NATIVE PLANT COMMUNITIES AND RARE SPECIES IN MILLE LACS COUNTY, MINNESOTA

Minnesota County Biological Survey March 2006

Native plant communities are groups of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms. These groups of native species form recognizable units, such as oak forest, prairie, or marsh, that tend to repeat over space and time. The classification and description of native plant communities depicted on this map are based on *Minnesota's Native Plant Community Classification, (version 2.0)*. This hierarchical classification uses vegetation composition, hydrology, landforms, soils, and natural disturbance regimes to categorize plant communities first into System Groups, followed by Systems, Classes, Types, and Subtypes. The native plant communities of Mille Lacs County are generally mapped and described at the Class or Type level; where more detailed data were available, communities sometimes are mapped at the level of Subtype.

The Minnesota County Biological Survey located areas of native plant communities in Mille Lacs County from 1995 to 1998 using aerial photo interpretation followed by field surveys of selected sites. The description and approximate acreage of each native plant community are based on the results of the Survey. White areas on the map represent land where modern human activities such as farming, overgrazing, wetland drainage, recent logging, and residential and commercial development have destroyed or greatly altered the natural vegetation. Higher quality native plant communities covered approximately 92,790 acres (21.3% of the County) at the time of the Survey.

FIRE-DEPENDENT FOREST/WOODLAND SYSTEM

FDs37 Southern Dry-Mesic Oak (Maple) Forest Class

FDs37a Oak – (Red Maple) Woodland Type
Fire-dependent dry-mesic hardwood forests on gently undulating, sandy outwash and terrace deposits and rolling to hummocky, sandy or gravelly glacial till. Canopy is continuous or nearly so, usually thin, and often composed of open-grown trees. Many occurrences appear to have developed from oak woodland. Oak (*Quercus* spp.) dominated canopy, including bur oak (*Q. macrocarpa*), northern pin oak (*Q. ellipsoidalis*), and northern red oak (*Q. rubra*). Common canopy associates include black cherry (*Prunus serotina*), red maple (*Acer rubrum*), quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and basswood (*Tilia americana*). Subcanopy is typically patchy and often includes red maple, black cherry, and bur oak. Shrub layer usually has 25 to >75% cover with American hazelnut (*Corylus americana*), chokecherry (*Prunus virginiana*), gray dogwood (*Cornus racemosa*), smooth juneberry (*Amelanchier laevis*), and hawthorns (*Crataegus* spp.) typical. Forb layer is composed primarily of widespread forest or woodland herbs such as hog-peanut (*Amphicarpaea bracteata*), pointed-leaved tick-trefoil (*Desmodium glutinosum*), bracken (*Pteridium aquilinum*), Canada mayflower (*Maianthemum canadense*), Clayton's sweet cicely (*Osmorhiza claytonii*), Virginia creeper (*Parthenocissus* spp.) and wild grape (*Vitis riparia*). Pennsylvania sedge (*Carex pensylvanica*) is the most common graminoid and is often abundant. FDs37a is limited to the extreme southern edge of the county on the Anoka Sand Plain. Nineteen occurrences have been mapped covering 267 acres.

MESIC HARDWOOD FOREST SYSTEM

MHc26 Central Dry-Mesic Oak-Aspen Forest Class

MHc26b Red Oak – Sugar Maple – Basswood – (Large-flowered Trillium) Forest Type
Dry-mesic hardwood or, rarely, hardwood-conifer forests. Present on well-drained loamy or sandy soils, primarily on stagnation moraines and less frequently on till plains or glacial river terraces. Interrupted to continuous canopy (50-100% cover) dominated by northern red oak with big-toothed aspen (*Populus grandidentata*), bur oak, red maple, sugar maple (*Acer saccharum*), basswood, and paper birch common canopy associates. Patchy to interrupted (25-75% cover) subcanopy typically includes sugar maple, red maple, ironwood (*Ostrya virginiana*), and basswood. Shrub layer is usually patchy to nearly continuous and is almost always dominated by beaked hazelnut (*Corylus cornuta*) with lesser amounts of juneberries (*Amelanchier* spp.), chokecherry, and ironwood. Saplings of sugar maple and red maple are also common. Forbs are variable in cover with large-leaved aster (*Aster macrophyllus*), hog-peanut, wild sarsaparilla (*Aralia nudicaulis*), bracken, pointed-leaved tick-trefoil, and Canada mayflower among the most typical. Graminoids vary considerably in cover and typically include Pennsylvania sedge, mountain rice-grass (*Oryzopsis asperifolia*), nodding fescue (*Festuca obtusa*), and bearded short-husk (*Brachyelytrum erectum*). Lowbush blueberry (*Vaccinium angustifolium*) is often present in the ground layer. In Mille Lacs County, MHc26b is most common on the Kathio moraine (in and near Mille Lacs Kathio State Park) and on the esker in Hayland Township, with scattered occurrences on higher points of the ground moraine covering central Mille Lacs County. MHc26b often contains inclusions of and can be difficult to distinguish from MHc36a. MHc26b was mapped 44 times covering 3,166 acres.

