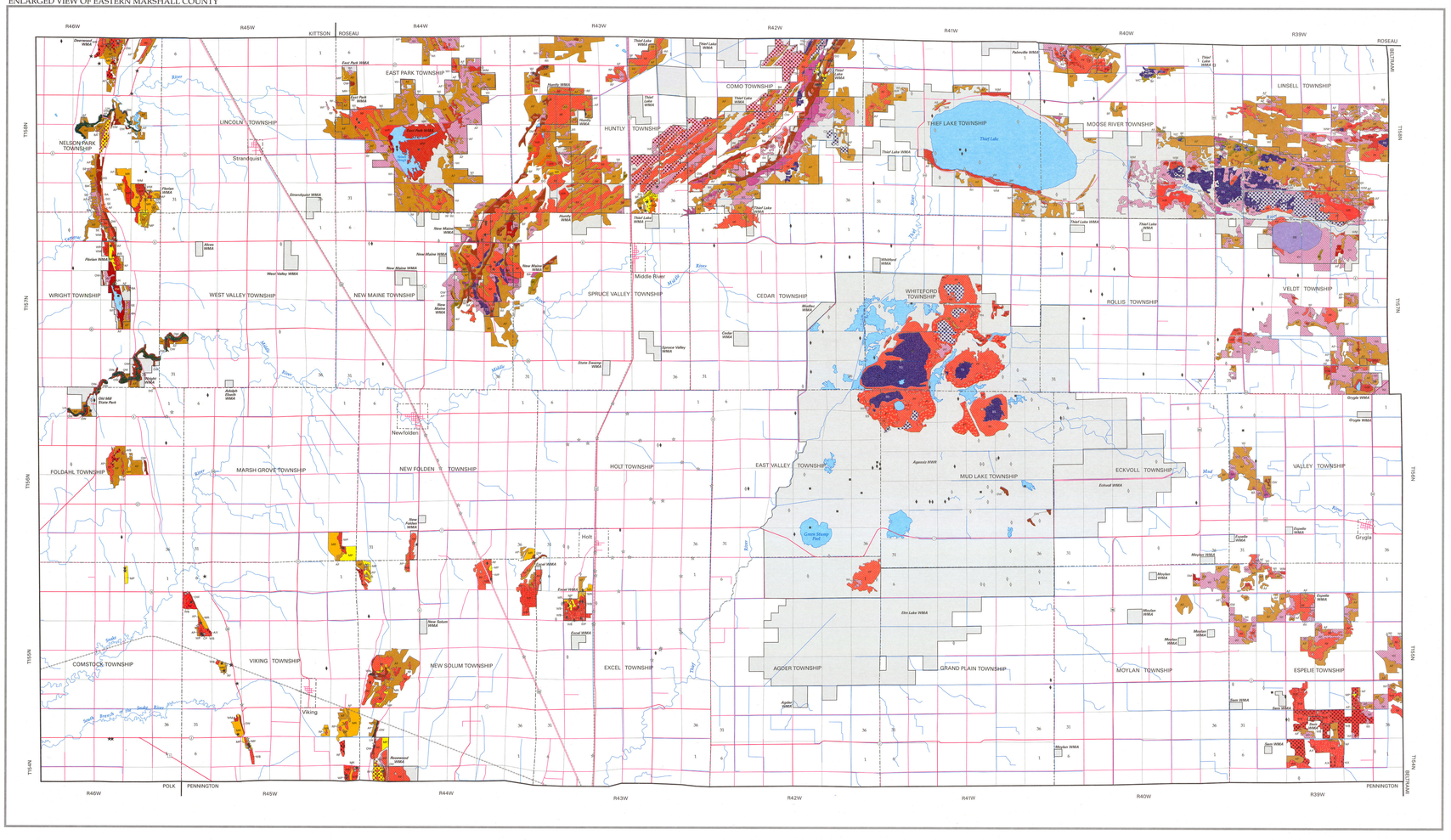
Minnesota County Biological Survey
Department of Natural Resources
Division of Ecological Services
500 Lafayette Road - Box 25, St. Paul, MN 55155
Phone (651) 296-2835

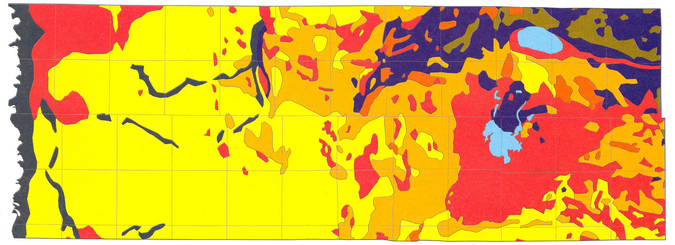
Minnesota County Biological Survey Map Series No. 20 (2001)
Marshall County, Minnesota

NATIVE PLANT COMMUNITIES AND RARE SPECIES OF MARSHALL COUNTY, MINNESOTA

by the
Minnesota County Biological Survey[1]

ENLARGED VIEW OF EASTERN MARSHALL COUNTY





THE VEGETATION OF MARSHALL COUNTY AT THE TIME OF THE PUBLIC LAND SURVEY

This map shows the vegetation of Marshall County as interpreted by Francis J. Marschner using Public Land Survey records from 1872-1893.[3] Marschner's interpretation of these records provides an accurate historical overview of Minnesota's vegetation patterns, with occasional local discrepancies between his interpretation and the original survey records. The legend descriptions of vegetation types have been modified from Marschner's descriptions as appropriate for northwestern Minnesota. Extant native plant community types corresponding to Marschner's categories are listed in parentheses.

