452

MAP UNITS 66

COMMENTS

REFERENCES

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Picea mariana / Ledum groenlandicum / Sphagnum spp. Forest

COMMON NAME	Black Spruce / Labrador-tea / Peatmoss species Forest
SYNONYM	Black Spruce / Labrador Tea Poor Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Saturated temperate or subpolar needle-leaved evergreen forest (I.A.8.N.g)
ALLIANCE	PICEA MARIANA SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon, and scattered throughout the park.

Globally

This community is found in northern Michigan, northwestern Ontario, northern Minnesota, northern Wisconsin, and southeastern Manitoba. This community is rare in Michigan.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions at elevations ranging from 610 feet (just a few feet above Lake Superior lake level) to 990 feet. Soils are saturated peat or muck.

Globally

This type is found in confined peatland basins, on the upland margins of large peatlands, in poorly drained depressions in bedrock, and removed from the water's edge on peatland shorelines (Harris *et al.* 1996). Stands occur on level, wet sites with organic soils (Zoladeski *et al.* 1995). The substrate is deep, acidic Sphagnum peat that is mineral poor (Kurmis *et al.* 1986). Hummock and hollow microtopography is moderately to well developed. The water regime is saturated.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Picea mariana*
Short shrub	*Ledum groenlandicum*
Graminoid	*Carex trisperma*
Nonvascular	*Sphagnum* spp.

Globally

Stratum	Species
Tree canopy	*Picea mariana*
Short shrub	*Ledum groenlandicum*
Graminoid	*Carex trisperma*
Nonvascular	*Sphagnum* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Picea mariana, Ledum groenlandicum, Carex trisperma

Globally

Picea mariana, Ledum groenlandicum, Carex trisperma, Sphagnum spp.

VEGETATION DESCRIPTION

Isle Royale National Park

This black spruce poor swamp is an open canopy, evergreen wooded swamp, typically with 20 to 50% cover of trees over 5 m tall. *Picea mariana* (with 25 to 50% cover), *Larix laricina* (with 1 to 5% cover), and *Betula papyrifera* (1 to 5% cover) are the most abundant trees. Cover of tall shrubs varies from about 5 to 30%; the most abundant tall shrubs are *Picea mariana* (1 to 25% cover) and *Larix laricina* (0 to 5% cover). Cover of short shrubs is variable, ranging from 5 to 90%. The most abundant short shrubs (including dwarf shrubs) are *Chamaedaphne calyculata* (5 to 90% cover), *Ledum*

groenlandicum (5 to 25% cover), and *Abies balsamea* (0 to 25% cover). Herb cover varies from about 20 to 70%. The most common herbs are *Carex oligosperma, Carex trisperma, Calamagrostis canadensis, Maianthemum trifolia, Sarracenia purpurea*, and *Symplocarpus foetidus*. Cover of *Sphagnum* spp. ranges from 5 to 90%.

Globally

The overstory of this community is dominated by conifers. The tree canopy is broken to closed over a moderately well developed low shrub layer, sparse herbaceous layer, and a carpet of mosses (Kurmis *et al.* 1986). The canopy is often pure *Picea mariana*, but *Larix laricina* may be a codominat. *Abies balsamea* can be present to codominant, and the occasional *Pinus banksiana* may occur (Sims *et al.* 1989). The shrubs are primarily ericaceous and include *Chamaedaphne calyculata*, *Gaultheria hispidula*, *Kalmia polifolia*, *Ledum groenlandicum*, and *Vaccinium* spp, but mixed spruce-tamarack stands can contain *Alnus incana* or *Betula glandulosa*. The few herbaceous species found in this community include *Carex lasiocarpa, Carex trisperma*, *Clintonia borealis*, *Coptis trifolia*, *Cornus canadensis*, and *Maianthemum trifolium*. Occasional minerotrophic indicators found in northern Minnesota include *Carex lacustris, Iris versicolor* and *Monotropa uniflora* (M. Smith personal communication 1999). Mosses, particularly *Sphagnum* spp. typically cover nearly 100% of the forest floor. *Dicranum polysetum*, *Sphagnum* spp. (including *Sphagnum magellanicum, Sphagnum recurvum sensu lato, Sphagnum capillifolium*, *Sphagnum russowii*), and *Pleurozium schreberi* are among the species found in this abundant moss layer (Sims *et al.* 1989, Harris *et al.* 1996).

OTHER NOTEWORTHY SPECIES

Isle Royale National Park

Information not available

CONSERVATION RANK G5.

DATABASE CODE CEGL002454

MAP UNITS 25

COMMENTS

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

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Thuja occidentalis - (Picea mariana, Abies balsamea) / Alnus incana Forest

COMMON NAME	Northern White-cedar - (Black Spruce, Balsam Fir) / Speckled Alder Forest
SYNONYM	White Cedar - (Mixed Conifer) / Alder Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Evergreen forest (I.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen forest (I.A.8)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.A.8.N)
FORMATION	Saturated temperate or subpolar needle-leaved evergreen forest (I.A.8.N.g)
ALLIANCE	THUJA OCCIDENTALIS SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is common and widespread throughout the park.

Globally

This community is found in northern Minnesota, northern Wisconsin, Upper and Lower Michigan, southeastern Manitoba, and northwestern Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions that are either flat or have a gentle slope, at elevations ranging from about 605 to 1000 feet. Soils are peat or muck, poorly to very poorly drained, and saturated to seasonally flooded.

Globally

This community is found on level to gently sloping ground with wet, organic (Sims *et al.* 1989) or mineral soil (MN NHP 1993). Stands typically occur along the margins of peatlands, in drainage courses, or shallow depressions. The substrate has moderately minerotrophic conditions over deep peat. Hummock and hollow microtopography is usually well developed. In wetter stands, there is often standing water present in the hollows. Coarse woody debris can be significant. The water regime is saturated.

Schwintzer and Tomberlin (1982) reported detailed results on the chemical characteristics of the ground water of several wetland types in Lower Michigan. They found that it was difficult to differentiate swamps dominated by conifers from those dominated by other vegetation on the basis of ground water. The swamps were moderately to strongly minerotrophic and had circumneutral pH.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Thuja occidentalis*
Tall shrub	*Alnus incana*
Short shrub	*Rhamnus alnifolius*
Forb	*Symplocarpus foetidus*
Graminoid	*Calamagrostis canadensis*

Globally

Stratum	Species
Tree canopy	*Thuja occidentalis*
Tall shrub	*Alnus incana*
Forb	*Coptis trifolia, Maianthemum canadense*
Graminoid	*Calamagrostis canadensis, Carex disperma, Carex leptalea*
Nonvascular	*Hylocomium splendens, Rhytidiadelphus triquestrus, Sphagnum* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Thuja occidentalis, Alnus incana, Symplocarpus foetidus

Globally
Thuja occidentalis, Alnus incana, Coptis trifolia, Carex disperma, Hylocomium splendens, Sphagnum spp.

VEGETATION DESCRIPTION
Isle Royale National Park
At Isle Royale NP, this white cedar -(mixed conifer) swamp is a wooded wetland that has variable canopy cover, ranging from 25 to 90%. *Thuja occidentalis* is the most abundant canopy tree (average 30% cover); *Larix laricina* and *Picea mariana* may also be common. The tall shrub layer varies from 5 to 70% cover; *Alnus incana* is the most abundant tall shrub (average 26% cover). Saplings of *Thuja occidentalis* and *Picea mariana* are also common in tall or short shrub layers. The short shrub layer usually varies from 5 to 30% cover; *Ledum groenlandicum*, and *Rhamnus alnifolia* are characteristic shrubs. Cover of herbs is usually from 50 to 80%; the most abundant herbs are *Symplocarpus foetidus, Calamagrostis canadensis*, and *Carex stricta*. Other characteristic herbs include *Cornus canadensis, Carex trisperma, Iris versicolor, Coptis trifolia, Mitella nuda, Maianthemum trifolium, Menyanthes trifoliata, Linnaea borealis, Clintonia borealis, Trientalis borealis, Viola renifolia, Caltha palustris*, and *Glyceria striata*. Nonvascular cover varies from 5 to 80%. The most abundant mosses are *Sphagnum* spp.

Globally
The canopy is often moderately dense to dense (MN NHP 1993). Basal areas of 42.2-62.2 m^2/ha and densities of 2457-7565 stems/ha have been reported in four stands in Lower Michigan, using a tree definition of woody stems greater than 2.5 cm dbh (Schwintzer 1981). The understory structure consists of high hummocks and deep, water-filled hollows, with fallen, moss-covered logs common. *Thuja occidentalis* is usually moderately to strongly dominant in the canopy, but occasionally *Picea mariana* may overtop the subdominant *Thuja occidentalis*. Other species include *Abies balsamea, Acer rubrum, Betula papyrifera, Fraxinus nigra, Larix laricina* and, more rarely, *Picea glauca* (in northern Minnesota and northwestern Ontario), or *Tsuga canadensis* (eastward). The shrub layer in this community is sparse to dense, in inverse proportion to the tree canopy. Species present in this stratum include *Alnus incana, Chamaedaphne calyculata, Cornus sericea, Gaultheria hispidula, Ledum groenlandicum, Linnaea borealis, Rosa acicularis, Rubus pubescens*, and *Vaccinium myrtilloides*. *Nemopanthus mucronatum* and *Viburnum cassinoides* are more common eastward. Species diversity in the herbaceous layer can be very high. The most common species are *Carex* spp. (including *Carex disperma, Carex leptalea*), *Coptis trifolia, Cornus canadensis, Clintonia borealis, Dryopteris carthusiana, Galium triflorum, Maianthemum canadense, Mitella nuda, Trientalis borealis*, and *Viola renifolia*. Mosses include *Hylocomium splendens, Pleurozium schreberi, Ptilium crista-castrensis, Rhytidiadelphus triquetrus*, *Sphagnum capillifolium, Sphagnum girgensohnii*, and *Sphagnum magellanicum*. Moss cover may be thin where the canopy is very dense. Diagnostic species include *Thuja occidentalis* as a dominant/co-dominant species, with a combination of acidic and minerotrophic understory species, such as *Alnus incana* and *Cornus sericea*. (Sims *et al.* 1989, Harris *et al.* 1996, Chambers *et al.* 1997).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available

CONSERVATION RANK G4.

DATABASE CODE CEGL002456

MAP UNITS 07

COMMENTS
Isle Royale National Park
At Isle Royale NP this community has a variable physiognomy, occurring as either a woodland (25 to 60% canopy cover) or a forest (60 to 100% canopy cover).

Globally
Tipup mounds caused by blowdowns are common, in part because the very wet soils permit only shallow rooting by *Thuja occidentalis*.

REFERENCES
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

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Quercus rubra - Acer saccharum Forest

COMMON NAME	Red Oak - Sugar Maple Forest
SYNONYM	Red Oak - Sugar Maple Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Lowland or submontane cold-deciduous forest (I.B.2.N.a)
ALLIANCE	QUERCUS RUBRA - ACER SACCHARUM - (QUERCUS ALBA) FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is rare; it seems to be restricted to the southwest end of the island on Red Oak Ridge.

Globally

This association is found in Wisconsin, Minnesota, Michigan, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies somewhat steep to steep, south- to southeast-facing slopes at elevations from 1200 to 1300 feet. Soils are rapidly drained sandy loams. Landscape position is a high slope of a ridge.

Globally

Stands are found on dry to dry-mesic ridge tops and upper- to midslopes, occasionally with bedrock outcrops. Soils are moderately shallow (30-60 cm) to deep, varying from fine sands to loams and clay loams (Chambers *et al.* 1997, especially ecosites 23.1 and 23.2). In central Ontario, stands typically occur on mid- to uppper slopes of morainal landforms, with some stands on lower, very moist soils. Soil depths range from shallow (<30 cm) to deep (over 60 cm).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Acer saccharum, Quercus rubra*
Short shrub	*Juniperus communis, Amelanchier* sp.
Forb	*Aralia nudicaulis, Calystegia spithamea*
Nonvascular	*Leucobryum glaucum*

Globally

Stratum	Species
Tree canopy	*Acer saccharum, Quercus rubra*
Short shrub	*Amelanchier* spp.
Forb	*Aralia nudicaulis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Acer saccharum, Quercus rubra

Globally

Acer saccharum, Quercus rubra

VEGETATION DESCRIPTION

Isle Royale National Park

This red oak - sugar maple forest is a closed canopy, deciduous forest. Canopy cover varies from 30 to 70%. *Quercus rubra* is codominant with *Acer saccharum*; other tree species present at less than 10% cover include *Acer rubrum, Thuja occidentalis, Picea glauca, Sorbus decora*, and *Pinus strobus.* Tall shrubs vary from 0 to 30% cover, and cover of short shrubs varies from 10 to 70%. The most abundant shrubs are *Juniperus communis* and *Amelanchier* spp. Cover of herbs is from 30 to 40%. The most abundant herbs are *Aralia nudicaulis*, *Calystegia spithamea*, and *Elymus* sp. Cover of nonvascular plants

is about 10 to 20%. Characteristic nonvascular plants are the moss *Leucobryum glaucum* and reindeer lichens (*Cladina* spp.).

Globally
The canopy is dominated by deciduous trees. Dominant tree species include *Quercus rubra, Acer saccharum*, and *Acer rubrum*. Associates include *Betula papyrifera, Pinus strobus, Populus grandidentata*, and, in the eastern part of its range, *Fagus grandifolia*, *Fraxinus americana*, and *Ostrya virginiana*. Subcanopy species typically include *Acer rubrum* and *Acer saccharum*. Shrubs include *Amelanchier laevis, Acer pensylvanicum, Corylus cornuta*, and *Lonicera canadensis*. Herbs include *Aralia nudicaulis, Aster macrophyllus, Dryopteris carthusiana, Maianthemum canadense, Mitchella repens* (a creeping semi-shrub), *Polygonatum pubescens*, and *Pteridium aquilinum*. Diagnostic species include *Quercus rubra* with groundlayer species typical of the mixed hardwood/conifer region (Chambers *et al.* 1997).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL002461

MAP UNITS 10

COMMENTS
Globally
The type is thought to have originated through a combination of logging and burning of pine stands, at least in Minnesota, and the natural patterns of disturbance are not clear (MN NHP 1993).

REFERENCES
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

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Acer saccharum - Betula alleghaniensis - (Tilia americana) Forest

COMMON NAME	Sugar Maple - Yellow Birch - (American Basswood) Forest
SYNONYM	Maple - Yellow Birch Northern Hardwoods Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Lowland or submontane cold-deciduous forest (I.B.2.N.a)
ALLIANCE	ACER SACCHARUM - BETULA ALLEGHANIENSIS - (FAGUS GRANDIFOLIA) FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is restricted to the southwest end of the park.

Globally

This community occurs in northern Minnesota, northern Michigan, northern Wisconsin, and southern Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to somewhat steep slopes, mostly on glacial till, at elevations ranging from 680 to 1260 feet. Soils are sandy loams, and moderately well drained to well drained. Landscape positions are usually mid-slopes to high slopes of ridges.

Globally

This community is found on moderate to deep (60->150 cm) sandy loam, clay loam, or loamy sand soils (Coffman and Willis 1977, Pregitzer and Barnes 1984). The soils are typically slightly acidic to circumneutral, mesic to wet-mesic and nutrient rich (Kotar and Burger 1989). Most stands develop on flat to moderate slopes over glacial till.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Acer saccharum, Betula alleghaniensis*
Short shrub	*Acer saccharum* (seedlings)
Fern	*Lycopodium annotinum*

Globally

Stratum	Species
Tree canopy	*Acer saccharum, Betula alleghaniensis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Acer saccharum, Betula alleghaniensis

Globally

Acer saccharum, Betula alleghaniensis

VEGETATION DESCRIPTION

Isle Royale National Park

This sugar maple - yellow birch - northern hardwoods forest is a closed canopy, deciduous forest. Canopy cover varies from 60 to 80%. Canopy dominants are *Acer saccharum* and *Betula alleghaniensis* (their combined cover is over 50%); other tree species present include *Thuja occidentalis*, *Pinus strobus* and *Picea glauca* (each with less than 50% cover). Subcanopy cover varies from 0 to 60% cover. Tall shrub cover is sparse to absent (0 to 10% cover). Cover of short shrubs usually varies from 10 to 40%. *Corylus cornuta* has less than 50% cover in the understory (typical is less than 30%). There is often a fairly high cover of seedlings of *Acer saccharum.* Herbaceous cover is sparse (0 to 5% cover); the most abundant herbs are *Lycopodium annotinum* and *Lycopodium dendroideum.*

Globally
This forest community is dominated by deciduous trees with scattered conifers in some stands. *Acer saccharum* is a dominant throughout the range of this community. It may form nearly pure stands (Flaccus and Ohmann 1964, Hansen *et al.* 1973). Other common canopy trees include *Acer rubrum*, *Betula alleghaniensis*, *Fraxinus americana*, and *Tilia americana*. Conifers such as *Abies balsamea*, *Picea glauca*, *Thuja occidentalis*, and *Tsuga canadensis* can be found in some stands. The shrub layer is sparse, however it can be moderately developed where the tree canopy is not fully closed. Typical shrubs include *Acer spicatum*, *Corylus cornuta*, *Lonicera canadensis*, and *Taxus canadensis*. The herbaceous stratum includes *Clintonia borealis*, *Lycopodium* spp., *Maianthemum canadense*, *Osmorhiza claytoni*, *Streptopus roseus*, and *Viola* spp. (Chambers *et al.* 1997).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G3G4. There are probably over 100 occurrences rangewide. Ninety have been documented: 77 in Minnesota (where the community is ranked S2), 10 in Wisconsin (S4), and 3 in Michigan (S4). Although no other occurrences have been documented, the community is also reported from Ontario (S?). The 90 occurrences total 13,401 acres.

DATABASE CODE CEGL002457

MAP UNITS 09

COMMENTS
Globally
Boreal conifers, especially *Abies balsamea* and *Picea glauca*, increase in abundance and are common associates in northern Minnesota and on Isle Royale (Flaccus and Ohmann 1964, Hansen *et al.* 1973). *Tilia americana* is present along Minnesota's Lake Superior shore only about halfway to the Canadian border (Flaccus and Ohmann 1964).

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Betula alleghaniensis - (Acer saccharum, Picea glauca) Forest

COMMON NAME	Yellow Birch - (Sugar Maple, White Spruce) Forest
SYNONYM	Yellow Birch - (White Spruce) Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Lowland or submontane cold-deciduous forest (I.B.2.N.a)
ALLIANCE	ACER SACCHARUM - BETULA ALLEGHANIENSIS - (FAGUS GRANDIFOLIA) FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community seems to be restricted to the southwest end of the park, near Windigo, Grace Harbor, and Feldtmann Lake.

Globally

This association is found in northern Michigan and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to steep slopes at elevations from 630 to 780 feet. Soils are moderately well drained to rapidly drained sandy loams.

Globally

This community occupies gentle to steep slopes at elevations from 630 to 780 feet. Soils are moderately well drained to rapidly drained sandy loams (C. Reschke personal communication 1999).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Betula alleghaniensis, Picea glauca*
Short shrub	*Rubus parviflorus, Sorbus decora*
Forb	*Aralia nudicaulis, Cornus canadensis*

Globally

Stratum	Species
Tree canopy	*Betula alleghaniensis, Picea glauca*
Forb	*Aralia nudicaulis, Cornus canadensis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Betula alleghaniensis, Picea glauca

Globally

Betula alleghaniensis, Picea glauca

VEGETATION DESCRIPTION

Isle Royale National Park

At Isle Royale NP, yellow birch - (spruce) forest is a closed canopy, deciduous forest. Canopy cover is usually about 70 to 80% (sometimes less); the most abundant trees are *Betula alleghaniensis* (20 to 60% cover), *Picea glauca* (5 to 50% cover) and *Betula papyrifera* (5 to 25% cover). This community is distinguished from Sugar maple - yellow birch - northern hardwood forest by the absence or very low cover of *Acer saccharum* in either the canopy or as seedlings and saplings in the groundlayer. There is often a subcanopy with 5 to 30% cover (same species as in the canopy). Cover of tall shrubs is about 5 to 10%; the most abundant tall shrubs are saplings of *Picea glauca* and *Abies balsamea*, and *Sambucus racemosa* (each with 1 to 5% cover). Cover of short shrubs varies from 10 to 70%; the most abundant short shrubs are *Rubus*

parviflorus (5 to 25% cover), *Sorbus decora* (5 to 25% cover), *Diervilla lonicera* (5 to 25% cover), *Lonicera canadensis,* and *Rubus idaeus* (each with 1 to 5% cover). There is a sparse cover of dwarf shrubs, mainly *Rubus pubescens* (1 to 5% cover). Cover of herbs varies from 40 to 80%; the most abundant herbs are *Aralia nudicaulis* (5 to 25% cover), *Cornus canadensis* (5 to 25%), *Clintonia borealis, Lycopodium annotinum, Streptopus lanceolatus var. rosea, Athyrium filix-femina*, and *Oxalis montana* (each with 1 to 5% cover). Cover of nonvascular plants is sparse (0 to 10% cover); *Pleurozium schreberi* is characteristic but not abundant (less than 1% cover).

Globally
At Isle Royale NP, yellow birch - (spruce) forest is a closed canopy, deciduous forest. Canopy cover is usually about 70 to 80% (sometimes less); the most abundant trees are *Betula alleghaniensis* (20 to 60% cover), *Picea glauca* (5 to 50% cover) and *Betula papyrifera* (5 to 25% cover). This community is distinguished from Sugar maple - yellow birch - northern hardwood forest by the absence or very low cover of *Acer saccharum* in either the canopy or as seedlings and saplings in the groundlayer. There is often a subcanopy with 5 to 30% cover (same species as in the canopy). Cover of tall shrubs is about 5 to 10%; the most abundant tall shrubs are saplings of *Picea glauca* and *Abies balsamea*, and *Sambucus racemosa* (each with 1 to 5% cover). Cover of short shrubs varies from 10 to 70%; the most abundant short shrubs, with 5 to 25% cover, are *Rubus parviflorus*, *Sorbus decora* , and *Diervilla lonicera.* Less common are *Lonicera canadensis* and *Rubus idaeus.* There is a sparse cover of dwarf-shrubs, mainly *Rubus pubescens.* Cover of herbs varies from 40 to 80%; the most abundant herbs are *Aralia nudicaulis* and *Cornus canadensis* with > 5% cover. *Clintonia borealis, Lycopodium annotinum, Streptopus lanceolatus var. rosea, Athyrium filix-femina*, and *Oxalis montana* are less common (<5% cover). Cover of nonvascular plants is sparse (0 to 10% cover), but *Pleurozium schreberi* is characteristic (C. Reschke personal communication 1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005245

MAP UNITS 74

COMMENTS

REFERENCES

Betula papyrifera / Diervilla lonicera - (Abies balsamea) Forest

COMMON NAME	Paper Birch / Bush-honeysuckle - (Balsam Fir) Forest
SYNONYM	Paper Birch / Fir Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Montane or boreal cold-deciduous forest (I.B.2.N.b)
ALLIANCE	BETULA PAPYRIFERA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community mostly occurs in the central part of the island in old burn areas, as well as at some sites in the northeast end of the park.

Globally

This community is found in northern Michigan, northern Minnesota, southern Manitoba, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to somewhat steep slopes at elevations ranging from 620 to 864 feet.

Globally

This community is found on fresh to moist soils (Hansen *et al.* 1971, Sims *et al.* 1989). In Ontario, stands occur on coarse textured, non-calcareous mineral soils, at times very shallow (<15 cm). The soil texture is typically coarse loam or sandy loam (Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Betula papyrifera*
Short shrub	*Rubus parviflorus*
Forb	*Aster macrophyllus, Aralia nudicaulis*

Globally

Stratum	Species
Tree canopy	*Betula papyrifera*
Short shrub	*Diervilla lonicera*
Forb	*Aster macrophyllus, Aralia nudicaulis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Betula papyrifera

Globally

Betula papyrifera, Diervilla lonicera, Aster macrophyllus, Aralia nudicaulis

VEGETATION DESCRIPTION

Isle Royale National Park

This paper birch forest is a successional, deciduous forest with a variable physiognomy ranging from open canopy woodlands to closed canopy forest. Canopy cover varies from 60 to 80%. *Betula papyrifera* is the only dominant tree, 50 to 75% cover); *Picea glauca* is often present at less than 5% cover. Cover of tall shrubs varies from 0 to 40%; the most common tall shrubs are *Abies balsamea, Corylus cornuta*, and *Picea glauca*, although *A. balsamea* is uncommon in the area burned in 1936. Cover of short shrubs varies from 5 to 80% cover; the most abundant short shrubs are *Rubus parviflorus* and *Diervilla lonicera,* and seedlings, saplings, or browsed scrub of *Abies balsamea.* Herbaceous cover varies from 40 to 80% cover; the most abundant herbs are *Aster macrophyllus* (25 to 50% cover) and *Aralia nudicaulis* (5 to 25% cover).