MHc36 Central Mesic Hardwood Forest (Eastern) Class

MHc36a Red Oak – Basswood Forest (non-calcareous till) Type
Mesic hardwood forests present on loamy or sandy loam soils of hummocky stagnation moraines and rolling till plains. Interrupted to continuous canopy dominated variously by sugar maple, basswood, and northern red oak with lesser amounts of quaking aspen, red maple, green ash (*Fraxinus pennsylvanica*), and occasionally bitternut hickory (*Carya cordiformis*). Subcanopy varies in cover but usually is dominated by sugar maple with ironwood and basswood common associates. Shrub and sapling layer varies in cover and species dominance, but typically includes sugar maple, pagoda dogwood (*Cornus alternifolia*), beaked hazelnut, American hazelnut, ironwood, and gooseberries (*Ribes* spp.). Graminoids usually are not abundant although Pennsylvania sedge, often the dominant species, can sometimes be abundant with nodding fescue, long-stalked sedge (*Carex pedunculata*), Dewey's sedge (*C. deweyana*) and bearded shorthusk common associates. Forbs vary in abundance and species dominance; characteristic species include early meadow-rue (*Thalictrum dioicum*), wild sarsaparilla, large-leaved aster, yellow violets (*Viola pubescens/canadensis* group), and Clayton's sweet cicely. MHc36a is the most common native plant community in Mille Lacs County with 522 mapped occurrences covering 39,328 acres. The best quality examples are in the northern 2/3 of the county. MHc36a often contains inclusions of MHc26b and MHc47a

MHc47 Central Wet-Mesic Hardwood Forest Class

MHc47a Basswood – Black Ash Forest Type
Wet-mesic hardwood and hardwood-conifer forests on somewhat poorly drained sandy loam soils on till plains, stream terraces, and in ecotones between wetlands and mesic hardwood forests. Soils are saturated for prolonged periods due to a variety of factors including clayey subsoil horizons that impede drainage, high local water tables, and gentle, low topographic relief. Canopy is interrupted (50-75% cover) and is typically a mix of basswood and black ash (*Fraxinus nigra*) with lesser to equal amounts of bur oak, sugar maple, red maple, and green ash. Subcanopy is also usually interrupted and contains a similar mix of species as canopy. Shrub and sapling layers usually range from patchy to interrupted (25-75% cover) with beaked hazelnut often the dominant species and prickly gooseberry (*Ribes cynosbati*), chokecherry, nannyberry (*Viburnum lentago*), and blue beech (*Carpinus caroliniana*) common associates. Saplings of canopy species are also common but not usually abundant. Ground layer is continuous (>75% cover) and high in species richness with lady fern (*Athyrium angustum*), wild sarsaparilla, two-leaved miterwort (*Mitella diphylla*), early meadow-rue, large-leaved aster, and large-flowered bellwort (*Uvularia grandiflora*) common. Grass and sedge abundance and diversity is also usually high with nodding fescue, bearded shorthusk, woodland millet grass (*Milium effusum*), graceful sedge (*Carex gracillima*), bladder sedge (*C. intumescens*), and starry sedge (*C. rosea*) often present. MHc47a was mapped 101 times in Mille Lacs County covering 3,944 acres. It is most common in the northern ½ of the county. MHc47a is more common than the map implies because it often occurs in small patches within larger native plant communities and in ecotones between wetlands and mesic forests. MHc47a overlaps with and can be difficult to distinguish from MHn46a; species present in MHc47a that help distinguish it from MHn46a include species with a more southerly distribution such as wild geranium (*Geranium maculatum*), pointed-leaved tick trefoil, and maidenhair fern (*Adiantum pedatum*).

MHn46 Northern Wet-Mesic Hardwood Forest Class

MHn46a Aspen – Ash Forest Type
Wet-mesic hardwood forests on level sites with clayey subsoils or high local water tables. Canopy is patchy to continuous (25 to >75% cover) and dominated by black ash, basswood and quaking aspen with red maple, bur oak, paper birch, green ash, and northern red oak common associates. Subcanopy is usually present and has variable cover with sugar maple, black ash, red maple, and basswood common species. Shrub and sapling layer also has variable cover and includes saplings of canopy species as well as beaked hazelnut and chokecherry. Herbaceous and woody ground layers combined usually have 25 to >75% cover with a large number of species, usually including Canada mayflower, dwarf raspberry (*Rubus pubescens*), lady fern, and sweet-scented bedstraw (*Galium triflorum*). Graminoids typically have lower cover (1-25%) and often include Pennsylvania sedge, bearded shorthusk, and pointed woodrush (*Luzula acuminata*). MHn46a was mapped 134 times in Mille Lacs County covering 2,846 acres. It is most common in the northern ½ of the county. MHn46a is more common than the map implies because it often occurs in small patches within larger native plant communities and in ecotones between wetlands and mesic forests. MHn46a is similar to MHc47a, and like MHc47a is floristically rich. Species that help distinguish MHn46a from MHc47a include species with a more northerly distribution such as balsam fir (*Abies balsamea*), mountain maple (*Acer spicatum*), starflower (*Trientalis borealis*), spinulose shield fern (*Dryopteris carthusiana*), and wood horsetail (*Equisetum sylvaticum*). In Mille Lacs County, this is the most common native plant community in which to find canopy yellow birch (*Betula alleghieniensis*).