HARDWOOD FOREST

- **River Bottom Forest** - elm, ash, basswood, cottonwood, boxelder, willow, aspen, bur oak (Lowland Hardwood Forest).
- **Aspen-Birch (tending to conifers)** - successional forests dominated by quaking aspen with significant conifer elements, including tamarack, balsam fir, spruce, and paper birch (Boreal Hardwood-Conifer Forest; also includes areas that have succeeded to Aspen Forest).

BRUSHLAND

- **Brush Prairie** - mosaic of prairie and clumps of aspen and willow (Mesic Brush-Prairie, Wet Brush-Prairie; because of habitat fragmentation, parts of former brush prairie landscapes are now also mapped as Aspen Parkland, Willow, Wet Prairie, Rich Fen, and Willow Swamp; also includes areas that have succeeded to Aspen Forest).
- **Aspen-Oak Land** - oak and aspen, with scattered elms, ash, and basswood (The relationship between this vegetation type and current community types is sometimes unclear, but it probably included areas currently mapped as Oak Woodland-Brushland and Dry-Oak Savanna).

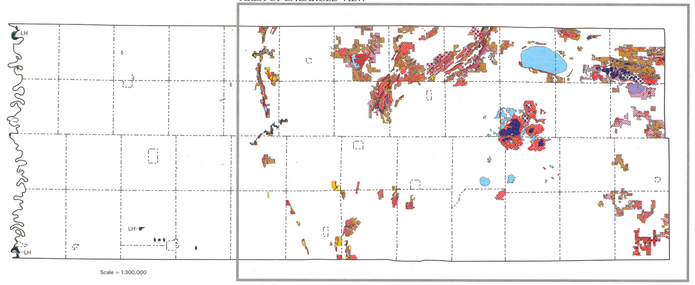
GRASSLAND

- **Prairie** - uplands dominated by native grasses (Dry Prairie-sand gravel subtype, Mesic Prairie).
- **Wet Prairies, Marshes and Sloughs** - marsh-grasses, rushes, with willow in some places (Calcareous Seepage Fen, Wet Prairie, Rich Fen, Wet Meadow, Wet Meadow-shrub subtype, Emergent Marsh; includes Shrub Swamp and Willow Swamp in prairie portions of the county).

BOGS AND SWAMPS

- **Conifer Bogs and Swamps** - tamarack and black spruce swamps (Tamarack Swamp, Black Spruce Swamp, Black Ash Swamp, White Cedar Swamp, Spruce Bog, Poor Fen; also includes Shrub Swamp and Willow Swamp in forested portions of the county).
- **Open Water**

AREA OF ENLARGED VIEW

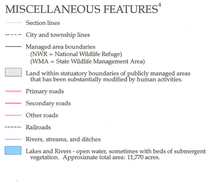


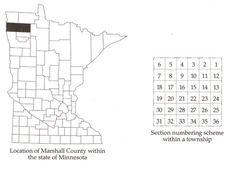
MARSHALL COUNTY NATIVE PLANT COMMUNITIES AND RARE SPECIES

The above view shows native plant communities for all of Marshall County and rare species only for the western portion of the county.

MISCELLANEOUS FEATURES[4]

- Section lines
- City and township lines
- Managed area boundaries (NWR = National Wildlife Refuge) (WMA = State Wildlife Management Area)
- Land within statutory boundaries of publicly managed areas that has been substantially modified by human activities.
- Primary roads
- Secondary roads
- Other roads
- Railroads
- Rivers, streams, and ditches
- Lakes and Rivers - water, sometimes with beds of submergent vegetation. Approximate total area: 11,770 acres.





Location of Marshall County within the state of Minnesota

NATIVE PLANT COMMUNITIES

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 an oak forest, a prairie, or a marsh, that tend to repeat over space and time. Native plant communities are generally classified and described by considering vegetation, hydrology, landforms, soils, and natural disturbance regimes. The native plant community types and subtypes on this map are classified primarily by vegetation and major habitat features.[2] The Minnesota County Biological Survey located areas of native plant communities in Marshall County during 1991 and 1992, using aerial photo interpretation followed by field surveys of selected sites. The description and approximate acreage of each native plant community type and subtype given below are based on the results of the Survey. While or light-gray areas on the map represent land where the natural vegetation has been destroyed primarily by cultivation, other human activities such as mowing, overgrazing, wetland drainage, or recent logging. Native plant communities covered approximately 89,750 acres, or 77% of the land area of Marshall County at the time of the Survey.