Globally
The canopy of this forested community is closed to moderately open. *Betula papyrifera* is the dominant canopy tree and can form nearly pure stands. *Populus tremuloides*, *Abies balsamea*, *Picea glauca*, and, especially in Canada, *Pinus banksiana* can be found in minor amounts, as well. Tree density can be high, but the growth form and size of the canopy dominants allows significant light to pass through. *Abies balsamea* is common to dense in the understory (Hansen *et al.* 1971) and shrubs such as *Corylus cornuta*, *Diervilla lonicera*, *Rosa acicularis*, and *Taxus canadensis*. The herbaceous layer is similar to other dry-mesic to mesic northern communities. Species found in this layer include *Aralia nudicaulis*, *Aster macrophyllus*, *Clintonia borealis*, *Cornus canadensis*, *Maianthemum canadense*, and *Trientalis borealis*.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G4?.

DATABASE CODE CEGL002463

MAP UNITS 53

COMMENTS
Isle Royale National Park
This successional forest is characteristic of burned sites.

Globally
This type often originates after fires. In the absence of disturbance the community may succeed to *Picea glauca - Abies balsamea* evergreen or mixed evergreen-deciduous community types (MN NHP 1993). Further north in Canada, it may succeed to *Pinus banksiana* and *Picea mariana* upland forests (Sims et al 1989). Paper birch has tiny, light-winged seeds, easily blown long distances by wind. Its bark is very flammable, and even ground fires may kill a mature stem. Birch can resprout from the root collar at the base of the trunk, but not from roots further away from the tree (Heinselman 1996).

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Populus tremuloides - Betula papyrifera / (Abies balsamea, Picea glauca) Forest

COMMON NAME	Trembling Aspen - Paper Birch / (Balsam Fir, White Spruce) Forest
SYNONYM	Aspen-Birch/Boreal Conifer Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Montane or boreal cold-deciduous forest (I.B.2.N.b)
ALLIANCE	POPULUS TREMULOIDES - BETULA PAPYRIFERA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is common and widespread throughout the park.

Globally

This community is found in Manitoba, Ontario, northern Minnesota, northern Wisconsin, and Michigan.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to steep slopes of ridges at elevations ranging from 630 to 960 feet. Soils are silt loams and sandy loams, usually well-drained.

Globally

This community is found on a variety of topographic positions. Omann and Ream (1971) found it on ridgetops, upper, mid, and lower slopes. These slopes are gentle to moderate. The soils are deep, well drained to rapidly drained mineral soils (Sims *et al.* 1989). The soils are usually loam but can be clay, silt, or sand.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Populus tremuloides, Betula papyrifera*
Short shrub	*Abies balsamea, Rubus parviflorus*
Forb	*Aster macrophyllus, Aralia nudicaulis*

Globally

Stratum	Species
Tree canopy	*Populus tremuloides, Betula papyrifera*
Short shrub	*Abies balsamea, Picea glauca*
Forb	*Aster macrophyllus, Aralia nudicaulis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Populus tremuloides, Betula papyrifera, Abies balsamea (understory)

Globally

Populus tremuloides, Betula papyrifera, Abies balsamea (sapling)

VEGETATION DESCRIPTION

Isle Royale National Park

The aspen - birch / boreal conifer forest is a successional, deciduous forest with a variable physiognomy ranging from open canopy woodlands to closed canopy forests. Canopy cover varies from 40 to 100% cover; *Populus tremuloides* (25 to 50% cover) and *Betula papyrifera* (5 to 25% cover) are the most abundant canopy trees. *Picea glauca, Abies balsamea,* and *Thuja occidentalis* are present as subcanopy trees, saplings, or seedlings. *Abies balsamea* is uncommon in the area burned in the 1936 fire. This is a successional forest that seems most likely to develop into a mixed or evergreen forest type. Cover of subcanopy trees varies from 10 to 70%, the most abundant subcanopy tree is *Picea glauca.* Cover of tall shrubs varies from 20 to 60%; the most abundant tall shrubs are *Abies balsamea, Picea glauca*, and *Corylus cornuta.* Cover of short

shrubs varies from 5 to 50%; the most abundant short shrubs are *Abies balsamea, Rubus parviflorus*, and *Populus tremuloides*. Cover of dwarf shrubs varies from 5 to 40%, most abundant are *Abies balsamea* and *Diervilla lonicera*. Cover of herbs varies from 20 to 90%; the most abundant herbs are *Aster macrophyllus* (25 to 50% cover) and *Aralia nudicaulis* (5 to 25% cover). Cover of mosses and lichens varies from 5 to 30%.

Globally
This community is dominated by deciduous trees, with a moderate amount of conifers (<25%). The dominant tree species do not have dense leaf layers and allow a significant amount of light to pass through. This promotes the establishment of prominent sapling and shrub layers and a moderately dense herbaceous stratum. The canopy is dominated by *Betula papyrifera* and *Populus tremuloides,* and occasionally *Populus grandidentata*. Conifer associates include *Abies balsamea* and *Picea glauca*, either in the canopy or, more characteristically, in the subcanopy. *Abies balsamea* and *Picea glauca* are abundant in the sapling layer. Common shrubs include *Acer spicatum, Corylus cornuta, Diervilla lonicera, Linnaea borealis, Lonicera canadensis, Rosa acicularis, Rubus pubescens, Sorbus decora,* and *Vaccinium myrtilloides*. The herbaceous stratum is sometimes dominated by *Aster macrophyllus*, but can include a diversity of forbs, such as *Anemone quinquifolia*, *Aralia nudicaulis, Clintonia borealis, Cornus canadensis, Galium triflorum, Maianthemum canadense, Mitella nuda, Pteridium aquilinum, Streptopus roseus*, *Trientalis borealis,* and *Viola renifolia*. Mosses include *Plagiomnium cuspidatum, Pleurozium schreberi, Ptilium crista-castrensis,* and *Rhytidiadelphus triquestris* (Sims *et al.* 1989, Chambers *et al.* 1997). Diagnostic features of this type are the dominance by both *Populus tremuloides* and *Betula papyrifera*, boreal conifer associates (but very little *Picea mariana* or *Pinus banksiana*), and lack of more southern hardwoods (such as *Acer saccharum*).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available

CONSERVATION RANK G5.

DATABASE CODE CEGL002466

MAP UNITS 54a

COMMENTS
Globally
Historically, this type originated after catastrophic fires in boreal systems. Aspen can form suckers from the roots of fire-killed trees, up to 30 m from the main stem, and has tiny, light seeds that can travel thousands of meters (Heinselman 1996). This type can cover extensive areas because of logging and repeated post-logging fires, which eliminated most of the local pine seed sources (MN NHP 1993). Locally, where this type occurs adjacent to beaver ponds, beaver may cut many trees resulting in a very open canopy and, eventually, a Boreal Hazelnut-Serviceberry Rocky Shrubland (CEGL005197) community (M. Smith personal communication 1999).

REFERENCES
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Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Populus tremuloides - Betula papyrifera - (Acer rubrum, Populus grandidentata) Forest

COMMON NAME	Trembling Aspen - Paper Birch - (Red Maple, Bigtooth Aspen) Forest
SYNONYM	Aspen - Birch - Red Maple Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Montane or boreal cold-deciduous forest (I.B.2.N.b)
ALLIANCE	POPULUS TREMULOIDES - BETULA PAPYRIFERA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon, and occurs primarily in the central portions of the park.

Globally

This community is found in Ontario, northern Minnesota, northern Wisconsin, and Michigan.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to somewhat steep slopes of ridges at elevations ranging from 720 to 1110 feet. Soils are usually well drained loams or sandy loams.

Globally

This community is mostly found on level to rolling topography. It can occur on upper slopes or plateaus or in valley bottoms (Ohmann and Ream 1971). The soil is typically deep, sandy loam or loamy sand (Alban *et al.* 1991). The sites are on glacial outwash, lacustrine deposits, or moraines (Ohmann and Ream 1971, Sims *et al.* 1989). Most are well drained; however, this community can be found on somewhat poorly drained sites.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Populus tremuloides, Betula papyrifera, Acer rubrum*
Tall shrub	*Corylus cornuta*
Forb	*Aster macrophyllus, Aralia nudicaulis*
Fern	*Pteridium aquilinum*

Globally

Stratum	Species
Tree canopy	*Populus tremuloides, Betula papyrifera, Acer rubrum*
Tall shrub	*Corylus cornuta*
Forb	*Aster macrophyllus, Aralia nudicaulis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Populus tremuloides, Betula papyrifera, Acer rubrum, Corylus cornuta

Globally

Populus tremuloides, Betula papyrifera, Acer rubrum, Corylus cornuta

VEGETATION DESCRIPTION

Isle Royale National Park

Aspen - birch - red maple forest is a deciduous forest with a variable physiognomy ranging from open canopy woodlands to closed canopy forests. Canopy cover varies from 40 to 90% cover; one or more of *Populus tremuloides, Betula papyrifera,* or *Acer rubrum* are the most abundant canopy trees. Cover of tall and short shrubs varies from 5 to 70%; *Corylus cornuta* is usually the most abundant shrub. Cover of herbs varies from 10 to 80%; the most abundant herbs are *Aster macrophyllus, Aralia nudicaulis*, and *Pteridium aquilinum*.

Globally
This deciduous forest community has a moderately closed canopy usually dominated by *Populus tremuloides* and *Betula papyrifera*. *Acer rubrum* and *Populus grandidentata* may be absent to dominant. Other minor components of the overstory may include *Abies balsamea*, *Pinus resinosa*, *Pinus strobus*, *Picea glauca*, and *Quercus rubra*. The shrub layer is approximately 2 meters tall and often well developed (MN NHP 1993). The most abundant species are *Acer spicataum*, *Amelanchier* spp., *Corylus cornuta*, *Diervilla lonicera*, and *Rosa acicularis*. Other shrubs present include *Lonicera canadensis*, *Rubus pubescens, Vaccinium angustifolium*, and *Vaccinium myrtilloides*. The herbaceous layer tends to contain many species. Common species include *Aralia nudicaulis*, *Aster macrophyllus*, *Clintonia borealis*, *Maianthemum canadense*, *Trientalis borealis*, and *Viola* spp.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G5.

DATABASE CODE CEGL002467

MAP UNITS 08

COMMENTS
Isle Royale National Park
The successional status of these stands is not clear; the understory usually includes some saplings and seedlings of the canopy species, and has few or no seedlings or saplings of boreal conifers or late successional hardwoods such as sugar maple, yellow birch, or red oak. This may be a fairly stable community type, or it may be an early successional type where later successional species haven't yet become established.

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Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Populus tremuloides - Betula papyrifera / Acer saccharum - Mixed Hardwoods Forest

COMMON NAME	Trembling Aspen - Paper Birch / Sugar Maple - Mixed Hardwoods Forest
SYNONYM	Aspen - Birch / Sugar Maple - Mixed Hardwoods Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Montane or boreal cold-deciduous forest (I.B.2.N.b)
ALLIANCE	POPULUS TREMULOIDES - BETULA PAPYRIFERA FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is common, occurring primarily in the central and southwestern portions of the park.

Globally

This community is found in northwestern Ontario, northern Minnesota, northern Wisconsin, and western upper Michigan.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies moderate to somewhat steep slopes at elevations ranging from 660 to 1260 feet. Soils are usually sandy loams that are well drained to rapidly drained.

Globally

This community is found on a variety of rich mesic sites over clay or silt loam soils. Alban *et al.* (1991) identified two examples of this community in Minnesota and upper Michigan. Both sites had 6 cm of organic material over the mineral soil. One site was on clay soil and the other on silt loam.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Betula papyrifera, Populus tremuloides*
Short shrub	*Rubus parviflorus, Acer saccharum*
Forb	*Aster macrophyllus, Aralia nudicaulis*

Globally

Stratum	Species
Tree canopy	*Betula papyrifera, Populus tremuloides*
Tall shrub	*Acer saccharum*
Forb	*Aster macrophyllus, Aralia nudicaulis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Betula papyrifera, Populus tremuloides, Acer saccharum (understory)

Globally

Betula papyrifera, Populus tremuloides, Acer saccharum (understory)

VEGETATION DESCRIPTION

Isle Royale National Park

The aspen - birch / sugar maple - mixed hardwoods forest is a successional, deciduous forest with a variable physiognomy ranging from open canopy woodlands to closed canopy forests. Canopy cover varies from 50 to 80%; *Betula papyrifera* (25 to 75% cover) and *Populus tremuloides* (25 to 50% cover) are the most abundant canopy trees. *Acer saccharum, Betula alleghaniensis,* or *Quercus rubra* are present as subcanopy trees, saplings, or seedlings. This is a successional forest that seems most likely to be developing into a deciduous forest type in which sugar maple will be dominant. *Acer saccharum* sometimes occurs as a subcanopy tree. Cover of tall shrubs varies from 5 to 30%; *Acer saccharum* and *Corylus*

cornuta are the most common tall shrubs or saplings. Cover of short shrubs varies from 10 to 60%; the most common shrubs or small saplings are *Rubus parviflorus, Acer saccharum*, and *Populus tremuloides*. Herb cover varies from 10 to 70%; the most abundant herbs are *Aster macrophyllus* and *Aralia nudicaulis* (each usually 5 to 25%).

Globally

Deciduous trees dominate the canopy and tree reproduction layers of this community. Conifers, when present, are widely scattered. Tree density is moderate to high but substantial light penetrates the canopy due to the growth form of the two dominant species, *Betula papyrifera* and *Populus tremuloides*. Other northern hardwoods may be found in the canopy but are more common in the sapling layer. These include *Acer rubrum, Acer saccharum, Betula alleghaniensis, Fraxinus pennsylvanica, Ostrya virginiana, Tilia americana*, and *Ulmus americana* (in more mesic sites). The shrub stratum is usually not well developed due to shading from the canopy and sub-canopy trees. Scattered *Acer spicatum, Corylus cornuta*, *Diervilla lonicera* and *Rubus pubescens* are typical shrubs. *Taxus candensis* and *Acer pensylvanicum* are present on some sites. For example, Hansen *et al.* (1973) found *Taxus candensis* to be one of the more abundant shrubs on Isle Royale in Lake Superior. They also found this type to have the most diverse herbaceous layer of their sites. The herbaceous layer contains species such as *Aralia nudicaulis, Aster macrophyllus, Clintonia borealis, Maianthemum canadense, Oryzopsis asperifolia*, and *Streptopus roseus*. Mosses include *Dicranum flagellare, Dicranum montanum*, and others (Chambers *et al.* 1997).

OTHER NOTEWORTHY SPECIES

Isle Royale National Park

Information not available.

CONSERVATION RANK G5.

DATABASE CODE CEGL002468

MAP UNITS 54b

COMMENTS

REFERENCES

Alban, D. H., D. A. Perala, M. F. Jurgensen, M. E. Ostry, and J. R. Probst. 1991. Aspen ecosystem properties in the Upper Great Lakes. Res. Pap. NC-300. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. 47 p.

Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Hansen, H. L., L. W. Krefting, and V. Kurmis. 1974. The forest of Isle Royale in relation to fire history and wildlife. University of Minnesota, Agricultural Exper. Station, Tech. Bull. 294, Forestry Series 13.

Populus tremuloides - Populus balsamifera - Mixed Hardwoods Lowland Forest

COMMON NAME	Trembling Aspen - Balsam Poplar - Mixed Hardwoods Lowland Forest
SYNONYM	Aspen - Balsam Poplar Lowland Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Temporarily flooded cold-deciduous forest (I.B.2.N.d)
ALLIANCE	POPULUS TREMULOIDES TEMPORARILY FLOODED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is rare, only known from 2 sites, one north of Chickenbone Lake and the other near Hay Bay.

Globally

This association is found in northern Wisconsin, Michigan, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle, east to southeast-facing slopes of a lakeplain, at elevations from 623 to 645 feet. Soils are well-drained sandy loams.

Globally

Stands are found on lower slopes and draws, occasionally under seepage conditions. Soils are deep, fresh to moist, poorly drained, and often fine-textured and of lacustrine origin (Sims *et al.* 1989).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Populus tremuloides, Populus balsamifera, Betula papyrifera*

Globally

Stratum	Species
Tree canopy	*Populus tremuloides, Populus balsamifera, Betula papyrifera*

CHARACTERISTIC SPECIES

Isle Royale National Park

Populus balsamifera, or *Populus tremuloides* with wetland groundlayer species

Globally

Populus balsamifera, Populus tremuloides, Alnus incana, Calamagrostis canadensis

VEGETATION DESCRIPTION

Isle Royale National Park

At Isle Royale NP, aspen - balsam poplar lowland forest is an open to closed canopy, deciduous forest. Canopy cover varies from 40 to 80%. The most abundant canopy trees are *Populus balsamifera, Betula papyrifera,* or *Populus tremuloides; Picea glauca* is often present. Cover of tall and short shrubs varies from 10 to 70%; *Alnus incana,* and *Rubus parviflorus* are the most abundant understory shrubs (over 50% cover) and *Lonicera hirsuta* is another common understory shrub (average 37% cover). Cover of herbs varies from 50 to 80%; the most abundant herbs are *Aster macrophyllus, Clintonia borealis, Heracleum maximum,* and *Calamagrostis canadensis.*

Globally

Stands are dominated by deciduous trees, but can contain a mix of evergreen species. Dominants include *Populus tremuloides* and *Populus balsamifera.* Other associates include *Abies balsamea, Betula papyrifera*, and *Picea glauca.* The shrub and herb layer are often fairly rich. Typical shrubs/saplings include *Abies balsamea, Alnus incana, Amelanchier* spp., *Cornus sericea, Ribes* spp., *Rosa acicularis, Rubus idaeus*, and *Rubus pubescens.* The herb layer contains *Aralia nudicaulis, Aster ciliolatus,*

Aster macrophyllus, Anemone quinquifolia, Calamagrostis canadensis, Carex spp. (including *Carex intumescens, Carex gracillima*), *Clintonia borealis, Cornus canadensis, Dryopteris carthusiana, Equisetum* spp. (including *Equisetum sylvaticum*), *Galium triflorum, Maianthemum canadense, Mertensia paniculatus, Mitella nuda, Petasites frigidus var. palmatus, Streptopus roseus*, and *Viola renifolia. Calamagrostis canadensis* can be abundant in the herb layer (Sims *et al.* 1989, McCarthy *et al.* 1994).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G5.

DATABASE CODE CEGL005036

MAP UNITS 14

COMMENTS

REFERENCES

McCarthy, T.G., R.W. Arnup, J. Nieppola, B.G. Merchant, K.C. Taylor, and W.J. Parton. 1994. Field Guide to Forest Ecosystems of Northeastern Ontario. NEST Field Guide FG-001, Ontario Ministry of Natural Resources, Northeast Science and Technology, Timmins ON.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Fraxinus nigra - Mixed Hardwoods - Conifers / Cornus sericea / Carex spp. Forest

COMMON NAME	Black Ash - Mixed Hardwoods - Conifers / Red-osier Dogwood / Sedge species Forest
SYNONYM	Black Ash - Mixed Hardwood Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Saturated cold-deciduous forest (I.B.2.N.g)
ALLIANCE	FRAXINUS NIGRA - ACER RUBRUM SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon, and has been found only in the central portion of the park.

Globally

This association is found in North Dakota, Minnesota, Michigan, Illinois, Wisconsin, Ontario, and Manitoba. It may be found in Indiana.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies poorly drained wetland depressions on flat, gentle, or moderate slopes at elevations ranging from 617 to 930 feet. Soils are poorly drained silt loam or muck that are seasonally flooded to saturated.

Globally

Stands occur on poorly drained wetland depressions on flat, gentle, or moderate slopes in valleys with impeded drainages or near lake shores. These wet pockets contain fine sandy clay loams, fine loams, mucks or soils with well-decomposed peat. Hydrology can vary from seasonally flooded to saturated. Conditions are often transitional to uplands (Sims *et al.* 1989, Minnesota NHP1993, Cleland *et al.* 1994, Chambers *et al.* 1997).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Fraxinus nigra*
Tall shrub	*Alnus incana*
Forb	*Symplocarpus foetidus*

Globally

Stratum	Species
Tree canopy	*Fraxinus nigra, Abies balsamea, Acer rubrum*
Tall shrub	*Alnus incana*

CHARACTERISTIC SPECIES

Isle Royale National Park

Fraxinus nigra, Alnus incana

Globally

Fraxinus nigra, Alnus incana

VEGETATION DESCRIPTION

Isle Royale National Park

This black ash swamp community is a deciduous wooded wetland. Canopy cover varies from 30 to 80%; *Fraxinus nigra* is the most abundant tree (15 to 60% cover), other trees present include *Betula papyrifera and Populus tremuloides.* Cover of tall shrubs varies from 10 to 60%; *Alnus incana* is the most abundant tall shrub (15 to 50% cover). Cover of herbs varies from 40 to 90%; the most common herbs are *Symplocarpus foetidus, Equisetum arvense, Osmunda claytoniana, Athyrium filix-femina,* and *Thalictrum dasycarpum.* Cover of nonvascular plants varies from 5 to 20%; the most abundant mosses are

Calliergon spp.

Globally

Canopy structure is variable, ranging from 30 to 90% cover. The canopy is dominated by *Fraxinus nigra* (at least 50% cover), with a diverse mix of hardwoods and conifers in the main and sub canopies, including *Abies balsamea, Acer rubrum, Acer saccharum, Betula papyrifera, Betula alleghaniensis, Fraxinus pennsylvanica, Picea glauca, Populus balsamifera, Populus tremuloides, Thuja occidentalis, Tilia americana*, and *Ulmus americana*. Shrub and sapling species include *Abies balsamea, Acer spicatum, Alnus incana, Cornus sericea, Corylus cornuta, Lonicera canadensis, Prunus virginiana, Ribes triste, Rubus idaeus*, and *Rubus pubescens*. Herbaceous species include *Aralia nudicaulis, Aster macrophyllus, Athyrium felix-femina, Carex gracillima, Carex intumescens, Cinna latifolia, Circaea alpina, Clintonia borealis, Dryopteris carthusiana, Equisetum sylvaticum, Fragaria virginiana, Maianthemum canadense, Mitella nuda, Streptopus roseus, Thalictrum pubescens*, and *Trientalis borealis*. Mosses include *Climacium dendroides, Plagiomnium* spp. (Sims *et al.* 1989, Minnesota DNR 1993, Cleland *et al.* 1994, Harris *et al.* 1996, Chambers *et al.* 1997). A floodplain variant may also occur, with more hardwood dominance, with wetter species present, such as *Alnus incana, Calamagrostis canadensis*, and *Caltha palustris* (Harris *et al.* 1996). Diagnostic features include the dominance by *Fraxinus nigra*.

OTHER NOTEWORTHY SPECIES

Isle Royale National Park

Information not available.

CONSERVATION RANK G4.

DATABASE CODE CEGL002105

MAP UNITS 26

COMMENTS

REFERENCES

Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Cleland, D. T., J. B. Hart, G. E. Host, K. S. Pregitzer, and C. W. Ramm. 1994. Field guide to the ecological classification and inventory system of the Huron-Manistee National Forest. USDA Forest Service, North Central Forest Experiment Station.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Acer rubrum - Fraxinus spp. - Betula papyrifera / Cornus canadensis Forest

COMMON NAME	Red Maple - Ash species - Paper Birch / Canadian Bunchberry Forest
SYNONYM	Red Maple - Ash - Birch Swamp Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Saturated cold-deciduous forest (I.B.2.N.g)
ALLIANCE	FRAXINUS NIGRA - ACER RUBRUM SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is rare, apparently restricted to a few wet depressions on the southeast-facing upper slopes of the Greenstone Ridge.

Globally

This association occurs in northern Minnesota, northern Michigan, Ontario, and possible northern Wisconsin.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies sites with poorly drained wetland depressions at relatively high elevations (ca 1000 ft) near top of Greenstone Ridge, on the south side of ridge, in a shallow depression with muck soils.

