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)