UPLAND FORESTS

DECIDUOUS FORESTS

AP **Aspen Forest** - Mapped examples in Marshall County include two variants: nearly level wet forests on sandy soils in the prairie-forest border area and mesic stands on rolling sandy forest soils in the northeast part of the county. Canopy coverage nearly continuous. Quaking aspen (*Populus tremuloides*) frequent in both variants, occurring with white spruce (*Picea glauca*), balsam fir, jack pine, and bur oak. Quercus was surprised in upland stands. Balsam Poplar (*Populus balsamifera*) and paper birch frequent in wet stands. Shrub layer interrupted to continuous, dominated by beaked hazel (*Corylus cornuta*). Juneberry (*Amelanchier alnifolia*) frequent in both wet and mesic stands. Common ground-layer species in both variants include northern bedstraw (*Galium boreale*), common strawberry (*Fragaria virginiana*), poison ivy (*Rhus radicans*), black snakeroot (*Sanicula marilandica*), and dwarf raspberry (*Rubus pubescens*). Yarrow (*Achillea millefolium*), spreading dogbane (*Apocynum androsaemifolium*), rattlesnake fern (*Botrychium virginianum*), and Canada mayflower (*Maianthemum canadense*) common in wet-mesic stands; sweet-cicely (*Osmorhiza depauperata*) frequent in mesic stands, whereas wild sarsaparilla (*Aralia nudicaulis*), starflower (*Trientalis borealis*), and blueberries (*Vaccinium* spp.) were more commonly in wet stands. A common community throughout eastern half of county, mapped only in sites where other native plant communities are present. Approximate area mapped: 29,150 acres.

LH **Lowland Hardwood Forest** - Highly variable mesic and wet-mesic forests, most frequently occurring along creeks and small drainages in lower parts of community temporarily flooded during spring runoff. Canopy dominated by combination of American elm (*Ulmus americana*), basswood (*Tilia americana*), bur oak (*Quercus macrocarpa*), white green ash (*Fraxinus pennsylvanica*), quaking aspen, balsam poplar, and bur oak frequent. Shrub layer sparse, with chokecherry (*Prunus virginiana*), prairie-leaved willow (*Salix humilis*), and gooseberries (*Ribes* spp.) most frequent. No distinctive or consistent association of ground-layer species. Vines present in nearly all sites. Map units sometimes include forested side slopes of small valleys. But oak is usually the dominant tree on drier side slopes, especially south-facing slopes. Approximate area mapped: 1,145 acres.

MIXED CONIFEROUS-DECIDUOUS FORESTS

RF **Boreal Hardwood-Conifer Forest** - Mixed deciduous-coniferous forests with combination of boreal species and species of deciduous forests to the south. Trees of boreal forest, deciduous component of tree canopy and balsam fir (*Abies balsamea*) or white spruce in coniferous component of canopy. Subcanopy and shrub layer sparse, with mountain maple (*Acer spicatum*) distinctive to community. High-bush cranberry (*Viburnum trilobum*) and chokecherry frequent. Most frequent ground-layer species include wild sarsaparilla (*Aralia nudicaulis*), dwarf raspberry, Canada mayflower (*Maianthemum canadense*), milkweeds (*Mitella nuda*), Lindley's aster (*Aster ciliolatus*), three-flowered bedstraw (*Galium triflorum*), red baneberry (*Actaea rubra*), and wild ginger (*Asarum canadense*). Approximate area mapped: 600 acres.

DECIDUOUS WOODLANDS/SAVANNAS

DECIDUOUS WOODLANDS

OW **Oak Woodland-Brushland** - Rolling to hilly dry-mesic woodlands on coarse-textured soils, usually associated with beach ridges. Tree canopy interrupted to patchy, dominated by bur oak. Shrub layer moderately dense, with American hazelnut (*Corylus americana*), chokecherry, gray dogwood (*Cornus foemina*), and downy arrow-wood (*Viburnum rafinesquianum*) characteristic. Presence of mountain rice-grass and false mesic grass (*Schizachne purpurascens*) in ground layer is characteristic. Other common forest floor species include poison ivy, Lindley's aster, Canada mayflower, veiny meadow-rue (*Thalictrum venulosum*), Canada goldenrod (*Solidago canadensis*), veiny pea (*Lathyrus venosus*), American vetch (*Vicia americana*), and spreading dogbane. Often develops as a successional community following fires in areas formerly occupied by oak savanna. Community is also mapped as a component of dry prairie-woodland complexes (see below). Approximate area mapped: 2,935 acres.

DECIDUOUS SAVANNAS

OS **Dry Oak Savanna** - Open oak-dominated communities on sandy and gravelly soils associated with glacial beach ridges. Interrupted to open canopy dominated by bur oak. Subcanopy and shrub layer sparse, with Saskatoon (*Amelanchier alnifolia*) and American hazelnut the most frequent species. Ground layer dominated by some combination of the prairie grasses big bluestem (*Andropogon gerardii*), porcupine-grass (*Stipa spartea*), and June-grass (*Koeleria macrantha*). Common forbs include white sage (*Artemisia ludoviciana*), gray goldenrod (*Solidago nemoralis*), stiff goldenrod (*Solidago rigida*), wild strawberry (*Fragaria virginiana*), and hairy Solomon's-seal (*Polygonatum pubescens*) in the ground layer. Approximate area mapped: 1,465 acres.