MHn47 Northern Rich Mesic Hardwood Forest Class

MHn47a Sugar Maple – Basswood (Bluebead Lily) Forest Type
Rich mesic hardwood forests on well-drained to somewhat poorly drained, loamy soils on glacial drift and till in areas with undulating to hummocky topography. Canopy is typically interrupted to continuous and dominated by basswood, sugar maple, and northern red oak with lesser amounts of quaking aspen. Subcanopy ranges from patchy to interrupted, with sugar maple dominating and ironwood, basswood, red maple and basswood common associates. Shrub layer is typically patchy and most often dominated by beaked hazelnut and sugar maple saplings. Graminoids are low in abundance with Pennsylvania sedge usually dominating and nodding fescue, long-stalked sedge, and bearded shorthusk common associates. Herbaceous ground layer various in cover and typically includes lady fern, wild sarsaparilla, Canada mayflower, and hairy Solomon's seal (*Polygonatum pubescens*). Species often present in MHn47a that help define it as a rich forest include yellow birch, jack-in-the-pulpit (*Arisaema triphyllum*), spinulose shield fern, ostrich fern (*Matteuccia struthiopteris*), and bloodroot (*Sanguinaria canadensis*). MHn47a is uncommon in Mille Lacs County with limited occurrences primarily in and near Mille Lacs Kathio State Park; it has been mapped in 5 locations covering 225 acres. MHn47a is similar in many respects to MHc36 but is more likely to have northern forest species such as balsam fir, mountain maple, bluebead lily (*Clintonia borealis*), and groundpines (*Lycopodium* spp.).

FLOODPLAIN FOREST SYSTEM

FFs59 Southern Terrace Forest Class

FFs59a Silver Maple – Green Ash – Cottonwood Terrace Forest Type
Wet-mesic deciduous forests on silty or sandy alluvium on level, occasionally flooded sites along medium and large rivers in the southern half of Minnesota. Mille Lacs County examples typically have an interrupted canopy dominated by silver maple (*Acer saccharinum*), hackberry (*Celtis occidentalis*) and green ash with lesser amounts of American elm (*Ulmus americana*), box elder (*Acer negundo*) and black ash. Subcanopy varies from patchy to interrupted (25-75% cover) with species composition similar to canopy. Shrubs and saplings are typically uncommon but when present include saplings of canopy species and scattered individuals and isolated groupings of common buckthorn (*Rhamnus cathartica*), prickly gooseberry, prickly ash (*Zanthoxylum americanum*), winterberry (*Ilex verticillata*), and hawthorns. Graminoids are also sparse with bladder sedge, wild-rye (*Elymus virginicus*), and white grass (*Leersia virginica*) typically present. Herbaceous ground layer is usually continuous (>75% cover) with wood nettle (*Laportea canadensis*) very abundant and often continuous, and lesser amounts of tall coneflower (*Rudbeckia laciniata*), honewort (*Cryptotaenia canadensis*), sweet-scented bedstraw, and smooth carrion flower (*Smilax herbacea*). Mille Lacs County is at the northern edge of the range of FFs59a in Minnesota; most occurrences are in the southern 1/8 of the county along the Rum River and West Branch Rum River. 37 occurrences have been mapped covering 938 acres.

WET FOREST SYSTEM

WFn55 Northern Wet Ash Swamp Class

WFn55b Black Ash - Yellow Birch – Red Maple – Basswood Swamp (Eastcentral) Type
Wet hardwood forests on mucky mineral soils in shallow basins and groundwater seepage areas or on low, level terrain near rivers, lakes, or as part of larger wetlands. There is typically standing water in the spring that drains by late summer. Canopy is interrupted to continuous (50 to >75% cover) and can be dominated purely by black ash or dominated by black ash with a mix of yellow birch, red maple, and quaking aspen. Subcanopy is patchy and has species composition similar to canopy. Shrub and sapling layer varies from patchy to interrupted (25-75% cover) with black ash common along with mountain maple, yellow birch, speckled alder (*Alnus incana*), winterberry, beaked hazelnut, and chokecherry. Graminoids vary in cover from sparse to patchy (<50% cover) but often have a diverse mix of species, including bristle-stalked sedge (*Carex leptalea*), awl-fruited sedge (*C. stipata*), bladder sedge, lake sedge (*C. lacustris*), drooping woodreed (*Cinna latifolia*), and fowl manna grass (*Glyceria striata*). Herbaceous ground layer is usually continuous (>75% cover) and diverse with dwarf raspberry, lady fern, marsh marigold (*Caltha palustris*), sensitive fern (*Onoclea sensibilis*), and horsetails (*Equisetum* spp.) common. WFn55b is common primarily in the northern ½ of Mille Lacs County with 185 mapped occurrences covering 4,941 acres. WFn55b often contains inclusions of and can be difficult to distinguish from WFn64b, MHn46a, and MHc47a.