Globally

Stands are typically found on muck and shallow peat on lake plains and floodplains (MN NHP 1993).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Acer rubrum, Betula papyrifera*
Tall shrub	*Alnus viridis, Alnus incana*
Forb	*Aster macrophyllus, Aralia nudicaulis*
Graminoid	*Calamagrostis canadensis, Carex rostrata*

Globally

Stratum	Species
Tree canopy	*Acer rubrum, Betula papyrifera, Fraxinus nigra, Fraxinus pennsylvanica*
Tall shrub	*Alnus incana*
Fern	*Onoclea sensibilis, Osmunda cinnamomea, Osmunda claytonia*
Forb	*Aster macrophyllus, Aralia nudicaulis, Impatiens capensis*
Graminoid	*Calamagrostis canadensis, Carex rostrata*

CHARACTERISTIC SPECIES

Isle Royale National Park

Acer rubrum, Betula papyrifera, Alnus viridis, Alnus incana

Globally

Acer rubrum, Betula papyrifera, Fraxinus nigra, Alnus incana

VEGETATION DESCRIPTION

Isle Royale National Park

This maple-ash swamp community is an open canopy, deciduous wooded swamp. Canopy cover varies from 50 to 60%; the most abundant tree is either *Acer rubrum* or *Betula papyrifera* (25 to 60% cover). Tall shrub cover is about 20 to 30%; the most abundant shrub is either *Alnus viridis* or *Alnus incana.* Cover of herbs varies from 60 to 90%; the most abundant herbs are *Calamagrostis canadensis, Carex rostrata, Aster macrophyllus,* and *Aralia nudicaulis.*

Globally
The canopy structure is variable, with cover ranging from open (25-60%) to closed (60-100%). Common canopy dominants include *Acer rubrum, Betula alleghaniensis, Betula papyrifera, Fraxinus nigra, Fraxinus pennsylvanica*, and occasional *Larix laricina, Pinus strobus*, and *Ulmus americana*. *Pinus strobus* may form a patchy supercanopy above the hardwood canopy. Common shrubs include *Alnus incana* and *Rhus vernix*. Other associates include *Ilex verticillata, Ribes* spp., and *Rubus strigosus*. Dwarf-shrubs may include *Cornus canadensis*. The herbaceous layer contains *Calamagrostis canadensis, Carex stipata, Impatiens capensis, Mitella nuda, Onoclea sensibilis, Osmunda cinnamomea, Osmunda claytoniana, Saxifraga pensylvanica*, and others (MN NHP 1993, Wovcha *et al.* 1995). A seepage swamp subtype can occur where steep sandy slopes and gravelly slopes merge with a river or stream terrace. The groundlayer can be exceptionally diverse, with characteristic seepage species including *Angelica atropurpurea, Carex bromoides, Hydrocotyle americana, Poa paludigena, Saxifraga pensylvanica*, and *Symplocarpus foetidus* (MN NHP 1993, Wovcha *et al.* 1995).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available

CONSERVATION RANK G4.

DATABASE CODE CEGL002071

MAP UNITS 27

COMMENTS

REFERENCES
Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.
Wovcha, D.S., B.C. Delaney, and G. Nordquist. 1995. Minnesota's St. Croix Valley and Anoka sandplain: a guide to native habitats. University of Minnesota Press, Minneapolis, MN. 234 p.

Larix laricina / Alnus incana Forest

COMMON NAME	Tamarack / Speckled Alder Forest
SYNONYM	Northern Tamarack Rich Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Deciduous forest (I.B)
PHYSIOGNOMIC GROUP	Cold-deciduous forest (I.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.B.2.N)
FORMATION	Saturated cold-deciduous forest (I.B.2.N.g)
ALLIANCE	LARIX LARICINA SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is only found at the southwest end of Isle Royale, near Siskiwit Bay. Only two examples were sampled in 1998, one west of Hay Bay campground, and one west of Lake Halloran.

Globally

This community is found in the United States in northern and central parts of Minnesota, Wisconsin, and Michigan; and in Canada in Ontario, Manitoba, and probably elsewhere.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occurs in wetland depressions overlying conglomerate or sandstone bedrock near Siskiwit Bay. These wetlands occur at relatively low elevations (620 to 640 feet); these sites are likely old lake bed deposits from postglacial lakes (probably Lake Nipissing). Soils are saturated muck or peat. The species composition and the saturated soils (even in a very dry summer) suggest that these wetlands are kept saturated by groundwater.

Globally

Stands are found on the shores of lakes and rivers above the flooding level, as well as margins of flowage areas of peatland complexes. The substrate is primarily a well-decomposed woody peat in wet, saturated soils, but can also be a moist mineral soil. Hummock and hollow microtopography is moderately to well developed, with standing water occasionally occurring in the hollows. (Sims *et al.* 1989, MN NHP 1993, Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Larix laricina*
Tall shrub	*Thuja occidentalis, Betula pumila, Alnus incana*
Short shrub	*Chamaedaphne calyculata, Ledum groenlandicum*
Graminoid	*Carex lasiocarpa, Calamagrostis canadensis*
Nonvascular	*Sphagnum* spp.

Globally

Stratum	Species
Tree canopy	*Larix laricina*
Tall shrub	*Alnus incana, Betula pumila, Thuja occidentalis*
Short shrub	*Ledum groenlandicum, Chamaedaphne calyculata, Gaultheria hispidula*
Nonvascular	*Sphagnum* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Larix laricina, Alnus incana, Betula pumila, Carex lasiocarpa, Carex livida, Sphagnum spp.

Globally

Larix laricina, Alnus incana, Chamaedaphne calyculata, Betula pumila, Sphagnum spp.

VEGETATION DESCRIPTION

Isle Royale National Park

The tamarack rich swamp is a deciduous, needle-leaved wooded wetland. This community has a woodland physiognomy, with about 30% canopy cover of trees (over 5 m tall), from 20 to 60% cover of tall shrubs (2 to 5 m tall), about 20% cover of short shrubs (0.5 to 2 m tall), and 5 to 10% cover of dwarf shrubs (< 0.5 m tall). *Larix laricina* is the most abundant canopy tree (average 26% cover); *Thuja occidentalis, Picea mariana,* and *Pinus strobus* may also be present, generally with less than 10% cover, but *Picea mariana* can be higher. The most abundant tall shrubs are *Thuja occidentalis, Betula pumila, Alnus incana,* and *Larix laricina.* The most abundant short shrubs are *Chamaedaphne calyculata, Ledum groenlandicum*, and *Myrica gale.* The most abundant dwarf shrubs are *Andromeda polifola* var. *glaucophylla, Vaccinium oxycoccos, Gaultheria hispidula*, and *Rubus pubescens*. Herbs typically have about 40 to 50% cover; the most abundant herbs are *Carex lasiocarpa, Calamagrostis canadensis*, and *Solidago uliginosa*. *Sphagnum* spp. are abundant in the groundlayer, averaging about 40% cover.

Globally

The canopy layer varies from closed (60-100% cover) to open (25-60% cover), and may also range from 3-10 m in height. *Larix laricina* is the dominant tree species, with associates of *Picea mariana* and *Thuja occidentalis.* The shrub, herb, and moss layers can be very rich. The shrub layer typically contains *Alnus incana,* along with *Abies balsamea, Cornus sericea, Salix* spp., and *Picea mariana.* The dwarf-shrub layer is strongly ericaceous, including *Ledum groenlandicum*, and *Gaultheria hispidula*. Other dwarf-shrubs include *Chamaedaphne calyculata, Linnaea borealis, Lonicera villosa, Ribes triste, Rosa acicularis*, and *Rubus pubescens*. Herbaceous cover is variable; species include *Carex disperma, Carex lacustris, Carex trisperma, Coptis trifolia, Cornus canadensis, Equisetum sylvaticum, Galium triflorum, Maianthemum canadense, Maianthemum trifolium, Mitella nuda, Trientalis borealis*, and *Viola renifolia*. The moss layer, which is sometimes patchy, includes *Dicranum polysetum, Hylocomium spendens, Pleurozium schreberi, Ptilium crista-castrensis, Rhytidiadelphus triquestrus, Sphagnum capillifolium, Spaghnum girgensohnii*, and *Sphagnum nemoreum* (Sims *et al.* 1989, Minnesota NHP 1993, Harris *et al.* 1996).

OTHER NOTEWORTHY SPECIES

Isle Royale National Park

The orchids *Platanthera dilatata* and *Spiranthes cernua* were common in one site, and the other site had many standing dead snags of *Thuja occidentalis*.

CONSERVATION RANK G4.

DATABASE CODE CEGL002471

MAP UNITS 65, 57

COMMENTS

Globally

Fires may move through this community in dry years.

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Thuja occidentalis - Betula alleghaniensis Forest

COMMON NAME	Northern White-cedar - Yellow Birch Forest
SYNONYM	Northern White Cedar - Yellow Birch Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.a)
ALLIANCE	THUJA OCCIDENTALIS - BETULA ALLEGHANIENSIS FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is found primarily at the southwest end of the island; the eastern-most site sampled is west of Chickenbone Lake, most of the sites are near Windigo and Feldtmann Ridge, where it is not uncommon.

Globally

This community is found in northern Minnesota, northern Wisconsin, northern Michigan, and Ontario. It is reported from two ecoregion subsections in the western Lake Superior basin.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to somewhat steep slopes facing northwest, northeast, or east. Sometimes it occurs in a ravine with a small stream running through. It usually occurs at elevations from about 700 to 1170 feet.

Globally

This community is found on both poorly drained lowland soils, occasionally bordering on wet, organic soils (Beals and Cottam 1960, Chambers *et al.* 1997), and gentle to somewhat steep northerly slopes (C. Reschke personal communication 1999). The soil is typically moderately acidic sandy clay with a thin litter layer.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Thuja occidentalis, Betula alleghaniensis*
Short shrub	*Rubus parviflorus*
Forb	*Clintonia borealis, Cornus canadensis*

Globally

Stratum	Species
Tree canopy	*Thuja occidentalis, Betula alleghaniensis*
Dwarf-shrub	*Cornus canadensis*
Forb	*Clintonia borealis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Thuja occidentalis, Betula alleghaniensis

Globally

Thuja occidentalis, Betula alleghaniensis

VEGETATION DESCRIPTION

Isle Royale National Park

White cedar - yellow birch forest is a closed canopy, mixed evergreen and deciduous forest. Canopy cover varies from about 60 to 80%; the most abundant trees are *Thuja occidentalis* (25 to 60% cover), *Betula alleghaniensis* (15 to 60% cover), *Betula papyrifera* (5 to 25% cover), and *Picea glauca* (5 to 25% cover). Cover of subcanopy trees is about 10 to 20%, mostly *Betula alleghaniensis* and *Thuja occidentalis* (each 5 to 25% cover). Cover of tall shrubs varies from 0 to 30%, *Picea glauca* is

the most common tall shrub. Cover of short shrubs varies from 5 to 60%; the most abundant short shrubs are *Rubus parviflorus* (25 to 50% cover), *Sorbus decora* (1 to 10% cover), and *Acer spicatum* (1 to 5% cover). Cover of herbs varies from 40 to 90%; the most abundant herbs are *Clintonia borealis*, *Cornus canadensis, Lycopodium annotinum, Mitella nuda, Athyrium filix-femina, Phegopteris connectilis*, and *Symplocarpus foetidus.* Cover of mosses and lichens varies from 5 to 30%; the most common lichens are epiphytic *Parmelia* spp. and *Usnea* spp. *Hylocomium splendens* is a common groundlayer moss.

Globally
The canopy of this community is dominated by *Thuja occidentalis* and a variety of hardwoods, most typically *Betula alleghaniensis, Betula papyrifera*, and *Populus tremuloides*, but occasionally *Acer rubrum, Acer saccharum* and *Fraxinus nigra.* Associated conifers include *Abies balsamea*, *Picea glauca*, and, rarely, *Tsuga canadensis.* The understory usually contains a well developed shrub/sapling layer, including *Abies balsamea*, *Acer spicatum, Corylus cornuta, Diervilla lonicera*, *Linnaea borealis*, *Ribes triste*, *Rubus pubescens*, and *Taxus canadensis.* Herbaceous species include *Aralia nudicaulis, Aster macrophyllus*, *Clintonia borealis, Coptis trifolia, Cornus canadensis, Dryopteris carthusiana, Galium triflorum, Gymnocarpium dryopteris, Lycopodium* spp., *Maianthemum canadense, Mitella nuda, Onoclea sensibilis,* and *Trientalis borealis*. Moss species include *Hylocomium splendens*, *Pleurozium schreberi, Rhytidiadelphus triquestrus*, and others (Minnesota NHP 1993, Chambers *et al.* 1997). Diagnostic features include the mixed dominance of *Thuja occidentalis* and hardwoods, particularly *Betula alleghaniensis*, in an essentially upland site type.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available

CONSERVATION RANK G2Q. There are probably fewer than 100 occurrences of this community rangewide. It is reported from Minnesota (where it is ranked S2), Wisconsin (S?), Michigan (S?), and Ontario (S?). Currently there is only one occurrence documented from Minnesota. Minimal data on current acreage are available; the one occurrence documented from Minnesota has 14 acres. It is likely that many stands have been degraded by logging. This community is reported from two ecoregion subsections in the western Lake Superior basin.

DATABASE CODE CEGL002450

MAP UNITS 16

COMMENTS

REFERENCES
Beals, E. and G. Cottam. 1960. The forest vegetation of the Apostle Islands, Wisconsin. Ecology 41:743-751.
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.
Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Pinus strobus - Populus tremuloides / Corylus cornuta Forest

COMMON NAME	White Pine - Trembling Aspen / Beaked Hazelnut Forest
SYNONYM	White Pine-Aspen-Birch Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.a)
ALLIANCE	PINUS STROBUS - (PINUS RESINOSA) - POPULUS TREMULOIDES FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon, and seems to be restricted to the Minong Ridge from Lake Desor to McCargoe Cove, and the Greenstone Ridge near Hatchet Lake.

Globally

This association is found in northern Minnesota, northern Wisconsin, northern Michigan, and northwestern Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to somewhat steep slopes, usually with a south to southeast aspect, at elevations ranging from 745 to 1050 feet. Soils are usually sandy loams.

Globally

Stands are found on a variety of slope positions on shallow to deep (> 60 cm), dry-mesic to mesic, rapidly drained soils, with fine sandy to loamy soil textures (Sims *et al.* 1989, MN NHP 1993, Chambers *et al.* 1997).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Pinus strobus, Betula papyrifera*

Globally

Stratum	Species
Tree canopy	*Pinus strobus, Betula papyrifera, Populus tremuloides*

CHARACTERISTIC SPECIES

Isle Royale National Park

Pinus strobus, Betula papyrifera

Globally

Pinus strobus, Betula papyrifera, Populus tremuloides

VEGETATION DESCRIPTION

Isle Royale National Park

White pine - aspen - birch forest is a closed canopy forest with a variable mixture of evergreen and deciduous trees. Canopy cover of trees is usually 70 to 80%. Most sites sampled had a predominantly evergreen canopy, with less than 25% of the canopy cover made up of deciduous trees, but some were mixed. *Pinus strobus* is usually the most abundant tree (25 to 75% cover), mixed with smaller numbers of *Populus tremuloides*, *Betula papyrifera*, and *Abies balsamea.* Cover of short shrubs varies from 10 to 40%; the most abundant short shrub is *Rubus parviflorus* (5 to 25% cover); other characteristic shrubs are *Diervilla lonicera* and *Amelanchier* spp. Cover of herbs varies from 20 to 60%; the most abundant herbs are *Aster macrophyllus* and *Aralia nudicaulis*.

Globally

The tree canopy is mixed evergreen-deciduous. *Pinus strobus* may form a supercanopy over a mixture of other species, including *Betula papyrifera, Populus tremuloides, Picea glauca*, and *Abies balsamea.* Less frequent are *Pinus resinosa, Populus*

grandidentata, and *Thuja occidentalis*. The subcanopy can include *Acer rubrum* and *Acer saccharum*, as well as a mixture of canopy species. Tall shrubs and saplings include *Abies balsamea, Acer spicatum, Amelanchier* spp., and *Corylus cornuta.* Short shrubs include *Diervilla lonicera, Linnaea borealis, Lonicera canadensis*, and *Vaccinium myrtilloides. Viburnum cassinoides* may be present in the eastern part of the range. Herbs include *Aralia nudicaulis, Aster macrophyllus, Clintonia borealis, Cornus canadensis, Maianthemum canadense, Oryzopsis asperifolia, Pteridium aquilinum, Streptopus roseus*, and *Trientalis borealis*. Typical mosses include *Pleurozium schreberi, Dicranum polysetum,* and *Dicranum flagellare* (Sims *et al.* 1989, Minnesota NHP 1993, Chambers *et al.* 1997).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G4?.

DATABASE CODE CEGL002479

MAP UNITS 03

COMMENTS
Globally
This community may arise as a successional stage after fire, but may also originate after logging.

REFERENCES
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Picea glauca - Abies balsamea - Populus tremuloides / Mixed Herbs Forest

COMMON NAME	White Spruce - Balsam Fir - Trembling Aspen / Mixed Herbs Forest
SYNONYM	Spruce - Fir - Aspen Forest
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.a)
ALLIANCE	PICEA GLAUCA - ABIES BALSAMEA - POPULUS SPP. FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This is a common forest community that occurs throughout the park.

Globally

This community is found in northern Michigan, northern Wisconsin, northern Minnesota, northwestern Ontario, and southeastern Manitoba.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to somewhat steep slopes at elevations ranging from 605 to 1300 feet. Soils are mostly well drained to rapidly drained sandy loams. The open forest variant usually occupies sites on gentle to moderate slopes at lower elevations (from 610 to 800 feet); occasionally it occupies somewhat steep slopes, and can occur near ridgetops, at elevations up to 1210 feet.

Globally

This upland community is found on deep, well drained to rapidly drained, moist, fine-textured, mineral soils. Loams are the most common, but silts and clays are not rare (Sims *et al.* 1989, Zoladeski *et al.* 1995).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Picea glauca, Populus tremuloides, Betula papyrifera*
Short shrub	*Rubus parviflorus*
Forb	*Aster macrophyllus, Aralia nudicaulis*

Globally

Stratum	Species
Tree canopy	*Picea glauca, Populus tremuloides, Betula papyrifera*
Forb	*Aster macrophyllus, Aralia nudicaulis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Picea glauca, Populus tremuloides, Betula papyrifera; additional diagnostics of the open forest variant are *Rubus parviflorus* and *Diervilla lonicera*

Globally

Picea glauca, Abies balsamea, Populus tremuloides, Betula papyrifera, Diervilla lonicera, Aster macrophyllus, Aralia nudicaulis, Pteridium aquilinum, Cornus canadensis, Calamagrostis canadensis

VEGETATION DESCRIPTION

Isle Royale National Park

White spruce - fir - aspen forest is a closed to open canopy, mixed evergreen and deciduous forest. It contains two structural phases or variants. The main type is the closed canopy forest type with a canopy cover of about 60 to 80%. The most abundant canopy trees are *Picea glauca* (5 to 50% cover), *Populus tremuloides* (5 to 25% cover), *Betula papyrifera* (5

to 25% cover), *Abies balsamea,* and *Thuja occidentalis* (each 1 to 5% cover). *A. balsamea* is uncommon in the 1936 burn area. There may be a subcanopy (0 to 50% cover) with *Abies balsamea* and *Picea glauca* (each 0 to 25% cover). Cover of short shrubs varies from about 10 to 90%; the most abundant short shrubs are *Rubus parviflorus* (5 to 25% cover) and *Abies balsamea* (1 to 5% cover). Cover of herbs varies from 40 to 100%; the most abundant herbs are *Aralia nudicaulis* and *Aster macrophyllus* (each 5 to 25% cover).

The spruce-fir-aspen open forest variant is a mixed evergreen and deciduous community with a variable physiognomy, ranging from open canopy forest to woodland (usually 20 to 50% canopy cover, sometimes more or less). The most abundant trees over 5 m tall are *Betula papyrifera*, *Picea glauca*, and *Populus tremuloides*; each of these typically occurs with about 5 to 25% cover, occasionally they will have up to 50% cover. Other trees occasionally present include *Thuja occidentalis, Abies balsamea, Picea mariana*, and *Betula alleghaniensis*. Cover of tall shrubs is usually about 5 to 30%; the most abundant tall shrubs are *Picea glauca, Abies balsamea, Thuja occidentalis*, and *Sambucus racemosa*. Cover of short shrubs varies from about 5 to 60%; the most abundant short shrubs are browsed *Abies balsamea* scrub, *Rubus parviflorus*, *Corylus cornuta*, and *Diervilla lonicera*. Herbaceous cover typically varies from 30 to 50%. The most abundant herbs are *Aster macrophyllus, Aralia nudicaulis, Pteridium aquilinum, Cornus canadensis,* and *Calamagrostis canadensis*. Many sites with this community type are recovering from past disturbance; standing dead snags of *Betula papyrifera* and *Populus tremuloides* are common.

Globally
The overstory composition is varied. The most abundant tree species typically *are Abies balsamea, Acer rubrum, Picea glauca, Pinus strobus, Populus tremuloides*, and *Populus balsamifera.* The sapling/shrub layer is usually moderately well developed. *Acer spicatum, Corylus cornuta, Rosa acicularis, Rubus pubescens*, and saplings of *Abies balsamea* are the most commonly encountered in this stratum. Herb diversity is usually high. *Aralia nudicaulis, Aster ciliolatus, Aster macrophyllus, Clintonia borealis, Cornus canadensis, Galium triflorum, Maianthemum canadense, Mitella nuda*, and *Trientalis borealis* are typical of this community.

On Isle Royale, two structural phases or variants have been described, and these may apply elsewhere. The principal type is the more closed canopy variant, with 60-80% cover. The second is the more open woodland variant, with 20-50% cover (C. Reschke personal communication 1999). Many of these sites are recovering from past disturbance, either blowdowns, (in which case the shrub/sapling layer can be very dense), moose-browsing (in which case the shrub/sapling layer can be fairly open), or fire.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available

CONSERVATION RANK G5.

DATABASE CODE CEGL002475

MAP UNITS 23, 55

COMMENTS
Isle Royale National Park
The spruce-fir-aspen open forest variant is a woodland phase of the spruce-fir-aspen forest that appears to be caused by disturbance such as logging or fire. On Isle Royale it may be kept more open than is typical as a result of heavy browsing by moose. The two species most severely impacted by moose browsing, especially at the southwest end of the island, are *Abies balsamea* and *Sorbus decora.* Herbivory by aspen tortrix was also noted at many sites, resulting in moderate (or sometimes severe) defoliation of *Populus tremuloides*.

REFERENCES

Thuja occidentalis - Fraxinus nigra Forest

COMMON NAME	Northern White-cedar - Black Ash Forest
SYNONYM	White Cedar - Black Ash Swamp
PHYSIOGNOMIC CLASS	Forest (I)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous forest (I.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous forest (I.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (I.C.3.N)
FORMATION	Saturated mixed needle-leaved evergreen - cold-deciduous forest (I.C.3.N.d)
ALLIANCE	THUJA OCCIDENTALIS - ACER RUBRUM SATURATED FOREST ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community occurs primarily at the southwest end of the island; the furthest east it was sampled was near the west end of Chickenbone Lake.

Globally

This association can be found in Michigan and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions with saturated soils, at elevations ranging from 700 to 1200 feet.

Globally

This type is found in confined basins surrounded by upland or as part of large wetland complexes. If associated with peatlands, it is usually found on the upland border where wetter, more minerotrophic conditions exist. Soils are either deep, well decomposed peats or shallow well decomposed peats over clay. Microtopography of hummocks and hollows may be well developed or absent. Standing water is often present. The water regime is seasonally flooded to saturated (M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Thuja occidentalis, Fraxinus nigra*
Tall shrub	*Alnus incana*
Forb	*Symplocarpus foetidus*

Globally

Stratum	Species
Tree canopy	*Thuja occidentalis, Fraxinus nigra*
Tall shrub	*Alnus incana*

CHARACTERISTIC SPECIES

Isle Royale National Park

Thuja occidentalis, Fraxinus nigra, Symplocarpus foetidus

Globally

Thuja occidentalis, Fraxinus nigra, Alnus incana

VEGETATION DESCRIPTION

Isle Royale National Park

This white cedar - black ash swamp is a wooded wetland with a mixed evergreen and deciduous tree canopy, and a variable canopy closure ranging from 40 to 100% canopy cover. *Thuja occidentalis* and *Fraxinus nigra* are codominant (each typically with 25 to 50% cover). *Betula alleghaniensis* is a common associate in the canopy (typically with less than 20% cover). The shrub layer is variable, ranging from 5 to 50% cover. The most abundant tall shrubs are *Alnus incana*, and saplings of *Fraxinus nigra, Thuja occidentalis*, and *Acer spicatum*. Dwarf shrub cover varies from 0 to 20%, and herb

cover varies from 40 to 90%. *Rubus pubescens* is a common dwarf shrub, and *Symplocarpus foetidus* is the most abundant herb. Other characteristic herbs are *Carex intumescens, Mitella nuda, Equisetum fluviatile*, and *Athyrium filix-femina.*

Globally
Canopy cover is variable, sometimes fairly open. *Thuja occidentalis* and *Fraxinus nigra* dominate the canopy, but some stands may have *Fraxinus nigra* in the upper canopy and *Thuja occidentalis* in the lower canopy. *Thuja occidentalis* also tends to occur on the hummocks and *Fraxinus nigra* in the hollows. *Populus tremuloides* can be a major component, but this may be caused by logging of *Thuja occidentalis*. *Acer rubrum, Betula alleghaniensis*, and *Picea glauca* may also be present. Shrubs include *Acer spicatum, Alnus incana, Cornus alternifolia, Lonicera canadensis, Ribes* spp., and *Rubus pubescens*. The herb rich layer includes *Aralia nudicaulis, Arisaema triphyllum, Carex gracillima, Carex intumescens, Clintonia borealis, Cornus canadensis, Dryopteris carthusiana, Galium triflorum, Maianthemum canadense, Tiarella cordifolia* and *Trientalis borealis* (Chambers *et al.* 1997). In northern Minnesota, moss cover is highly variable, ranging from 30-90%. The most abundant mosses are *Rhytidiadelphus triquetrus, Calliergon cordifolium, Calliergon giganteum, Mniaceae, Thuidium* spp., *Sphagnum warnstorfii*, and *Sphagnum squarrosum* (M. Smith personal communication 1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005165

MAP UNITS 18

COMMENTS
Isle Royale National Park
Globally

REFERENCES
Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant, P. Uhlig. Field Guide to Forest Ecosystems of Central Ontario. Southcentral Science Section (SCSS) Field Guide FG-01, Ontario Ministry of Natural Resources, North Bay, Ontario, Canada. 200 pp.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Pinus banksiana - (Picea mariana, Pinus strobus) / Vaccinium spp. Rocky Woodland

COMMON NAME	Jack Pine - (Black Spruce, White Pine) / Blueberry species Rocky Woodland
SYNONYM	Boreal Pine Rocky Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.A.4.N)
FORMATION	Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.a)
ALLIANCE	PINUS (BANKSIANA, RESINOSA) WOODLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is scattered throughout the park on the tops of ridges.