CONIFER SWAMP FORESTS

WCe2 **White Cedar Swamp** - Very small inclusions of forested swamp on the south slope of Randeen Ridge in Lisnell Township and on poorly drained fine sandy soils north of Thief Lake in Moose River Township. Also mapped in small inclusions in Whitefor and Lisnell Township and with tamarack swamp in Moose River Township. Interrupted canopy of white cedar (*Thuja occidentalis*) and paper birch. Shrub layer dominated by speckled alder (*Alnus incana*), with balsam fir as common canopy associates. Shrub layer sparse, with red-osier dogwood, mainly lacustrine ground-layer species, and sphagnum moss common. Ground-layer vegetation interrupted by numerous small pools; species-rich but with few species dominant. Characteristic ground-layer forbs include wild sarsaparilla, dwarf raspberry, wild calla, and twinflower (*Linnaea borealis*), three-leaved lake Solomon's-seal (*Smilacina trifoliata*), and gold-thread (*Coptis groenlandica*). Common ground-layer graminoids include soft-leaved sedge (*Carex disperma*), bristle-stalked sedge (*Carex leptalea*), and three-seeded bog sedge (*Carex trisperma*). Feathermoses common. Approximate area mapped: 85 acres.

TS **Tamarack Swamp** - Forested swamps on saturated peat in wetland complexes in Agassiz National Wildlife Refuge, along the Roseau County line north of Thief Lake, adjacent to the Moose River, and at bases of ozone-structured beach ridges adjacent to rich fen complexes in New Maine Township. Surface water circumneutral to mildly acidic. Canopy dominated by moderately open to fairly dense stands of tamarack with occasional quaking aspen, black ash, and black spruce. In Lisnell Township and Agassiz National Wildlife Refuge, community grades into open tamarack bog with more open canopy and more peat moss. Diverse, sparse to moderately dense shrub layer includes Labrador tea, bog birch, twinflower, balsam willow, and speckled alder. Graminoids prominent in ground layer, but not as dominant as in open bogs with tamarack. Carex lasiocarpa, soft-leaved sedge, bristle-stalked sedge, bog willow grass (*Glyceria striata*), and bluejoint (*Calamagrostis canadensis*) frequent. Other common ground-layer species include dwarf raspberry, twinflower, cranberries (*Vaccinium oxycoccus*), bunchberry, and twinflower. Sphagnum mosses (*Sphagnum* spp.) present in drier or more acidic areas. Approximate area mapped: 1,530 acres.

BS **Black Spruce Swamp** - Forested swamps on saturated peat in wetland complexes in the northeast part of the county. Usually associated with open tamarack swamps but have less than 30% cover; typical species include shrubby cinquefoil, pussy willow, Bebb's willow, slender willow, and bog birch. Approximate area mapped: 1,025 acres.

DPg2 **Dry Prairie - sand-gravel subtype** - Dry to dry-mesic prairies on glacial beach ridges. Typically dominated by some combination of the grasses little bluestem (*Schizachyrium scoparium*), porcupine-grass, June-grass, and big bluestem. Although not dominant, oat grass (*Helictotrichon hookeri*) is characteristically present. Leaf-plant and prairie rose (*Rosa arkansana*) are common shrubs. Typical forbs include prairie wild onion (*Allium stellatum*), prairie-clover (*Dalea candida*), upright prairie coneflower (*Ratibida columnifera*), silky aster (*Aster sericeus*), harebell (*Campanula rotundifolia*), northern bedstraw, stiff sunflower, hoary puccoon, purple prairie-clover (*Petalostemum purpureum*), and wild goldenrod. Approximate area mapped: 185 acres.

FORESTED WETLANDS

HARDWOOD SWAMP FORESTS

BA **Black Ash Swamp** - Wet, minerotrophic forests at bases of gravel ridges in Como and New Maine Townships in the eastern part of the county. Mapped examples also include several mesic black ash stands on south-facing to slopes along Randeen Ridge. Both wet and mesic stands characterized by closed canopy of multi-aged black ash, paper birch, and American elm. Quaking aspen frequent in mesic stands. Shrub layer interrupted to continuous, typically sparse, dominated by beaked hazel (*Corylus cornuta*). Juneberry frequent in both wet and mesic stands. Common ground-layer species in both variants include northern bedstraw (*Galium boreale*), common strawberry (*Fragaria virginiana*), poison ivy (*Rhus radicans*), black snakeroot (*Sanicula marilandica*), and dwarf raspberry (*Rubus pubescens*). Yarrow (*Achillea millefolium*), spreading dogbane (*Apocynum androsaemifolium*), rattlesnake fern (*Botrychium virginianum*), and Canada mayflower (*Maianthemum canadense*) common in wet-mesic stands; sweet-cicely (*Osmorhiza depauperata*) frequent in mesic stands, whereas wild sarsaparilla, starflower (*Trientalis borealis*), and blueberries (*Vaccinium* spp.) were more commonly in wet stands. A common community throughout eastern half of county, mapped only in sites where other native plant communities are present. Approximate area mapped: 29,150 acres.