WFn64 Northern Very Wet Ash Swamp Class

WFn64b Black Ash – Yellow Birch – Red Maple – Alder Swamp (Eastcentral) Type
Wet hardwood or hardwood-conifer forests on peaty soils in small closed depressions, around edges of large peatlands, and in other areas where permanent standing water is possible. Canopy is typically patchy to interrupted (25-75% cover) with black ash most abundant and far lesser amounts of yellow birch, red maple, and rarely tamarack (*Larix laricina*). Subcanopy is patchy, not always clearly defined from the canopy, and composed of species common in the canopy. Shrub and sapling layer is patchy to interrupted (25-75% cover) with black ash and speckled alder dominating. Graminoids typically have 25-50% cover, often with a diverse mix of species including lake sedge, bluejoint (*Calamagrostis canadensis*), fowl manna grass, and autumn bentgrass (*Agrostis perennans*). Herbaceous ground layer is diverse and usually has 50 to >75% cover including bunchberry (*Cornus canadensis*), Canada mayflower, cinnamon fern (*Osmunda cinnamomea*), blue-flag iris (*Iris versicolor*), spotted touch-me-not (*Impatiens capensis*), and northern marsh-fern (*Thelypteris palustris*). Moss cover is variable but typically does not exceed 25% and is dominated by non-*Sphagnum* species. WFn64b is a far less common type of black ash swamp in Mille Lacs County than WFn55b. It is most common in the northern ½ of the county with 40 mapped occurrences covering 1,612 acres. WFn64b often contains inclusions of and can be difficult to distinguish from WFn55b.

FORESTED RICH PEATLAND SYSTEM

FPn72 Northern Rich TamarackSwamp (Eastern Basin) Class

FPn72a Rich Tamarack Swamp (Eastcentral) Type
Tamarack-dominated swamps on shallow to deep peat in basins and in depressions in abandoned river channels. Canopy is patchy to interrupted (25-75% cover) and dominated by tamarack, occasionally with black spruce (*Picea mariana*). Deciduous trees can be scattered in canopy and include black ash, yellow birch, and red maple. Subcanopy is similar in composition and cover to canopy. Tall-shrub and sapling layer usually has >50% cover and is most often dominated by speckled alder mixed with yellow birch, red-osier dogwood (*Cornus stolonifera*), winterberry, mountain maple, and red maple. Low-shrub layer is dominated by Labrador tea (*Ledum groenlandicum*) with lesser amounts of lowbush blueberry, velvet-leaved blueberry (*V. myrtilloides*), small cranberry (*V. oxycoccos*), and bog rosemary (*Andromeda glaucophylla*). Graminoid cover usually does not exceed 25% cover and can be nearly absent with three-fruited bog sedge (*Carex trisperma*), lake sedge, bristle-stalked sedge (*C. leptalea*), and bluejoint typically present. Forb cover is variable but typically exceeds 50% and includes bunchberry, cinnamon fern, goldthread (*Coptis groenlandica*), starflower, three-leaved false Solomon's seal (*Smilacina trifolia*), and crested fern (*Dryopteris cristata*). Moss cover ranges from 50-100% and is dominated by *Sphagnum* species. FPn72a has 59 mapped occurrences in Mille Lacs County covering 1,215 acres and is restricted to the northern ½ of the county.

FPn73 Northern Alder Swamp Class

FPn73a Alder Swamp Type
Tall-shrub wetlands dominated by speckled alder on mineral, muck, or peat soils. Present in wetland basins on glacial moraines and till plains, along streams and drainage ways, or in lags along peatland and upland borders. Trees over 6ft (2m) tall are commonly present as scattered individuals or small isolated clumps with paper birch and black ash common; trees shorter than 6ft (2m) are also commonly scattered in the shrub layer and include paper birch, black ash, and red maple. Tall-shrub layer (>6ft (2m)) has >50% cover and is dominated by speckled alder with red-osier dogwood, willows (*Salix* spp.), dwarf alder (*Rhamnus alnifolia*), and gooseberries common associates. Low-shrub layer (<6ft (2m)) is usually sparse, with red raspberry (*Rubus idaeus*) typical. Forb layer is variable in cover, ranging from 5-50% with typical species including dwarf raspberry, northern bugleweed (*Lycopus uniflorus*), common marsh marigold, red-stemmed aster (*Aster puniceus*), and spotted touch-me-not. Graminoid layer is also variable in cover but usually includes bluejoint with lesser amounts of fowl manna grass, and bristle-stalked sedge. Moss cover is usually minimal and composed of species other than *Sphagnum* species. FPn73a is common throughout Mille Lacs County with 106 mapped occurrences covering 2,656 acres.