Globally

This association is found in northern Minnesota, Michigan, southern Manitoba, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies sites on tops of ridges or on steep, usually south- or southeast-facing upper slopes of ridges (occasionally on northwest-facing exposures), mostly on basalt bedrock.

Globally

Stands typically occur on shallow, sandy or rocky sites. Soils vary from talus slopes and bare bedrock to deep mineral soils of coarse to fine sand (Sims *et al.* 1989, McCarthy *et al.* 1994).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Pinus banksiana, Pinus strobus, Pinus resinosa*
Short shrub	*Juniperus communis, Quercus ellipsoidalis, Vaccinium angustfolium*
Nonvascular	*Cladina* spp.

Globally

Stratum	Species
Tree canopy	*Pinus banksiana, Pinus strobus, Pinus resinosa*
Short shrub	*Juniperus communis, Quercus ellipsoidalis, Vaccinium angustfolium*
Nonvascular	*Cladina* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Pinus strobus, Pinus banksiana, or *Pinus resinosa, Juniperus communis*

Globally

Pinus banksiana, Pinus strobus, Pinus resinosa, Juniperus communis, Vaccinium angustifolium, Cladina spp.

VEGETATION DESCRIPTION

Isle Royale National Park

This boreal pine rocky woodland is an open canopy, usually evergreen, woodland that occurs mainly on exposed rocky summits. Canopy cover of trees over 5 m tall varies from 10 to 60% cover. The most abundant trees are one of three pines: either *Pinus banksiana*, *Pinus strobus*, or *Pinus resinosa.* Usually one of these species is dominant at a site and others are rare or absent. Other trees commonly present with less than 5% cover *include Picea glauca, Abies balsamea, Populus tremuloides*, *Thuja occidentalis,* and *Picea mariana.* The tall shrub layer usually has about 5 to 20% cover and includes saplings or browsed scrub of canopy trees, plus *Sorbus decora* and *Amelanchier* sp. (probably *Amelanchier bartramiana*). Short shrubs (including dwarf shrubs) usually have from about 5 to 60% cover; the most abundant low shrubs are *Juniperus communis,*

Diervilla lonicera, Rosa acicularis, *Rubus parviflorus, Vaccinium angustifolium, Vaccinium myrtilloides,* and *Arctostaphylos uva-ursi.* Herbaceous cover varies from about 10 to 70%; the most common herbs are *Aster macrophyllus, Danthonia spicata, Maianthemum canadense, Pteridium aquilinum, Deschampsia flexuosa,* and *Oryzopsis asperifolia.* Cover of nonvascular plants varies from 10 to 60%; the most abundant nonvascular plants are crustose and foliose lichens, *Cladina* spp. and *Pleurozium schreberi.* At some sites on southeast slopes of Stanley Ridge there is a narrow zone or open meadow associated with this community, just downhill from the pines. Emmet Judziewicz has observed numerous spring ephemerals (some quite rare on Isle Royale) in these meadows, which may be a type of snowbank community (in microhabitats where deep snow accumulates in winter).

Globally
The tree canopy is variable, typically open, with stands often being dominated by a single pine species, but the pines could be *Pinus banksiana*, *Pinus resinsa* or *Pinus strobus*. Occasionally *Picea mariana* is present, particularly northward in the range of the type. The understory is quite open, with scattered clumps of shrubby *Picea mariana. Abies balsamea, Pinus strobus*, and *Quercus ellipsoidalis* constitute the scrub/shrub layer which, when present, comprises 20-30% cover. The dwarf-shrub layer contains *Vaccinium angustifolium* and *Vaccinium myrtilloides*, with occasional *Juniperus communis*, *Cornus canadensis, Diervilla lonicera, Amelanchier* spp, *Rubus* spp., and *Arctostaphylos uva-ursi.* The herbaceous layer is sparse, containing *Agrostis scabra, Danthonia spicata, Maianthemum canadense*, and *Melampyrum lineare.* Moss and lichen cover is highly variable, ranging from 20-90%, though most commonly around 30%. Moss species include *Dicranum polysetum* and *Pleurozium shreberi.* Lichens include *Cladina rangifera, Cladina mitis*, and *Cladina stellaris* (Sims *et al.* 1989, McCarthy *et al.* 1994, M. Smith personal communication 1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G4?.

DATABASE CODE CEGL002483

MAP UNITS 63

COMMENTS
Isle Royale National Park
Many sites with this community have a fire history. Some, if not all, were probably established following a severe burn; in some cases (as at the west end of the Minong Ridge) an accidental fire can consume the canopy trees, leaving little more than bare rock and some herbs, resulting in a Poverty grass barrens. Following a burn the vegetation may or may not succeed back to a pine woodland, depending on available seed sources. In at least one burn site (west end of Minong Ridge) no reproduction of pines was observed in 1998, following a fire just a few years earlier. Jack pine (*Pinus banksiana*) growing on rocky summits may not require fire for reproduction; in some places the heat of the bedrock during warm summer days can be sufficient to open jack pine cones. On Stanley Ridge, some jack pines were observed in 1997 with low branches extending across the rock surface as if they might reproduce by layering (vegetative reproduction). Similar layering in red pine has been observed on rocky ridges near the lakeshore on the Keweenaw Peninsula. A ground fire near pines with low, layering branches would likely cause a crown fire, killing the trees with this unusual growth form.

REFERENCES
McCarthy, T.G., R.W. Arnup, J. Nieppola, B.G. Merchant, K.C. Taylor, and W.J. Parton. 1994. Field Guide to Forest Ecosystems of Northeastern Ontario. NEST Field Guide FG-001, Ontario Ministry of Natural Resources, Northeast Science and Technology, Timmins ON.

Sims, R. A., W. D. Towill, K. A. Baldwin, and G. M. Wickware. 1989. Field guide to the forest ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources.

Picea glauca - (Betula papyrifera) / Danthonia spicata Woodland

COMMON NAME	White Spruce - (Paper Birch) / Poverty Grass Woodland
SYNONYM	White Spruce Rocky Woodland
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.A.4.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.b)
ALLIANCE	PICEA GLAUCA WOODLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is fairly common, especially on the southwest end of the park, and it is scattered throughout the park (less common at the northeast end).

Globally

This association is found in Michigan and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies flat areas to steep slopes at elevations usually ranging from 610 to 900 feet (in one case at 1250 feet), sometimes on old beach flats or beach ridges. Soils are sandy, sandy loam, or organic, and well drained to rapidly drained.

Globally

This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Picea glauca*
Tall shrub	*Picea glauca, Abies balsamea, Sorbus decora*
Short shrub	*Rubus parviflorus, Diervilla lonicera*
Forb	*Aster macrophyllus, Aralia nudicaulis*

Globally

Stratum	Species
Tree canopy	*Picea glauca*
Tall shrub	*Picea glauca, Abies balsamea, Sorbus decora*
Short shrub	*Diervilla lonicera, Rubus parviflorus,*
Forb	*Aster macrophyllus, Aralia nudicaulis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Picea glauca, browsed *Abies balsamea, Sorbus decora*

Globally

Picea glauca, Abies balsamea, Sorbus decora

VEGETATION DESCRIPTION

Isle Royale National Park

White spruce rocky woodland is an open canopy, evergreen woodland with variable physiognomy; canopy cover ranges from 10 to 60% cover. *Picea glauca* is the most abundant tree over 5 m tall, with 10 to 50% cover. *Betula papyrifera* and *Populus tremuloides* are the next most abundant trees, each with 1 to 5% cover. Shrub strata vary from about 5 to 50%

cover by tall shrubs, from 5 to 60% cover by short shrubs, and from 0 to 60% cover by dwarf shrubs. The most abundant tall shrubs are saplings (or browsed scrub) of *Picea glauca, Abies balsamea*, and *Sorbus decora*, as well as *Alnus incana* shrubs. *A. balsamea* is uncommon in the area burned by the 1936 fire. The most abundant short shrubs are *Diervilla lonicera, Rubus parviflorus, Sambucus racemosa, Ribes glandulosum*, and *Rosa acicularis*. *Arctostaphylos uva-ursi* is the most abundant dwarf shrub. Herb cover is variable, ranging from about 30 to 80%. The most abundant herbs are *Aster macrophyllus, Aralia nudicaulis, Pteridium aquilinum, Cornus canadensis, Poa* spp., *Calamagrostis canadensis*, and *Deschampsia flexuosa*. Nonvascular cover is variable, ranging from 0 to 60%; the most abundant lichens are *Cladina* spp. and foliose lichens; the most abundant moss is *Pleurozium schreberi*.

Globally

This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005196

MAP UNITS 19

COMMENTS
Isle Royale National Park
This community seems to be successional after disturbance, such as logging or fire; on Isle Royale it may be kept more open than is typical as a result of heavy browsing by moose. The two species most severely impacted by moose browsing, especially at the southwest end of the island, are *Abies balsamea* and *Sorbus decora*.

REFERENCES

Picea glauca - Abies balsamea Basalt (Conglomerate) Woodland

COMMON NAME	White Spruce - Balsam Fir Basalt (Conglomerate) Woodland
SYNONYM	Spruce - Fir Basalt Bedrock Glade
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Evergreen woodland (II.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved evergreen woodland (II.A.4)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.A.4.N)
FORMATION	Conical-crowned temperate or subpolar needle-leaved evergreen woodland (II.A.4.N.b)
ALLIANCE	PICEA GLAUCA WOODLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon, widely scattered around the park, often in sites where it grades into common juniper rocky krummholz.

Globally

This association is found in Michigan, Minnesota, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to steep slopes of rocky ridges, usually at low elevations near the Lake Superior shore, but sometimes also on high inland ridges. Sites are often on southeast- to south-facing slopes; elevations usually range from 615 to 800 feet, at least one site is at 1260 feet. Soils are usually sandy loams that are well drained to rapidly drained. Usually about 5 to 30% of the ground surface is exposed bedrock.

Globally

Stands occur between the open basalt bedrock and the inland forests. Soils are thin and exposed areas of bedrock are common. The bedrock includes basalt, volcanic conglomerates, and localized rhyolites (Albert *et al.* 1995). This community occupies gentle to steep slopes of rocky ridges, usually at low elevations near the Lake Superior shore, but sometimes also on high inland ridges. Sites are often on southeast- to south-facing slopes; elevations usually range from 615 to 800 feet, at least one site is at 1260 feet. Soils are usually sandy loams that are well drained to rapidly drained. Usually about 5 to 30% of the ground surface is exposed bedrock (C. Reschke personal communication 1999).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Picea glauca*
Short shrub	*Juniperus communis*
Graminoid	*Danthonia spicata, Deschampsia flexuosa*
Nonvascular	*Cladina* spp., *Pleurozium schreberi*

Globally

Stratum	Species
Tree canopy	*Picea glauca*
Short shrub	*Juniperus communis*
Graminoid	*Danthonia spicata, Deschampsia flexuosa*
Nonvascular	*Cladina* spp., *Pleurozium schreberi*

CHARACTERISTIC SPECIES

Isle Royale National Park

Picea glauca, Juniperus communis, Danthonia spicata, Deschampsia flexuosa, Cladina spp., *Pleurozium schreberi*

Globally

Picea glauca, Juniperus communis, Danthonia spicata, Deschampsia flexuosa, Cladina spp., *Pleurozium schreberi*

VEGETATION DESCRIPTION

Isle Royale National Park
Spruce - fir basalt bedrock glade is an open canopy, evergreen woodland. Canopy cover varies from 20 to 50% and cover of tall shrubs (stunted trees) varies from 5 to 30 %. *Picea glauca* is the most abundant tree (> 5 m tall) or tall shrub (2 - 5 m) with 20 to 50% cover. Other tree species that are present at low abundance (under 25% cover each) are *Abies balsamea*, *Betula papyrifera, Sorbus decora*, and *Thuja occidentalis*. Cover of short shrubs varies from 5 to 40%; *Juniperus communis, Amelanchier* spp.*, Lonicera dioica, Rosa acicularis*, and *Diervilla lonicera* are common shrubs. Cover of herbs is usually 30 to 50%; *Danthonia spicata, Deschampsia flexuosa, Aster macrophyllus,* and *Pteridium aquilinum* are the most abundant herbs. Cover of nonvascular plants varies from 5 to 60%; *Cladina* spp. and *Pleurozium schreberi* are the most abundant nonvascular plants.

Globally
This community consists of scattered, open-grown trees, scattered shrubs or shrub thickets, and a partial layer of graminoids, mosses, and lichens. The scattered, and often stunted, tree layer contains *Abies balsamea, Betula papyrifera, Picea glauca, Pinus resinosa, Pinus strobus, Quercus rubra, Sorbus decora*, and *Thuja occidentalis*. The shrub layer is very sparse and may contain *Amelachier* spp. and *Juniperus communis*. More prominent is the dwarf-shrub layer, which contains *Arctostaphylos uva-ursi, Epigaea repens, Juniperus horizontalis, Lonicera dioica, Rosa acicularis*, and *Vaccinium angustifolium*. The herbaceous layer is characterized by *Achillea millefolium, Calamagrostis canadensis, Danthonia spicata, Festuca saximontana* (= *Festuca ovina var. saximontana*), *Fragaria virginiana*, and *Sibbaldiopsis tridentata* (=*Potentilla tridentata)*. Mosses and lichens occur in localized patches throughout the stand.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005214

MAP UNITS 62

COMMENTS

REFERENCES

Betula papyrifera - Picea glauca / Acer spicatum - Alnus viridis / Polypodium vulgare Talus Woodland [Provisional]

COMMON NAME	Paper Birch - White Spruce / Mountain Maple - Mountain Alder / Rock Polypody Talus Woodland
SYNONYM	Great Lakes Boreal Talus Woodland [provisional]
PHYSIOGNOMIC CLASS	Woodland (II)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous woodland (II.C)
PHYSIOGNOMIC GROUP	Mixed needle-leaved evergreen - cold-deciduous woodland (II.C.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (II.C.3.N)
FORMATION	Mixed needle-leaved evergreen - cold-deciduous woodland (II.C.3.N.a)
ALLIANCE	PICEA GLAUCA - BETULA PAPYRIFERA WOODLAND ALLIANCE [PROVISIONAL]

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is rare, and restricted to talus at the base of cliffs, primarily along the northeast end of the island along Stanley Ridge.

Globally

This association is found in Michigan and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies steep to very steep talus slopes at the base of basalt cliffs facing northwest.

Globally

This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Betula papyrifera, Picea glauca*
Short shrub	*Acer spicatum, Alnus viridis*
Fern	*Polypodium virginianum*

Globally

Stratum	Species
Tree canopy	*Betula papyrifera, Picea glauca*
Short shrub	*Acer spicatum, Alnus viridis*
Fern	*Polypodium virginianum*

CHARACTERISTIC SPECIES

Isle Royale National Park

Acer spicatum, Alnus viridis, Polypodium virginianum

Globally

Acer spicatum, Alnus viridis, Polypodium virginianum

VEGETATION DESCRIPTION

Isle Royale National Park

This paper birch - white spruce talus woodland is an open canopy, mixed evergreen and deciduous woodland that occurs on steep talus slopes. Canopy cover of trees over 5 m tall is typically 30 to 50% cover. The most abundant trees are *Betula papyrifera* and *Picea glauca*. Cover of tall shrubs varies from 10 to 70% cover; the most abundant tall shrubs are *Acer spicatum* and *Alnus viridis*. Cover of short shrubs (including dwarf shrubs) varies from 5 to 40%; the most abundant low shrubs are *Taxus canadensis* and *Rubus pubescens*. Herbs usually have about 30 to 40% cover; the most abundant herbs

are *Polypodium virginianum* and *Dryopteris expansa*. Cover of nonvascular plants is usually about 30 to 40%; mosses such as *Pleurozium schreberi,* and foliose lichens are common in the groundlayer.

Globally
This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005252

MAP UNITS 28

COMMENTS

REFERENCES

Juniperus communis - (Quercus rubra) / Juniperus horizontalis - Arctostaphylos uva-ursi Shrubland

COMMON NAME	Common Juniper - (Red Oak) / Creeping Juniper - Bearberry Shrubland
SYNONYM	Common Juniper Rocky Krummholz
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland (III.A)
PHYSIOGNOMIC GROUP	Needle-leaved evergreen shrubland (III.A.3)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.A.3.N)
FORMATION	Needle-leaved evergreen shrubland (III.A.3.N.a)
ALLIANCE	JUNIPERUS COMMUNIS SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is fairly common and widespread near the lakeshore, especially on the southeast-facing, basalt bedrock shores. The variant of this association is restricted to Passage Island; it may also occur on a few other islands or peninsulas at the extreme northeast end of the park.

Globally

Known from northwestern Michigan along and near shores of Lake Superior and on Isle Royale. It probably also occurs along the north shore of Lake Superior in Ontario, and possibly along the northern shores of Lake Huron: north channel and Georgian Bay areas.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies exposed rock outcrops near the Lake Superior shore and on some rocky inland ridges exposed to wind (sometimes just above a cliff). When near a lakeshore fully exposed to wave wash and ice scour, this community usually occurs in a zone between the open bedrock lakeshore and adjacent forest communities. In more protected situations, such as shores of islands on the interior side of harbors or in narrow channels, this community extends down the rocks to the lake. This community occurs on gentle to steeply sloping rock outcrops, usually with a south- to southeastern-facing slope, at elevations ranging from 600 to 920 feet.

The variant of this community occupies a narrow zone at the upper edge of the Great Lakes basalt (conglomerate) bedrock lakeshore, at the transition between open rocky lakeshore and upland woods or boggy wetlands.

Globally

Stands are found on exposed, igneous bedrock substrates. In Michigan, stands are found at higher elevations in the Porcupine Mountains, where exposure to wind and cold has stunted the vegetation. It occupies exposed rock outcrops near the Lake Superior shore and on some rocky inland ridges exposed to wind (sometimes just above a cliff).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Picea glauca*
Dwarf shrub	*Juniperus communis, Arctostaphylos uva-ursi*
Graminoid	*Danthonia spicata*
Nonvascular	*Cladina* spp., *Pleurozium schreberi*

Globally

Stratum	Species
Tree canopy	*Picea glauca*
Short shrub	*Juniperus communis, Arctostaphylos uva-ursi*
Graminoid	*Danthonia spicata*
Nonvascular	*Cladina* spp., *Pleurozium schreberi*

CHARACTERISTIC SPECIES

Isle Royale National Park

Juniperus communis, Juniperus horizontalis, Sibbaldiopsis tridentata

Globally
Juniperus communis, Juniperus horizontalis, Sibbaldiopsis tridentata

VEGETATION DESCRIPTION
Isle Royale National Park
This common juniper rocky krummholz is an evergreen shrubland that includes stunted, krummholz forms of some tree species. There may be a sparse cover of trees over 5 m tall (usually 0 to 10% cover); the most common trees are *Picea glauca, Betula papyrifera, Populus tremuloides, Picea mariana*, and *Thuja occidentalis* (each with 1 to 5% cover). Tall shrub cover varies from 0 to 10%; mostly these are stunted, scrub forms of trees such as *Picea glauca* and *Thuja occidentalis*, as well as the shrub *Alnus viridis*. The cover of short shrubs (0.5 to 2 m tall) varies from 0 to 10%; the most abundant short shrub is *Rubus parviflorus*. Cover of dwarf shrubs (under 0.5 m tall) varies from 20 to 80%; the most abundant dwarf shrubs are *Juniperus communis* (25 to 50% cover), *Arctostaphylos uva-ursi* (5 to 25% cover*), Vaccinium angustifolium, Juniperus horizontalis, Diervilla lonicera, Amelanchier* spp., and *Viburnum edule* (each with 1 to 5% cover). Herbaceous cover varies from 5 to 30%; the most abundant herbs are *Danthonia spicata* (1 to 10% cover), *Sibbaldiopsis tridentata* (=*Potentilla tridentata*), *Aster macrophyllus, Aralia nudicaulis, Pteridium aquilinum, Hieracium* spp., *Deschampsia cespitosa,* and *Deschampsia flexuosa* (each with 1 to 5% cover). Cover of nonvascular plants varies from 20 to 80%; the most abundant lichens and mosses are *Cladina* spp. (reindeer lichens, 5 to 50% cover), crustose lichens (5 to 25% cover), *Pleurozium schreberi* (5 to 25% cover), foliose lichens such as *Dermatocarpon miniatum* and *Xanthoparmelia* spp., and the mosses *Grimmia* spp. and *Dicranum* spp.

The variant of this association, *Thuja occidentalis - Abies balsamea / Chamaedaphne calyculata / Empetrum nigrum* krummholz, is an evergreen shrubland that is composed of stunted, scrub forms of evergreen trees mixed with shrubs. The tall shrub layer has 20 to 50%; stunted, shrub-size *Thuja occidentalis* and *Abies balsamea,* and *Alnus viridis* are the most abundant tall shrubs (2 to 5 m tall). The short shrublayer has 20 to 60% cover; *Chamaedaphne calyculata* and *Ledum groenlandicum* are the most abundant short shrubs. Dwarf shrubs (under 0.5 m tall) have about 20 to 30% cover; the most abundant dwarf shrubs are *Empetrum nigrum, Arctostaphylos uva-ursi, Juniperus horizontalis, Vaccinium uliginosum,* and *Vaccinium angustifolium*. The herbaceous layer is sparse, with about 5 to 10% cover; characteristic herbs are *Sibbaldiopsis tridentata* (= *Potentilla tridentata*), *Clintonia borealis, Geocaulon lividum, Lilium philadelphicum,* and *Lycopodium annotinum*. There is usually about 10 to 20% cover of nonvascular plants, including crustose and foliose lichens, *Cladina* spp., and mosses.

Globally
The shrub/scrub canopy varies from open to closed. In the Upper Peninusla of Michigan the scrub layer includes stunted *Quercus rubra* and *Juniperus communis*. The dwarf-shrub layer contains *Juniperus horizontalis* and *Arctostaphylos uva-ursi.* This common juniper rocky krummholz is an evergreen shrubland that includes stunted, krummholz forms of some tree species. There may be a sparse cover of trees over 5 m tall (usually 0 to 10% cover); the most common trees are *Picea glauca, Betula papyrifera, Populus tremuloides, Picea mariana*, and *Thuja occidentalis* (each with 1 to 5% cover). Tall shrub cover varies from 0 to 10%; mostly these are stunted, scrub forms of trees such as *Picea glauca* and *Thuja occidentalis*, as well as the shrub *Alnus viridis*. The cover of short shrubs (0.5 to 2 m tall) varies from 0 to 10%; the most abundant short shrub is *Rubus parviflorus*. Cover of dwarf shrubs (under 0.5 m tall) varies from 20 to 80%; the most abundant dwarf-shrubs, with cover between 3-50%, are *Juniperus communis* and *Arctostaphylos uva-ursi.* Less abundant species, with cover between 1 and 5%, include *Vaccinium angustifolium, Juniperus horizontalis, Diervilla lonicera, Amelanchier* spp., and *Viburnum edule*. Herbaceous cover varies from 5 to 30%; the most abundant herbs, with cover between 1 and 5%, are *Danthonia spicata*, *Sibbaldiopsis tridentata* (=*Potentilla tridentata*), *Aster macrophyllus, Aralia nudicaulis, Pteridium aquilinum, Hieracium* spp., *Deschampsia cespitosa,* and *Deschampsia flexuosa* . Cover of nonvascular plants varies from 20 to 80%; the most abundant lichens and mosses, with cover between 5 and 25%, are *Cladina* spp. (reindeer lichens), crustose lichens, and *Pleurozium schreberi* . Less common are the foliose lichens, such as *Dermatocarpon miniatum* and *Xanthoparmelia* spp., and the mosses *Grimmia* spp. and *Dicranum* spp. (Reschke personal communication 1999).