PRAIRIES

UPLAND PRAIRIES

MP **Mesic Prairie** - Wet-mesic to dry-mesic prairies on sandy glacial lake sediments and loamy tills. Dominated by grasses, typically some combination of big bluestem, prairie dropseed (*Sporobolus heterolepis*), and Indian grass (*Sorghastrum nutans*), with porcupine-grass and June-grass on drier sites and prairie cordgrass (*Spartina pectinata*) and tufted hair grass (*Deschampsia cespitosa*) on wetter sites. Brush cover sparse; shrubby cinquefoil (*Potentilla fruticosa*), leadplant (*Amorpha canescens*), and prairie rose (*Rosa arkansana*) frequent, with lead-plant (*Amorpha canescens*) common on dry-mesic sites. Typical forbs include northern bedstraw and Maximilian's sunflower (*Helianthus maximiliani*). Heath aster (*Aster ericoides*), gray goldenrod, and stiff goldenrod (*Solidago rigida*) are also common on drier sites, with giant sunflower (*Helianthus giganteus*), heart-leaved alexanders (*Zizia aptera*), blazing star (*Liatris ligulistylis*), and late-golden ragwort (*Senecio pauperculus*) common on wetter sites. Approximate area mapped: 540 acres.

MP **Mesic Brush-Prairie** - Nearly level wet-mesic to dry-mesic prairies on sandy glacial lake sediments and loamy tills. Characterized by frequent clumps of woody vegetation, which may have as much as 50% cover. Bebb's willow (*Salix bebbiana*), Sandbar willow, prairie willow (*Salix humilis*), and quaking aspen are common woody species on dry-mesic sites. Bog birch (*Betula pumila*var.*glandulifera*), shrubby cinquefoil, pussy willow (*Salix discolor*), and slender willow are characteristic of wet-mesic sites. Height and density of woody species variable, with bog birch and willows usually forming dense thickets and aspen a mosaic of big bluestem, prairie dropseed, and Indian grass with porcupine-grass and June-grass on drier sites, and prairie cord-grass and tufted hair grass on wetter sites. Forbs include those characteristic of mesic prairies, and frequent tall meadow-rue (*Thalictrum dasycarpum*). Approximate area mapped: 1,595 acres.

WMe **Wet Brush-Prairie** - Nearly level wet prairies on poorly drained sediments associated with red-osier dogwood, and bog birch. Ground layer diverse, seldom dominated by a single species. Common woody ground-layer species include dwarf raspberry and blueberries (*Vaccinium pensylvanicum* and *V. myrtilloides*). Other ground-layer species include three-leaved false Solomon's-seal, soft-leaved sedge, twinflower, bunchberry, creeping snowberry (*Gaultheria hispidula*), and mitrewort. Sphagnum mosses and feathermosses common. Approximate area mapped: 2,865 acres.

BOGS

FORESTED BOGS

BS **Black Spruce Bog** - Forested bogs on saturated peat in wetland complexes in Agassiz National Wildlife Refuge and adjacent to the Moose River in Lisnell Township. Commonly grade into black spruce swamps. Canopy dominated by black spruce with occasional tamarack. Tall-shrub layer scattered to absent. Low-shrub layer dominated by members of the heath family, particularly Labrador tea, leather-leaf, and blueberries. Characteristic ground-layer species include three-seeded bog sedge, soft-leaved sedge, three-leaved false Solomon's-seal, bunchberry, and twinflower. This community occurs on slightly drier sites than black spruce swamp and is characterized by continuous carpet of sphagnum mosses. Approximate area mapped: 930 acres.

WM **Wet Meadow** - Wet, graminoid-dominated communities on nearly level, slightly depressional, very poorly drained soils formed in organic material over loamy till or sands. Seasonally flooded with persistent high water tables. Very patchy shrub layer, commonly including shrubby willows, heart-leaved willow, autumn willow (*Salix serissima*), and pussy willow. Ground-layer dominated by broad-leaved sedges and soft-stemmed grasses, including lake sedge, slough sedge (*Carex atherodes*), water sedge (*Carex aquatilis*), beaked sedge (*Carex rostrata*), bluejoint, and northern reed grass, with patches of hard stem bulrush (*Scirpus acutus*), common spike-rush (*Eleocharis palustris*), and wool-grass (*Scirpus cyperinus*). Sometimes with narrow-leaved cattail (*Typha angustifolia*), water smartweed (*Polygonum amphibium*), marsh cinquefoil (*Potentilla palustris*), tufted loosestrife (*Lysimachia thyrsiflora*), bog aster (*Aster borealis*), swamp aster (*Aster puniceus*), and several species of sedges. Rare to occur with other native plant communities. Approximate area mapped: 2,420 acres.

WMe **Wet Meadow - shrub subtype** - Shrubby variant of wet meadow. Graminoid-dominated communities on nearly level, slightly depressional, very poorly drained soils formed in organic material over loamy till or sands. Seasonally flooded with persistent high water tables. Several species of willow collectively attain cover of up to 50%, including slender willow (*Salix petiolaris*), Bebb's willow, pussy willow (*Salix discolor*), and prairie willow (*Salix humilis*). Bog birch (*Betula pumila*) and red-osier dogwood also common. Similar to wet meadow, but with northern marsh-fern (*Thelypteris palustris*) and tall meadow-rue noticeably more common. A common community, mapped in Marshall County only where it occurs with other native plant communities. Approximate area mapped: 1,435 acres.