FPs63 Southern Rich Conifer Swamp Clas

FPs63a Tamarack Swamp (Southern) Type
Tamarack-dominated swamps on shallow to deep peat in basins on moraines and outwash plains. Occasionally present on floating mats at edges of ponds. Canopy is patchy to interrupted (25-75% cover) and dominated by tamarack with scattered individuals of red maple and paper birch occasionally present. Subcanopy is limited and includes elms (*Ulmus* spp.) in addition to species present in canopy. Tall-shrub layer is variable in cover but typically includes red-osier dogwood, bog birch (*Betula pumila*), and willows. Red raspberry and Virginia creeper dominate low-shrub layer. Forb layer ranges from 25-75% cover with northern marsh fern, dwarf raspberry, spotted touch-me-not, great water dock (*Rumex orbiculata*), and tufted loosestrife (*Lysimachia thyrsiflora*) typical. Graminoid layer is variable in cover and usually includes bluejoint, fowl manna grass, bristle-stalked sedge, and lake sedge. Moss cover is patchy to continuous (25-100%) with variable dominance by *Sphagnum* and non-*Sphagnum* species. FPs63a is uncommon in Mille Lacs County and restricted to 4 small mapped locations in the southeast corner of the county covering 20 acres.

ACID PEATLAND SYSTEM

APn80 Northern Spruce Bog Class

APn80a Black Spruce Bog Type

APn80a2 Black Spruce Bog Semi -Treed Subtype
Black spruce-dominated peatlands on deep peat. Canopy is often sparse, with stunted trees. Understory is dominated by ericaceous shrubs and fine-leaved graminoids on high *Sphagnum* hummocks. Minerotrophic plants are absent or present as widely scattered individuals or clonal patches. Overall species diversity is low and cover of all lifeforms is low except for ericaceous shrubs and *Sphagnum* moss species; graminoid cover can be as high as 25%. Tamarack is often present but is usually much less common than black spruce in all height classes. Scattered saplings and seedlings of paper birch, northern red oak, and red maple are typical. Typical graminoids include three-seeded bog sedge, poor sedge (*C. paupercula*), tussock cottongrass (*Eriophorum vaginatum* var. *spissum*), and tawny cottongrass (*E. virginicum*). Low-shrub layer is dominated by Labrador tea with lowbush blueberry, leatherleaf (*Chamaedaphne calyculata*), and creeping snowberry (*Gaultheria hispidula*) common associates. Forbs are present in low numbers but usually include three-leaved false Solomon's seal (*Smilacina trifolia*), stemless lady slipper (*Cypripedium acaule*), pitcher plant (*Sarracenia purpurea*), and Indian pipe (*Monotropa uniflora*). Mille Lacs County is at the southern edge of the range of APn80a2 with only two mapped locations covering a total of 36 acres within Mille Lacs Kathio State Park and the Mille Lacs Wildlife Management Area. Most black-spruce dominated peatlands in the county are classified as APn81, which differs from APn80 by containing minerotrophic species. It is likely that a few of the areas mapped as APn81 in Mille Lacs County might actually belong in APn80.

APn81 Northern Poor Conifer Swamp Class

Conifer-dominated peatlands with sparse canopy of stunted trees in small isolated basins and in larger basins adjacent to acid peatlands such as poor fens (APn91). Understory is depauperate and dominated by ericaceous shrubs and fine-leaved graminoids on low hummocks of *Sphagnum* moss. Minerotrophic plant species are present. Patchy to interrupted canopy of black spruce and tamarack with jack pine (*Pinus banksiana*) occasionally present. Broadleaf deciduous shrubs and trees are absent or nearly so but when present include individuals of bog birch, paper birch, willows, speckled alder, and red maple. Broadleaf evergreen shrubs are common, have patchy to interrupted cover, and include lowbush blueberry, velvet-leaved blueberry, Labrador tea, leatherleaf, and bog rosemary. Forbs are present but not abundant and include three-leaved false Solomon's seal, stemless lady slipper, tufted loosestrife, cinnamon fern, and pitcher plant. Graminoids are common with patchy-to-interrupted cover, typically including three-seeded bog sedge and tussock cottongrass. Moss cover is usually continuous. APn81 is most common in the northern ½ of Mille Lacs County with 122 mapped locations covering 2,745 acres (including types and subtypes described below). Some occurrences of APn81 may legitimately be mapped as APn80; the presence of minerotrophic species such as tufted loosestrife, cinnamon fern, and speckled alder help distinguish APn81 from APn80.

APn81a Poor Black Spruce Swamp Type
Variation of APn81 with canopy cover >50% and dominated by black spruce with lesser amounts of tamarack. APn81a is typically on slightly drier areas than APn81b and as a result has a more closed canopy and greater presence of shade-tolerant species in the understory, including creeping snowberry and soft-leaved sedge (*Carex disperma*). APn81a is most common in the northern ½ of the county with 41 mapped locations covering 1,469 acres. Some occurrences of this type may legitimately be mapped as APn80a.