A variant of this association found on Isle Royale, and perhaps elsewhere in northern Ontario, is the *Thuja occidentalis - Abies balsamea / Chamaedaphne calyculata / Empetrum nigrum* krummholz. It is an evergreen shrubland that is composed of stunted, scrub forms of evergreen trees mixed with shrubs. The tall shrub layer has 20 to 50% cover; stunted, shrub-size *Thuja occidentalis* and *Abies balsamea,* and *Alnus viridis* are the most abundant tall shrubs (2 to 5 m tall). The short shrublayer has 20 to 60% cover; *Chamaedaphne calyculata* and *Ledum groenlandicum* are the most abundant short shrubs. Dwarf shrubs (under 0.5 m tall) have about 20 to 30% cover; the most abundant dwarf shrubs are *Empetrum nigrum, Arctostaphylos uva-ursi, Juniperus horizontalis, Vaccinium uliginosum,* and *Vaccinium angustifolium*. The herbaceous layer is sparse, with about 5 to 10% cover; characteristic herbs are *Sibbaldiopsis tridentata* (= *Potentilla tridentata*), *Clintonia borealis, Geocaulon lividum, Lilium philadelphicum,* and *Lycopodium annotinum*. There is usually about 10 to 20% cover of nonvascular

plants, including crustose and foliose lichens, *Cladina* spp., and mosses (C. Reschke personal communication 1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available

CONSERVATION RANK G3G4. Fewer than 100 small occurrences are restricted to a narrow range in northwestern MI along Lake Superior shores; this community probably also occurs along the north shore of Lake Superior, and possibly along northern shores of Lake Huron in Ontario, where it may be more common.

DATABASE CODE CEGL005065

MAP UNITS 31, 34

COMMENTS
Globally
In Michigan, stands found at higher elevations in the Porcupine Mountains are exposed to wind and cold that can physically abrade the vegetation. This community can occupy exposed rock outcrops near the Lake Superior shore and on some rocky inland ridges exposed to wind (sometimes just above a cliff). When near a lakeshore fully exposed to wave wash and ice scour, this community usually occurs in a zone between the open bedrock lakeshore and adjacent forest communities (Reschke 1999, personal communication).

REFERENCES
Bakowsky, W.D., and H.T. Lee. 1996. Vegetation communities of southern Ontario (draft). Ontario Natural Heritage Information Centre and Southern Region STTU, Ontario Ministry of Natural Resources, Peterborough, Ontario. 87 p.

Acer spicatum - Thuja occidentalis - Betula papyrifera / Taxus canadensis Cliff Forested Scrub [Provisional]

COMMON NAME	Mountain Maple - Northern White-cedar - Paper Birch / Canada Yew Cliff Forested Scrub
SYNONYM	Great Lakes Boreal Cliff Forested Scrub [Provisional]
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Temperate cold-deciduous shrubland (III.B.2.N.a)
ALLIANCE	ACER SPICATUM SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is rare, and occurs primarily at the northeast end of the park.

Globally

This type is reported from Isle Royale National Park in Michigan, where this community is rare, and occurs primarily at the northeast end of the park.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies sites on very steep talus slopes or cliffs, typically facing northwest.

Globally

This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tall shrub	*Acer spicatum, Thuja occidentalis, Betula papyrifera*
Short shrub	*Taxus canadensis*
Forb	*Mitella nuda*
Fern	*Gymnocarpium dryopteris*

Globally

Stratum	Species
Tall shrub	*Acer spicatum, Thuja occidentalis, Betula papyrifera*
Short shrub	*Taxus canadensis*
Forb	*Mitella nuda*
Fern	*Gymnocarpium dryopteris*

CHARACTERISTIC SPECIES

Isle Royale National Park

Acer spicatum, Thuja occidentalis, Betula papyrifera, Taxus canadensis

Globally

Acer spicatum, Thuja occidentalis, Betula papyrifera, Taxus canadensis

VEGETATION DESCRIPTION

Isle Royale National Park

This Great Lakes boreal cliff type is a closed canopy forested scrub, with about 80% canopy cover. *Acer spicatum* is dominant in the canopy, with over 50% cover; other tree species present include *Thuja occidentalis, Betula papyrifera*, and *Picea glauca*. There is about 30% cover of short shrubs; *Taxus canadensis* and *Rubus parviflorus* are the most abundant shrubs. Cover of herbs is about 30%; the most abundant herbs are *Gymnocarpium dryopteris* and *Mitella nuda*. Cover of

nonvascular plants is about 20%; *Pleurozium schreberi* is a common moss.

Globally
This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available

CONSERVATION RANK G?.

DATABASE CODE CEGL005251

MAP UNITS 12

COMMENTS
Globally
The physiognomy of this type is unclear. It may be that the type belongs in a forest class.

REFERENCES

Sorbus decora - Acer spicatum / Dryopteris carthusiana Forested Scrub [Provisional]

COMMON NAME	Mountain-ash - Mountain Maple / Spinulose Woodfern Forested Scrub
SYNONYM	Mountain Ash-Mountain Maple Forested Scrub
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Temperate cold-deciduous shrubland (III.B.2.N.a)
ALLIANCE	ACER SPICATUM SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is restricted to a few outer islands in Rock Harbor at the northeast end of the park. Plots were sampled on Smithwick Island.

Globally

This type is only known from Isle Royale National Park in Michigan, where it is restricted to a few outer islands in Rock Harbor at the northeast end of the park. It is expected to be in northwestern Ontario, as well.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies sites on gentle to moderate slopes at low elevations (under 650 feet) on some of the outer islands in Rock Harbor. Soils are loams to sandy loam, moderately well drained to well drained.

Globally

This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Sorbus decora, Acer spicatum*
Fern	*Dryopteris carthusiana*
Nonvascular	*Usnea* spp.

Globally

Stratum	Species
Tree canopy	*Sorbus decora, Acer spicatum*
Fern	*Dryopteris carthusiana*
Nonvascular	*Usnea* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Sorbus decora, Acer spicatum, Dryopteris carthusiana

Globally

Sorbus decora, Acer spicatum, Dryopteris carthusiana

VEGETATION DESCRIPTION

Isle Royale National Park

Mountain ash - mountain maple forest is a rare type of deciduous forested scrub. Canopy cover varies from 40 to 90%; *Sorbus decora* is the most abundant canopy tree, *Acer spicatum* may be codominant, and other less common trees include *Abies balsamea, Picea glauca*, and *Betula papyrifera*. Cover of shrubs varies from about 10 to 70%; *Oplopanax horridus* may be a common understory shrub (but is absent in some places); other common shrubs are *Rubus idaeus, Sambucus racemosa*, and *Taxus canadensis*. *Dryopteris carthusiana* is the most abundant herb, (25 to 75% cover); other common herbs are *Gymnocarpium dryopteris* (20 to 60% cover) and *Maianthemum canadense* (5 to 35% cover). Cover of nonvascular plants is

about 5 to 25%; the most abundant nonvascular plant is the epiphytic lichens called 'old man's beard' or 'hairy lichens' (*Usnea* spp.).

Globally
This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005253

MAP UNITS 13

COMMENTS
Globally
The physiognomy of this type is variable. It may be more tree dominated than shrub-dominated, but at this time *Acer spicatum* is placed in the shrub category.

REFERENCES

Corylus cornuta - Amelanchier spp. - Prunus virginiana Rocky Shrubland

COMMON NAME	Beaked Hazelnut - Serviceberry species - Choke Cherry Rocky Shrubland
SYNONYM	Boreal Hazelnut - Serviceberry Rocky Shrubland
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Temperate cold-deciduous shrubland (III.B.2.N.a)
ALLIANCE	CORYLUS CORNUTA - AMELANCHIER SPP. SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is fairly common on ridges and rocky summits throughout the park.

Globally

This association is found in Michigan and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies exposed ridges and rocky summits. This community often has evidence of past fires; it is likely a successional stage following a severe burn. It seems to be an intermediate successional stage after Poverty grass barrens, and gradually developing into a woodland. Soils are often very shallow, and successional development is very slow on the exposed rocky summits where this community is found; so the community may be a fairly long-lived and stable successional stage.

Globally

This type occurs on a wide variety of slopes, soils, topographic positions and moisture regimes. It typically arises because of natural or human disturbance, most commonly beavers, fire, logging and blow down. This community can also occur without disturbance, usually on dry rock ridgetops that have thin, acidic soils. These sites, however, are usually so small that they are often included within other communities (C. Reschke personal communication 1999, M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tall shrub	*Corylus cornuta, Empetrum nigrum Empetrum nigrum, Sorbus decora*
Short shrub	*Diervilla lonicera, Amelanchier* spp.
Forb	*Aster macrophyllus, Hieracium piloselloides*

Globally

Stratum	Species
Tall shrub	*Corylus cornuta,*
Short shrub	*Diervilla lonicera, Amelanchier* spp.
Forb	*Aster macrophyllus, Hieracium piloselloides*

CHARACTERISTIC SPECIES

Isle Royale National Park

Corylus cornuta, Empetrum nigrum Empetrum nigrum, Sorbus decora

Globally

Corylus cornuta, Diervilla lonicera, Amelanchier spp., *Hieracium piloselloides*

VEGETATION DESCRIPTION

Isle Royale National Park

This boreal rocky shrubland is a deciduous shrubland with variable physiognomy and composition. This community often has a sparse tree layer, with about 5 to 20% cover of trees over 5 m tall; the most common trees are *Picea glauca, Populus tremuloides*, and *Sorbus decora*. The tall shrub layer varies from 0 to 70% cover; the most abundant tall shrubs are

Corylus cornuta, Crataegus douglasii, Picea glauca, Prunus pensylvanica, and *Sorbus decora.* The short shrub layer (including dwarf shrubs) varies from about 10 to 80% cover; the most abundant short shrubs are *Diervilla lonicera, Amelanchier* sp., *Rubus parviflorus, Juniperus communis, Rubus idaeus, Rosa acicularis*, and *Arctostaphylos uva-ursi.* The herb layer varies from 5 to 80% cover; the most abundant herbs are *Aster macrophyllus, Hieracium piloselloides, Clinopodium vulgare, Poa compressa, Danthonia spicata*, and *Pteridium aquilinum*. The cover of nonvascular plants varies from about 5 to 60%, with lichens (including *Cladina* spp.), and mosses.

Globally
The vegetation is dominated by shrubs, with a strong graminoid layer. Dominant shrubs include *Amelanchier* spp., *Corylus cornuta*, and *Prunus virginiana.* Other shrubs include *Acer spicatum, Juniperus communis, Rosa acicularis*, and *Rhus typhina.* Associated herbs include *Danthonia spicata, Hieracium* spp., and *Poa compressa.* This community often has a sparse tree layer, with about 5 to 20% cover of trees over 5 m tall. The species are quite variable, but the most common trees are *Picea glauca* and *Populus tremuloides.* The tall shrub layer varies from 0 to 70% cover. At Isle Royale National Park, the most abundant tall shrubs are *Corylus cornuta*, *Crataegus douglasii, Picea glauca, Prunus pensylvanica*, and *Sorbus decora*; the short shrub layer (including dwarf shrubs) varies from about 10 to 80% cover, with the most abundant short shrubs being *Diervilla lonicera, Amelanchier* sp., *Rubus parviflorus, Juniperus communis, Rubus idaeus, Rosa acicularis*, and *Arctostaphylos uva-ursi.* At Voyageurs National Park the tall shrub layer contains *Acer spicatum, Populus tremuloides, Corylus cornuta,* and/or *Abies balsamea*; where the canopy of tall shrubs is more open, short shrubs such as *Rubus strigosus, Rubus pubescens, Taxus canadensis* and *Juniperus communis* exist at low to moderate cover. On Isle Royale the herb layer varies from 5 to 80% cover; the most abundant herbs are *Aster macrophyllus, Hieracium piloselloides, Clinopodium vulgare, Poa compressa, Danthonia spicata*, and *Pteridium aquilinum*. The cover of nonvascular plants varies from about 5 to 60% cover, with lichens (including *Cladina* spp.), and mosses. At Voyaguers, the density and composition of the herbaceous strata is highly variable. The most common species include *Aster macrophyllus, Pteridium aquilinum,* and *Polygonum cilinode.* On wetter sites, herbaceous species such as *Calamagrostis canadensis and Scirpus cyperinus* may dominate. (C. Reschke personal communication 1999, M. Smith personal communication 1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005197

MAP UNITS 29

COMMENTS
Globally
This community often has evidence of past fires; it can be a successional stage following a severe burn. It seems to be an intermediate successional stage after Poverty grass barrens that may gradually develop into a woodland. Soils are often very shallow, and successional development is very slow on the exposed rocky summits where this community is found; so the community may be a fairly long-lived and stable successional stage (C. Reschke personal communication 1999). This type can also arise after logging has removed the tree canopy. In these circumstances, the shrubs are typically dense *Populus tremuloides* saplings. This community is also common on slopes above beaver ponds where beaver have removed all or most of the tree canopy. In these situations, the shrubs are usually dense *Corylus cornuta* and *Acer spicatum.* Finally this type can also occur on ridge tops, high slopes and other places where high winds have blown down the trees in the canopy (M. Smith personal communication 1999).

REFERENCES

Rubus parviflorus Shrubland

COMMON NAME	Thimbleberry Shrubland
SYNONYM	Thimbleberry Shrubland
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Subalpine or subpolar cold-deciduous shrubland (III.B.2.N.b)
ALLIANCE	RUBUS PARVIFLORUS SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon; it occurs primarily in widely scattered locations at the northeast end of the island.

Globally

This association is found in Michigan and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to moderate slopes at fairly low elevations (from 620 to 750 feet); it seems to be successional following disturbance by burning or clearing. It is probably a fairly short-lived successional stage.

Globally

This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Betula papyrifera, Picea glauca*
Short shrub	*Rubus parviflorus*
Forb	*Aralia nudicaulis, Streptopus roseus, Aster macrophyllus*

Globally

Stratum	Species
Tree canopy	*Betula papyrifera, Picea glauca*
Short shrub	*Rubus parviflorus*
Forb	*Aralia nudicaulis, Streptopus roseus, Aster macrophyllus*

CHARACTERISTIC SPECIES

Isle Royale National Park

Rubus parviflorus

Globally

Rubus parviflorus

VEGETATION DESCRIPTION

Isle Royale National Park

Thimbleberry shrubland is a deciduous shrubland. There may be a sparse tree layer with 10 to 20% cover; the most common trees are *Betula papyrifera, Picea glauca,* and *Populus tremuloides*. A tall shrub layer may be present, cover of tall shrubs varies from 0 to 40%; the most abundant tall shrubs are saplings or browsed scrub of *Abies balsamea*. The short shrub layer (including dwarf shrubs) has from 40 to 80% cover; *Rubus parviflorus* is the most abundant shrub (usually 25 to 50% cover); *Rubus idaeus* may also be present. Cover of the herbaceous layer varies from 20 to 90% cover; the most abundant herbs are *Aralia nudicaulis*, *Streptopus roseus, Aster macrophyllus, Clintonia borealis, Equisetum arvense, Galium triflorum, Gymnocarpium dryopteris*, and *Linnaea borealis*. There may be up to about 10% cover of lichens. This shrubland seems to be a successional type following disturbance, (for example, disturbance by fire or clearing) that will develop into a mixed

or deciduous forest. Standing dead snags of *Betula papyrifera* are common in several examples.

Globally
This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005248

MAP UNITS 32

COMMENTS
Globally
This type seems to be successional following disturbance by burning or clearing. It is probably a fairly short-lived successional stage (C. Reshcke personal communication 1999).

REFERENCES

Alnus incana Swamp Shrubland [Provisional]

COMMON NAME	Speckled Alder Swamp Shrubland
SYNONYM	Speckled Alder Swamp
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Seasonally flooded cold-deciduous shrubland (III.B.2.N.e)
ALLIANCE	ALNUS INCANA SEASONALLY FLOODED SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is common and occurs throughout the park.

Globally

This association is found in the Midwest and Northeast United States.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions with saturated or seasonally flooded muck soils. It mostly occurs at elevations ranging from 600 to 750 feet, but it can occur as high as 1230 feet.

Globally

Sites are typically along streams, lakeshores, edges of beaver meadows, swales associated with small streams in peatlands or upland forests, or near seeps. Most have little to no slope, but some sites are on moderate slopes. Hydrologic conditions can range from temporarily flooded to semipermanently flooded. The water that affects this alliance is non-stagnant, nutrient rich, and often slightly calcareous (Curtis 1959). Soils are wet, often mucks or peats (Anderson 1982, Chapman *et al.* 1989).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tall shrub	*Alnus incana*
Forb	*Symplocarpus foetidus*
Graminoid	*Calamagrostis canadensis*

Globally

Stratum	Species
Tall shrub	*Alnus incana*
Graminoid	*Calamagrostis canadensis*

CHARACTERISTIC SPECIES

Isle Royale National Park

Alnus incana

Globally

Alnus incana, Calamagrostis canadensis

VEGETATION DESCRIPTION

Isle Royale National Park

The speckled alder swamp is a wooded wetland dominated by tall, deciduous shrubs. There may be a sparse tree layer with up to 20% cover; common trees include *Picea glauca, Thuja occidentalis, Betula papyrifera*, and *Fraxinus nigra* (each less than 5% cover). The tall shrub layer has 30 to 100% cover; *Alnus incana* is the most abundant shrub (average is 50 to 75% cover); other shrubs occasionally present include *Cornus sericea, Rubus idaeus,* and *Rubus parviflorus* (each with less than 10% cover). Herbaceous cover varies from 40 to 90%; the most abundant herbs are *Calamagrostis canadensis* (usually 5 to 25% cover) and *Symplocarpus foetidus* (usually less than 10% cover). Other characteristic herbs are *Caltha palustris,*

Carex stricta, Impatiens capensis, Thalictrum dasycarpum, and *Equisetum fluviatile.* Mosses may be common in the groundlayer, especially *Sphagnum* spp. and *Calliergon* spp. (each with less than 10% cover).

Globally
The vegetation is dominated by tall shrubs, 2-8 meters tall, with a moderately open to dense shrub canopy. There is an understory of shorter shrubs and herbaceous species. The density of the understory varies inversely with the tall shrub canopy. The overstory is usually overwhelmingly dominated by *Alnus incana*, but where it is not as dominant, other shrubs, such as *Cornus sericea, Rubus idaeus, Salix* spp.*, Spiraea alba*, and *Viburnum* spp. can be found. The herbaceous layer contains species such as *Aster simplex, Calamagrostis canadensis, Caltha palustris, Carex lacustris, Carex prairea, Eupatorium maculatum, Impatiens capensis, Lycopus uniflorus, Scirpus atrovirens, Symplocarpus foetidus, Thelypteris palustris,* and *Typha* spp. Mosses include *Climacium dendroides.* Where the tall shrub canopy is open, the graminoids can become dense. Trees are found in many stands, including *Acer rubrum, Fraxinus nigra*, and *Thuja occidentalis* (Anderson 1982, Curtis 1959, Harris *et al.* 1996, Minnesota NHP 1993).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G5?.

DATABASE CODE CEGL002381

MAP UNITS 36

COMMENTS

REFERENCES

Myrica gale Fen Shrubland

COMMON NAME	Sweet Gale Fen Shrubland
SYNONYM	Sweet Gale Shrub Fen
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Saturated cold-deciduous shrubland (III.B.2.N.g)
ALLIANCE	PENTAPHYLLOIDES FLORIBUNDA - MYRICA GALE - (CAREX LASIOCARPA) SATURATED SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is rare; most of the sites sampled were in the southwest end of the island, with only one site in the northeast end.

Globally

This association is found in Michigan, Minnesota, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions at elevations ranging from 620 feet to 988 feet, with saturated muck or peat soils, in areas that are not influenced by fluctuating Lake Superior water levels.

Globally

Rangewide information on the environmental features of this type are not available.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Short shrub	*Myrica gale, Chamaedaphne calyculata*
Graminoid	*Carex lasiocarpa, Rhynchospora alba*

Globally

Stratum	Species
Short shrub	*Myrica gale, Chamaedaphne calyculata*
Graminoid	*Carex lasiocarpa, Rhynchospora alba*

CHARACTERISTIC SPECIES

Isle Royale National Park

Myrica gale, Carex lasiocarpa

Globally

Myrica gale, Chamaedaphne calyculata, Carex lasiocarpa, Rhynchospora alba

VEGETATION DESCRIPTION

Isle Royale National Park

This sweet gale shrub fen is a peatland dominated by deciduous shrubs and sedges. Cover of short shrubs varies from 30 to 80%; the most abundant shrubs are *Myrica gale* (25 to 60% cover), *Chamaedaphne calyculata, Andromeda polifolia* var. *glaucophylla* (each 1 to 5% cover), and *Betula pumila* (<1% cover). Cover of dwarf-shrubs varies from 0 to 10%; the most abundant dwarf-shrub is *Vaccinium oxycoccos*. Scattered stunted trees and tall shrubs may be present (with 0 to 5% cover); most common are *Larix laricina, Picea mariana, Thuja occidentalis,* and *Alnus incana*. Cover of herbs varies from 40 to 80%; the most abundant herbs are *Carex lasiocarpa, Rhynchospora alba,* and *Calamagrostis canadensis*. *Sphagnum* spp. are common in the groundlayer (5 to 50% cover).

Globally

This shrub fen community is potentially found in the northern Great Lakes region of the United States and Canada. It

has not been well described by any authors, and it may overlap in concept with other shrub fens, e.g. the leatherleaf-sweet gale shore fen (CEGL005228). Further work is needed to determine the rangewide characteristics of this type.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available

CONSERVATION RANK G?.

DATABASE CODE CEGL005141

MAP UNITS 37

COMMENTS

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Lee, H., W. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. Ecological land classification for southern Ontario: first approximation and its application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

Thuja occidentalis - (Myrica gale) / Eriophorum alpinum / Drepanocladus spp. Shrubland

COMMON NAME	Northern White-cedar - (Sweet Gale) / Alpine Cottongrass / Brown Moss species Shrubland
SYNONYM	White Cedar - Sweet Gale Scrub Fen
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland (III.B)
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland (III.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.B.2.N)
FORMATION	Saturated cold-deciduous shrubland (III.B.2.N.g)
ALLIANCE	PENTAPHYLLOIDES FLORIBUNDA - MYRICA GALE - (CAREX LASIOCARPA) SATURATED SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon, and it occurs scattered through the park; the largest areas are in parts of Siskiwit Swamp (southwest end), but it also occurs in wetlands south of Lake Desor (west central) and near the Duncan Bay campground (northeast end).

Globally

This association is found in northern Michigan and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies large wetland depressions with peat soils that remain saturated, even during a dry summer. It occurs at elevations ranging from 600 to 900 feet. The diverse fen vegetation suggests that these wetlands are kept saturated by groundwater that is minerotrophic (with a relatively high pH and alkalinity).

Globally

This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Larix laricina, Picea mariana, Thuja occidentalis*
Short shrub	*Thuja occidentalis, Larix laricina, Rhamnus alnifolia*
Graminoid	*Carex lasiocarpa*

Globally

Stratum	Species
Tree canopy	*Larix laricina, Picea mariana, Thuja occidentalis*
Short shrub	*Thuja occidentalis, Larix laricina, Rhamnus alnifolia*
Graminoid	*Carex lasiocarpa*

CHARACTERISTIC SPECIES

Isle Royale National Park

Larix laricina, Thuja occidentalis, Rhamnus alnifolia, Betula pumila, Pentaphylloides floribunda, Carex lasiocarpa, Carex exilis, Solidago uliginosa, Eriogonum alpinum

Globally

Larix laricina, Thuja occidentalis, Rhamnus alnifolia, Betula pumila, Pentaphylloides floribunda, Carex lasiocarpa, Carex exilis, Solidago uliginosa, Eriogonum alpinum

VEGETATION DESCRIPTION

Isle Royale National Park

White cedar - sweet gale scrub fen is a wooded wetland with a diverse mixture of evergreen and deciduous scrub trees and shrubs. There may be a sparse cover of trees over 5 m tall (0 to 20% cover of trees); the most abundant trees are

Larix laricina, Thuja occidentalis, and *Picea mariana* (each usually 1 to 5% cover). The tall shrub layer consists mainly of scrub forms (2 to 5 m tall) of the same three tree species, with overall 5 to 40% cover of tall shrubs. The short shrub layer (under 2 m tall) varies from 30 to 70% cover; the most abundant short shrubs (including dwarf shrubs) are small scrub forms of *Thuja occidentalis, Rhamnus alnifolia, Chamaedaphne calyculata*, scrub forms of *Larix laricina, Myrica gale, Andromeda polifolia, Betula pumila, Pentaphylloides floribunda, Juniperus horizontalis, Ledum groenlandicum*, and *Vaccinium oxycoccos*. Herbaceous cover varies from 40 to 70%; the most abundant herbs are *Carex lasiocarpa, Equisetum fluviatile, Eriophorum alpinum, Carex exilis, Iris versicolor, Solidago uliginosa*, and *Rhynchospora alba*. Moss cover varies from 10 to 70%; the most abundant mosses are *Sphagnum* spp. (average 5 to 25% cover), and *Campylium* sp.