RFe **Rich Fen** - Seasonally flooded, open wetlands on level to slightly convex fine sediments and till. Water table remaining in rooting zone for most of growing season. Characterized by wiregrass sedge (*Carex lasiocarpa*) and northern reed-grass, with frequent Bushnan's sedge, tall cottongrass (*Eriophorum angustifolium*), flattened spike-rush (*Eleocharis compressa*), and clustered stalky grass (*Muhlenbergia glomerata*). Fork diversity is generally low; characteristic species include bog aster, marsh bellflower (*Campanula aparinoides*), grass-leaved goldenrod, water smartweed, tufted loosestrife, northern bedstraw (*Galium asprellum*), bedge-nettle, and marsh St. John's-wort (*Hypericum kalmii*). Sphagnum mosses are absent, but brown mosses (*Drepanocladus* spp.) are frequent. Shrubs rare to absent, with less than 30% cover; low shrubs achieve cover of 30% to 70%. Common shrubs include slender willow, shrubby cinquefoil, bog birch, and red-osier dogwood. Approximate area mapped: 12,625 acres.

WMe **Wet Prairie** - Nearly level prairies on mineral soil formed in glacial till and glacial lake deposits. Typically occur in shallow depressions where drainage is impeded but flooding is temporary and water tables are below rooting zone for most of growing season. Characterized by graminoids, with grasses more common than sedges. Major species are big bluestem, prairie cord-grass, tufted hair grass, northern bedstraw, prairie dropseed, and mat muhly grass (*Muhlenbergia richardsonis*). Characteristic sedges include Sartwell's sedge (*Carex sartwellii*), Bushnan's sedge (*Carex bushnanii*), woolly sedge (*Carex lanuginosa*), and northern sallow sedge (*Carex scirpoidea*). Typical forbs include giant sunflower, northern bedstraw, grass-leaved goldenrod, Canada goldenrod, Maximilian sunflower, heart-leaved alexanders (*Zizia aurea*), and tall meadow-rue. Shrubs sometimes common but have less than 30% cover; typical species include shrubby cinquefoil, pussy willow, Bebb's willow, slender willow, and bog birch. Approximate area mapped: 1,925 acres.

SHRUB WETLANDS

SHRUB SWAMPS

SS **Shrub Swamp - seepage subtype** - Wet, shrub-dominated communities on organic soils on slight slopes where up-welling calcareous groundwater maintains saturated conditions but flooding is unimportant. Most frequently occur near bases of glacial beach ridges. Characterized by a dense shrub layer dominated by some combination of bog birch, pussy willow, Bebb's willow, and slender willow; prairie willow (*Salix humilis*) and red-osier dogwood also frequent. Ground layer variable, generally with low diversity. Approximate area mapped: 320 acres.

WMe **Wet Meadow - shrub subtype** - Shrubby variant of wet meadow. Graminoid-dominated communities on nearly level, slightly depressional, very poorly drained soils formed in organic material over loamy till or sands. Seasonally flooded with persistent high water tables. Several species of willow collectively attain cover of up to 50%, including slender willow (*Salix petiolaris*), Bebb's willow, pussy willow (*Salix discolor*), and prairie willow (*Salix humilis*). Bog birch (*Betula pumila*) and red-osier dogwood also common. Similar to wet meadow, but with northern marsh-fern (*Thelypteris palustris*) and tall meadow-rue noticeably more common. A common community, mapped in Marshall County only where it occurs with other native plant communities. Approximate area mapped: 1,760 acres.

WMe **Willow Swamp** - Wet, shrub-dominated communities on poorly drained, mainly lacustrine soils. Most frequently occur on gently sloping areas at bases of beach ridges in Agassiz Lacustrine Plain. Semi-permanently flooded or seasonally flooded with persistent high water tables. Shrub layer dominated by some combination of pussy willow, Bebb's willow, and slender willow, with red-osier dogwood and heart-leaved willow (*Salix eriocephala*) common. Sage willow (*Salix candida*) is characteristic, although not common. Herbaceous species composition highly variable, with many grass and sedge species typical of wet meadows and also with emergent marshes. Common graminoids include lake sedge and bluejoint. A very common community in managed areas in Marshall County, mapped only in areas where it occurs with other native plant communities. Approximate area mapped: 13,965 acres.

OPEN WETLANDS

LOWLAND PRAIRIES

WMe **Wet Prairie - tamarack subtype** - Low-shrub dominated wetlands with nearly continuous expression of both shrub layers and significant tamarack component, which attains heights up to 10 meters and 30% to 70% cover. Community occurs in wetland complexes on saturated peat in the northwestern part of the county in Agassiz National Wildlife Refuge, where it grades into conifer swamp and spruce bog. In addition to tamarack, occasional paper birch, black spruce, and aspen (*Populus* spp.) contribute to interrupted tree layer. In one anomalous site in Moose River Township, dwarf aspen trees achieve greater than 50% cover. Low-shrub layer dominated by bog birch, pussy willow, Bebb's willow, Labrador tea, and lowbush blueberry. Ground layer dominated by sphagnum mosses. Characteristic graminoids include wiregrass sedge and candle-lantern sedge (*Carex limosa*). Forb species composition variable, generally with low diversity. Approximate area mapped: 2,275 acres.