APn81b Poor Tamarack – Black Spruce Swamp Type
Variation of APn81 with canopy cover of 25-50% and dominated by black spruce and tamarack. APn81b is typically on slightly wetter areas than APn81a. Because of this, the canopy is more open and there are more sun-loving species in the understory, including bog birch, bog rosemary, leatherleaf, lake sedge, and bog wiregrass sedge (*Carex oligosperma*). APn81b is most common in the northern ½ of the county with 10 mapped locations covering 317 acres.

APn81b2 Poor Tamarack – Black Spruce Swamp Tamarack Subtype
A variation of APn81b with canopy dominated by tamarack with lesser amounts of black spruce. APn81b2 tends to have a fairly open canopy. APn81b2 is most common in the northern ½ of the county with 22 mapped locations covering 320 acres.

APn91 Northern Poor Fen Class

Open *Sphagnum* peatlands with variable development of hummocks and hollows. Dominated by mosses and either fine-leaved sedges or low ericaceous shrubs. Present in small basins, on floating mats near lakes and ponds, and in large peatlands on glacial lake plains. Trees and deciduous shrubs are typically absent or present as individuals with minimal cover and have species composition similar to APn81. Forbs are also nearly absent but when present are likely to include scattered occurrences of crested fern, three-leaved false Solomon's seal, pitcher plant, and scheuchzeria (*Scheuchzeria palustris*). Ericaceous shrub cover can range from barely present to nearly continuous (see types below). Typical shrubs include leatherleaf, Labrador tea, velvet-leaved blueberry, bog rosemary, and small cranberry. Graminoid cover is most often >50% with typical species including tufted cottongrass, bog wiregrass sedge, candle-lantern sedge (*C. limosa*), and fen wiregrass sedge (*C. lasiocarpa*). Moss cover is almost always continuous and composed mainly of *Sphagnum* species. 76 occurrences of APn91 have been mapped in Mille Lacs County, covering 1,749 acres (including the types listed below). Good quality examples are most common in the northern 2/3 of the county.

APn91a Low Shrub Poor Fen Type
Variation of APn91 with leatherleaf and/or bog birch cover either >50% or greater than cover of all graminoids combined (although tussock cottongrass may be abundant, resulting in nearly equal cover of graminoids and low shrubs). Leatherleaf is usually the dominant shrub and tufted cottongrass the dominant graminoid. Wet hollows are uncommon and therefore APn91a lacks wet hollow species listed below for APn91b. 26 examples of APn91a have been mapped in Mille Lacs County, covering 789 acres in the northern 2/3 of the county.

APn91b Graminoid Poor Fen (Basin) Type
Variation of APn91 with cover of leatherleaf and/or bog birch either <50% or less than all graminoid cover combined. APn91b occurs both as small inclusions within larger acid peatlands and within small isolated basins. Typical graminoids include tussock cottongrass, bog wiregrass sedge, and few-fruited sedge (*Carex pauciflora*). Wet hollows are common in APn91b and species restricted to wet hollows are typically present, including white beak rush (*Rhynchospora alba*), scheuchzeria, and candle-lantern sedge. APn91b is uncommon in Mille Lacs County with only 4 mapped occurrences in the northern ½ of the county covering 14 acres and ranging in size from 1.5 – 6 acres.

OPEN RICH PEATLAND SYSTEM

OPn81 Northern Shrub Shore Fen Class

OPn81a Bog Birch – Alder Shore Fen Type
Shrub-dominated peatlands on floating mats along outside margins of peatlands bordering ponds, lakes, and streams. Also present in zones between upland forests and poor conifer swamps. Tree cover is sparse or absent, with scattered individuals and clumps of stunted tamarack, black spruce, or paper birch. Shrub cover is usually 50 to >75% and is dominated by bog birch and speckled alder with lesser amounts of willows, meadowsweet (*Spiraea alba*), and leatherleaf. Forb cover is usually <25% with marsh cinquefoil (*Potentilla palustris*), three-leaved false Solomon's seal, and tufted loosestrife usually present. Graminoid cover is variable with some examples containing abundant bluejoint and lake sedge and other examples with barely 5% graminoid cover. Moss cover is variable but usually 50% or greater and dominated by *Sphagnum* spp. along with lesser amounts of brown mosses. OPn81a is uncommon in Mille Lacs County with 2 mapped occurrences covering 223 acres in the east-central portion of the county.