Globally
This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available

CONSERVATION RANK G?.

DATABASE CODE CEGL005193

MAP UNITS 60

COMMENTS

REFERENCES

Taxus canadensis - Viburnum edule - Cornus sericea - Alnus viride - Oplopanax horridus Shrubland [Provisional]

COMMON NAME	Canada Yew - Squashberry - Red-osier Dogwood - Mountain Alder - Devil's-club Shrubland
SYNONYM	Balsam Fir / Canada Yew Woodland
PHYSIOGNOMIC CLASS	Shrubland (III)
PHYSIOGNOMIC SUBCLASS	Mixed evergreen-deciduous shrubland (III.C)
PHYSIOGNOMIC GROUP	Mixed evergreen - cold-deciduous shrubland (III.C.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (III.C.2.N)
FORMATION	Mixed evergreen - cold-deciduous shrubland (III.C.2.N.a)
ALLIANCE	TAXUS CANADENSIS - MIXED DECIDUOUS SHRUBLAND ALLIANCE [PROVISIONAL]

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This is a rare community restricted in the park to Passage Island.

Globally

This association is found in Michigan and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies gentle to somewhat steep slopes facing southeast, at elevations ranging from 613 to 650 feet. Soils are usually sandy loams. The variant occupies gentle, south-facing slopes at elevations of about 630 feet.

Globally

This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Thuja occidentalis, Abies balsamea, Sorbus decora*
Short shrub	*Taxus canadensis, Oplopanax horridus, Viburnum edule, Alnus viridis*
Forb	*Cornus canadensis*
Fern	*Lycopodium annotinum*

Globally

Stratum	Species
Tree canopy	*Thuja occidentalis, Abies balsamea, Sorbus decora*
Short shrub	*Taxus canadensis, Oplopanax horridus, Viburnum edule, Alnus viridis*
Forb	*Cornus canadensis*
Fern	*Lycopodium annotinum*

CHARACTERISTIC SPECIES

Isle Royale National Park

Taxus canadensis, Oplopanax horridus, Viburnum edule, Alnus viridis, Cornus sericea

Globally

Taxus canadensis, Oplopanax horridus, Viburnum edule, Alnus viridis, Cornus sericea

VEGETATION DESCRIPTION

Isle Royale National Park

This canada yew - squashberry mixed shrubland is a mixture of evergreen and deciduous shrubs that form a dense, nearly impenetrable thicket. There may be a sparse cover (0 to 10%) of trees over 5 m tall including *Thuja occidentalis, Abies balsamea*, or *Sorbus decora*. Cover of tall shrubs varies from 5 to 50%, the most abundant tall shrubs are *Abies*

balsamea, Sorbus decora, and *Alnus viridis* (each usually 1 to 5% cover). Cover of short shrubs varies from 40 to 90%; the most abundant short shrubs are *Taxus canadensis* (5 to 50% cover, average is 26%), *Viburnum edule* (5 to 25% cover), *Oplopanax horridus* (5 to 25% cover), *Prunus pensylvanica* (5 to 25%), *Cornus sericea* (1 to 5%), and *Chamaedaphne calyculata* (1 to 5%). Cover of dwarf-shrubs varies from 0 to 70%, the most abundant dwarf-shrubs are *Diervilla lonicera* and *Empetrum nigrum* (each with 5 to 25% cover). Cover of herbs varies from 10 to 70%; the most abundant herbs are *Lycopodium annotinum, Cornus canadensis*, *Dryopteris expansa*, and *Clintonia borealis* (each usually 5 to 25% cover). Cover of nonvascular plants is usually less than 10%; the most abundant nonvascular plants are foliose and crustose lichens, *Pleurozium schreberi*, and *Dicranum polysetum*.

There is an uncommon variant of this association. The *Abies balsamea* / *Taxus canadensis* Woodland variant is an open canopy, evergreen woodland that is a rare variant of the canada yew - squashberry mixed shrubland. Canopy cover of trees over 5 m tall is about 50%; *Abies balsamea* is the single most abundant tree (25 to 50% cover). The shrub layer is a dense thicket with about 70% cover; *Taxus canadensis* is the most abundant shrub (over 50 to 75% cover), other characteristic shrubs mixed with the *Taxus* include *Oplopanax horridus, Alnus viridis, Sorbus decora*, and *Viburnum edule*. Cover of herbs is about 20%; the most abundant herbs are *Dryopteris expansa, Cornus canadensis,* and *Lycopodium annotinum.* This variant is only known from ridges on Passage Island; it may also occur in other areas in the northeastern end of the park.

Globally
This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available

CONSERVATION RANK G?.

DATABASE CODE CEGL005254

MAP UNITS 35, 22

COMMENTS

REFERENCES

Chamaedaphne calyculata - Ledum groenlandicum - Kalmia polifolia Bog Dwarf-shrubland

COMMON NAME	Leatherleaf - Labrador-tea - Bog Laurel Bog Dwarf-shrubland
SYNONYM	Leatherleaf Bog
PHYSIOGNOMIC CLASS	Dwarf-shrubland (IV)
PHYSIOGNOMIC SUBCLASS	Evergreen dwarf-shrubland (IV.A)
PHYSIOGNOMIC GROUP	Needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (IV.A.1.N)
FORMATION	Saturated needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1.N.g)
ALLIANCE	CHAMAEDAPHNE CALYCULATA SATURATED DWARF-SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is an uncommon community that is scattered around the park.

Globally

This association is found in northern Minnesota, northern Wisconsin, northern Michigan, Ontario, and Manitoba.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions at elevations ranging from 600 to 760 feet.

Globally

Sites are found on raised bog landforms in large peatland complexes, basin bogs, and occasionally on shores (but still isolated from groundwater influence). Stands have a saturated hydrology with a fibric *Spaghnum* spp. peat soil and a pH usually < 4.3 (Harris *et al.* 1996, Minnesota DNR 1993).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Picea mariana, Larix laricina*
Short shrub	*Chamaedaphne calyculata, Ledum groenlandicum*
Graminoid	*Carex oligosperma*
Nonvascular	*Sphagnum* spp.

Globally

Stratum	Species
Tree canopy	*Picea mariana, Larix laricina*
Short shrub	*Chamaedaphne calyculata, Ledum groenlandicum*
Graminoid	*Carex oligosperma*
Nonvascular	*Sphagnum* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Chamaedaphne calyculata, Ledum groenlandicum, Sphagnum spp.

Globally

Chamaedaphne calyculata, Ledum groenlandicum, Sphagnum spp.

VEGETATION DESCRIPTION

Isle Royale National Park

The leatherleaf bog is a peatland dominated by evergreen dwarf-shrubs. This community may have a few scattered trees, with canopy cover from 0 to 20%. The common trees are *Picea mariana* and *Larix laricina*. There may be a few tall shrubs with 0 to 5% cover, these are mainly stunted, scrub forms of *Larix laricina, Picea mariana*, and *Thuja occidentalis*. The short shrub layer (less than 1 m tall, including dwarf shrubs) varies from 40 to 70% cover; the most abundant shrubs are *Chamaedaphne calyculata* (25 to 50% cover), *Ledum groenlandicum* (5 to 25% cover), *Alnus incana*, *Andromeda*

polifolia var. *glaucophylla, Kalmia polifolia*, and *Vaccinium oxycoccos* (each with 1 to 5% cover). Cover of herbs varies from 10 to 60%; the most common herbs are *Carex oligosperma, Carex lasiocarpa, Drosera rotundifolia*, and *Sarracenia purpurea.* There is a nearly continuous mat of peat mosses, with 80 to 100% cover of *Sphagnum* spp.

Globally
Vegetation is dominated by an open dwarf-shrub/scrub conifer layer with very scattered trees (<10% cover). Microtopography is high hummocks with weakly developing hollows. Ericaceous dwarf-shrubs are dominant, including *Chamaedaphne calyculata, Kalmia polifolia*, and *Ledum groenlandicum*, and the creeping dwarf-shrubs *Andromeda polifolia* and *Vaccinium oxycoccos*. Scrub conifers include *Larix laricina* and *Picea mariana.* They also occur as scattered trees (> 3m). The herb layer is species poor, containing *Carex oligosperma, Carex pauciflora, Eriophorum vaginatum*, and *Sarracenia purpurea.* The moss layer forms a continuous hummocky mat dominated by *Sphagnum angustifolium, Sphagnum fuscum*, and *Sphagnum magellanicum* (Minnesota NHP 1993, Harris *et al.* 1996). Diagnostic features of this type include the dominance of a dwarf-shrub ericaceous layer, absence of a tree layer (<10%), species-poor herbaceous layer, and almost complete lack of minerotrophic indicators, such as *Betula pumila, Carex aquatilis*, and *Carex stricta.* A possible subtype may occur where pools form near the bog crests, and contain maritime species such as *Scheucherzia palustris, Rhynchospora alba, Sphagnum cuspidatum*, and *Utricularia cornata.*

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G5.

DATABASE CODE CEGL002498

MAP UNITS 70

COMMENTS

REFERENCES
Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ontario Ministry of Natural Resources, Northwest Science and Technology, Thunder Bay, Ontario. Field guide FG-01. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Chamaedaphne calyculata - Myrica gale / Carex lasiocarpa Dwarf-shrubland

COMMON NAME	Leatherleaf - Sweet Gale / Wiregrass Sedge Dwarf-shrubland
SYNONYM	Leatherleaf-Sweetgale Shore Fen
PHYSIOGNOMIC CLASS	Dwarf-shrubland (IV)
PHYSIOGNOMIC SUBCLASS	Evergreen dwarf-shrubland (IV.A)
PHYSIOGNOMIC GROUP	Needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (IV.A.1.N)
FORMATION	Saturated needle-leaved or microphyllous evergreen dwarf-shrubland (IV.A.1.N.g)
ALLIANCE	CHAMAEDAPHNE CALYCULATA SATURATED DWARF-SHRUBLAND ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is an uncommon community that is scattered around the island near the Lake Superior shore.

Globally

This association is found in Minnesota, Wisconsin, Michigan, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions along the Lake Superior shore where water levels are influenced by lake processes.

Globally

This community is typically found on floating mats on the edges of lakes and streams, with localized shallow surface pools that may persist throughout the growing season. Stands occur where there is low wave and current energy with seasonal flooding; the water regime is otherwise saturated (Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Short shrub	*Chamaedaphne calyculata, Myrica gale*
Graminoid	*Carex lasiocarpa*

Globally

Stratum	Species
Short shrub	*Chamaedaphne calyculata, Myrica gale*
Graminoid	*Carex lasiocarpa*

CHARACTERISTIC SPECIES

Isle Royale National Park

Myrica gale, Chamaedaphne calyculata

Globally

Myrica gale, Chamaedaphne calyculata, Carex lasiocarpa

VEGETATION DESCRIPTION

Isle Royale National Park

This leatherleaf - sweet gale shore fen is a peatland with a mixture of broad-leaved evergreen and deciduous shrubs and sedges. It often occurs as a floating mat. Cover of short shrubs (under 1 m tall, including dwarf shrubs) usually varies from 50 to 80%; the most abundant shrubs are *Myrica gale* (25 to 50% cover), *Chamaedaphne calyculata* (5 to 50% cover), *Andromeda polifolia* var. *glaucophylla* (1 to 10% cover)*, Vaccinium oxycoccos,* and *V. macrocarpon* (each 0 to 5% cover). Scattered stunted trees and tall shrubs may be present (with 0 to 5% cover); most common are *Larix laricina* and *Picea mariana*. Cover of herbs varies from 50 to 80%; the most abundant herb is *Carex lasiocarpa*. Cover of mosses varies from 0 to 90%; the most abundant mosses are *Sphagnum* spp.

Globally

Low shrubs dominate the stands, generally over 60% cover. Dominant species include *Chamaedaphne calyculata* and *Myrica gale*. *Salix pedicillaris* is often present. The herbaceous layer is variable in cover and composition, sometimes shaded out by the heavy shrub cover. Species include *Calamagrostis canadensis, Carex aquatilis, Carex lasiocarpa, Carex rostrata*, and *Potentilla palustris* (Harris *et al.* 1996). In northern Minnesota a short shrub layer with low to moderate cover is often present, with *Myrica gale, Betula glandulifera, Alnus incana, Salix petiolaris*, and *Salix pedicellaris* the most abundant shrubs. In the dwarf-shrub layer *Chamaedaphne calyculata* is usually present at 80-100% cover but may be mixed with lesser amounts of *Andromeda glaucophylla* and *Vaccinium oxycoccos*. In addition to bog plants such as *Eriophorum spissum* and *Drosera rotundifolia*, other minerotrophic indicators are also present at 10-40% cover. These include *Carex lacustris, Carex lasiocarpa, Typha latifolia, Calamagrostis canadensis,* and *Iris versicolor.* Occasionally, herbaceous cover may reach 90%. A continuous carpet of peat moss includes species such as *Sphagnum magellanicum, Sphagnum recurvum sensu stricta, Sphagnum angustifolium,* and *Sphagnum subsecundum sensu lato* (M. Smith personal communication 1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005228

MAP UNITS 67

COMMENTS

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Phleum pratense - (Calamagrostis canadensis) Seminatural Herbaceous Vegetation

COMMON NAME	Timothy Grass - (Canada Bluejoint) Seminatural Herbaceous Vegetation
SYNONYM	Timothygrass-Bluejoint Meadow
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Tall sod temperate grassland (V.A.5.N.a)
ALLIANCE	PHLEUM PRATENSE HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon, and scattered around the park, usually near old residences or building sites.

Globally

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occurs in areas that have been disturbed, often near old fishermen's residences, former pastures, or old hotel sites.

Globally

This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Graminoid	*Calamagrostis canadensis, Phleum pratense*

Globally

Stratum	Species
Graminoid	*Calamagrostis canadensis, Phleum pratense*

CHARACTERISTIC SPECIES

Isle Royale National Park

Calamagrostis canadensis, Phleum pratense

Globally

Phleum pratense

VEGETATION DESCRIPTION

Isle Royale National Park

Timothy - (bluejoint) seminatural meadow is a successional meadow dominated by grasses, sedges, and herbs. There are usually a few scattered trees and tall shrubs (5 to 10% cover); most common are *Picea glauca, Thuja occidentalis, Betula papyrifera,* and *Alnus incana.* There may be a sparse cover (0 to 20%) of short shrubs (under 2 m tall, including dwarf shrubs); the most common low shrubs are *Amelanchier bartramiana, Physocarpus opulifolius, Diervilla lonicera, Abies balsamea, Rosa acicularis,* and *Sambucus racemosa.* Herbaceous cover varies from 70 to 90%; the most abundant herbs are *Calamagrostis canadensis* (25 to 50% cover), *Phleum pratense* (20 to 30% cover), *Hieracium* sp., *Anthoxanthum odoratum, Doellingeria umbellata, Ranunculus acris*, and *Epilobium angustifolium.* Nonvascular plant cover varies from about 5 to 30%; the most abundant are *Polytrichum* spp. and *Cladina* spp.

Globally

This association has only been described at Isle Royale NP. The global description is the same as the local description until more examples can be examined.

OTHER NOTEWORTHY SPECIES

Isle Royale National Park
Information not available.

CONSERVATION RANK GW.

DATABASE CODE CEGL005249

MAP UNITS 72

COMMENTS
Globally
Type originates following cultural disturbances.

REFERENCES

Danthonia spicata - Poa compressa Granite Herbaceous Vegetation

COMMON NAME	Poverty Grass - Canada Bluegrass Granite Herbaceous Vegetation
SYNONYM	Poverty Grass Granite Barrens
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Medium-tall sod temperate or subpolar grassland (V.A.5.N.c)
ALLIANCE	DANTHONIA SPICATA HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is restricted to rocky summits and rocky slopes of ridges where a lot of bedrock is exposed; it is scattered throughout the park.

Globally

This association is found in Michigan and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

At Isle Royale National Park, this community occupies sites on well-drained rocky ridges and slopes; usually there is a lot of exposed bedrock.

Globally

Stands occur on granite or metamorphic rocks. Soils are thin and acidic. Conditions at Isle Royale National Park, where this community is restricted to rocky summits and rocky slopes of ridges where a lot of bedrock is exposed, may be typical of the type (C. Reschke 1999). It may also occur on disturbed sites, following clearing of the natural vegetation (M. Smith personal communication).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Tree canopy	*Picea glauca, Populus tremuloides*
Short shrub	*Juniperus communis, Amelanchier bartramiana, Diervilla lonicera*
Forb	*Hieracium piloselloides*
Graminoid	*Danthonia spicata*
Nonvascular	*Cladina* spp., *Xanthoparmelia* spp.

Globally

Stratum	Species
Short shrub	*Juniperus communis, Amelanchier bartramiana, Diervilla lonicera*
Forb	*Hieracium piloselloides*
Graminoid	*Danthonia spicata*
Nonvascular	*Cladina* spp., *Xanthoparmelia* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Danthonia spicata, Hieracium piloselloides, Cladina spp., *Xanthoparmelia* spp.

Globally

Danthonia spicata, Hieracium piloselloides, Cladina spp., *Xanthoparmelia* spp.

VEGETATION DESCRIPTION

Isle Royale National Park

Poverty grass barrens is an open grassland community on rocky summits and slopes. There may be a sparse cover of trees over 5 m tall (from 0 to 20% cover); the most common trees are *Picea glauca* and *Populus tremuloides*. Tall shrubs

may be present (from 0 to 10% cover); the most common tall shrubs are *Picea glauca, Amelanchier bartramiana*, and *Crataegus douglasii*. Cover of low shrubs (under 1 m tall, including dwarf shrubs) varies from 5 to 20%; the most common low shrubs are *Juniperus communis, Amelanchier bartramiana, Diervilla lonicera, Rosa acicularis*, *Juniperus horizontalis*, and *Arctostaphylos uva-ursi*. Cover of herbs varies from 30 to 80%; *Danthonia spicata* is the dominant herb (15 to 40% cover), other characteristic herbs are *Hieracium piloselloides, Agrostis hyemalis, Clinopodium vulgare, Elymus trachycaulus*, and *Poa* spp. Cover of nonvascular plants varies from 10 to 60%; the most abundant lichens are *Cladina* spp. (reindeer lichens, 5 to 25% cover) and *Xanthoparmelia* spp. (1 to 5% cover).

Globally
The vegetation is open and dominated by graminoids. Characteristic dominants include *Danthonia spicata* and *Poa compressa*. Features at Isle Royale NP may be typical of the type. There, a sparse cover of trees over 5 m tall (from 0 to 20% cover) is found. The most common trees are *Picea glauca* and *Populus tremuloides*. Tall shrubs may be present (from 0 to 10% cover); the most common tall shrubs are *Picea glauca, Amelanchier bartramiana*, and *Crataegus douglasii*. Cover of low shrubs (under 1 m tall, including dwarf shrubs) varies from 5 to 20%; the most common low shrubs are *Juniperus communis, Amelanchier bartramiana, Diervilla lonicera, Rosa acicularis*, *Juniperus horizontalis*, and *Arctostaphylos uva-ursi*. Cover of herbs varies from 30 to 80%; *Danthonia spicata* is the dominant herb (15 to 40% cover), other characteristic herbs are *Hieracium piloselloides, Agrostis hyemalis, Clinopodium vulgare, Elymus trachycaulus*, and *Poa* spp. Cover of nonvascular plants varies from 10 to 60%; the most abundant lichens are *Cladina* spp. (reindeer lichens, 5 to 25% cover) and *Xanthoparmelia* spp. (1 to 5% cover) (C. Reschke personal communication 1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005157

MAP UNITS 38

COMMENTS
Isle Royale National Park
This community is frequently found in areas with a known history of fire, and it may represent a fairly long-lived successional community following a severe burn.

Globally
This type may arise after clearing or burning of conifer-dominated stands on rocky sites.

REFERENCES

Calamagrostis canadensis Eastern Herbaceous Vegetation [Provisional]

COMMON NAME	Canada Bluejoint Eastern Herbaceous Vegetation
SYNONYM	Bluejoint Eastern Meadow
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Seasonally flooded temperate or subpolar grassland (V.A.5.N.k)
ALLIANCE	CALAMAGROSTIS CANADENSIS SEASONALLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is uncommon and widely scattered throughout the park.

Globally

This association is widespread in the Northeast, mid-Atlantic, and northern Midwest regions of the United States. It also can be found in Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions or alluvial flats at elevations of 605 to 820 feet. Slopes vary from flat to gentle. Soils are usually very poorly drained peats or mucks that are saturated to seasonally flooded.

Globally

Stands occur on the floodplains of small streams, in poorly drained depressions, beaver meadows, and lakeshores. Soils are typically mineral soil or well-decomposed peat, with a thick root mat (Harris *et al.* 1996). In northern Minnesota, the water regime varies between temporarily and seasonally flooded (M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Short shrub	*Alnus incana*
Graminoid	*Calamagrostis canadensis, Scirpus cyperinus, Carex rostrata*
Nonvascular	*Sphagnum* spp.

Globally

Stratum	Species
Short shrub	*Alnus incana*
Graminoid	*Calamagrostis canadensis, Scirpus cyperinus, Carex rostrata, Carex stricta*
Forb	*Eupatorium maculatum*

CHARACTERISTIC SPECIES

Isle Royale National Park

Calamagrostis canadensis

Globally

Calamagrostis canadensis, Scirpus cyperinus, Carex rostrata, Carex stricta, *Eupatorium maculatum*

VEGETATION DESCRIPTION

Isle Royale National Park

Canada Bluejoint Eastern Meadow is a wetland dominated by grasses. *Calamagrostis canadensis* is the most abundant herb (average 43% cover); other common herbs are *Scirpus cyperinus* (average 25% cover), *Carex rostrata* (average 15% cover), *Carex lasiocarpa* (average 7% cover), *Campanula aparinoides,* and *Viola blanda.* The most abundant shrub is *Alnus incana* (average 9% cover). The most abundant mosses are *Sphagnum* spp. (average 6% cover).

Globally
Graminoid cover is typically dense, and can form hummocky microtopography. *Calamagrostis canadensis* dominates, often in almost pure stands or with tall sedges, such as *Carex aquatilis, Carex lacustris, Carex rostrata*, and *Carex stricta*. In fen transitions, *Carex lasiocarpa* can be present. *Glyceria grandis, Poa palustris, Scirpus cyperinus*, and *Typha latifolia* are sometimes abundant. Forbs include *Campanula aparinoides, Epilobium leptophyllum, Eupatorium maculatum, Iris versicolor, Polygonum amphibium*, and *Potentilla palustris* (Harris *et al.* 1996).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005174

MAP UNITS 40

COMMENTS
Globally
In northern Minnesota, this type commonly occurs in beaver meadows. Constant beaver activity can alter local hydrology and, over time, cause this community to grade into other communities (M. Smith personal communication 1999).

REFERENCES
Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Carex rostrata - Carex lacustris - (Carex vesicaria) Herbaceous Vegetation

COMMON NAME	Swollen-beak Sedge - Hairy Sedge - (Inflated Sedge) Herbaceous Vegetation
SYNONYM	Northern Sedge Wet Meadow
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Seasonally flooded temperate or subpolar grassland (V.A.5.N.k)
ALLIANCE	CAREX (ROSTRATA, UTRICULATA) SEASONALLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is uncommon, and widely scattered through the park.

Globally

This association is found in North Dakota, South Dakota, Minnesota, Iowa, Wisconsin, Michigan, Ontario, Manitoba, and possible Maine.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions and alluvial flats, at elevations ranging from 610 to 670 feet. Slopes are flat to gentle. Soils are very poorly drained mucks or peats that are saturated to permanently flooded.

Globally

Sites are found on floodplains, shallow bays of lakes and streams, beaver meadows, ditches, and occasionally in isolated basins, or on semi-floating mats. Hydrology is seasonally to semipermanently flooded. Substrate is mineral soil or well-decomposed peat (Curtis 1959, Harris *et al.* 1996). Standing dead trees, especially in beaver meadows, are common. Hummock and hollow microtopography is usually well developed, with standing water often in the hollows. The water regime is highly variable, ranging from saturated to permanently flooded (M. Smith personal communication 1999).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Graminoid	*Carex rostrata, Carex stricta*

Globally

Stratum	Species
Graminoid	*Carex rostrata, Carex lacustris, Calamagrostis canadensis*
Forb	*Eupatorium maculatum*

CHARACTERISTIC SPECIES

Isle Royale National Park

Carex rostrata, Carex stricta

Globally

Carex rostrata, Carex lacustris, Carex vesicaria

VEGETATION DESCRIPTION

Isle Royale National Park

This wet meadow is a wetland dominated by sedges. *Carex rostrata* is the most abundant sedge (average 75% cover), *Carex stricta* is also common (average 18% cover); other characteristic herbs are *Scirpus cyperinus, Lycopus americanus* and *Sium suave; Myrica gale* is the most common shrub (< 5% cover).