PFe **Poor Fen - shrub subtype** - Low-shrub dominated wetlands on saturated peat in the northeastern part of the county and in Agassiz National Wildlife Refuge, where community occurs in wetland complexes with rich fen and bog. Low-shrub layer cover of leather-leaf, Labrador tea, and lowbush blueberry. Tamarack, paper birch, and quaking aspen present as scattered individuals. Ground layer dominated by sphagnum mosses. Characteristic graminoids include wiregrass sedge and candle-lantern sedge. Forb species composition variable, generally with low diversity. Approximate area mapped: 360 acres.

PF **Poor Fen** (subtype not differentiated) - Includes examples of poor fen - shrub subtype and poor fen - tamarack subtype described above. Present in northeastern part of county and in Agassiz National Wildlife Refuge. Approximate area mapped: 4,550 acres.

EMARGENT MARSHES

EM **Emergent Marsh** - Open, semi-permanently flooded wetlands between glacial beach ridges or on nearly level, slightly depressional, very poorly drained soils over loamy till or sands. Seasonally flooded with persistent high water tables. Very patchy shrub layer, commonly including willow, heart-leaved willow, autumn willow (*Salix serissima*), and pussy willow. Ground-layer dominated by broad-leaved sedges and soft-stemmed grasses, including lake sedge, slough sedge (*Carex atherodes*), water sedge (*Carex aquatilis*), beaked sedge (*Carex rostrata*), bluejoint, and northern reed grass, with patches of hard stem bulrush (*Scirpus acutus*), common spike-rush (*Eleocharis palustris*), and wool-grass (*Scirpus cyperinus*). Sometimes with narrow-leaved cattail (*Typha angustifolia*), water smartweed (*Polygonum amphibium*), marsh cinquefoil (*Potentilla palustris*), tufted loosestrife (*Lysimachia thyrsiflora*), bog aster (*Aster borealis*), swamp aster (*Aster puniceus*), and several species of sedges. Rare to occur with other native plant communities. Approximate area mapped: 2,420 acres.

EMe **Emergent Marsh** - Open, semi-permanently flooded wetlands between glacial beach ridges or on nearly level, slightly depressional, very poorly drained soils over loamy till or sands. Seasonally flooded with persistent high water tables. Very patchy shrub layer, commonly including willow, heart-leaved willow, autumn willow, and pussy willow. Ground-layer dominated by broad-leaved sedges and soft-stemmed grasses, including lake sedge, slough sedge (*Carex atherodes*), water sedge (*Carex aquatilis*), beaked sedge (*Carex rostrata*), bluejoint, and northern reed grass, with patches of hard stem bulrush (*Scirpus acutus*), common spike-rush (*Eleocharis palustris*), and wool-grass (*Scirpus cyperinus*). Sometimes with narrow-leaved cattail (*Typha angustifolia*), water smartweed (*Polygonum amphibium*), marsh cinquefoil (*Potentilla palustris*), tufted loosestrife (*Lysimachia thyrsiflora*), bog aster (*Aster borealis*), swamp aster (*Aster puniceus*), and several species of sedges. Rare to occur with other native plant communities. Approximate area mapped: 2,420 acres.

EMe **Emergent Marsh - shrub subtype** - Shrubby variant of wet meadow. Graminoid-dominated communities on nearly level, slightly depressional, very poorly drained soils formed in organic material over loamy till or sands. Seasonally flooded with persistent high water tables. Several species of willow collectively attain cover of up to 50%, including slender willow (*Salix petiolaris*), Bebb's willow, pussy willow (*Salix discolor*), and prairie willow (*Salix humilis*). Bog birch (*Betula pumila*) and red-osier dogwood also common. Similar to wet meadow, but with northern marsh-fern (*Thelypteris palustris*) and tall meadow-rue noticeably more common. A common community, mapped in Marshall County only where it occurs with other native plant communities. Approximate area mapped: 1,760 acres.

NATIVE PLANT COMMUNITY COMPLEXES

DPe **Dry Prairie-Woodland Complex** - Mosaics of dry prairie and oak woodland on glacial beach ridges. Dry prairie - sand gravel subtype, oak savanna, and oak woodland-brushland are the most constituent community types. Approximate area mapped: 205 acres.

PWe **Prairie-Wetland Complex** - Mosaics of mainly wet prairie and other open wetlands in Agassiz Lacustrine Plain and Agassiz Lacustrine Plain and eolsed peat, drained lands formed in loamy glacial till. Principal community types are wet prairie, wet meadow, mixed emergent marsh, and mesic prairie. Approximate area mapped: 85 acres.

LPe **Lake Agassiz Shoreline and Swale Complex** - Recurring patterns of ridges dominated by aspen and wet aspen forests and swales dominated by willow-carr, swamp, fen, and wet meadow. Occurs downslope and west of gravel ridges northeast of Middle River in Huntley and Como townships. Approximate area mapped: 1,990 acres.

APe **Aspen Parkland Complex** - Mosaic of wet prairie, wet brush-prairie, mesic prairie, mesic brush-prairie, and aspen groves on coarse loamy till at scale too fine for communities to be mapped separately. Approximate area mapped: 1,370 acres.