OPn92 Northern Rich Fen (Basin) Class

OPn92a Graminoid Rich Fen (Basin) Type
Open peatlands on deep, well-decomposed peat or floating peat mats in basins, often adjacent to lakes and ponds. Dominated by fine-leaved graminoids or shrubs with *Sphagnum* cover typically <25% and often absent. Trees are usually absent or consist of occasional stunted paper birch or tamarack. Shrub cover is variable but <25%, with bog birch and bog willow (*Salix pedicellaris*) typically present. Forb abundance is also minimal with tufted loosestrife, northern marsh fern, marsh cinquefoil, and marsh bellflower (*Campanula aparinoides*) typical in low numbers. Among graminoids, fen wiregrass sedge, bluejoint, and prairie sedge (*Carex prairea*) are often common to abundant. OPn92a is uncommon in Mille Lacs County with 3 occurrences covering 156 acres, all within Mille Lacs Kathio State Park.

WET MEADOW/CARR SYSTEM

WMn82 Northern Wet Meadow/Carr Class

WMn82a Willow – Dogwood Shrub Swamp Type
Open wetlands dominated by dense cover of broad-leaved graminoids or tall shrubs. Present on mineral to sapric soils in basins or along streams. Trees >6ft (2m) tall are typically present only as widely scattered individuals or small clumps and include paper birch and black ash. Shrub cover is typically >25% and includes willows, red-osier dogwood, speckled alder, and occasionally bog birch. Forb cover is variable with marsh bellflower, tufted loosestrife, marsh skullcap (*Scutellaria galericulata*), and great water dock commonly present. Broad-leaved graminoids are always abundant, including bluejoint, lake sedge, tussock sedge (*Carex stricta*), and beaked sedge (*C. utriculata*). Moss cover varies from nearly absent to up to 75% cover and is typically dominated by brown mosses but *Sphagnum* can also be abundant, especially when WMn82a occurs adjacent to acid peatlands. WMn82a is common across Mille Lacs County with 227 mapped occurrences covering 9,132 acres.

WMn82b Sedge Meadow Type
Open wetlands similar in all respects to WMn82a except that shrub abundance is typically <25%. WM82b is very common throughout Mille Lacs County with 275 mapped occurrences covering 16,772 acres.

MARSH SYSTEM

MRn83 Northern Mixed Cattail Marsh Class

Emergent marsh communities, typically dominated by cattails (*Typha* spp.). Present on floating mats along shorelines in lakes, ponds, and river backwaters, or rooted in mineral soils in shallow wetland basins. Vegetation is often composed of dense stands of cattails, interspersed with pools of open water. Associated species are highly variable. Shrubs are absent or very sparse with willows most common. Forb cover is strongly dominated by cattails, usually with >50% cover. Other common forbs include marsh cinquefoil, tufted loosestrife, and linear-leaved willow-herb (*Epilobium leptophyllum*). Graminoid cover is variable with bluejoint, lake sedge, bristly sedge (*Carex comosa*), cyperus sedge (*C. pseudocyperus*), and woolgrass (*Scirpus cyperinus*) commonly present. Floating-leaved and submergent aquatic plant cover is sparse with typical species including duckweeds (*Lemna* spp.), greater duckweed (*Spirodela polyrhiza*), and common bladderwort (*Utricularia vulgaris*). MRn83 was mapped 43 times throughout Mille Lacs County covering 1,466 acres.

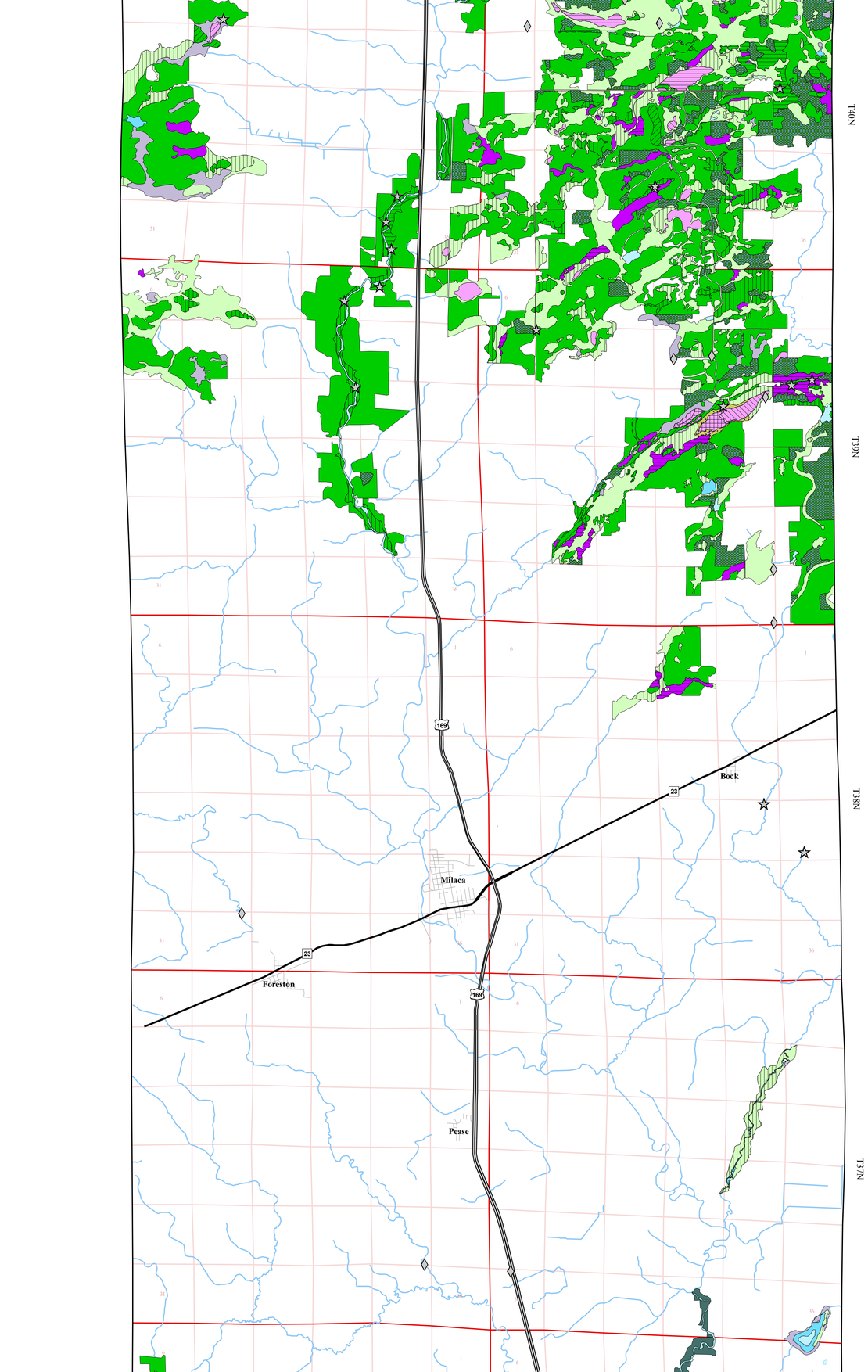
MRn93 Northern Bulrush-Spikerush Marsh Class