Globally
Tall coarse-leaved sedges dominate the vegetation layer, often creating a tussocky hummock microtopography. Shrubs can cover up to 25% of the area. Pools with submergents may also be present. Dominant graminoids include a number of carices, including *Carex aquatilis, Carex lacustris, Carex lasiocarpa, Carex rostrata, Carex vesicaria*, and locally *Carex stricta*. Other graminoids include *Calamagrostis canadensis, Scirpus atrovirens, Scirpus cyperinus*, and, in wetter areas, *Eleocharis smallii* and *Equisetum fluviatile*. Forbs include *Acorus calamus, Aster simplex, Campanula aparinoides, Eupatorium maculatum, Iris shrevei, Lycopus uniflorus, Poa palustris, Polygonum amphibium, Potentilla palustris*, and others (Curtis 1959, Harris *et al.* 1996). Stands with standing water or water channels running through them may contain species typical of wetter conditions such as *Brasenia schreberii* or *Potamogeton* spp. In most circumstances, the moss layer is virtually absent. In the uncommon cases where sedges are colonizing a peatland, however, the moss strata can be 20-90% cover of *Sphagnum* spp. (M. Smith personal communication 1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G4G5.

DATABASE CODE CEGL002257

MAP UNITS 41

COMMENTS

REFERENCES
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Mohlenbrock, R. H. and D.M. Ladd. 1978. Distribution of Illinois vascular plants. Southern Illinois Univ. Press, Carbondale. 282 p.
Ownbey, G.B. and T. Morley. 1991. Vascular Plants of Minnesota: A Checklist and Atlas. University of Minnesota Press. Minneapolis.
Voss, E.G. 1972. Michigan Flora, Part I. Gymnosperms and Monocots. Cranbrook Institute of Science, Bloomfield Hills Bull., No. 55.

Cladium mariscoides - Carex cryptolepis - Rhynchospora alba - Juncus canadensis Herbaceous Vegetation

COMMON NAME	Twig-rush - Northeastern Sedge - White Beaksedge - Canada Rush Herbaceous Vegetation
SYNONYM	Twigrush Wet Meadow
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Seasonally flooded temperate or subpolar grassland (V.A.5.N.k)
ALLIANCE	CLADIUM MARISCOIDES SEASONALLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is rare; only one site, at Hidden Lake, was found in 1997 or 1998.

Globally

This community is reported from the central and eastern Great Lakes in Ohio, Indiana, Ontario, and on Isle Royale in Michigan. Its possible distribution in New York needs confirmation. Range-wide distribution needs to be clarified.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies a wet depression in a lake plain at an elevation of 610 feet. Soils are very poorly drained peats that are saturated.

Globally

The environmental characteristics of this association have not been described rangewide.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Short shrub	*Myrica gale*
Graminoid	*Cladium mariscoides, Carex lacustris*

Globally

Stratum	Species
Graminoid	*Cladium mariscoides*

CHARACTERISTIC SPECIES

Isle Royale National Park

Cladium mariscoides

Globally

Cladium mariscoides

VEGETATION DESCRIPTION

Isle Royale National Park

This twig rush wet meadow is a wetland dominated by sedges. *Cladium mariscoides* is the most abundant herb (average 62% cover), other common herbs are *Carex lacustris, Rhynchospora alba*, and *Utricularia intermedia* (each < 25% cover); *Myrica gale* is the most abundant shrub (<25% cover); *Sphagnum* spp. are very common in the groundlayer (average 37% cover).

Globally

The vegetation is dominated by graminoids. Stands in northwest Ohio, and possibly adjacent states, contain *Cladium mariscoides, Carex cryptolepis, Juncus canadensis*, and *Rhynchospora alba* (G. Schneider personal communication 1996). This twig rush wet meadow is a wetland dominated by sedges. *Cladium mariscoides* is the most abundant herb (average 62%

cover), other common herbs are *Carex lacustris, Rhynchospora alba*, and *Utricularia intermedia* (each < 25% cover); *Myrica gale* is the most abundant shrub (<25% cover); *Sphagnum* spp. are very common in the groundlayer (average 37% cover) (C. Reschke personal communication1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G3G5. There are probably close to 100 occurrences of this community in the Great Lakes basin. It is reported from Ohio (where it is ranked S4), Indiana (S1), and Ontario (S?). Similar vegetation occurs along the Lake Ontario shores in New York. Currently there are two occurrences documented in Indiana. There are probably at least 1000 acres of this community rangewide. Currently 75 acres are documented from one occurrence in Indiana. Many wetlands along the Great Lakes shores have been disturbed by shoreline development and alterations to hydrology, including alterations to lake level fluctuations.

DATABASE CODE CEGL005103

MAP UNITS 48

COMMENTS

REFERENCES

Typha spp. - Scirpus spp. - Mixed Herbs Great Lakes Shore Herbaceous Vegetation

COMMON NAME	Cattail species - Bulrush species - Mixed Herbs Great Lakes Shore Herbaceous Vegetation
SYNONYM	Great Lakes Shoreline Cattail - Bulrush Marsh
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Semipermanently flooded temperate or subpolar grassland (V.A.5.N.l)
ALLIANCE	TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCIRPUS SPP.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is rare; it was only sampled at one site during 1997 surveys, at Brady Cove. There are probably a few other widely scattered sites in well-protected, quiet bays of Lake Superior.

Globally

This association is found in Michigan, Minnesota, Wisconsin, New York, and Ontario. It may have been eliminated from its range in Ohio.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies shallow water of a bay or cove of Lake Superior, subject to fluctuating water levels from the lake's seiche. Soils are permanently flooded sands.

Globally

Storms, seiches, and water level cycles contribute to a dynamic vegetation structure and composition. Substrate is mineral soil. Water depth generally exceeds 0.3 m (Minc 1997).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Graminoid	*Scirpus acutus*

Globally

Stratum	Species
Graminoid	*Scirpus acutus, Scirpus tabernaemontanii, Typha latifolia, Typha angustifolia*

CHARACTERISTIC SPECIES

Isle Royale National Park

Scirpus acutus

Globally

Scirpus acutus, Scirpus tabernaemontanii, Typha latifolia, Typha angustifolia

VEGETATION DESCRIPTION

Isle Royale National Park

This Great Lakes shoreline bulrush - cattail marsh is a wetland dominated by bulrushes. *Scirpus acutus* is the most abundant herb (average < 25% cover); associated herbs include *Sagittaria latifolia, Carex lasiocarpa*, and *Utricularia intermedia.*

Globally

Species composition and structure can be quite variable. Typical dominants include the emergents *Scirpus acutus, Scirpus tabernaemontanii*, and *Typha* spp. (including *angustifolia, glauca, latifolia*). Floating and rooted aquatics include *Ceratophyllum demersum, Lemna minor, Nuphar advena, Nymphaea odorata, Potamogeton gramineus*, and *Spirodela polyrhiza* (Minc 1997).

OTHER NOTEWORTHY SPECIES

Isle Royale National Park
Information not available.

CONSERVATION RANK G4?.

DATABASE CODE CEGL005112

MAP UNITS 45

COMMENTS

REFERENCES

Minc, L.D. 1996. Michigan's Great Lakes Coastal Wetlands: Definition, Variability, and Classification. A report in 2 parts submitted to: Michigan Natural Features Inventory, Lansing, MI.

Typha spp. - Scirpus acutus - Mixed Herbs Midwest Herbaceous Vegetation

COMMON NAME	Cattail species - Hardstem Bulrush - Mixed Herbs Midwest Herbaceous Vegetation
SYNONYM	Midwest Mixed Emergent Deep Marsh
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Semipermanently flooded temperate or subpolar grassland (V.A.5.N.l)
ALLIANCE	TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCIRPUS SPP.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is uncommon, and scattered mainly on interior lakes; it may also occur on very protected, quiet bays of Lake Superior.

Globally

This community was once widespread in depressions or swales of riverine systems and shallow water zones in swamps, ponds, lakes, and streams throughout the midwestern United States. It is currently found in Minnesota, Iowa, Wisconsin, Ontario, Michigan, Ohio, Indiana, Illinois, Missouri, and probably Kentucky. Many of the presettlement occurrences of this community has been drained and converted to cropland or destroyed by siltation. Siltation greatly accelerates the natural transition of this habitat type as it succeeds from shallow inundation to moist soil.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies a narrow fringe zone in shallow water of lake beds, on flat to gentle slopes, at elevations ranging from 605 to 700 feet. Soils are usually permanently flooded sands or mucks; occasionally soils may be only seasonally flooded.

Globally

These highly productive wetlands are found in glacial potholes, river valleys, ponds, and on lake plains. They are characterized by continuous inundation and are considered a deep marsh. Water depth averages 0.3 - 0.6 m, ranging from several centimeters to more than one meter for a significant part of the growing season. Seasonal flooding during winter and spring or flooding during heavy rains help maintain these marshes by causing water exchange which replenishes freshwater and circulates nutrients and organic debris. Soils can be mineral or organic but are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. Vegetative diversity and density is highly variable in response to water depth, water chemistry, and natural forces. Periods of excessive flooding can occur in the winter and spring.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Forb	*Nelumbo lutea*
Graminoid	*Scirpus acutus, Carex hyalinopsis, Phragmites australis, Typha latifolia*
Floating-leaved	*Lemna minor*

Globally

Graminoid	*Scirpus acutus, Typha latifolia*
Floating-leaved	*Lemna minor*

CHARACTERISTIC SPECIES

Isle Royale National Park

Scirpus acutus, Eleocharis smallii

Globally

Scirpus acutus, Typha latifolia

VEGETATION DESCRIPTION

Isle Royale National Park

This emergent marsh wetland community is dominated by bulrushes and spikerushes. *Scirpus acutus* is the most abundant emergent aquatic plant (average 22% cover); *Eleocharis smallii* is a common associate with a low cover (average < 2% cover); *Typha* spp. are very rare or absent from this community on Isle Royale, probably an effect of moose browsing.

Globally

This deepwater emergent marsh community is dominated by perennial herbaceous vegetation with graminoid leaves. A typical example of this marsh contains a mosaic of emergents, submergents, and floating plants interspersed with areas of open water (Harris *et al.* 1996). Various kinds of emergents may dominate a marsh depending on the water depth. Quite often the vegetation arranges itself in belts (wetland zonation), with a particular species or range of species occupying specific depths from the shoreline to deep open water. Marshes may display areas of open water, but vegetation dominates (>30 percent cover). *Typha latifolia*, *Typha angustifolia*, *Scirpus fluviatilis* and *Scirpus acutus* dominate this dynamic ecosystem. Sedges are also common (*Carex lupuliformis*, *Carex hyalinolepis*). A diverse assemblage of grasses, floating leaved aquatics, and submerged aquatics are present.

OTHER NOTEWORTHY SPECIES

Isle Royale National Park

Information not available.

Globally

Lythrum salicaria, Scirpus californicus

CONSERVATION RANK G5.

DATABASE CODE CEGL002229

MAP UNITS 46

COMMENTS

Globally

Emergent marshes exhibit differences in vegetative composition and physiognomy in response to water depth and substrate aggradation. In Ohio, *Scirpus validus* is most common and *Scirpus acutus* is rare (it is more common in OH fens). Seasonal flooding and heavy rains influence vegetative growth, aquatic animals, and nutrient cycling in marsh ecosystems.

REFERENCES

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Whitley, J. R., B. Bassett, J. G. Dillard, and R. A. Haefner. 1990. Water plants for Missouri ponds. Missouri Department of Conservation. 151 p.

Carex lasiocarpa - Carex oligosperma / Sphagnum spp. Herbaceous Vegetation

COMMON NAME	Wiregrass Sedge - Few-seed Sedge / Peatmoss species Herbaceous Vegetation
SYNONYM	Northern Poor Fen
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Saturated temperate or subpolar grassland (V.A.5.N.m)
ALLIANCE	CAREX OLIGOSPERMA - CAREX LASIOCARPA SATURATED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is rare and scattered in the central to northeast portions of the park.

Globally

This association is found in North Dakota, Minnesota, Iowa, Wisconsin, Michigan, Illinois, Manitoba, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions at elevations ranging from 650 to 740 feet. Soils are very poorly drained peats that are saturated.

Globally

Stands are found in peatlands with low exposure to mineral-rich groundwater, including basin fens, shores above the level of seasonal flooding and larger peatlands. Water hydrology is saturated (Harris *et al.* 1996). The surface water is slightly acidic (pH 4.1-5.9) and nutrient poor [calcium < 13 mg/l) (MN NHP 1993).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Short shrub	*Chamaedaphne calyculata*
Graminoid	*Carex oligosperma*
Nonvascular	*Sphagnum* spp.

Globally

Stratum	Species
Short shrub	*Chamaedaphne calyculata, Andromeda polifolia*
Graminoid	*Carex lasiocarpa, Carex oligosperma*
Nonvascular	*Sphagnum* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Carex oligosperma, Sphagnum spp.

Globally

Carex lasiocarpa, Carex chordorrhiza, Carex limosa, Carex oligosperma, Rhynchospora alba, Scirpus cespitosus, Sphagnum spp.

VEGETATION DESCRIPTION

Isle Royale National Park

This poor fen is a peatland dominated by sedges and peat moss. *Carex oligosperma* is the most abundant sedge (over 50% cover), other common herbs are *Calamagrostis canadensis* and *Campanula aparinoides* (each with < 25% cover); other characteristic herbs are *Drosera rotundifolia, Iris versicolor, Platanthera psycodes, Dulichium arundinaceum*, and *Comarum palustre* (= *Potentilla palustris*); the most abundant shrub is *Chamaedaphne calyculata* (< 25% cover); *Sphagnum* spp. are very common in the groundlayer (average 37% cover).

Globally

The vegetation is dominated by graminoids, with up to 25% shrub cover, and scattered trees. The dominant graminoid is *Carex lasiocarpa*, and typical associates include *Carex chordorrhiza, Carex limosa, Carex oligosperma, Rhynchospora alba, Scirpus cespitosus*, and *Scheuchzeria palustris*. Forbs include *Sarracenia purpurea*. The low shrub layer contains *Andromeda polifolia, Betula pumila, Chamaedaphne calyculata, Larix laricina, Salix discolor, Salix pedicillaris*, and *Vaccinium oxycoccos*. The moss layer is virtually continuous, and is dominated by *Sphagnum capillifolium, Sphagnum fuscum*, and *Sphagnum magellanicum* (Chapman *et al.* 1989, MN NHP 1993, Harris *et al.* 1996).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G3G4.

DATABASE CODE CEGL002265

MAP UNITS 42

COMMENTS

REFERENCES

Chapman, K. A., D. A. Albert, and G. A. Reese. 1989. Draft descriptions of Michigan's natural community types. Michigan Department of Natural Resources, Lansing, MI. 35 pp.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Carex lasiocarpa - Scirpus cespitosus - Rhynchospora capillacea / Andromeda glaucophylla Herbaceous Vegetation

COMMON NAME	Wiregrass Sedge - Deerhair Bulrush - Limestone Beaksedge / Bog Rosemary Herbaceous Vegetation
SYNONYM	Boreal Calcareous Seepage Fen
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial graminoid vegetation (V.A)
PHYSIOGNOMIC GROUP	Temperate or subpolar grassland (V.A.5)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.A.5.N)
FORMATION	Saturated temperate or subpolar grassland (V.A.5.N.m)
ALLIANCE	CAREX LASIOCARPA SATURATED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is uncommon, and widely scattered throughout the park.

Globally

This community is reported from northern Minnesota, Manitoba, and northern Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies wet depressions at elevations from 601 to 770 feet. Soils are very poorly drained peats, sands, or mucks that are saturated to permanently flooded.

Globally

Stands occur on shallow or deep peaty soils in areas of calcareous discharge. The surface water may be circumneutral (pH 6.8 - 8.0), with high concentrations of dissolved salts that often form a marl precipitate. The discharge water is low in oxygen, which is believed to be important in inhibiting dense vegetation growth, and favoring heliophytic vascular and moss species (Minnesota NHP 1993).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Short shrub	*Myrica gale*
Graminoid	*Carex lasiocarpa, Carex rostrata*

Globally

Stratum	Species
Graminoid	*Carex lasiocarpa, Muhlenbergia glomerata, Rhynchospora capillacea, Scirpus cespitosus*

CHARACTERISTIC SPECIES

Isle Royale National Park

Carex lasiocarpa, Carex rostrata

Globally

Carex lasiocarpa, Muhlenbergia glomerata, Rhynchospora capillacea, Scirpus cespitosus, Andromeda polifolia

VEGETATION DESCRIPTION

Isle Royale National Park

This boreal calcareous seepage fen is a wetland dominated by sedges. *Carex lasiocarpa* is the most abundant sedge (average 68% cover), *Carex rostrata* is also common (average 20% cover). Other characteristic herbs are *Utricularia intermedia* and *Menyanthes trifoliata*. The most abundant shrub is *Myrica gale* (average 4% cover). *Sphagnum* spp. are common in the groundlayer (average 13% cover).

Globally

The vegetation is dominated by an open graminoid layer of sedge and rush species. The dominant species include *Carex lasiocarpa, Muhlenbergia glomerata, Rhynchospora capillacea* and *Scirpus cespitosus*. Other associates include the dwarf-shrubs

Andromeda polifolia and *Vaccinium oxycoccos*, and the herbs *Sarracenia purpurea* (Minnesota NHP 1993).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G2Q. There are probably fewer than 100 occurrences, and there may be fewer than 20 occurrences of this community rangewide. Currently there are two occurrences documented from Minnesota, and several undocumented occurrences on Isle Royale in Michigan. This community is reported from Michigan (unranked), Minnesota (where it is ranked S2), Manitoba (S?), and Ontario (S?). It is reported from three ecoregion subsections: the Lake Agassiz Lowlands subsection, the Border Lakes subsection, and the Isle Royale subsection.

DATABASE CODE CEGL002496

MAP UNITS 44

COMMENTS

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Equisetum fluviatile - (Eleocharis smallii) Herbaceous Vegetation

COMMON NAME	Water Horsetail - (Marsh Spikerush) Herbaceous Vegetation
SYNONYM	Water Horsetail-Spikerush Marsh
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Perennial forb vegetation (V.B)
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial forb vegetation (V.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.B.2.N)
FORMATION	Semipermanently flooded temperate perennial forb vegetation (V.B.2.N.e)
ALLIANCE	EQUISETUM FLUVIATILE SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is uncommon and widely scattered in interior lakes.

Globally

This associations is found in Minnesota, Michigan, Manitoba, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies a very narrow fringe zone of interior lakes, at elevations ranging from 625 to 700 feet, on flat to gentle slopes of the lake bed. Soils are permanently flooded mucks or sands.

Globally

Stands occur in wave-washed shores, sandbars, and stream channels. Substrate is mineral soil (often sand), sometimes held together by root mats. The water regime is permanently flooded to intermittently exposed, and water depth is generally less than 1 m (Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Fern	*Equisetum fluviatile*
Graminoid	*Eleocharis smallii, Sparganium fluctuans*

Globally

Stratum	Species
Fern	*Equisetum fluviatile*
Graminoid	*Eleocharis smallii*

CHARACTERISTIC SPECIES

Isle Royale National Park

Eleocharis smallii, Equisetum fluviatile, Sparganium fluctuans

Globally

Eleocharis smallii, Equisetum fluviatile, Sparganium fluctuans

VEGETATION DESCRIPTION

Isle Royale National Park

This emegent marsh community is a sparsely vegetated (<25% cover) wetland dominated by graminoid plants. *Eleocharis smallii* (average 9% cover) and *Equisetum fluviatile* (average 4% cover) are the most abundant emergent aquatic plants; *Sparganium fluctuans* is a common floating-leaved aquatic plant (average < 2% cover), and algae are the most common submerged aquatic plants.

Globally

Emergent cover is typically greater than 25%, and floating-leaved and submergent cover is low. Emergent graminoids < 1 m dominate the stands, including *Equisetum fluviatile* and/or *Eleocharis smallii.* Associated species of low constancy include *Glyceria borealis, Isoetes echinospora, Potamogeton gramineus*, and *Utricularia vulgaris* (Harris *et al.* 1996). In northern

Minnesota, stands most commonly have a mix of *Equisetum fluviatile* and *Acorus calamus*. *Acorus calamus* may also mix with *Sagittaria rigida* and, less commonly, *Sparganium chlorocarpum*. Other herbs that may be present but are not dominant include *Cicuta bulbifera, Polygonum lapathifolium, Sium Suave,* and *Sparganium fluctuans.* Aquatic species may also be present at low density and include *Potamogeton* spp., *Utricularia intermedia,* and *Najas flexilis* (M. Smith personal communication 1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G4.

DATABASE CODE CEGL005258

MAP UNITS 47

COMMENTS

REFERENCES

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Potamogeton spp. - Ceratophyllum spp. Midwest Herbaceous Vegetation

COMMON NAME	Pondweed species - Coontail species Midwest Herbaceous Vegetation
SYNONYM	Midwest Pondweed Submerged Aquatic Wetland
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Hydromorphic rooted vegetation (V.C)
PHYSIOGNOMIC GROUP	Temperate or subpolar hydromorphic rooted vegetation (V.C.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.C.2.N)
FORMATION	Permanently flooded temperate or subpolar hydromorphic rooted vegetation (V.C.2.N.a)
ALLIANCE	POTAMOGETON SPP. - CERATOPHYLLUM SPP. - ELODEA SPP. PERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is common in interior lakes, and occasionally occurs on very protected, quiet water bays of Lake Superior.

Globally

This associations is found in North Dakota, South Dakota, Minnesota, Iowa, Wisconsin, Michigan, Illinois, Indiana, Ohio, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies permanently flooded lake beds with substrates of sand, muck, or clay. This is a submerged aquatic community; nearly all the vegetation is under water.

Globally

The major environmental controls on submerged aquatic vegetation, as noted by Curtis (1959), are water depth (as it relates to light intensity), water chemistry, water movement, and nature of the substrate. Various combinations of these factors can interact in a variety of ways to influence the local composition of the community. As a result, a single lake may contain a number of relatively homogeneous stands, each with a different species makeup, depending on depth, nature of adjoining shoreline, degree of protection from waves, etc. Water chemistry may be one of the few constants. Assessment of water conductivity and alkalinity are two measured parameters that can provide some understanding of the influence of water chemistry on species composition. Curtis (1959) also summarizes a study by Swindale and Curtis (1959).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Submersed	*Chara* spp., algae, *Utricularia* spp., *Potamogeton* spp., *Sparganium fluctuans*

Globally

Stratum	Species
Submersed	*Potamogeton* spp., *Ceratophyllum* spp. *Myriophyllum* spp., *Utricularia* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Chara spp., *Utricularia* spp., *Potamogeton* spp., *Sparganium fluctuans*

Globally

Potamogeton spp., *Ceratophyllum* spp., *Myriophyllum* spp., *Chara* spp., *Utricularia* spp.

VEGETATION DESCRIPTION

Isle Royale National Park

At Isle Royale NP, Midwest pondweed submerged aquatic wetland is a deepwater wetland dominated by submerged aquatic vegetation. The most abundant vegetation consists of submerged aquatics such as *Chara* spp., algae, *Utricularia*

spp., and *Potamogeton* spp.; *Sparganium fluctuans* is a common floating leaved aquatic plant (average 10 % cover); *Eleocharis smallii* and *Equisetum fluviatile* are the most abundant emergent aquatic plants (each averaging < 5% cover).

Globally

Based on information in the northern parts of the Midwest, several vegetation subgroups can be recognized that may be separate associations. Subgroup A is a shallow (<50 cm), sparsely vegetated, open water marsh found on sand, or organic and mineral material trapped in rocky bottoms. Stands are often exposed to wave action and found in oligotrophic lakes. Dominant plants often have basal rosettes that are resistant to wave action. Typical species include *Elatine minima, Eriocaulon aquaticum, Gratiola aurea, Isoetes echinospora, Isoetes macrospora, Juncus pelocarpus*, and *Lobelia dortmanna* (Curtis 1959, Harris *et al.* 1996). Subgroup B is a shallow (<50 cm) open water marsh with emergent cover <25% and floating-leaved aquatics >25%. Substrate is a mineral soil (often sand), boulders, or a mixture of sedimentary peat and fine mineral soil. Stands can be exposed to waves or are in stream channels. Stands may often be dominated by a single species. Typical dominants include *Eleocharis acicularis, Myriopyllum* spp.*, Potamogeton amplifolius, Potamogeton gramineus, Potamogeton praelongus, Potamogeton robbinsii, Sparganium fluctuans*, and *Utricularia vulgaris.* Subgroup C includes open water marsh with emergent cover < 25% and floating leaved aquatics >25%. Substrate is sedimentary peat and stands are often found in sheltered bays of lakes and streams which do not have high wave energy. Stands may often be dominated by a single species. Typical dominants include *Ceratophyllum demersum, Lemna* spp.*, Myriophyllum sibiricum, Myriophyllum verticillatum, Potamogeton natans, Potamogeton pectinatus, Potamogeton richardsonii, Potamogeton zosteriformis, Ranunculus aquatilis, Utricularia vulgaris*, and *Vallisneria americana* (Curtis 1959, Harris *et al.* 1996).