CFe **Conifer Swamp Complex** - Areas where black spruce swamp and tamarack swamp intergrade in mosaic too fine to be mapped or where communities are not clearly differentiable as black spruce swamp or tamarack swamp. Map units may also have small inclusions of white cedar swamp, black ash swamp, and tamarack bog. Confined to Thief Lake and Agassiz National Wildlife Refuge area of the county. Approximate area mapped: 1,785 acres.

RARE SPECIES AND ANIMAL AGGREGATIONS

Locations of rare plants, rare animals, and selected animal aggregations are maintained in the Natural Heritage Information System.[5] The following rare species and animal aggregations (which include concentrations and rare species) have been found in Marshall County. Mapped locations include both historical records and the results of field surveys conducted by the Minnesota County Biological Survey in 1991 and 1992, and by the 1997 MCBS Railroad Right-of-Way survey.[6] Rare plants and animals are often protected under the provisions of the Federal Endangered Species Act or the Minnesota Endangered Species Statute and associated Rules, or are being considered for protection, or were protected when the MCBS was conducted in the County.[7] An asterisk (*) indicates that no recent observation (1970-2001) of that species has been confirmed. A dagger (†) indicates that the species has been documented in the county but its exact location is not determinable.

★	Plants, federally- or state-listed	
	Siberian yarrow	(*Achillea sibirica*)
	Northern androsace	(*Androsace septentrionalis* ssp. *puberulenta*)
	Small-leaved pussytoes	(*Antennaria parvifolia*)
	Prairie moonwort	(*Botrychium campestre*)
	Hill's thistle	(*Cirsium hillii*)
	Blunt sedge	(*Carex retrorsa*)
	Northern singlespike sedge	(*Carex scirpoidea*)
	Sterile sedge	(*Carex sterilis*)
	Dry sedge	(*Carex xerantica*)
	Small yellow lady's-slipper	(*Cypripedium parviflorum*)
	Blanket-flower	(*Gaillardia aristata*)
	Oak grass	(*Hylotelephium hookeri*)
	Rock sandwort	(*Minuartia dawsonensis*)
	Hair-like beak-rush	(*Rhynchospora capillacea*)
	Macoun's willow	(*Salix macoliana*)
	Gray ragwort	(*Senecio canus*)
	Drummond's campion	(*Silene drummondii*)
	Long-stalked chickweed	(*Stellaria longipes*)
★	Plants, previously state-listed*	
	Cooper's milk-vetch	(*Astragalus neglectus*)
	Field sedge	(*Carex conoidea*)
	Nuttall's ground-rose	(*Chamaerhodos nuttallii*)
	Alkali cord-grass	(*Spartina gracilis*)
	Hair-like pondweed	(*Stuckenia filiformis*)
	Marsh arrow-grass	(*Triglochin palustris*)
●	**Colonial waterbird nesting site**	
▲	**Sandhill crane migratory roost**	
■	**Greater prairie-chicken booming ground**	

★	Animals, federally- or state-listed	
	Mammals	
	Prairie vole	(*Microtus ochrogaster*)
	Northern pocket gopher *	(*Thomomys talpoides*)
	Birds	
	Nelson's sharp-tailed sparrow	(*Ammodramus nelsoni*)
	Short-eared owl	(*Asio flammeus*)
	Piping plover †	(*Charadrius melodus*)
	Yellow rail	(*Coturnicops noveboracensis*)
	Upland sandpiper	(*Bartramia longicauda*)
	Buff-breasted sandpiper	(*Tryngites subruficollis*)
	Wilson's phalarope	(*Phalaropus tricolor*)
	Horned grebe	(*Podiceps auritus*)
	Forster's tern	(*Sterna forsteri*)
	Fish	
	Lake sturgeon *	(*Acipenser fulvescens*)
	Mussels	
	Black sandshell mussel *	(*Ligumia recta*)
	Butterflies	
	Dakota skipper * †	(*Oarisma poweshiek*)
▲	Animals, previously state-listed*	
	Birds	
	Upland sandpiper	(*Bartramia longicauda*)
	American bittern	(*Botaurus lentiginosus*)
	Sandhill crane	(*Grus canadensis*)

MINNESOTA COUNTY BIOLOGICAL SURVEY

Supervisor
Carmen Converse

Assisting Field Staff (continued)
Michael Hedemark, Ornithologist
Jan Janssens, Botanical Contractor
Jeffrey Lee, Botanical Contractor
Pam Page, Ornithologist
Steven Pressley, Herpetologist / Mammalogist
Lorna Sandstrom, Ecologist
Jenny Sneddon, Botanist
Daniel Svedarsky, Botanist

Map Production Staff
Jodi Slaats, Cartographer / Cartographer
Nancy Sather, Digitizer
Shanlon Nelson, Data Manager
Kathy Hollerman, Cartographer
Daniel Wovcha & Gerda Nordquist, Copy Editors

Current Staff
Nancy Sather, Botanist / Plant Ecologist
Gerda Nordquist, Animal Survey Coordinator / Mammalogist
Steve Stucker, Ornithologist

Assisting Field Staff
Mark Bacon, Botanical Ecologist
Karl Bardon, Ornithologist
Lori Biederman, Plant Ecologist
Brett Bee, Plant Ecologist
Robert Dana, Plant Ecologist
Dan Dunn, Botanical Ecologist
Doug Easterday, Herp