Emergent marsh communities typically dominated by bulrushes (*Scirpus* spp.) and spike rushes (*Eleocharis* spp.) rooted in mineral soils along lakeshores and stream borders. Forb cover is usually low with typical species including broad-leaved arrowhead (*Sagittaria latifolia*), bur reeds (*Sparganium* spp.), American white waterlily (*Nymphaea odorata*), and yellow pond lily (*Nuphar luteum* ssp. *variegatum*). Graminoid cover often consists of dense, clonal, single-species patches interspersed with open water. Typical graminoid species include soft stem bulrush (*Scirpus validus*), hardstem bulrush (*S. acutus*), and Small's spikerush (*Eleocharis smallii*). Floating-leaved and submergent aquatic plant cover is variable with typical species including pondweeds (*Potamogeton* spp.), duckweeds, common bladderwort, and northern water milfoil (*Myriophyllum sibiricum*). The two mapped occurrences of MRn93 in Mille Lacs County occur in Shakopee Lake and cover 49 acres. Scattered patches are also present along the Lake Mille Lacs shoreline but are too small to include on this map

NATIVE PLANT COMMUNITY COMPLEXES

MMS_CX MEADOW -MARSH-FEN-SWAMP COMPLEX
Complex of sedge meadow (WMn82b), cattail marsh (MRn83), rich fen (OPn81a, OPn92a) and willow-dogwood shrub swamp (WMn82a). Individual elements of MMS_CX occur as areas too intricately mixed or too small to map individually. MMS_CX occurs in Mille Lacs Kathio State Park within the wetland fringes of Ogeechie & Shakopee Lakes and along the Rum River between these lakes. MMS_CX covers 639 acres.

YF_CX YOUNG FOREST COMPLEX
An area dominated by forests < 30 years old with a canopy structure significantly different than the surrounding forests. It often contains inclusions of older forests, wetlands, and disturbed lands. This complex was used to map young forest inclusions within surrounding areas containing significant native plant communities. Isolated occurrences were not mapped. Based on this procedure, it has been mapped 196 times covering 9,195 acres primarily in the northeastern 2/3 of the county.



THE VEGETATION OF MILLE LACS COUNTY AT THE TIME OF THE PUBLIC LAND SURVEY

This map shows the vegetation of Mille Lacs County as interpreted by Francis J. Marschner using Public Land Survey records from 1851-1856. The legend descriptions shown are from Marschner's original descriptions.

- Wet Prairie
- Brush Prairie
- Aspen-Oak Land
- Oak Openings and Barrens
- Big Woods
- Aspen-Birch (Hardwoods)
- Mixed Hardwood and Pine
- Pine Groves - White Pine
- Pine Groves - White and Norway Pine
- Aspen-Birch (Conifer)
- Conifer Bogs and Swamps
- Water

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1:60,000

RARE SPECIES OF SPECIAL INTEREST

- Rare Animals
- Rare Plants
- Colonial Waterbird Nesting Site

OTHER MAPPED FEATURES

- Lakes and Open Water
- Rivers, Streams, and Ditches

MINNESOTA COUNTY BIOLOGICAL SURVEY
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