OTHER NOTEWORTHY SPECIES

Isle Royale National Park

Information not available.

CONSERVATION RANK G5Q.

DATABASE CODE CEGL002282

MAP UNITS 49

COMMENTS

REFERENCES

Curtis, J. T. 1959. The vegetation of Wisconsin: An ordination of plant communities. Univ. of Wisconsin Press, Madison. 657 p.

Harris, A. G., S. C. McMurray, P. W. C. Uhlig, J. K. Jeglum, R. F. Foster, and G. D. Racey. 1996. Field guide to the wetland ecosystem classification for northwestern Ontario. Ont. Minist. Nat. Resour., Northwest Sci. Tech. Field Guide FG-01.Thunder Bay, Ont. 74 p.

Swindale, Delle N. and Curtis, J. T. 1957. Phytosociology of the larger submergered plants in Wisconsin lakes. Ecology 38:397-407.

Nymphaea odorata - Nuphar lutea (ssp. pumila, variegata) Herbaceous Vegetation

COMMON NAME	White Water Lily - Yellow Water Lily Herbaceous Vegetation
SYNONYM	Northern Water Lily Aquatic Wetland
PHYSIOGNOMIC CLASS	Herbaceous Vegetation (V)
PHYSIOGNOMIC SUBCLASS	Hydromorphic rooted vegetation (V.C)
PHYSIOGNOMIC GROUP	Temperate or subpolar hydromorphic rooted vegetation (V.C.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (V.C.2.N)
FORMATION	Permanently flooded temperate or subpolar hydromorphic rooted vegetation (V.C.2.N.a)
ALLIANCE	NUPHAR LUTEA - NYMPHAEA ODORATA PERMANENTLY FLOODED HERBACEOUS ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 3

USFWS WETLAND SYSTEM PALUSTRINE

RANGE

Isle Royale National Park

This community is uncommon on interior lakes, widely scattered throughout the park.

Globally

This associations is found in Michigan, New York, Ontario, Manitoba, and possible Minnesota.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies quiet waters of interior lakes. It may also occur on very protected, quiet bays of Lake Superior (however none were reported on Lake Superior in 1997 or 1998 surveys). The interior lakes occur at elevations ranging from 660 to 987 feet; substrates are permanently flooded mucks.

Globally

Stands occur in open, slow-moving water on lakes and streams, often less than 0.5 m deep. The substrate is variable, from muck to sedimentary peat (Harris *et al.* 1996).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Floating-leaved	*Potamogeton* spp., *Nuphar lutea* ssp. *variegata, Nymphaea odorata*

Globally

Stratum	Species
Floating-leaved	*Nuphar lutea* ssp. *variegata, Nuphar lutea ssp. pumila, Nymphaea odorata, Potamogeton* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Nuphar lutea ssp. *variegata, Nymphaea odorata*

Globally

Nuphar lutea ssp. *variegata, Nuphar lutea ssp. pumila, Nymphaea odorata, Potamogeton* spp.

VEGETATION DESCRIPTION

Isle Royale National Park

At Isle Royale NP, northern water lily aquatic wetland is a sparsely vegetated deepwater wetland dominated by floating-leaved and submerged aquatic vegetation. *Potamogeton* spp. are the most abundant herbs (average < 5% cover); *Nuphar lutea* ssp. *variegata* and *Nymphaea odorata* are the most abundant floating-leaved aquatic plants (each averages < 1 % cover).

Globally

Emergent vegetation cover is less than 25% and floating-leaved aquatics cover at least 25% of the surface. Typical dominants vary from stand to stand, but include *Nymphaea odorata*, *Nuphar lutea ssp. pumila,* and *Nuphar lutea ssp. variegata.* Other dominants may include *Brasenia schreberi* and *Potamogeton amplifolius*. A variety of emergent species can occur with this type (Harris *et al.* 1996).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G5.

DATABASE CODE CEGL002562

MAP UNITS 50

COMMENTS

REFERENCES

Basalt/Diabase Great Lakes Cliff Sparse Vegetation

COMMON NAME	Basalt/Diabase Great Lakes Cliff Sparse Vegetation
SYNONYM	Great Lakes Basalt/Diabase Cliff
PHYSIOGNOMIC CLASS	Sparse Vegetation (VII)
PHYSIOGNOMIC SUBCLASS	Consolidated rock sparse vegetation (VII.A)
PHYSIOGNOMIC GROUP	Sparsely vegetated cliffs (VII.A.1)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (VII.A.1.N)
FORMATION	Cliffs with sparse vascular vegetation (VII.A.1.N.a)
ALLIANCE	OPEN BLUFF/CLIFF SPARSELY VEGETATED ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon; it is mostly found on ridges near the northwest shore of the park, and it also occurs along the shoreline cliffs on the northwest shore.

Globally

This associations is found in Minnesota, Wisconsin, Michigan, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies very steeply sloping cliffs where the exposed bedrock is basalt, usually at elevations ranging from 605 to 705 feet.

Globally

This community occurs on vertical or near-vertical, south- to west-facing aspects of basalt or diabase bedrock. In Michigan cliffs range from only 3 - 6 m to over 60 m tall (Albert *et al.* 1995). Moisture is derived from precipitation. Cliffs along the Great Lakes shore are exposed to severe wave action, preventing establishment of vegetation.

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Shrub	*Pinus strobus, Picea glauca, Alnus viridis*
Fern	*Woodsia ilvensis, Polypodium virginianum*
Graminoid	*Deschampsia flexuosa*
Nonvascular	*Cladonia* spp.

Globally

Stratum	Species
Fern	*Woodsia ilvensis, Polypodium virginianum*
Graminoid	*Deschampsia flexuosa*
Nonvascular	*Cladonia* spp.*, Pleurozium schreberi*

CHARACTERISTIC SPECIES

Isle Royale National Park

Cladonia spp., *Woodsia ilvensis, Polypodium virginianum, Deschampsia flexuosa*

Globally

Cladonia spp., *Woodsia ilvensis, Polypodium virginianum, Deschampsia flexuosa*

VEGETATION DESCRIPTION

Isle Royale National Park

This basalt cliff type is sparsely vegetated. Crustose and foliose lichens and mosses are very common: characteristic lichens (average 40% cover) include *Cladonia* spp., *Xanthoparmelia* spp., *Umbilicaria deusta, Lobaria pulmonaria, Parmelia* spp., and *Rhizocarpon* spp. Characteristic mosses (average 30% cover) are *Schistidium* spp. and *Pleurozium schreberi.* The most abundant herbs are *Woodsia ilvensis, Polypodium virginianum*, and *Deschampsia flexuosa.* The most abundant trees and shrubs are *Pinus strobus* (average 5% cover), *Picea glauca*, and *Alnus viridis* (each with < 2% cover).

Globally
Vegetation is often sparse, due to severe wave action. Mosses, lichens, ferns, and liverworts may be found, with occasional graminoids in crevices or shelves that trap soil. In Minnesota, arctic-alpine disjunct plant species (e.g., *Arenaria macrophylla, Draba norvegica*) and more temperate plant species may be found (Minnesota nhp 1993, Albert *et al.* 1995). At Isle Royale NP, crustose and foliose lichens and mosses are very common. Characteristic lichens (average 40% cover) include *Cladonia* spp., *Xanthoparmelia* spp., *Umbilicaria deusta, Lobaria pulmonaria, Parmelia* spp., and *Rhizocarpon* spp. Characteristic mosses (average 30% cover) are *Schistidium* spp. and *Pleurozium schreberi.* The most abundant herbs are *Woodsia ilvensis, Polypodium virginianum*, and *Deschampsia flexuosa*. The most abundant trees and shrubs are *Pinus strobus* (average 5% cover), *Picea glauca*, and *Alnus viridis* (each with < 2% cover) (C. Reschke personal communication 1999).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005191

MAP UNITS 52

COMMENTS

REFERENCES
Albert, D. A., P. J. Comer, R. A. Corner, D. Cuthrell, M. Penskar, and M. Rabe. 1995. Bedrock shoreline survey of the Niagaran Escarpment in Michigan's Upper Peninsula: Mackinac County to Delta County. Michigan Natural Features Inventory for Land and Water Management Division (grant # CD-0.02).

Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Ver. 1.5. Minn. Dep. Nat. Resour., Nat. Heritage Prog. St. Paul, Minn. 110 p.

Great Lakes Basalt (Conglomerate) Bedrock Lakeshore Sparse Vegetation

COMMON NAME	Great Lakes Basalt (Conglomerate) Bedrock Lakeshore Sparse Vegetation
SYNONYM	Great Lakes Basalt (Conglomerate) Bedrock Lakeshore
PHYSIOGNOMIC CLASS	Sparse Vegetation (VII)
PHYSIOGNOMIC SUBCLASS	Consolidated rock sparse vegetation (VII.A)
PHYSIOGNOMIC GROUP	Sparsely vegetated pavement (VII.A.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (VII.A.2.N)
FORMATION	Pavement with sparse vascular vegetation (VII.A.2.N.a)
ALLIANCE	OPEN PAVEMENT SPARSELY VEGETATED ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon; it occurs primarily along the southeast shores of Isle Royale, with a few widely scattered sites along the northwest shore on peninsulas, islands, or coves that are exposed on their east, southeast, or south sides to wave wash and ice scour.

Globally

This associations is found in Michigan, Minnesota, and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies rugged, rocky shores of Lake Superior where the exposed bedrock is basalt, sandstone, or conglomerate that has a gentle to somewhat steep, usually southeast- (or south- or east-) facing slope. Elevations range from lake level to about 620 feet. This community is restricted to shores most exposed to wave wash and ice-scour, and does not occur in protected bays or harbors.

Globally

The bedrock consists of basalts, volcanic conglomerates, and localized rhyolites. Volcanic conglomerate shores may be more species rich than basalt shores due to the presence of cracks or small cavities in the former. Wave action and ice scour action exert a strong influence on the vegetation, producing a wave-washed zone almost devoid of vegetation near the shore, and scattered patches of vegetation further above the lakeshore (Albert *et al.* 1995).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Short shrub	*Physocarpus opulifolius, Pentaphylloides floribunda, Juniperus horizontalis*
Forb	*Sibbaldiopsis tridentata, Oligoneuron album, Campanula rotundifolia*
Nonvascular	*Xanthoparmelia* spp., *Xanthoria elegans, Rhizocarpon geographicum*

Globally

Stratum	Species
Short shrub	*Physocarpus opulifolius, Pentaphylloides floribunda, Juniperus horizontalis*
Forb	*Sibbaldiopsis tridentata, Oligoneuron album, Campanula rotundifolia*
Nonvascular	*Xanthoparmelia* spp.

CHARACTERISTIC SPECIES

Isle Royale National Park

Sibbaldiopsis tridentata, Oligoneuron album, Campanula rotundifolia, Xanthoparmelia spp., *Xanthoria elegans, Rhizocarpon geographicum*

Globally

Sibbaldiopsis tridentata, Oligoneuron album, Campanula rotundifolia, Xanthoparmelia spp.

VEGETATION DESCRIPTION

Isle Royale National Park

At Isle Royale NP, Great Lakes basalt (conglomerate) bedrock lakeshore is a sparsely vegetated community dominated

by lichens and mosses. Crustose and foliose lichens are common to abundant (average 25 - 50% cover); characteristic nonvascular plants are the lichens *Xanthoparmelia* spp., *Xanthoria elegans*, *Rhizocarpon geographicum* and other *Rhizocarpon* spp., *Acarospora* spp. and *Lecanora muralis,* and *Schistidium* mosses; the most abundant herb is *Sibbaldiopsis tridentata* (= *Potentilla tridentata*) (average 2% cover), other characteristic herbs of dry rocks are *Oligoneuron album* (= *Solidago ptarmicoides*), *Campanula rotundifolia, Carex umbellata*, and *Achillea millefolium*; woody plants consist of dwarf forms of tree and shrub species, mostly under 1 m tall; characteristic woody plants of dry rocks are *Physocarpus opulifolius, Pentaphylloides floribunda* (= *Potentilla fruticosa*), *Juniperus horizontalis, Thuja occidentalis*, and *Arctostaphylos uva-ursi*; in areas where seepage keeps rocks moist, or fills rock pools and allows miniature perched meadows to develop on the rock, characteristic herbs are *Scirpus cespitosus, Primula mistassinica, Castilleja septentrionalis*, and *Tofieldia glutinosa.*

Globally
Wave action and ice scour action are strongest near the shore, producing a wave-washed zone almost devoid of vegetation, except for scattered patches of mosses and lichens, and pockets of herbaceous species around bedrock pools. Crustose and foliose lichens are common to abundant (average 25 - 50% cover). On Isle Royale, characteristic nonvascular plants are the lichens *Xanthoparmelia* spp., *Xanthoria elegans*, *Rhizocarpon geographicum* and other *Rhizocarpon* spp., *Acarospora* spp. and *Lecanora muralis,* and *Schistidium* mosses (C. Reschke personal communication 1999). With increasing distance above the lake, herbaceous and nonvascular plant cover increases, though still very patchy, with lichens predominating, particularly on high, dry rocks. Herbaceous species include *Achillea millefolium, Campanula rotundifolia, Fragaria virginiana, Sibbaldiopsis tridentata (=Potentilla tridentata)*, and *Solidago simplex*. Perched meadows, dominated by tufted graminoids, are found at the edge of seasonal pools. The most common meadow species are *Calamagrostis canadensis, Carex buxbaumii, Carex castanea, Danthonia spicata, Deschampsia cespitosa, Scirpus cespitosus*, and *Trisetum spicatum*, as well as *Pinguicula vulgaris*. Lichens, mosses, and liverworts are prominent. Scattered, often stunted, woody trees and shrubs are found throughout, including *Abies balsamea, Amelanchier* spp., *Juniperus communis, Picea glauca, Populus tremuloides, Rubus pubescens, Shepherdia canadensis, Thuja occidentalis*, and *Vaccinium angustifolium* (Albert *et al.* 1995).

OTHER NOTEWORTHY SPECIES
Isle Royale National Park
Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005215

MAP UNITS 51

COMMENTS
Isle Royale National Park
Globally
Wave action and ice scour action are the primary disturbances affecting the vegetation. Near the lakeshore a wave-washed zone is almost devoid of vegetation. A gradient of increasing vegetation occurs further above the lakeshore (Albert *et al.* 1995).

REFERENCES
Albert, D. A., P. J. Comer, R. A. Corner, D. Cuthrell, M. Penskar, and M. Rabe. 1995. Bedrock shoreline survey of the Niagaran Escarpment in Michigan's Upper Peninsula: Mackinac County to Delta County. Michigan Natural Features Inventory for Land and Water Management Division (grant # CD-0.02).

Basalt/Diabase Cobble-Gravel Great Lakes Shore Sparse Vegetation

COMMON NAME	Basalt/Diabase Cobble-Gravel Great Lakes Shore Sparse Vegetation
SYNONYM	Great Lakes Basalt/Diabase Cobble-Gravel Lakeshore
PHYSIOGNOMIC CLASS	Sparse Vegetation (VII)
PHYSIOGNOMIC SUBCLASS	Boulder, gravel, cobble, or talus sparse vegetation (VII.B)
PHYSIOGNOMIC GROUP	Sparsely vegetated rock flats (VII.B.2)
PHYSIOGNOMIC SUBGROUP	Natural/Semi-natural (VII.B.2.N)
FORMATION	Cobble/gravel beaches and shores (VII.B.2.N.b)
ALLIANCE	COBBLE/GRAVEL SHORE SPARSELY VEGETATED ALLIANCE

CLASSIFICATION CONFIDENCE LEVEL 2

USFWS WETLAND SYSTEM TERRESTRIAL

RANGE

Isle Royale National Park

This community is uncommon, mostly occurring at the southwest end of the park in gently curving, exposed bays of Lake Superior, in areas underlain by sandstone and conglomerate bedrock; it also occurs occasionally on shores underlain by basalt at the central and northeast portion of the park.

Globally

This associations is found in Michigan and Ontario.

ENVIRONMENTAL DESCRIPTION

Isle Royale National Park

This community occupies cobble or gravel shores of Lake Superior. These shores occur in coves and gently curving bays between rocky points. These are exposed shores that are regularly disturbed by wave action and winter ice movements, at elevations from lake level to about 608 feet. Most of the shore has little or no vegetation, probably due to regular disturbance by waves washing the shore. There is a shrub zone that occurs on the highest beach ridge, which is usually nearly level. This high beach ridge is formed by the most severe storm waves, so the disturbance is irregular and infrequent. There may be little or no soil; the plants are rooted in the cobble or gravel.

Globally

This community occupies cobble or gravel shores of Lake Superior. These shores occur in coves and gently curving bays between rocky points. These are exposed, mostly non-vegetated shores that are regularly disturbed by wave action and winter ice movements. There may be a shrub zone that occurs on the highest beach ridge, which is usually nearly level. There may be little or no soil; the plants are rooted in the cobble or gravel (C. Reschke personal communication 1999).

MOST ABUNDANT SPECIES

Isle Royale National Park

Stratum	Species
Short shrub	*Rubus idaeus, Cornus sericea, Alnus viridis*
Forb	*Lathyrus palustris, Oenothera biennis*
Graminoid	*Elymus trachycaulus*

Globally

Stratum	Species
Short shrub	*Rubus idaeus, Cornus sericea, Alnus viridis*
Forb	*Lathyrus palustris, Oenothera biennis*
Graminoid	*Elymus trachycaulus*

CHARACTERISTIC SPECIES

Isle Royale National Park

Lathyrus palustris, *Oenothera biennis, Elymus trachycaulus*

Globally

Lathyrus palustris, *Oenothera biennis, Elymus trachycaulus*

VEGETATION DESCRIPTION

Isle Royale National Park

This cobble-gravel lakeshore is a sparsely vegetated community on cobble or gravel beaches. This community occurs as a mosaic of sparse grassland with over 25% cover, and sparsely vegetated areas with less than 25% cover. Cover of herbs varies from 10 to 40%; the most abundant herbs are grasses, mostly *Elymus trachycaulus* (average 29%). The most common forbs are *Lathyrus palustris, Oenothera biennis, Calamagrostis canadensis,* and *Equisetum hyemale*). The most abundant shrubs are *Rosa acicularis*, *Rubus idaeus, Diervilla lonicera, Physocarpus opulifolius, Ribes oxyacanthoides, Alnus incana*, *Cornus canadensis*, and *Sorbus decora*. There may be scattered trees (0 to 5% cover) including *Picea glauca*, *Abies balsamea, Thuja occidentalis*, and *Betula papyrifera*.

Globally

At Isle Royale National Park in Michigan, this cobble-gravel lakeshore is a sparsely vegetated community on cobble or gravel beaches. This community occurs as a mosaic of sparse grassland with over 25% cover, and sparsely vegetated areas with less than 25% cover. Cover of herbs varies from 10 to 40%; the most abundant herbs are grasses, mostly *Elymus trachycaulus* (average 30%). The most common forbs are *Lathyrus palustris, Oenothera biennis, Calamagrostis canadensis,* and *Equisetum hyemale*.). The most abundant shrubs are *Rosa acicularis*, *Rubus idaeus, Diervilla lonicera, Physocarpus opulifolius, Ribes oxyacanthoides, Alnus incana*, *Cornus canadensis*, and *Sorbus decora*. There may be scattered trees (0 to 5% cover) including *Picea glauca*, *Abies balsamea, Thuja occidentalis*, and *Betula papyrifera* (C. Reschke personal communication 1999).

OTHER NOTEWORTHY SPECIES

Isle Royale National Park

Information not available.

CONSERVATION RANK G?.

DATABASE CODE CEGL005250

MAP UNITS 39, 33

COMMENTS

Globally

These are exposed shores that are regularly disturbed by wave action and winter ice movements from the lake. Most of the shore has little or no vegetation, probably due to regular disturbance by waves washing the shore. The high beach ridge is formed by the most severe storm waves, so the disturbance is irregular and infrequent (C. Reschke personal communication 1999).

REFERENCES

APPENDIX: INFORMATION IN VEGETATION DESCRIPTIONS

GLOBAL NAME
Association name based on Latin names of dominant or characteristic plant species. The association (or plant association) is the finest level of the classification system. It is the level at which community inventory and conservation action are aimed.

COMMON NAME
Association common name; same as the GNAME, but with common names instead of scientific names for the species.

SYNONYM
A unique name by which the community may be more easily recognized or described.

PHYSIOGNOMIC CLASS
The second level of National Vegetation Classification System, which is a vegetation structural classification, adapted from UNESCO 1973 and Driscoll et al. 1984. This level is based on the structure of the vegetation. This is determined by the height and relative percentage of cover of the dominant life-forms: tree, shrub, dwarf-shrub, herbaceous and nonvascular.

PHYSIOGNOMIC SUBCLASS
The third level of National Vegetation Classification System. This level is determined by the predominant leaf phenology of classes defined by a tree, shrub or dwarf-shrub stratum, the persistence and growth form of herbaceous and nonvascular vegetation, and particle size of the substrate for sparse vegetation (e.g., consolidated rocks, gravel/cobble).

PHYSIOGNOMIC GROUP
The fourth level of National Vegetation Classification System. The group generally represents a grouping of vegetation units based on leaf characters, such as broad-leaf, needle-leaf, microphyllous, and xeromorphic. These units are identified and named with broadly defined macroclimatic types to provide a structural-geographic orientation, but the ecological climate terms do not define the groups *per se*.

PHYSIOGNOMIC SUBGROUP
The fifth level of National Vegetation Classification System represents a distinction between natural vegetation, including natural, semi-natural and some modified vegetation, and cultural vegetation (planted/cultivated).

FORMATION
The sixth level of National Vegetation Classification System; represents a grouping of community types that share a definite physiognomy or structure and broadly defined environmental factors, such as elevation and hydrologic regime.

ALLIANCE: Level of National Vegetation Classification System reflecting a physiognomically uniform group of plant associations sharing one or more diagnostic species (dominant, differential, indicator, or character), which (generally) are found in the uppermost stratum of the vegetation.

CLASSIFICATION CONFIDENCE LEVEL: the degree of confidence associated with the classification of the Element. This confidence is based on the quality and type of data used in the analysis as well as the extent to which the entire (or potential) range of the Element was considered
1 = STRONG
Classification based on recent field data. Information is based on Element Occurrences or other data based on occurrences that can be relocated. Classification considers information collected across the entire range or potential range of the Element. Classification may be based on quantitative or qualitative data

2 MODERATE
Classification is based on data that is of questionable quality, limited numbers of sample points, or data from a limited range.

3 WEAK
Classification is based on secondary or anecdotal information. Or a new type for which data have only been collected at a very small number of sites.

USFWS WETLAND SYSTEM:
USFWS Wetland Classification System, if applicable. (Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States.* United States Fish and Wildlife Service. Washington, DC.).

RANGE:
Globally
Description of the association's present range, including states of occurrence
XXXXX National Park
Description of where the community is found in the Park or environs.

ENVIRONMENTAL DESCRIPTION
Globally
Most important environmental determinants of the biological composition or structure of this association and/or its subtypes.
XXXXX National Park
Important environmental determinants of the biological composition or structure of this association within the Park or environs (if known).

MOST ABUNDANT SPECIES
Globally
Stratum Species
Most abundant species by stratum
XXXXX National Park
Stratum Species
Most abundant species by stratum, based on data and observations in the Park and environs.

DIAGNOSTIC SPECIES
Globally
Latin names of plant species not necessarily most abundant, but which are characteristic or diagnostic of the association when taken singly or in combination with other species.
XXXXX National Park
Characteristic species for the association in the Park and environs.

VEGETATION DESCRIPTION
Globally
Additional comments on vegetation attributes of the association including species richness, diversity, physiognomic structure, spatial distribution of vegetation, strata height, dominant life-forms, coverage of unvegetated substrate, and additional compositional comments.
XXXXX National Park
Vegetation description for the association as it is found in the Park and environs.

OTHER NOTEWORTHY SPECIES
High ranked species, animals, endemics, disjuncts, and exotics that are found within occurrences of this association.

CONSERVATION RANK
Global Element rank which characterizes the relative rarity or endangerment of the association world-wide.

RANK JUSTIFICATION
Reason for assigning the Global Element Rank, such as number of occurrences, number of hectares, total area reduction from original, threats, degradation, etc.

DATABASECODE
Element Code from the National Community Database.

COMMENTS
Globally
Any other comments about this association not covered in the fields above such as landscape relationships, inclusion communities, etc.
XXXXX National Park
Any other comments about this association specific to the Park, including notes about possible problems in photointerpretation.

REFERENCES
Sources of information used to define or describe the association.